Ophthalmology and Allied Sciences

Corresponding address
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II, Mayur Vihar, Phase-I
Delhi - 110 091 (India)
Tel: 91-11-22754205, 45796900, Fax: 91-11-22754205
E-mail: info@rfppl.co.in
Website: www.rfppl.co.in

Ophthalmology and Allied Sciences (OAS) (pISSN: 2454-7816, eISSN: 2455-8354) is a half yearly peer-reviewed journal for ophthalmologists and visual science specialists, with a broad international scope. The journal publishes original, peer-reviewed reports of research in ophthalmology, including basic science investigations and clinical studies. Topics include new diagnostic and surgical techniques, treatment methods, instrument updates, the latest drug findings, results of clinical trials, and research findings. In addition to original research papers, the journal presents review articles, editorial comments, an international calendar of events and book reviews.

Subscription Information

Institutional (1 year): INR6000/USD469

Payment methods

Bank draft / cashier s order / check / cheque / demand draft / money order should be in the name of **Red Flower Publication Pvt. Ltd.** payable at **Delhi.**

International Bank transfer / bank wire / electronic funds transfer / money remittance / money wire / telegraphic transfer / telex

1. **Complete Bank Account No.** 604320110000467
2. **Beneficiary Name (As per Bank Pass Book):** Red Flower Publication Pvt. Ltd.
3. **Address:** 41/48, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi – 110 091(India)
4. **Bank & Branch Name:** Bank of India; Mayur Vihar
5. **Bank Address & Phone Number:** 13/14, Sri Balaji Shop,Pocket II, Mayur Vihar Phase- I, New Delhi - 110091 (India); Tel: 22750372, 22753401. **Email:** mayurvihar.newdelhi@bankofindia.co.in
6. **MICR Code:** 110013045
7. **Branch Code:** 6043
8. **IFSC Code:** BKID0006043 (used for RTGS and NEFT transactions)
9. **Swift Code:** BKIDINBBDOS
10. **Beneficiary Contact No. & E-mail ID:** 91-11-22754205, 45796900, E-mail: info@rfppl.co.in

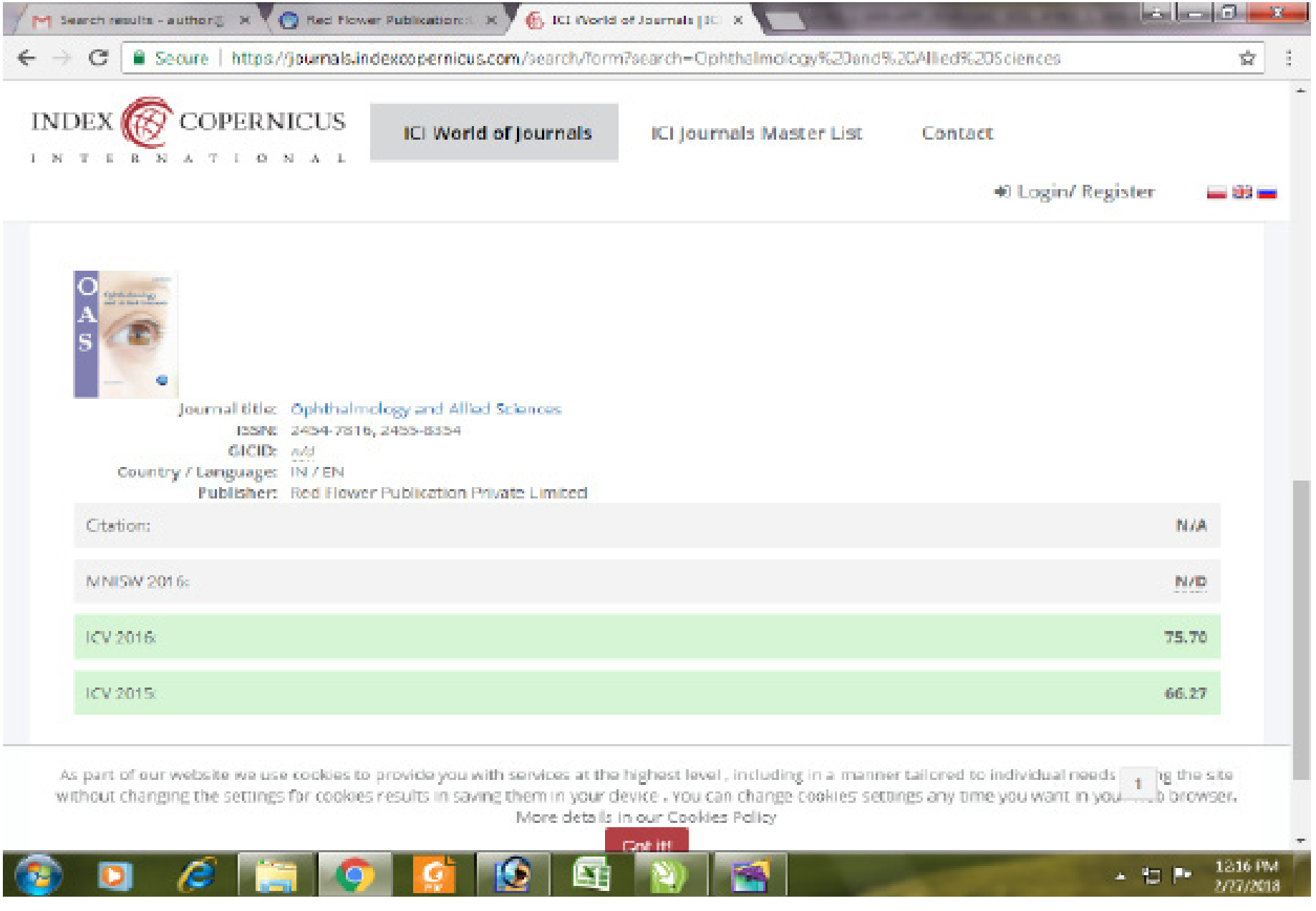
Online You can now renew online using our RFPPL renewal website. Visit http://rfppl.co.in/subscribe.php?mid=7 and enter the required information and than you will be able to pay online.

Send all Orders to: **Red Flower Publication Pvt. Ltd.,** 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi – 110 091 (India). Phone: 91-11-22754205, 45796900, Fax: 91-11-22754205, E-mail: sales@rfppl.co.in, Website: www.rfppl.co.in

Ophthalmology and Allied Sciences

Volume 4 Number 2
May - August 2018

Contents


Search results - author:
Red Flower Publication:
ICI World of Journals
Secure | https://journals.indexcopernicus.com/search/form?search=Ophthalmology%20and%20Allied%20Sciences
INDEX COPERNICUS INTERNATIONAL
ICI World of Journals
ICI Journals Master List
Contact
Login/ Register
Journal title: Ophthalmology and Allied Sciences
ISSN: 2454-7816, 2455-8354
GICID: n/d
Country / Language: IN / EN
Publisher: Red Flower Publication Private Limited
Citation: N/A
MNiSW 2016: N/D
ICV 2016: 75.70
ICV 2015: 66.27
As part of our website we use cookies to provide you with services at the highest level, including in a manner tailored to individual needs
without changing the settings for cookies results in saving them in your device. You can change cookies settings any time you want in your browser.
More details in our Cookies Policy
Got it!
12:16 PM
2/27/2018

Ophthalmology and Allied Sciences

Library Recommendation Form

If you would like to recommend this journal to your library, simply complete the form below and return it to us. Please type or print the information clearly. We will forward a sample copy to your library, along with this recommendation card.

Please send a sample copy to:

Name of Librarian

Name of Library

Address of Library

Recommended by:

Your Name/ Title

Department

Address

Dear Librarian,

I would like to recommend that your library subscribe to the **Ophthalmology and Allied Sciences.** I believe the major future uses of the journal for your library would provide:

1. useful information for members of my specialty.
2. an excellent research aid.
3. an invaluable student resource.

I have a personal subscription and understand and appreciate the value an institutional subscription would mean to our staff.

Should the journal you're reading right now be a part of your University or institution's library? To have a free sample sent to your librarian, simply fill out and mail this today!

Stock Manager

Red Flower Publication Pvt. Ltd.

48/41-42, DSIDC, Pocket-II

Mayur Vihar Phase-I

Delhi - 110 091(India)

Phone: Phone: 91-11-45796900, 22754205, 22756995, Cell: +91-9821671871

E-mail: sales@rfppl.co.in

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.1

A Cross-sectional Study of Refractive Errors in Vernal Keratoconjunctivitis.

Niharika K. Shetty[1], Jane Anna Koshy[2], Chandana Krishna[3]

Abstract

Vernal Keratoconjunctivitis (VKC) is an allergic disease that typically affects young individuals, of which males are predominant. The disease involves the lids, conjunctiva, limbus and the cornea. The corneal changes range from punctate keratitis to shield ulcers. High incidences of keratoconus and abnormal corneal topographic patterns have been reported in these cases. The configuration of the corneal surface and the abnormal pattern of corneal surface can lead to vernal keratoconjunctivitis. Hence, an association between refractive errors and vernal keratoconjunctivitis was needed to be made.In our study we compared the refractive error with the stage of vernal keratoconjunctivitits (acute or chronic). Also we have tried to compare the type (limbal, bulbar or mixed) with the refractive error. *Materials and methods:* Fifty patients, ages ranging between 3 and 20 years, with Vernal Keratoconjunctivitis attending the ophthalmology out-patient department at Sri Siddhartha Medical College from December 2015 to December 2016 were included in the Study. The demographic data were noted, slit lamp evaluation and refractive error assessment were done for all patients. The data was compiled on a percentile basis of the two variables. Chi–square and Fisher's exact statistical analysis was used to study the association. *Results:* We found a male preponderance (78%) for the disease. Hypermetropia was the commonest (48% of patients) refractive error. Maximum patients manifested with signs of chronic Vernal Keratoconjunctivitis (76% patients). Bulbar type of Vernal Keratoconjunctivitis was commonest in our study group, (76% of patients). On evaluating the association of refractive error type with stage of Vernal Keratoconjunctivitis, the P value was not significant, thus indicating their independence. Also on evaluating the type of refractive error with the clinical variant of Vernal Keratoconjunctivitis, the p- value was not significant suggesting that they were independent. *Conclusion:* We found hypermetropia to be the commonest refractive error associated with VKC, followed by myopia and astigmatism. Perilimbal pigmentation suggestive of chronic Vernal Keratoconjunctivitis was the commonest stage of manifestation seen. Bulbar Vernal Keratoconjunctivitis was the commonest clinical type. There was no conclusive evidence to show an association between the refractive error and the stage and type of Vernal Keratoconjunctivitis

Keywords: Vernal Keratoconjunctivitis; Bulbar; Palpebral; Hypermetropia; Astigmatism.

Introduction

Vernal Keratoconjunctivitis (VKC) is an allergic disease that typically affects young individuals [1,2].

Author Affiliation: [1]Associate Professor [2]Post Graduate (M.S. in Ophthalmology), Department of Ophthalmology [3]Assistant Professor, Department of Community Medicine, Sri Siddhartha Medical College & Research Centre, Tumakuru, Karnataka 527107, India.

Corresponding Author: Niharika K Shetty, Associate Professor, Department of Ophthalmology, Sri Siddhartha Medical College & Research Centre, Tumakuru, Karnataka 527107, India.

E-mail: niharika.shetty30@gmail.com

Received on 25.03.2018, **Accepted on** 11.04.2018

VKC is an ocular disease which has a broad racial and geographical distribution. It is most common and most severe in hot, arid environments such as the Mediterranean basin, West Africa, and the Indian subcontinent [3].

Differences in prevalence could be due to the diversity of gene pool, the environment (climate, socioeconomic status, and living styles), and gene-environment interaction [4].

The condition is more common in males, although this gender difference is less absolute in tropical climates. The gender discrepancy coupled with the tendency to spontaneously improve during puberty has prompted a possible role for hormonal influence on disease burden [4].

Patients from age 1 to 22 years old (mean 6±3.7 years) may present with signs and symptoms of VKC. Resolution has been noted to start as early as eight years of age, and as late as 22. The disease usually lasts 4 to 10 years and resolves after puberty [5,6].

Symptoms in Vernal Keratoconjunctivitis consist predominantly of eye itching, along with tearing, discharge, irritation, redness, blepharospasm and photophobia.

Clinically, lids may be erythematous and thickened; a reactive ptosis may be present due to photosensitivity. The tarsal conjunctiva develops a cobblestone appearance and, in active disease, can have mucus accumulation between the papillae. In the limbal form, the conjunctiva may show a fine papillary reaction. Here the predominant findings are gelatinous limbal papillae associated with epithelial infiltrates called Horner-Trantas dots. These are focal collections of degenerated eosinophils and epithelial cells.

The corneal changes range from mild (punctate epithelial erosions) to severe (macroerosions and ulcers). Superficial corneal neovascularization and macroerosions form the inciting agents (e.g., eosinophilic major basic protein) released from the epithelium of the upper tarsal conjunctiva progress to corneal epithelial necrosis [8].

Epithelial erosions may heal completely, however, mucus and calcium deposition can prevent re-epithelialization, and a shield ulcer develops. Waxing and waning gray-white lipid deposits in the peripheral, superficial stroma create an arcuate infiltrate known as pseudogerontoxon [3].

Higher incidences of keratoconus (due to eye rubbng) and abnormal corneal topography patterns have been reported [9].

The role of IgE-mast cell activation in VKC comes from findings such as IgE in serum, tear cytology, increased number of mast cells in conjunctival tissue, clinical observations of allergen exposure and symptom exacerbation, and association with other atopic states. Overexpression of proinflammatory cytokines, chemokines, growth factors, and enzymes are found in VKC. Eosinophils and eosinophil-derived major basic protein (MBP) and cationic protein, neurotoxins, and collagenases, in particular matrix metallopeptidase (MMP)-9, have been shown to damage the corneal epithelium and the basement membrane, causing corneal involvement in VKC [10].

In our study, we tried to observe if there was an association between refractive errors and VKC, its clinical type and the stage of disease.

In a study by Sucheki et al., they tried to compare the clinical variant of vernal keratoconjuctivitis with refractive errors. The prevalence of allergic conjunctivitis is higher in the contact lens wearers with refractive errors than in the non-contact lens wearers. This result suggests that allergic conjunctivitis occurs more frequently in the contact lens wearers [11].

Mimura et al found the mean spherical equivalent and spherical power were significantly lower in patients with SAC than in patients without SAC. These results suggested that with respect to the non-contact lens wearers, patients with SAC were more myopic than healthy individuals. Therefore, myopes might have more association with vernal keratoconjunctivitis was their conclusion [12].

The configuration of the corneal surface leads to allergic conjunctivitis. Vernal conjunctivitis is related to the abnormal pattern of the corneal surface [9]. The abnormal ocular surface deteriorates the capacity of the fluid reservoir over the ocular surface. Tear film anomalies capture allergens in the conjunctival SAC and cause the conjunctival immune-based inflammation by inducing T-cell activation. Thus, refractive error may be a possible risk factor for the direct progression to allergic conjunctivitis. Second, myopic eyes, which have a longer axial eye length and wider palpebral fissures, may be liable to mediate intimate attachment of allergens by the close interaction between bulbar and palpebral conjunctiva. Third, myopia may be indirectly relevant to seasonal allergic conjunctivitis.

Six-patients with VKC experience significant morbidity, which affects the quality of life; [13] moreover, vision-threatening corneal complications in severe and chronic cases coupled with potential iatrogenic side effects makes VKC an ocular surface disorder with considerably sinister consequences if not treated optimally.

Materials and Methods

All patients in the age group of 3 years to 20 years with ocular features suggestive of Vernal Keratoconjunctivitis attending the Ophthalmology OPD at Sri Siddhartha Medical College from December 2015 to December 2016 were included in the Study. The children with systemic atopic dermatitis, phlyctenularconjunctivis and other seasonal allergic diseases were excluded.

The demographic data of these students were collected along with detailed anterior segment examination of the eye. This included Visual Acuity testing on Snellens Visual Acuity Chart,

Slit lamp examination of the eye on diffuse light and oblique illumination, Examination of the upper tarsal and the lower palpebral conjunctiva for papillae, Evaluation of the refractive error on autorefractometer (model UNIQUE –RK –URK800) testing and dilated acceptance of the refractive error.

The data was collected and is presented on a percentile basis.

A total of 40 patients' data was collected and evaluated.

Result

Table 1: Age Distribution of the patient

Age of the patient	Frequency of Distribution
0-5	10(20.00)
6-10	17(34.00)
11-15	16(32.00)
16-20	4(8.00)
21-25	2(4.00)
26-30	1(2.00)
Total	50(100.00)

Table 2: Gender Distribution of the Patients with Vernal Keratoconjunctivitis

Sex	Frequency
Male	39(78.00)
Female	11(22.00)
Total	50.(100.00)

Table 3: Distribution of Associated Refractive Error

Type of refractive error	Frequency
Myope	19 (38.00)
Hypermetrope	24 (48.00)
Astigmatism	7 (14.00)
Total	50 (100.00)

Table 4a: Type of VKC Stage

VKC Stage	Frequency
Acute	12 (24.00)
Chronic	38 (76.00)
Total	50 (100)

Table 4b: Clinical Variant of VKC

VKC Clinical Variant	Frequency
Bulbar	38(76.00)
Palpebral	8(16.00)
Both	4(8.00)
Total	50(100.00)

Table 5: Correlating VKC Stage with Age

	VKC Stage			Chi square =3.62 P=0.6
Age	Acute	Chronic	Total	
0-5	1 (8.33)	9 (23.68)	10 (18.37)	
6-10	4 (33.33)	13 (34.21)	17 (34.69)	
11-15	6 (50.00)	10 (26.32)	16 (32.65)	
16-20	1 (8.33)	3 (7.89)	4 (8.16)	
21-25	-	2 (5.26)	2 (4.08)	
26-30	-	1 (2.63)	1 (2.04)	
Total	12 (100.00)	38 (100.)	50 (100.0)	

Table 6: Correlation of VKC Stage with Gender

	VKC stage			Fisher's exact 0.07 p=0.10
Sex	Acute	Chronic	Total	
Male	7 (58.33)	32 (84.21)	39 (78.00)	
Female	5 (41.67)	6 (15.79)	10 (22.00)	
Total	12 (100.00)	38 (100.00)	50 (100.00)	

Table 7: Correlation of VKC Stage with Refractive Error

	VKC Stage			Chi square =0.26 P=0.87
Type of refractive error	Acute	Chronic	Total	
Myopia	5(41.67)	14 (36.84)	19 (38.00)	
Hypermetropia	5 (41.67)	19 (50.00	24(48..00)	
Astigmatism	2 (16.67)	5 (13.16)	7(14.00)	
Total	12 (100.00)	38 (100.00)	50(100.00)	

Table 8: Correlation of VKC Stage With Type of Astigmatism

	VKC Stage			Chi square =0.74 P=0.86
Type of Astigmatism	Acute	Chronic	Total	
None	5 (41.67)	12 (31.58)	17 (34.00)	
Simple Astigmatism	2 (16.67)	5 (13.16)	7 (12.00)	
Compound Astigmatism	2 (16.67)	7 (18.42)	9 (20.00)	
Mixed Astigmatism	3 (25.00)	14 (36.84)	17 (34.00)	
Total	12 (100.00)	38 (100.00)	50 (100.00)	

Table 9: Correlation of VKC Variant Type with Age

	VKC Type				Chi square =6.1 P=0.81
Age	Bulbar	Palpebral	Both	Total	
0-5	7(18.42)	2 (25.00)	19(25.00)	9 (18.18)	
6-10	11(28.95)	4 (50.00)	2 (50.00)	17938.64)	
11-15	14(36.84)	2 (25.00)	-	14(31.82)	
16-20	3 (7.89)	-	1(25.00)	2(4.55)	
21-25	2 (5.26)	-	-	2(4.55)	
26-30	1 (2.63)	-	-	1(2.27)	
Total	38 (100.00)	8 (100.00)	4(100.0)	50(100.00)	

Table 10: Correlation of VKC type with Gender

	VKC Type				Chi square =0.50 P=0.87
SEX	Bulbar	Palpebral	Both	Total	
Male	29 (76.32)	7 (87.50)	3 (75.00)	39(77.78)	
Female	9 (23.68)	1 (12.50)	1 (25.00)	11(22.22)	
Total	38 (100)	8 (100.00)	4 (100.00)	50(100.0)	

Table 11: Correlation of VKC Type with Refractive Error

Type of Refractive error	VKC Type				
	Bulbar	Palpebral	Both	Total	Chi square=2.67 P=0.61
Myope	16 (42.11)	2 (25.00)	1 (25.00)	19(38.00)	
Hypermetrope	17 (44.74)	4 (50.00)	3 (75.00)	24(48.00)	
Astigmatism	5 (13.16)	2 (25.00)	-	7(14.00)	
Total	38 (100.00)	8 (100.00)	4 (100.0)	50(100.0)	

Table 12: Correlation of VKC Type with Astigmatism Variant

Type of Astigmatism	VKC Type				
	Bulbar	Palpebral	Both	Total	Chi square =5.40 P=0.49
Simple Astigmatism	5 (13.16)	2 (25.00)	-	7 (14.00)	
Compound Myopic astigmatism	7 (18.42)	2 (25.00)	-	9 (18.00)	
Mixed Astigmatism	13 (34.21)	1 (12.50)	3 (75.00)	17 (34.00)	
None	13 (34.21)	3 (37.50)	1 (25.00)	17 (34.00)	
Total	389 (100.00)	8 (100.00)	4 (100.00)	50 (100.00)	

Discussion

The male:female ratio in our study was found to be 3.5:1, (Table 1). A similar study which was a cross sectional school study conducted by Roseline Duke et al. found the male: female ratio as 1.8:1 [14].

A study by Leonardi et al., had a similar male: female ratio between 3.3 and 3.5 [15].

In a study at a Tertiary Eye Care Institute in South India, showed a male female ratio of 6.4:1.16

Our study conforms to the global preponderance.

In our study maximum patients were in the age group of 6 to 10 years, which is up to 34% in our study. The second majority of patients were found in the age group of 11 to 15 years amounting up to 32%. (Table 2)

Hence, in our study almost 66% of patients were found in the age group of 6 to 15 years.

In a study by Saleh et al., they found 49.2% patients were less than 10 years of age. While they also found that the disease persists till the age of 20 years [17].

In Table 3, we tried to correlate the distribution of the refractive error in the Vernal Keratoconjunctivitis patients. We found that 24 patients (48%) of the patients had Hypermetropia as the associated refractive error. Whereas in 19 patients (38%), we found Myopia as the associated refractive error, Astigmatism was found to exist in 7 patients (14%).

In a study by T Mimura et al., they found that Seasonal allergic conjunctivitis was found to be more common in myopes than hypermetropes, though the study was conducted in contact lens and non contact lens users by them [12].

However we found more of hypermetropes, these were uncorrected hyperopes. Further commenting on the refractive status, we found that among the astigmatism group the maximum had a mixed type of astigmatism; that is hyperopic as well as myopic component co-existed in 17 (34%) of the patients (Table 4).

In our study we have considered perilimbal pigmentation as a manifestation of chronic VKC. Presence of degenerating eosinophils and epithelial debris suggestive of Horner Trantas spots were considered as a sign of acute VKC. We found 12 patients (24%) with acute VKC and 38(76%) patient with Chronic VKC. (Table 5)

According to a study by Rao et al., which was a cohort of Asian patients suffering from VKC perilimbal conjunctival pigmentation has been reported to be a constant finding. They found that no correlation existed between the extent of pigmentation and the severity of the VKC [23].

In a study by Faisal et al., the perilimbal pigmentation also extends along the conjunctiva and helps differentiating seasonal and perennial allergic conjunctivitis [27].

On comparing VKC stage with the age (Table 5), the commonest age group of manifestation was 6-10 years of age, of whom 34% patients had chronic VKC. The second commonest age group was 11-15 years of which 50% patient had acute VKC manifestations. The chi-square test for independence of the variable showed value of 3.62, P value 0.6 which is not significant.

Also number of patients in above 20 years was only 7.89% and all were under chronic stage suggesting that the disease manifestation reduces by 20 years of age.

In a study by Saleh et al they found 49.2%, maximum patient in the less than 10 years age group [17]. Similarly we also had maximum study population in the 6- 10 years age group. Also the maximum patients were in the chronic VKC stage.

Comparing the VKC stage with the gender, (Table 6) showed that the two variables are independent with a fisher's exact of 0.07 and p=0.1. which is not significant. So we did not find a correlation between VKC stage and gender.

On comparing the type of refractive error with the stage of vernal keratoconjunctivitis (Table 7), we found that most patients were in the hypermetropic group i.e. 24 (48.0%) and most of them were in the Chronic VKC stage about 19 (79%). The Fischer's exact test value was p=0.87 and chi square was 0.26, which was not significant, showing no correlation between the two variables.

In a study by T Mimura et al., the mean spherical equivalent refraction, was lower in patients with seasonal allergic conjunctivitis than in patients without seasonal allergic conjunctivitis ($p<0.05$). Hence they concluded that patients with seasonal allergic conjunctivitis are more myopic than healthy individuals. However their inclusion criteria included population with age group of 20 to 40 years and population with seasonal allergic conjunctivitis [12].

Recent investigations have demonstrated that vernal conjunctivitis, classified under the term allergic conjunctivitis, is related to the abnormal pattern of the corneal surface [6]. The abnormal ocular surface deteriorates the capacity of the fluid reservoir over the ocular surface. Tear film anomalies capture allergens in the conjunctival seasonal allergic conjunctivitis and cause the conjunctival immune-based inflammation by inducing T-cell activation. Thus, refractive error may be a possible risk factor for the direct progression to allergic conjunctivitis. Second, myopic eyes, which have a longer axial eye length and wider palpebral fissures, may be liable to mediate intimate attachment of allergens by the close interaction between bulbar and palpebral conjunctiva [12].

In a study by Paulo et al. data obtained by the topographic analysis of the corneal anterior surface of both groups clearly demonstrated that patients with VKC presented corneal contour changes when compared to patients with normal corneal asphericity. Of evident clinical interest, is the fact that the mean anterior corneal curvature of patients with VKC was more accentuated than in the control group ($p<0.05$). The parameters that verify anterior corneal contour such as AK and ERP, presented significantly higher values in patients with VKC ($p<0.05$) [18].

In Table 8, on comparing the VKC stage with astigmatism, maximum patients, 17 (34%) patients showed to have mixed astigmatism. And 34% patients did not have astigmatism, only spherical refractive error was found.

The chi-square test was found to be 0.7 and p value was found to be 0.86. It was found that the two variables are independent.

In Table 9, 10, 11, we are comparing the variables of vernal keratoconjunctivitis type in terms of bulbar type, palpebral type and both type withage, gender, refractive error, and astigmatism respectively.

In a study by Keziah N Malu conducted in Nigeria, they found limbal VKC in 46.5% cases and mixed subtype in 45.7% [19].

In Table 9, we found 25 patients with bulbar VKC out of 31 patients in the age group of 6 to 15 years; this is the commonest age group of manifestation. Bulbar VKC was the commonest variant amongst them. Bulbar VKC type was the only type of manifestation seen in all age groups, from below 5 years to 30 years of age. In our study we found no manifestation of palpebral VKC beyond 16 years of age. On applying the chi-square, the value was found to be 6.1 with p value of 0.81. The values were not significant suggesting that the variable were independent.

In a study by Keziah N Malu, they found that the prevalence of the limbal (46.5%) and mixed (45.7%) subtypes of VKC were almost equal. The most frequently associated ocular conditions were refractive error (6.7%) and eye lid disorders (3.3%). Limbal VKC includes the bulbar variety in their study [19].

The limbal (bulbar) and mixed forms of VKC are seen more commonly in Africans and Asians, whereas the palpebral form occur more among the Europeans and the Americas [20,21,22,23].

In Table 10, on comparing VKC type with gender, 29 male patients out of 39 were having bulbar VKC and 9 females out of 11 females were having bulbar VKC. Hence bulbar VKC were the commonest among both the gender. On applying fisher's exact, the value was 0.07 and p value of 0.77 and chi-square of 0.50, showing that the variables are independent.

The sex distribution of VKC is not uniform; whereas in European and Asiatic populations the male to female ratios are as high as 3:1 with sex predilection decreasing with age; [2] in most African studies there is a less marked male sex predominance [20,24,25,26].

In Table 11, on comparing VKC type with refractive error, we found that 16 (42.11%) of the myopes had bulbar VKC and 17 (44.74%) of the hyperopes had bulbar VKC. Both the refractive errors showed predisposition to bulbar VKC. Papillae on the lid can worsen the astigmatic error, however bulbar VKC is only more prevalent amongst astigmatics.

In Table 12, we have further tried to analyze the VKC type with the type of astigmatism. 34.21% patients amongst the bulbar VKC did not have any astigmatism and another 34.21% patients had mixed astigmatism. However, the palpebral variant showed maximum patients with no astigmatism, and equal distribution with simple astigmatism and myopic astigmatism with least in the mixed Astigmatism.

In a study by Tahir et al, they found 66% of cases with multiple signs of VKC including the bulbar variety. 24% of the cases had only follicles while in 10% cases only papillae were found. In their study out of 50 patients, 22 (55%) patients had astigmatism, 10 (25%) patients had myopia and 8 (20%) patients had hyperopia, whereas 10 patients were emmetrope [26].

Conclusion

In our study we found a male predilection for vernal keratoconjunctivities, male to female ratio was 3.5:1 with maximum patients in 6 to 15 years of age to be about 73.33%. We found hypermetropia as the commonest associated refractive error in 48% of the cases followed by myopia (38% cases) and astigmatism (14% of cases). Chronic vernal keratoconjunctivitis characterized by perilimbal pigmentation was the commonest stage of manifestation seen in 76% of cases.

In our study, most of the hyperopes (50%) manifested with the chronic VKC stage. We found that the commonest clinical variant was the Bulbar VKC type seen in 76% of the cases. Bulbar VKC was found to be the commonest association in hyperopes (44.74%), in myopes (42.11% cases) and in astigmatics (13.16% Cases).

We didn't find a significant association of the refractive error with the stage and type of the Vernal Keratoconjunctivitis. Probably a larger population of study might help us determine the association of these parameters.

References

1. Leonardi A, Secchi AG. Vernal keratoconjunctivitis. Int Ophthalmol Clin. 2003;43:41–58.
2. Bonini S, Coassin M, Aronni S, LambiaseA. Vernalkeratoconjunctivitis. Eye (Lond) 2004;18: 345–51.
3. Buckley RJ. Vernal keratoconjunctivitis. Int Ophthalmol Clin. 1988;28(4):303-08.
4. Bonini S, Lambiase A, Schiavone M, Centofanti M, Palma LA, Bonini S. Estrogen and progesterone receptors in vernal keratoconjunctivitis. Ophthalmology. 1995;102:1374–79
5. Leonardi A. Vernal keratoconjunctivitis: pathogenesis and treatment. ProgRetin Eye Res. 2002:21:319–39.
6. O'Shea JG. A survey of vernal keratoconjunctivitis and other eosinophil-mediated external eye diseases amongst Palestinians. Ophthalmic Epidemiol. 2000; 7:149-57.
7. Vichyanond P, Pacharn P, Pleyer U, Leonardi A. Vernal keratoconjunctivitis: A severe allergic eye disease with remodeling changes. Pediatr Allergy Immunol. 2014;25:314–22.
8. Trocmé SD, Hallberg CK, Gill KS, Gleich GJ, Tyring SK, Brysk MM. Effects of eosinophil granule proteins on human corneal epithelial cell viability and morphology. Invest Ophthalmol Vis Sci. 1997; 38:593-99.
9. Totan Y, Hepşen IF, Cekiç O, Gündüz A, Aydin E. Incidence of keratoconus in subjects with vernal keratoconjunctivitis: a videokeratographic study. 2001;108:824–27
10. Leonardi A, Brun P, Abatangelo G, Piebani M, Secchi AG. Tear levels and activity of matrix metalloproteinase (MMP)-1 and MMP-9 in vernal keratoconjunctivitis. Invest Ophthalmol Vis Sci. 2003;44:3052–58.
11. Suchecki JK, Donshik P, Ehlers WH. Contact lens complications. Ophthalmol Clin North Am 2003; **16**:471–84.
12. T Mimura, Y Mimura, A Arimoto, S Amano, S Yamagami, H Funatsu, T Usui, H Noma, N Hondaand S Okamoto. Relationship between refraction and allergic conjunctivitis. Eye 2009;23:63–66. doi:10.1038/sj.eye.6702999.
13. Sacchetti M, Baiardini I, Lambiase A, Aronni S, Fassio O, Gramiccioni C, et al. Development and testing of the quality of life in children with vernal keratoconjunctivitis questionnaire. Am J Ophthalmol. 2007;144:557–63.
14. Roseline E. Duke, Friday Odey, and Stefan De Smedt. Vernal Keratoconjunctivitis in Public Primary School Children in Nigeria: Prevalence and Nomenclature. Epidemiology Research International Volume 2016 (2016).
15. Leonardi A, Busca F, Motterle L, Cavarzeran F, Fregona IA, Plebani M, et al. Case series of 406 vernal keratoconjunctivitis patients: A demographic and epidemiological study. Acta Ophthalmol Scand. 2006;84:406–10.
16. Ujwala S Saboo, Manish Jain, Jagadesh C Reddy, and Virender S Sangwan. Demographic and clinical profile of vernal keratoconjunctivitis at a tertiary eye care center in India.Indian J Ophthalmol. 2013 Sep;61(9):486–89.
17. Saleh A. Al-Akily, Mahfouth A,Bamashmus.Ocular complications of severe vernal keratoconjunctivitis (VKC) in Yemen. Saudi journal of ophthalmology. 2011;25:291-94.
18. Paulo Elias Correa Dantas; Milton Ruiz Alves; Maria Cristina Nishiwaki-Dantas. Topographic corneal changes in patients with vernal keratoconjunctivitis. Arq. Bras. OFTALMOL. 2005 Sep-Oct;68(5).
19. Keziah N Malu. Vernal keratoconjunctivitis in Jos, North-Central Nigeria: A hospital-based study. Sahel medical Journal: 2014;17(2):65-70.
20. Chenge B, Makumyamviri AM, Kaimbowa K. Limbal-keratoconjunctivitis in the tropics in Lubumbashi, Democratic Republic of Congo. Bull SocbelgeOphtalmol 2003;290:9-16.

21. Bonini S, Bonini S, Lambiase A, Marchi S, Pasqualetti P, Zuccaro O, et al. Vernal keratoconjunctivitis revisited: A case series of 195 patients with long-term followup. Ophthalmology 2000;107:1157-63.
22. Khan MD, Kundi N, Saeed N, Gulab A, Nazeer AF. A study of 530 cases of vernal conjunctivitis from the North West Frontier Province of Pakistan. Pak J Ophthalmol 1986;2:111-4.
23. Rao SK, Meenakshi S, Srinivasan B, Baluswamy S. Perilimbal bulbar conjunctival pigmentation in vernal conjunctivitis: Prospective evaluation of a new clinical sign in an Indian population. Cornea 2004;23:356-59.
24. Ajaiyeoba AI. Prevalence of atopic diseases in Nigerian children with vernal kerato-conjunctivitis. West Afr J Med 2003;22:15-17.
25. Akinsola FB, Sonuga AT, Aribaba OT, Onakoya AO, Adefule-Ositelu AO. Vernal kerato conjunctivitis at Guinness Eye Centre, Luth (a five year study). Nig Q J Hosp Med 2008;18:1-4.
26. Tazeentahir, AsadAlam. Proportion of refractive error in patients with Vernal Keratoconjunctivitis. Ophthalmology (Pakistan) 2013;03(1):26-29.
27. Khan FA, Khan SP, Niazi and Awan S. The Clinical Significance of PerilimbalConjunctival Pigmentation in Vernal Conjunctivitis. Journal of the College of Physicians and Surgeons 2012;22(1): 19-22.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.2

A Case Control Study of Ocular Manifestations in New Onset Hypertension of Pregnancy and Normotensive Pregnant Women

Swathi Nadella[1], K. Srikanth[2]

Abstract

Background: Pregnancy, being a genuine test to the human body, is connected with a gathering of physiologic and pathologic changes. A standout amongst the most essential pathologies going with pregnancy is the preeclampsia-eclampsia disorder. Preeclampsia-eclampsia influences all organs and frameworks including eyes. *Aim:* To study prevalence of ocular manifestations in new onset hypertension of pregnancy and normotensive pregnant women. *Materials and Methods:* This is a prospective case control study in which 120 pregnant women are divided into two groups: 60 new onset hypetension of pregnancy and 60 Normal pregnant women as controls. *Results:* Hypertensive retinopathy changes (grade I and II) were seen in 13% of patients with new onset hypertension of pregnancy. Hemorrhages, exudates were found in 7% of the patients and retinal detachment was found in 0.8% in this study. In the present study, association between age group of patients and grade of retinopathy was and analysis revealed an equal number (n=47) of less than 25 years and above 25 years patients have normal grade of retinopathy. *Conclusion:* Early detection of ocular in new onset hypertension of pregnancy and appropriate intervention can achieve good prognosis.

Keywords: Hypertension; Pregnancy; Normotensive Pregnant.

Introduction

Generally, the duration of pregnancy is considered as a lot of physiological changes occurring in every system for the protection and growth of the fetus and also for parturition. These changes may affect the bodily systems including cardiovascular, renal, hematologic, immunologic, pulmonary, hormonal and also the ocular systems. The various cardiovascular changes during this period that are seen are mainly only to increase the blood supply to the developing fetus. That is characterized by increased cardiac output, increased maternal volume, increased heart rate, decreased maternal systemic vascular resistance, arterial blood pressure and physiologic reversible hypertrophy.

Moreover, the disease of hypertension is the most common complication among pregnant women which accounting for about 5 to 7% and it leads tocauses of maternal and fetal morbidity and mortality [1]. The type of hypertensive disorders of pregnancy which form the deadly triad along with hemorrhage and infection [1]. In short, the hypertension that occurs in pregnancy is termed as Pregnancy Induced Hypertension (PIH) in which the systolic blood pressure is moved above the 140mmHg and the diastolic pressure ismoving above 90mmHg. It can bealso classified asmild, moderate and severe [2]. There are different disorders which come under this spectrum namely pre-existing hypertension, gestational hypertension and Preeclampsia, pre-existing hypertension plus superimposed gestational hypertension with proteinuria and unclassifiable hypertension.

In a study it was reported that the long term effects of pregnancy induced hypertension women are more prone to the development of systemic illnesses such as hypertension, cardiovascular disease, diabetes mellitus and kidney disease etc. The other risk factors for the development of PIH reported in the study [3]. Which include advanced maternity age, increased level of BMI, vascular diseases, Diabetes Mellitus or gestational diabetes, family history of PIH, antiphospholipid syndrome and thrombophilia. In addition to the development of PIH, The ocular

Author Affiliation: [1]Post Graduate, [2]Professor and Head, Department of Ophthalmology, Mahatma Gandhi Medical College and Research Institute, Sri BalajiVidyapeeth University, Pondicherry 607402, India.

Corresponding Author: K. Srikanth, Professor and Head, Department of Ophthalmology, Mahatma Gandhi Medical College and Research Institute, Sri BalajiVidyapeeth University, Pondicherry – 607402, India

E-mail: nadellaswathi87@gmail.com

Received on 21.03.2018, **Accepted on** 11.04.2018

changes that occur in pregnancy can be physiological or pathological. Physiological changes which include increased pigmentation around the eye called as melasma/chloasma due to hormonal variations. The dry eye syndrome also prevalent due to direct disruption of lacrimal acinar cells, ptosis, and changes in cornea like decrease in corneal sensitivity, increase in the corneal thickness, increase in corneal curvature and alterations in the refractive status, decreased intraocular pressure in the eyes. In a study [5]it was reported thatthe permanent ocular changes that occur in cases of pre eclampsia are narrowing of arteriolar caliber, retinal pigment epitheliopathy, choroidal atrophy that occur in patches, proliferative retinopathy. Keeping the views of earlierstudies, the present study is designed to investigate the ocular manifestations in pregnancy induced hypertensive and normotensive women.

Materials and Methods

It is a Prospective case control study done in pregnant women who are admitted in the antenatal and labor ward that is in the department of GYN & OBG. The sampling procedure is done by conducting 60 cases with new onset hypertension of pregnancy (mild, moderate and severe) and 90 cases with normal pregnancies with the age group as case controls. The study does not involve interventional procedures on the subjects.

In the present study cases are included as defined in the inclusion and exclusion criteria

Inclusion criteria: All Pregnant women from 20 to 30 years of age who were diagnosed as new onset hypertension of pregnancy with or without proteinuria admitted in the antenatal and labor ward who are ambulatory.

Exclusion criteria: Pregnant mothers with gestational diabetes, Rh negative pregnancy, Pregnant women with Heart disease, ocular media opacities, autoimmune disorders like SLE, Rheumatoid Arthritis, Other chronic illness

All the patients who were admitted in antenatal ward and labor ward are ambulatory and they are diagnosed as new onset pregnancy of hypertension and controls with corresponds to the same age and trimester. Detailed history of the chronic illness is provided. Detailed ophthalmic history is taken. Kept under detailed ophthalmic examination like

- Visual acuity by the Snellen's chart.
- Anterior segment evaluations by the slit lamp examination.
- Expanded fundus examination.
- Visual fields and Gonioscopy if necessary should be taken.

Blood Pressure Measurements

Blood Pressure Measurements Upper arm pulse was measured through Mercury Sphygmomanometer (ELKO B.P APPARATUS) following 5 minutes of rest, as per standard conventional methods adopted in practice. The members' majority were situated in an upright position with back backing. A sleeve was put around the non-prevailing upper arm, which was upheld at the heart's level; while the central bladder portion over the brachial artery pulsation, an average middling of 3 separate estimations was taken.

Fundoscopy

Fundus examination was finished with Direct Ophthalmoscopy, on confirmation subsequent to expanding the students with about 1% Tropicamide drops (one drop in each eye at 15 minutes interim for 3 times)

Direct Ophthalmoscopy

Both pupils were widened with 1% Tropicamide eye drops and fundus examination was finished by ophthalmologist with direct ophthalmoscope in a semi dull room in the ward. Hypertensive retinopathy changes found in right or left or both eyes, was taken as positive discoveries in that patient. Age, para, gravida, circulatory strain, proteinuria were noted. The PIH was reviewed as preeclampsia (gentle and serious) and Eclampsia. Every one of the discoveries was noted on an information sheet. The retinal changes (hypertensive retinopathy) were reviewed by Wagener grouping.

The data is collected from 120 respondents, The data is collected from proforma which includes history patient illness, obstetric history, menstrual history, and last menstrual period. In addition, the proforma contains details about visual acuity, ocular examination, and provisional diagnosis. The purpose of the study is clearly explained to each participant in their own language and it is assured that information collected from them will be kept confidential. A signature in the consent form in regional language will be obtained from each participant.

Statistical analysis was performed using a statistical software package IBM SPSS Statistics (Statistical Package for the Social Sciences) analysis consisted of the mean with a standard deviation (SD). Various retinal changes and fetal parameters were analyzed by Chi-square test with the proportion mean of 95% and significance level of about 0.05 is found.

Results

Our study population include two groups New onset hypertension of pregnancy and normal pregnant women

Table 1: Frequency for age group of respondents

Age group	Frequency (n)	Percent (%)
Less than or equal 25	61	50.83
>25	59	49.17
Total	120	100.0
Gravida		
0-1	83	69.17
Above 1	37	30.83
Total	120	100.0
Gestation in weeks		
<36	10	8.33
36 - 37	70	58.34
>38	40	33.33
Total	120	100.0

Most of the respondents (50.83%) belong to below 25 years age group followed by, 49.17% percent belong to above 25 years age group. Majority of the respondents (69.17%%) have pregnancy at first time (69.17%). and rest of respondents have pregnancy more than one time. Most of the respondents' gestation period is between 36-37 weeks. 58.34% of respondents has gestation period between 36-37 weeks. 33.33% of of respondents has gestation period of more than 38 weeks (Table 1).

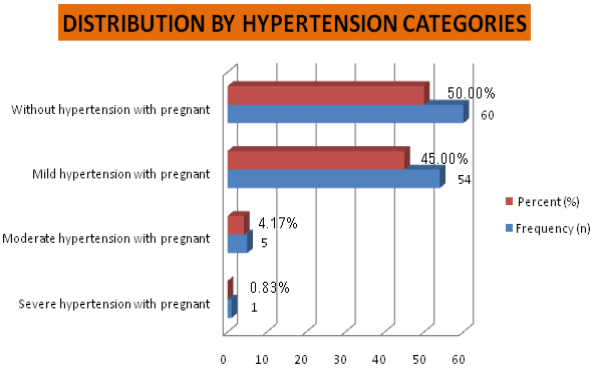


Fig. 1: Frequency distribution for hypertension categories

50% of respondenst didn't have hypertension while 45% of repondents has mild hypertension. 4.17% of respondents have moderate hypertension and 0.83% of respondents has severe hypertension (Fig. 1)

Table 2: Association between age group and categories of hypertension

AGE group	Categories of hypertension				Total
	Severe hypertension	Moderate hypertension	Mild hypertension	Without hypertension	
<=25	0 (0.00)	2 (40)	34 (62.96)	25 (41.67)	61(50.83)
>25	1 (100)	3(60)	20 (37.03)	35 (58.33)	59 (49.17)
Total	1 (100)	5 (100)	54 (100)	60 (100)	120 (100.0)

Phi value: 6.4647, p-value: 0.091

There is no association between age group and categories of hypertension. However, most of above 25 years age group respondents possess sever hypertension compared with less than 25 years age group respondents. In addition, majority of the less than 25 years age group respondents have mild hypertension compared with above 25 years age group respondents (Table 2)

Table 3: Association between categories of hypertension and local visual acuity

Categories of hypertension	Local Visual Acuity		Total
	Normal visual acuity	Abnormal visual acuity	
Severe hypertension with pregnant	1 (0.92)	0 (0)	1 (0.83)
Moderate hypertension with pregnant	5 (4.59)	0 (0)	5 (4.17)
Mild hypertension with pregnant	43 (39.45)	11 (100)	54 (45)
Without hypertension with pregnant	60 (55.04)	0 (0)	60 (50)
Total	109 (100)	11 (100)	120 (100)

Phi-value: 14.80122, p-value: 0.001995

The significance value (p value < 0.05) indicates that there a highly significant association between categories of hypertension and local visual acuity. In addition, most of the patients have the normal visual acuity (6/6) (Table 3).

Table 4: Association between blood pressure level and grade of retinopathy

Blood Pressure	Grade of retinopathy					Total
	Normal	Grade 1	Grade 2	Grade 3	Grade 4	
<150 systolic with <100 diastolic	99 (90)	3 (75)	3 (100)	1 (100)	1 (50)	107 (89.17)
<150 systolic with >=100 diastolic	7 (6.36)	0 (0)	0 (0)	0 (0)	0 (0)	7 (5.83)
>=150 systolic with <100 diastolic	1 (0.9)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.83)
>=150 systolic with >=100 diastolic	3 (2.72)	1 (25)	0 (0)	0 (0)	1 (50)	5 (4.17)
Total	110 (100)	4 (100)	3 (100)	1 (100)	2 (100)	120 (100)

Phi value: 26.1862, p-value: 0.0182

The significance value (p value <0.05) clearly indicates that there is an association between blood pressure and grade of retinopathy.In addition, Majority of the 150/100BP score's patients have all grade of retinopathy (Table 4).

Table 5: Comparison between the patients who had various grade of retinopathy based on the blood pressure, pulse rate and respiratory rate

Blood pressure	Grade of retinopathy					F- Value	p- Value
	Normal (n=93)	Grade I (n=4)	Grade II (n=3)	Grade III (n=1)	Grade IV (n=2)		
	Mean±SD						
Systolic BP	122.81±12.42	135±10.00	130±0.00	130±0.00	145±21.21	12.992	<0.0002 (S)
Diastolic BP	80.72±11.86	92.50±5	90±0.00	90±0.00	95±7.07	9.3522	0.0222 (S)
Pulse per minute	79.14±4.18	80.50±3	81.33±1.15	73±0.00	82±0.00	10.764	0.0053 (S)
Respiratory rate	14.30±0.81	13.75±0.50	14.33±0.58	16±0.00	14±1.41	2.0207	0.0812 (NS)

(NS- Not Significant, S- Significant)

All these significance values (p value < 0.05), reveal that almost all variable has significant value except respiratory rate (Table 5)

Discussion

In the present study, hypertensive retinopathy changes (grade I and II) were seen in 13% of patients with new onset hypertension of pregnancy. Hemorrhages, exudates were found in 7% of the patients and retinal detachment was found in 0.8% in this study. Since the antenatal examination of pregnant women has enhanced all that much in all countries, hypertension was recognized ahead of schedule amid the antenatal visits and treatment was begun promptly. This could be the likely explanation behind the vicinity of just grade I and grade II hypertensive retinopathy changes in our study.

Hypertension occurred to pregnancy terms is in charge of maternal demises, particularly in the developing countries.In a study, eclampsia was the reason for death in 7.8% and preeclampsia in 4.1% cases in india [6]. A study contemplated a gathering of patients with hypertensive issue of pregnancy (gestational hypertension, unending hypertension, preeclampsia/eclampsia, incessant hypertension with superadded preeclampsia/ eclampsia). The retinal changes were seen in 21.5% (5 out of 28 patients) of preeclampsia/eclampsia. They discovered summed up arteriolar narrowing (5/28), cotton fleece spot (1/28), discharge (1/28) and serous retinal separation (1/28). They noticed the determination of all the above retinal changes aside from narrowing of supply routes amid the purperium period [7].

The visual framework may be influenced in 30% to 100% of patients with PIH; the most widely recognized variation from the norm found in the fundus is narrowing of retinal arterioles. Different changes in the fundus and visual issues reported in patients of preeclampsia and eclampsia from diverse nations incorporate fit and central/summed up narrowing of retinal arterioles, hemorrhages, exudates, peripapillary or central retinal edema, serous retinal detachment, separated instances of intense ischemic optic neuropathy, transient blindness, cortical blindness, reciprocal retinal detachment, exudative retinal separation in one eye and serious macular edema in the other eye), retinal shade epithelial lesions temporary diminish in vision optional to extreme retinal arteriolar fit and retinal edema, perpetual visual deficiency auxiliary to focal retinal conduit impediment and optic atrophy. Albeit transient visual impairment has been accounted for in 1% to 3% of patients with eclampsia, with current routines for treatment the present occurrence is likely much lower. Optic decay optional to retinal vascular contribution is unordinary yet may bring about visual impairment [8].

In the present study, association between age group of patients and grade of retinopathy was and analysis revealed an equal number (n=47) of less than 25 years and above 25 years patients have normal grade of retinopathy. But other study also reported that when the age advances and remarkably more no. of patients fall under the grade of retinopathy. In a study of PIH and its association with retinal changes and age revealed that the severity of disease is closely related to the advances in the patients' age [9].

Landesman et al. [10] stated that eye grounds are probably the best single indicator of the toxemia. In general, retinal changes run parallel with severity of the hypertension and therefore the toxemia. Mussey and Mundell [11] concluded that examination of fundus in patients with Hypertensive disorders permits an objective assessment of vascular changes and gives a premise to promote obstetric administration. However reversible cortical visual deficiency and extraocular muscle paralysis are quite uncommon tend to have been very much reported in the eclamptic patients.The visual vascular changes have been said to associate with the seriousness of hypertension.and this has been utilized as a marker for end of pregnancy.Writing studies have considered the movement of retinal vascular changes an indication of expanding seriousness of PIH and have associated them with fetal mortality [12].

A 24hr proteinuria accumulation gives the clear evaluation report of renal status. Proteinuria of more than 5g/24 hrs (or > 3+ on irregular specimens gathered four hours separated) characterizes a mother as having extreme preeclampsia. Diminished filtration results in serum creatinine to ascend to values when compared to the non pregnant state that is 1mg/ml, however now and then considerably higher. Lactate Dehydrogenase (LDH) levels correspond with the seriousness of preeclampsia and are more related to maternal and fetal bleakness. The difficulties of preeclampsia and perinatal mortality were observed to be altogether expanded higher when LDH level was more prominent than 800IU/L. Plasma Uric acid, a corrosive resistant, is regularly felt high in preeclampsia state. This kind of increased level surpasses the diminishment in glomerular filtration rate and is additionally because of upgraded tubular reabsorption [13].

In addition, irrespective of various demographic characteristics of PIH patients, studies have conducted to determine the prevalence of the retinal changes in pregnancy induced hypertension and whether any association exists between the retinal changes and blood pressure, proteinuria and the severity of the disease. The results of the study indicated that retinal changes were seen in PIH and there was a significant positive association with blood pressure, proteinuria and severity of disease. Further, in the present study results the comparison of different categories of hypertensive patients are under the category of Gravida (Primi and Multi). Similarly, the recent study indicated that a positive association was observed between the retinal changes and blood pressure, proteinuria and the severity of the PIH [9]. The author concluded that the occurrence of hypertensive retinopathy was decreased due to early detection and better antenatal care.

Conclusion

Based on the results and the methodology employed, we have concluded that: Physiological and pathological ocular changes can occur in any stage of pregnancy. Dynamic fundal changes in preeclampsia and eclampsia demonstrate the intensifying pathological status. Hence timely ophthalmic intervention isdefinitely required for a better prognosis.

References

1. Lindheimer M.D., Taler S.J. & Cunningham F.G. ASH position paper: hypertension in pregnancy. Journal of clinical hypertension (Greenwich, Conn.). 2009;11(4):214–25.
2. Visintin C., Mugglestone M.A., Almerie M.Q., Nherera L.M., James D. & Walkinshaw S. Management of hypertensive disorders during pregnancy: summary of NICE guidance. BMJ (Clinical research ed.). 2010;341:2207.
3. Mitka, M. Any hypertension during pregnancy raises risk for several chronic diseases. JAMA. 2013. 309(10):971–2.
4. Bener A. & Saleh N.M. The impact of socio-economic, lifestyle habits, and obesity in developing of pregnancy-induced hypertension in fast-growing country: global comparisons. Clinical and experimental obstetrics & gynecology. 2013;40 (1):52–7.
5. Samra K.A. The eye and visual system in the preeclampsia/eclampsia syndrome: What to expect? Saudi Journal of Ophthalmology. 2013;27 (1):51–53.
6. Reddy S.C., Nalliah S., George S.R. & Who T.S. Fundus changes in pregnancy induced hypertension. International Journal of Ophthalmology. 2012;5(6): 694–97.
7. Rasdi A.R., Nik-Ahmad-Zuky N.L., Bakiah S. & Shatriah I. Hypertensive retinopathy and visual

outcome in hypertensive disorders in pregnancy. The Medical journal of Malaysia. 2011;66(1):42–7.

8. Beck, R.W., Gamel, J.W., Willcourt, R.J. & Berman, G. Acute ischemic optic neuropathy in severe preeclampsia. American journal of ophthalmology. 1980;90(3):342–6.
9. Shah A., Lune A., Magdum R., Deshpande, H., Bhavsar D. & Shah A. Retinal changes in pregnancy-induced hypertension. Medical Journal of Dr. D.Y. Patil University. 2015;8(3):304.
10. Landesman R., Douglas R.G. & Holze E. The bulbar conjunctival vascular bed in the toxemias of pregnancy. American journal of obstetrics and gynecology.1954;68(1):170–83.
11. Mussey R. & Mundell B. A guide in management of toxic hypertensive Syndrome of pregnancy. American Journal of Obstetrics & Gynecology. 1939;37:30–6.
12. Oguz, H. Diabetic retinopathy in pregnancy: effects on the natural course. Seminars in ophthalmology. 1999;14(4):249–57.
13. Qublan H.S., Ammarin V., Bataineh O., Al-Shraideh Z., Tahat Y., Awamleh I., Khreisat B., Nussair B. & Amarin Z.O. Lactic dehydrogenase as a biochemical marker of adverse pregnancy outcome in severe pre-eclampsia. Med Sci Monit. 2005;11(8):CR393–7.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.3

Management and Outcome in Hiv Patients with Oppurtuinistic Infections

Aliya Sultana[1], B. Lakshmi Reddy[2]

Abstract

Background: Morbidity and mortality in HIV patients is supposed to be more due to the various opportunistic infections in them and hence management of these infections and their outcome is essential. Ocular infections may cause impairment of vision or blindness. *Aim of the Study:* To detect the outcome after management of HIV patients who presented to the department of ophthalmology with various opportunistic infections. *Materials and Methods:* A retrospective study was done on HIV patients who reported to the department of ophthalmology with various infections from June 2015 to June 2016 at Sarojini Devi Eye Hospital, Hyderabad, India. A detailed systemic and ophthalmology examination was carried out on all the patients. Demographic data, visual acuity, slit lamp examination, indirect opthalmoscopy, colour charting and CD4 count were noted from the hospital records. *Results:* We found patients with cytomegalovirus (CMV retinitis), Acute retinal necrosis (ARN), toxoplasma retino chroiditis and subretinal tuberculous abscess were usually seen in our study. Patients with good general condition responded better to our treatment. Bilaterally affected patients were more than unilateral affected ones. Elderly patients had lower CD4 count and poor general condition. *Conclusion:* There is a need for having an ophthalmologist for screening in all HARRT centres. But in circumstances where clinical findings will emulate other infections, PCR analysis can help in finding the cause.

Keywords: Acute Retinal Necrosis; CD4; Cytomegalovirus Retinitis; HIV; Gangcyclovir; PCR.

Introduction

Opportunistic infections are disease processes that affect people with weakened immune systems, otherwise do not cause any disease in a healthy host. One such condition which affects immune system is Acquired Immune Deficiency Syndrome resulting in various opportunistic infections that affect eyes, oral cavity, skin and other parts of the body causing severe morbidity and mortality due to depleted CD4 count. Common opportunistic infections seen in HIV patients are cryptococcal meningitis, toxoplasmosis, oesophageal candidiasis and ocular lesions like viral retinitis due to cytomegalovirus, herpes simples and varicella zoster [1-3].

One of the commonest cause of blindness in HIV affected individuals is CMV retinitis. It is usually seen in advanced stages of infection where CD4+ T-cell count is less than 50 cells/ml [2].

CMV retinitis caused by EDNA virus was shown to have an incidence of about 30% before 1997, but with introduction of HARRT in management of HIV patients, its incidence has been reduced. But still CMV retinitis is seen in many patients in developing countries like India. CMV can affect any system, but commonly affects gastro intestinal tract and ocular apparatus [3-5].

The patients affected show characteristic features that include vascular sheathing, haemorrhagic retinal necrosis and combined retinal detachment. The lesions are present alongside the retinal vessels giving the characteristic Pizza-Pie or Cheese-Pizza appearance with thick yellowish white infiltrates alongside the retinal vessel and retinal haemorrhages at periphery that extend in the direction of the posterior pole [2]. Clinical examination and examination of intraocular fluid by PCR are usually carried in such patients. We carried our study to detect the outcome after management of HIV patients who presented to the department of ophthalmology with various opportunistic infections [6-8].

Materials and Methods

A retrospective study was carried out on 21 HIV patients with different opportunistic infections reported to the vitreo retina department of Sarojini Devi Eye Hospital, Hyderabad, India, from June 2015 to June 2016. A detailed case history was taken and systemic examination was done for all

Author Affiliation: [1]Assistant Professor [2]Post Graduate, Department of Opthalmology, Sarojini Devi Eye Hospital, Osmania Medical Collge, Hyderabad, Telangana 500095, India.

Corresponding Author: Aliya Sultana, Assistant Professor, Sarojini Devi Eye Hospital, Osmania Medical Collge, Hyderabad, Telangana 500095, India.

E-mail: respublication2000@gmail.com

Received on 14.02.2018, **Accepted on** 14.05.2018

the patients. After Best Corrected Visual Acuity (BCVA), a detailed ophthalmic assessment with slit lamp examination, indirect ophthalmoscopy and B Scan Ultrasonography (if media was not clear) was also done on all the subjects. Investigations including CD4 count was made in all the sample prior to treatment. Demographic data and the findings of ophthalmic examination were recorded. In all these patients fundus images were taken and intraocular fluid analysis was carried out to detect the pathogens by culture, gram stain and PCR analysis.

Patients with active retinitis in periphery and posterior pole were treated with intravitreal gangcyclovir. Injection gangcyclovir was given intra vitreally two times per week as induction therapy and weekly once as maintenance therapy till the lesion becomes dry. After the lesion becomes dry, laser was applied to the edges of lesion to prevent necrotic breaks which generally occurs at the junction of normal and atrophic healed necrotic retina. We maintained the dose based on the zone, area involved in fundus and also the severity of disease. Patient with sub retinal abscess was managed with posterior sub tenon's triamcinolone acetonide. We treated one patient who had severe, continuous retinal necrosis in both eyes, in whom anterior chamber (AC) tap showed herpes group of virus, was managed with systemic acyclovir.

Results

Our sample size was 21, among which 13 (61.9%) were females and 8 (38.0%) were males with a female to male ratio of 1.625 (Fig. 1). The age of the sample ranged between 25 to 60 years, with a mean age of 42 years. When the location or region was asked it was found that majority of them 13 (61.9%) belonged to coastal Andhra Pradesh, 6 (28.5%) from Telangana state and 2 (9.5%) from North Karnataka.

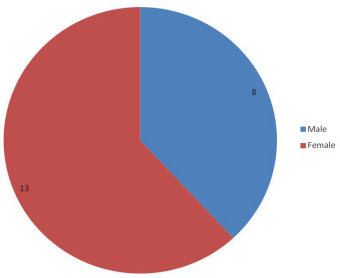


Fig. 1: Pie chart showing gender distribution.

On ophthalmic examination, the majority of the patients presented with light perception in cases of severe active retinitis and optic neuropathy. Three cases (14.2%) had no light perception in one eye owing to optic neuropathy. Two (9.5%) patients with only peripheral involvement had 6/6 vision, in three cases (14.2%) BCVA was 6/60.

Ophthalmic assessment revealed unilateral eye involvement in 6 cases (28.5%) and remaining all cases showed bilateral involvement. Two patients (9.5%) showed anterior chamber reaction with Keratic Precipitates (KPs), flare. Two (9.5%) patients had significant cataractous changes. On posterior segment examination, vitreous cells was seen in most of the patients, three patients (14.2%) showed moderate vitritis, and 5 patients (23.8%) had severe vitritis (Fig. 2).

The most common opportunistic infection in our study was CMV retinitis. It usually is categorized into four clinical types, oedematous, indolent, peri vascular and optic neuropathy, remaining clinical presentation grouped as others (Fig. 3) [7].

Five patients (23.8%) had severe active haemorrhagic retinitis and also exudative retinal detachment with massive subretinal exudation. PCR analysis done in all patients, clinically these patients fundus picture was like Progressive Outer Retinal Necrosis (PORN). Five cases (23.8%) presented with pale disc, attenuated vessels, atrophic retina in one eye and active retinitis involving the periphery and encroaching the posterior pole in the other eye (Fig. 4).

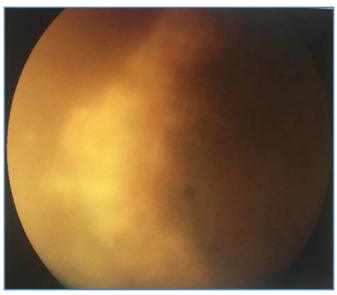


Fig. 2: Fundus details hazily seen due to severe vitritis.

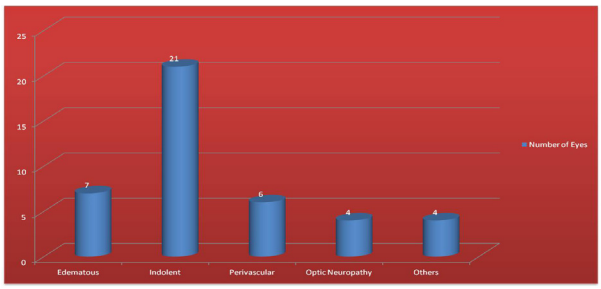


Fig. 3: Bar Graph showing number and percentage of clinical types of CMV Retinitis

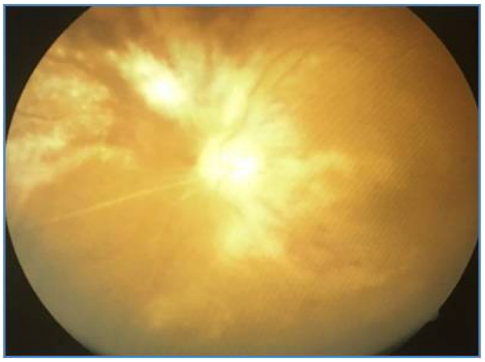


Fig. 4: Fundus image showing pale disc and confluent yellow white retina with superficial retinal haemorrhages, sclerosed vessel.

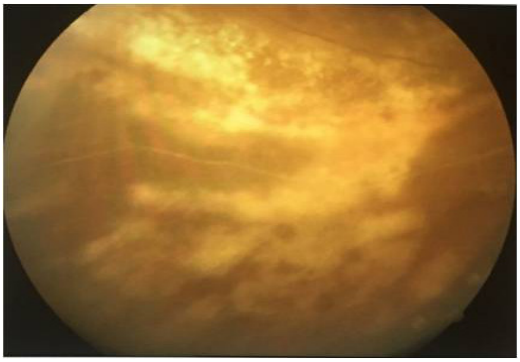


Fig. 5: Fundus image of patient showing retinitis in periphery.

Four cases (19.0%) showed typical pizza -pie appearance with frosted branch angitis in one eye and peripheral necrosed retina in one quadrant in the other eye (Fig. 5). Two patients (9.5%) had retinitis in one eye, with the other eye completely normal with 6/6 vision.

One female (4.7%) patient had combined retinal detachment in one eye and the other with healed retinitis, pigmented atrophic contiguous scars in periphery with necrotic break temporally. One female (4.7%) patient showed thinned out atrophic retina in periphery, with no vision in other eye as it was cataractous. Scan showed retinal detachment with intra retinal cystic, reminiscent of inflammatory vitreous opacities. In two patients (9.5%) there was involvement of macula in one eye and other eye was normal. In one patient (4.7%) vitritis and subretinal abscess in the inferior quadrant was seen.

Patients with localised oedematous type of CMV retinitis, after intravitreal gangcyclovir, showed good response with healing of lesion in few weeks and the visual outcome i.e. BCVA being 6/6 in them. In patients with low CD4 count with massive sub retinal exudation did not respond to the treatment, but vitritis was resolved to some extent, but the active retinitis persisted. In patients with indolent form treated with intravitreal gangcyclovir for long period showed moderate response. BCVA was CF 3mts to 6/60.

Patients who presented with pale disc, attenuated vessels were treated and explained about the prognosis. Patients with ARN due to herpes simplex were treated with acyclovir, without any response. Patients with combined exudative and rhegmotogenous retinal detachment were operated. Pars plana vitrectomy with silicone oil tamponade was carried out in them and the anatomical outcome was very bad due to exudation and thin necrotic retina. Two patients presented with rhegmatogenous retinal detachment due to small, multiple breaks in the periphery, which occurred in thin atrophic retina and were treated with pars plana vitrectomy and silicone oil tamponade. These patients anatomical was fairly good, retina attached under silicone oil, laser was done, the visual outcome was CF 2mts. BCVA was same even after removal of silicone oil.

Two patients showed macular chorio retinitis, To find out the pathogen, PCR analysis was carried out, but it did not disclose any pathogen, hence intravitreal dexamethasone and gangcyclovir were given two times per week. Towhich the response was very slow, taking about 8 weeks for resolving the lesion.

Discussion

Many opportunistic infections are seen in HIV affected individuals patients owing to the suppression of immune system. These infections are commonly seen in individuals with depleted CD4 count. Many studies have reported ocular lesions in HIV patients. We found the commonest infection as CMV retinitis which is supposed to be the most common cause of blindness in HIV patients with about 30 to 40% incidence in India [4,8-10].

We found a female preponderance, similar to the previous studies. However males showed aggressive clinical and laboratory picture of infections as well as bilateral involvement. Only one young female patient showed aggressive disease in both eyes with CD4 count 9 cells/micro litre and very poor general condition. The mode of transmission in our cases was due to sexual transmission, with the exception of one young adolescent boy who was supposed to get infected through trans placental transmission. All the opportunistic infections are thought to be due to haematogenous spread, rather than by direct entry of infective organism [11,12].

We found that majority of the sample patients reported to the department very late and end stage of the disease with almost no vision in one eye and drop in vision in the other. Some with both eyes and general condition being very bad. Hence we suggest proper counselling and awareness in HIV affected individuals regarding the likelihood of opportunistic infections and the chances of becoming blind due to ocular infections. Physicians rely on CD4 count whether to initiate HAART therapy count and literature has shown that CD4 count less than 50 cells/micro litre has higher risk of CMV retinitis. In our study many patients presented with lower CD4 counts, possibly explaining the occurrence of CMV retinitis in them. Thus CD4 count is thought to be strong predictor for the opportunistic infections to arise [7-9].

On clinical examination, majority of the patients showed with only posterior uveitis (86%), remaining 14% had pan uveitis, of which 12% had KPs, flare in anterior chamber and posterior synechiae. 1% had total cataractous lens in one eye and 1% had posterior sub capsular cataract in both eyes. It is proven that the risk of cataract is high when there is considerable long standing inflammatory reaction in anterior chamber, large CMV retinitis lesion, and increased age [6]. In our study cataract was not associated with either of these factors, it might be due to inflammation due to immune recovery after HAART therapy [11,12].

Majority of the patients had multiple large confluent necrosed active retinitis lesion with overlying superficial retinal haemorrhages in periphery threatening the posterior pole. Only two patients presented with only isolated single lesion involving the macula [13,14].

Some of the patients presented with systemic manifestations like skin rashes, high pyrexia due to septicaemia and altered sensorium due to neurological problems. Intravitreal Gangcyclovir 500 to 2000 micro grams, was given to the patients, based upon the site of lesion, size of lesion and involvement of one or both eyes. Gangcyclovir is anti viral drug that is effectual against cytomegalo virus and can be given systemically and also by intra vitreal route, with the former route has advantage of reduced risk of other eye involvement and disadvantage of drug toxicity and haematotoxic effects like neutropenia [8]. In our study systemic therapy was not initiated due to cost factor and also keeping the risk of toxicity in mind [15].

Intravitreal route offers the advantage of providing highest concentration of drug to the retina, without any side effects and drug toxicity. Hence we preferred this route. Initially all the patients were given Intravitreal Gangcyclovir twice a week for 3 to 4 weeks, later on small doses weekly once as maintenance dose. However intravitreal route has risk of endophthalmitis and retinal detachment. We found only one case with retinal detachment on the next day of injection, which might be due to the vitreous traction along the injection site on retina or pre existing necrotic holes. In three patients inflammatory reaction was seen after four injections which might be due to due to immune recovery [3,7]. In these patients injections were stopped and patients treated with topical steroids, and if needed posterior sub tenon steroid was given [12].

Three patients died within few days may due to the poor general health condition. Even after multiple intra vitreal injections few patients did not showed significant improvement. Hence, alternate drugs should be considered.

Conclusion

Majority of the patients in our study presented at the end stage of disease with poor general conditions. Hence early detection of this dreadful disease by screening at the HARRT centres will help to identify these patients and treat them as early as possible to prevent blindness. We can avoid opportunistic infections by maintaining the immune status by initiating HARRT therapy. Also regular ophthalmic checkups and CD4 count evaluation should be advised to these patients. In patients with atypical clinical presentation and lowered CD4 count, PCR should be considered in diagnosing the disease.

Even though our study has limitations like limited sample and alternate drugs not being tested, we could see improvement to the therapy mainly in younger patients between 25 to 35 years. We recommend ophthalmic screening at HARRT centres to prevent blindness in these patients who present late.

References

1. Okome-Nkoumou M, Mbounja-Loclo ME, Kombila M. Spectrum of opportunistic infections in subjects infected with HIV at Libreville, Gabon. Sante. 2000;10:329–337.
2. Philippe G. Kestelyn and Emmett T. Cunningham Jr. HIV/AIDS and blindness. Bulletin of the World Health Organization, 2001;79:208–13.
3. Hoover DR et al. Occurrence of cytomegalovirus retinitis after human immunodeficiency virus immunosuppression. Archives of Ophthalmology, 1996;114:821–27.

4. Pavan Kumar Singh et al. An Interesting Case of CMV Retinitis in a Case of ALL on Maintenance Therapy. Indian J Hematol Blood Transfus 2014;30:S154–S158.
5. Singh PK, Dayama AP, Maiwall R, et al. An Interesting Case of CMV Retinitis in a Case of ALL on Maintenance Therapy. Indian Journal of Hematology & Blood Transfusion. 2014;30(Suppl 1):154-158.
6. Jabs DA, Ahuja A, Van Natta M, Lyon A, Srivastava S, for the Studies of the Ocular Complications of AIDS Research Group S. Course of Cytomegalovirus Retinitis in the Era of Highly Active Antiretroviral Therapy: Five-year Outcomes. Ophthalmology. 2010;117(11):2152-2161.e2.
7. Stewart MW. Optimal management of cytomegalovirus retinitis in patients with AIDS. Clinical Ophthalmology (Auckland, NZ). 2010;4:285-299.
8. Patil AJ, Sharma A, Kenney MC, Kuppermann BD. Valganciclovir in the treatment of cytomegalovirus retinitis in HIV-infected patients. Clinical Ophthalmology (Auckland, NZ). 2010;4:111-119.
9. Kumar P et al. CD4 counts: A strong indicator of retinal and ocular lesions in HIV disease. MJAFI 2011;67:354–357.
10. Kempen JH, Sugar EA, Lyon AT, et al. Risk of Cataract in Persons with Cytomegalovirus Retinitis and the Acquired Immune Deficiency Syndrome. Ophthalmology. 2012;119(11):2343-50. doi:10.1016/j.ophtha.2012.05.044.
11. Chiotan C, Radu L, Serban R, Cornăcel C, Cioboată M, Anghelie A. Posterior segment ocular manifestations of HIV/AIDS patients. Journal of Medicine and Life. 2014;7(3):399-402.
12. Teoh SC, Ou X, Lim TH. Intravitreal Gagciclovir injection for CMV retinitis: Efficacy of a low volume, intermediate dose regimen. American Academy of Ophthalmology 2012;119(3):588-95.
13. Polsky B et al. Intravitreal Ganciclovir Salvage Therapy for Cytomegalovirus Retinitis in AIDS: AIDS Clinical Trials Group Protocol O85. International Journal of Infectious Diseases. 1996;1 (2):70-74.
14. Biswas J, Madhavan HN, Badrinath SS. Ocular lesions in AIDS: A report of first two cases in India. Indian J Ophthalmol 1995;43:69-72.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.4

Corneal Ulcer: A Case Series Study

Taklikar Anupama R.[1], Priyadarshini[2]

Abstract

Aims and Objectives: To identify the specific pathogenic organisms risk factors responsible for infection in corneal ulcer patient. *Materials and Method:* The present study was undertaken on 200 patients of corneal ulcer attending the outpatient department, with special reference to the etiology and predisposing factors, examination in detail for morphological features, microbiological work up, management and follow up. *Results:* Out of 200 patients, Male:Female ratio was 1.8:1. Most common age group affected was between 31–50 years for all types of infectious keratitis, 45%, 35%, 6% and 14% for bacterial, mycotic, mixed and sterile keratitis respectively. Socio-economically poor classes had 88% of keratitis. Keratitis occurred more frequently in the residents of rural areas 82%. Trauma was found to be the most common predisposing factor accounting for 66.5% followed by chronic dacryocystitis 8.5%. Inferonasal cornea was involved with highest frequency in bacterial and central cornea in fungal keratitis. Staphylococcus epidermidis 37.04% was the most common bacterial isolate followed by staphylococcus aureus 24.07%. Fusarium sp. 33.3% and Aspergillus sp. 33.3% were most common of fungal isolates. *Conclusion:* Central corneal ulceration is a common problem in surroundings of Raichur and most often occurs after a superficial corneal injury with organic material. Bacterial keratitis is marginally higher than fungal keratitis. Staphylococcus epidermidis is most common bacterial and Fusarium spp. And aspergillus spp are the most common fungal isolate.

Kaywords: Corneal Ulcer; Bacterial Keratitis; Mycotic Keratitis; Chronic Dacryocystitis.

Introduction

Corneal ulcer is a loss of the corneal epithelium with underlying stromal infiltration and suppuration associated with signs of inflammation with or without hypopyon [1].

Diseases affecting the cornea are a major cause of blindness worldwide, second only to cataract in overall importance. The epidemiology of corneal blindness is complicated and encompasses a wide variety of infectious and inflammatory eye diseases that cause corneal scarring, which ultimately leads to functional blindness. In addition, the prevalence of corneal disease varies from country to country and even from one population to another. While cataract is responsible for nearly 20 million of the 45 million blind people in the world, the next major cause is trachoma which blinds 4.9 million individuals, mainly as a result of corneal scarring and vascularisation. Ocular trauma and corneal ulceration are significant causes of corneal blindness that are often underreported but may be responsible for 1.5–2.0 million new cases of monocular blindness every year [2-9].

The epidemiological pattern and causative agents for corneal ulcer varies significantly from country to country and even from region to region within the same country. It is important to determine the regional etiology within a given region for comprehensive strategy for the diagnosis and treatment of corneal ulcer. The associated ocular morbidity is the result of several factors and patient's management is directly affected by lack of diagnostic facilities and initiation of appropriate antimicrobial therapy. Specific treatment requires quick and accurate identification of the causative micro organisms. These are crucial if a programme of prevention is to be considered and if appropriate therapeutic measures are to be instituted [10-13].

Author Affiliation: [1]Professor and Head [2]Post Graduate Student, Department of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103, India.

Corresponding Author: Anupama Raju Taklikar, Professor and Head, Department of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103

E-mail: dranusree67@gmail.com

Received on 30.01.2018, **Accepted on** 19.02.2018

Materials and Method

This prospective study was undertaken on 200 patients of corneal ulcer attending the outpatient department, with special reference to the etiology and predisposing factors, examination in detail for morphological features, microbiological work up, management and follow up.

Inclusion criteria included all patients diagnosed with infective corneal ulcer.

Patients with viral ulcers, healing ulcers, mooren's ulcers, marginal ulcers, interstitial keratitis, sterile neurotrophic ulcers, any ulcer associated with autoimmune conditions and if patient was on treatment were excluded from the study.

After selection of patients, standardized proforma was filled for each patient documenting, age, sex, domicile, education, economic status, occupation and predisposing factors including history of trauma, diabetes mellitus & surgeries (if any). Detailed clinical history was taken and any previous usage of medications were recorded.

Clinical procedure

After having obtained a written informed consent,the sampling procedure was undertaken. Detailed systemic clinical examination of patient was done. Visual acuity of every patient was noted. Detailed clinical examinations including slit lamp biomicroscopy with special reference to fluorescein staining was done.

Material was collected from conjunctiva, sac area, corneal ulcer scrapings. Corneal scrapings was performed under aseptic conditions on each ulcer taken after putting topical anaesthesia (4% lignocaine) using a flame sterilized kimura spatula or 15 No. blade. Material from corneal scraping was smeared on to separate glass slides: one for gram stain and other for KOH mount. Material was sent for culture. Material obtained from scraping was inoculated directly onto sheep's blood agar, chocolate agar, Mac Conkey's agar for bacterial culture and sensitivity. Also for fungal culture material was inoculated on to Sabouraud's Dextrose agar. By convention to indicate the site of inoculums on a solid medium, harvested material was inoculated in the form of a 'C' streak on each medium from separate scrapings.

Laboratory procedure

For bacterial culture, the specimens were cultured on dried plates of MacConkey's agar at 37°C for 18-24 hours and on 5% Sheep Blood agar and Chocolate agar with 5-10% CO_2 atmosphere (candle jar) at 37°C for 24-48 hours and the same swab was placed in BHI (Brain Heart Infusion) broth and incubated at 37°C for 18-24 hours. The plates were examined for growth, If there was no growth, the plates were further incubated for up to 7 days to look for any slow growing or fastidious organisms and reported as no growth if no growth even after 7 days of incubation. Presence of growth only on the "C" streak was considered significant then the colony morphology was studied on the Mac Conkey's agar, Blood agar and Chocolate agar plates and processed further. BHI broth was examined for any turbidity and sub cultured on MacConkey's agar at 37°C for 18-24 hours and Blood agar with 5-10% CO_2 atmosphere (candle jar) at 37°C for 24-48 hours were examined for growth, if there was no growth seen then it was reported as no growth. For further identification isolated colony was inoculated on appropriate media for biochemical tests.

For fungal culture, the specimens (one more separate swab) was used to inoculate on Sabouraud's Dextrose Agar tube and incubated at 25°C, it was examined daily for any growth for the first week and twice a week for a period of four weeks. Rate of growth, Morphology of colony, Texture, Surface pigmentation, was observed. Microscopic examination like Lactophenol cotton blue mount and slide culture were done to identify the fungi.

Systemic investigations:

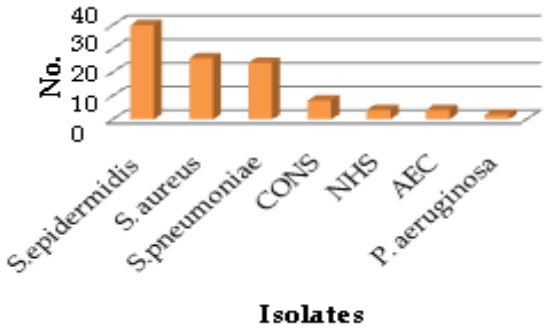
Haemoglobin, Total and Differential leucocyte count, Erythrocyte sedimentation rate, Random blood sugar, HIV testing, Hbs Ag testing, MRI head and brain (optional).

Results

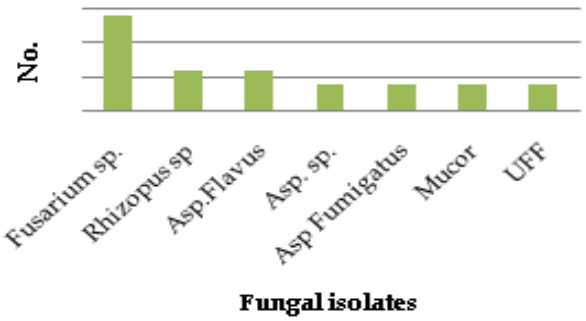
During 12 consecutive months (July 2016 to June 2017), 200 patients were seen with acorneal infiltrate who were compatible with the diagnosis of infective keratitis.

Male: Female ratio for infectious keratitis was 1.8:1. There was no significant difference in the eyes involved. Involvement of Right eye was slightly more (52%) compared to Left eye (48%). In total 90 cases were diagnosed as bacterial keratitis, 70 cases as fungal keratitis and 12 cases as mixed (both bacterial and fungal), no growth was seen in 14 cases and were termed as sterile. The commonest age group was found to be between 31–50 years for all types of infectious keratitis. 45%, 35%, 6% and 14% for bacterial, mycotic, mixed

and sterile keratitis respectively. Staphylococcus epidermidis was the predominant bacterial isolate in 40 cases (37.04%), followed by Staphylococcus aureus 26 cases (24.07%), Streptococcus pneumoniae 24 cases (22.22%), Coagulase negative staphylococci (CONS) in 8 cases (7.41%), Non Hemolytic streptococci (NHS), atypical E Coli in 4 cases (3.70%) each. Pseudomonas aeruginosa was isolated in contact lens user in 2 cases (1.85%).



Graph 1: Bacterial isolates



Graph 2: Fungal isolates

The predominant fungal isolate was Fusarium sp. 28 cases (33.3%) followed by Aspergillus Flavus and Rhizopus sp. 12 cases (14.29%) each. Aspergillus sp., Aspergillus Fumigatus, Mucor isolated in 8 cases (9.52%) each. 8 cases (9.52%) of the isolates remained unidentified all which were filamentous fungi (UFF).

Socio-economically poor classes showed the highest percentage of keratitis i.e 87%. Keratomycosis and bacterial keratitis occurred more frequently in the residents of rural areas 82%. People associated with farm work were most commonly predisposed to the infectious keratitis 76 cases (38%), followed by coolie labours 48 cases (24%)

Trauma was the most common (66.5%) predisposing factor followed by chronic dacryocystitis 8.5%, chronic steroid use 7%, lid disorders 6%, dry eye 4%, diabetes 2%, corneal degenerations/dystrophy 1.5%, contact lens use 1%, none 3.5%. The most common offending agent causing trauma leading to ulceration was vegetative matter. Out of 133 cases of trauma 74 (55.6%) cases had injury due to vegetative materials.

Table 1: Causes for corneal ulcer.

Factors associated	Bacterial	Fungal	Mixed	Sterile	Total
	No.	No.	No.	No.	No.
Trauma	49	64	6	14	133
Chronic dacrocystitis	13	0	0	4	17
Dry eye	5	1	0	2	8
Steroid usage	7	3	4	0	14
Lid disorder	6	1	0	5	12
Contact lens	2	0	0	0	2
Corneal degeneration	1	0	2	0	3
Diabetes	4	0	0	0	4
None	3	1	0	3	7
Total	90	70	12	28	200

Table 2: Modes of trauma

Agents	Bacterial	Fungal	Mixed	Sterile	Total
	No.	No.	No.	No.	No.
Vegetative matter	16	52	5	1	74
Soil/sand/stone	18	2	0	1	21
Animal tail	2	17	1	2	22
Finger nail	5	0	1	1	7
Unknown	6	2	0	1	9
Total	37	73	7	6	133

Central cornea was involved most commonly in fungal keratitis (29.41%) and inferonasal in bacterial keratitis (22.25%). 65% cases had> 5 mm^2 surface area of cornea involved. 65% had visual acuity in the range of PL PR – 6/60 at the time of presentation signifying late presentation.A majority of cases showed involvement $1/3^{rd}$ – $2/3^{rd}$ of corneal thickness i.e., 120 cases (60%). Rolled out/irregular feathery margins were noted in 70.59% cases of keratomycosis. Over hanging margin was more common in bacterial keratitis 79.5%. Hypopyon was present in 76.53% cases of keratomycosis which was higher than hypopyon positive cases of bacterial keratitis 68.5%. 69% cases of fungal keratitis showed thick and fibrinous hypopyon whereas 62.26% cases of bacterial keratitis showed liquid hypopyon.

Discussion

Microbial keratitis is a common, potentially sight threatening ocular infection that may be

caused by bacteria, fungi, viruses or parasites. Bacterial keratitis rarely occurs in normal eye because of the human cornea's natural resistance to infection. However, predisposing factors such as corneal injury, contact lens wear, ocular adnexal dysfunction (including tear film deficiencies), corneal abnormalities and other exogenous factors, systemic disease and immunosuppression may alter the defense mechanisms of the outer eye and permit bacteria to invade the cornea [14].

Corneal ulcer showed a higher prevalence i.e., 148 cases (74%) in the economically active age group 21-60 years. Basak et al. [10] showed 49.3% of keratitis cases were 21-40 years age group. Sharma et al. [14] showed 83% of cases were in 21-60 years age group with maximum incidence noted in the age group of 41-60 years.

Male to female ratio of 1.8: 1.M. Srinivasanet al[1] which showedoverall ratio of male to female patients of 1.6 to 1. It can be correlated with active outdoor activities.

Maximum incidence 176 cases (88%) was found in the socio-economically disadvantageous group. Out of 200 patients 164 (82%) were from rural areas and 36 (18%) were from urban residents.

History of corneal trauma predisposing to corneal ulceration was the most frequent predisposing factor noted in 133 cases (66.5%), representing 49 cases of bacterial (54.4%) and 64 cases of fungal (91.4%) corneal ulcers respectively. Chronic dacryocystitis was noted in 17 cases (8.5%). Lid disorder was noted 12 cases (6%). 4 patients had facial palsy with lagophthalmos, 4 had entropion, 2 had trichiasis, 2 had distichiasis. Chronic topical steroid use was noted in 14 cases (7%). Dry eye conditions representing 8 cases (4%) were noted. Corneal dystrophy/degeneration was noted in 3 cases (1.5%). Contact lens use was seen in 2 case (1%), as very few percentage of contact lens user are found in this area and 4 patients had diabetes.

The present results are similar to the work done by M. Srinivasan et al. [1] which showed trauma was most common (69.4%) followed by chronic dacryocystitis (4.60%) followed by lid disorder in (3%). Other causes noted were leprosy, diabetes, dry eye, corneal anaesthesia following herpes simplex or herpes zoster infections, corneal degeneration/dystrophy. Dr Suresh Prasad et al. [16] in their study noted 92% of their cases gave history of corneal trauma Basak et al. [10] and Norina et al. [13] showed 54.61% and 50% of cases of trauma were due to vegetative materials respectively. Hence, encouraging people to use protective measures like protective glasses, caution about penetrating objects, immediate referral of patients in any ophthalmic disorder can reduce the burden of corneal ulcer drastically.

Central locations were the most frequently observed in fungal ulcers i.e., 24 cases (34.2%). Most common sites of the cornea involved wasinfero-nasal in bacterial keratitis 27 cases (30%). The next most commonly involved site was central in bacterial i.e., 18 cases (20%) andinferotemporal in 28 cases (31.1%) of fungal corneal ulcers.The incidence of anterior chamber involvement with hypopyon was slightly more in cases of fungal keratitis 53 cases (75.71%) compared to 60 cases (66.66%) of bacterial keratitis.

In our study staphylococcus epidermidis was the predominant bacterial isolate (37.04%), followed by staphylococcus aureus (24.07%), Streptococcus pneumoniae (22.22%), Coagulase negative staphylococcus (CONS) (7.41%), Non hemolytic streptococci (3.70%), Atypical E coli. (3.70%) Pseudomonas aeruginosa(1.85%).The results were consistent with the work done by Gopinathan et al. [17] and Schaefer et al. [18] who found the Staphylococcus epidermidis to be the most common bacterial isolate followed by staphylococcus aureus. But it differs with work done by M. J. Bharathi et al. [15] and M. Srinivasan et al. [1] who found the Streptococcus pneumoniae to be the most common bacterial isolate followed by staphylococcus species. This indicates regional variation in micrbiological profile of corneal ulcer and importance of microbiological culture from infective tissues.

In our study the predominant fungal isolates was Fusarium sp. (33.3%) and Aspergillus spp. (33.3%) followed by Rhizopusspp (14.29%), Mucor (9.52)% unidentified filamentous fungi (9.52%). Filamentous fungi accounted for 76.18% of total 34 cases of fungal keratitis. Results in our study are similar to other studies carried out in tropical countries, where filamentous fungi specially the Fusarium sp. is the predominant fungal isolate from the corneal scraping and culture of fungal keratitis cases. Laila et al. [19] showed in their study aspergillus was the most common 45.4% followed by fusarium species 24.24%. Gopinathan et al. [18] in their study showed fusariumspp 36.6% followed by aspergillusspp 25% of fungal isolates.

Direct smear examination was done by gram's staining and for fungi by 10% KOH mount and gram's stain. Gram stain had sensitivity of 70.8%, specificity of 84.6%, Positive Predictive Value 80.95%, Negative Predictive Value 75.86%. P value <0.001(X^2 test). KOH had sensitivity of 80.95%, specificity of 96.5%, Positive Predictive Value 94.4%, Negative Predictive Value 87.5%. p value<0.001(X^2

test). Possible reason for low sensitivity may be due to inadequate specimens, insufficient microbiological investigation. However, it can be seen that most cases will be guided reliably by their Gram stain results if culture facilities are not available.

A clinical diagnosis of bacterial corneal ulcer was put on the basis of presence of corneal infiltrates, epithelial defects, conjunctival hyperaemia, cilliary congestion, mucopurulant exudates and presence of hypopyon.

A provisional diagnosis of bacterial corneal ulcer was given to 53 cases (excluding viral or fungal appearing cases) on the basis of round corneal ulcer with over hanging margins conjuctival hyperemia, circumciliary congestion and type of hypopyon. Out of 106 such cases only bacterial isolates were obtained from 82 cases with sensitivity of 85.42% and specificity of 76.92% Positive predictive value of 77.35%, Negative predictive value of 85.11%. p value <0.001 (X^2 test).

The clinical diagnosis of fungal corneal ulcer was put on the basis of a dry looking ulcer with rolled out margins and feathery finger like extensions into the surrounding stroma, presence of large hypopyon and presence of satellite lesions and immune ring.

70 out of 94 clinically suspected fungal ulcers yielded growth in culture, giving a sensitivity of 83.33% and specificity of 79.31%, Positive predictive value of 74.46%, Negative predictive value of 86.8%. P value <0.001. (X^2 test). Study done by Bharathi MJ. [20] stated that the sensitivity of clinical diagnosis of bacterial keratitis made by ophthalmologist was 83% and of fungal keratitis was 94.1%.

Conclusion

Central corneal ulceration is a common problem in surroundings of Raichur and most often occurs after a superficial corneal injury with organic material. Bacterial keratitis is marginally higher than fungal keratitis. Staphylococcus epidermidis is most common bacterial and Fusarium sp. And Aspergillusspare the most common fungal isolate.

Staining by Grams and KOH efficiently establishes the diagnosis therefore can be used in the management of corneal ulcer to start the prompt treatment as corneal ulcer is a medical emergency.

The microbiological profile helps the ophthalmologists to start the specific treatment directed against the causative organisms.

References

1. Srinivasan M, Gonzales CA, George C, et al. Epidemiology and aetiological diagnosis of corneal ulceration in Madurai, South India. British journal of ophthalmology 1997;81:965-71.
2. Whitcher John P, Srinivasan M, UpadhyayMadan. Bulletin of the world health organization 2001;79: 214–21.
3. Madhukar K. Reddy.Current perspectives in infectious keratitis. Indian journal of ophthalmology 1994;42(4):171-92.
4. Chirambo MC, Tielsch JM, West KP, Katz J. Blindness and visual impairment in southern Malawi. Bulletin of the world health organization 1986;64:567–72.
5. Chirambo MC. Causes of blindness among students in blind school institutions in a developing country. British journal of ophthalmology 1976;60:665–8.
6. Rapoza PA, West SK, Katala SJ, Taylor HR. Prevalence and causes of vision loss in central Tanzania. International ophthalmology 1991;15: 123–9.
7. Brilliant LB, Pokhrel RP, Grasset NC, et al. Epidemiology of blindness in Nepal. Bulletin of the world health organization1 985;63:375–86.
8. Khan MU, Hague MR, Khan MR. Prevalence and causes of blindness in rural Bangladesh. Indian journal of medical research 1985;82:257–62.
9. Gilbert CE, Wood M, Waddel K, Foster A. Causes of childhood blindness in East Africa: results in 491 pupils attending 17 schools for the blind in Malawi, Kenya and Uganda. Ophthalmic Epidemiology 1995;2:77–84.
10. Basak SK, Basak S, MohantaA,et al. Epidemiological and microbiological diagnosis of suppurative keratitis in Gangetic west Bengal, eastern India. Indian journal of ophthalmology 2005; 53(1):17-22.
11. George Alexandrakis,, Eduardo C. Alfonso.Shifting Trends in Bacterial Keratitis in south Florida and emerging resistance to fluoroquinolones. American Academy of Ophthalmology 2000;107:1497–1502
12. G. M. Rossolini and E. MantengoliTreatment and control of severe infections caused by multiresistant Pseudomonas aeruginosaClinical microbiology & infection 2005;11(Suppl. 4):17–32
13. J Norina T, S Raihan, S Bakiah et al. Microbial keratitis :aetiological diagnosis and clinical features in patients admitted to hospital universitisainsMalasia. Singapore Medicine journal 2008;49(1):67-71.
14. Sharma S, Gopalkrishnan S, Aasuri MK etal.Trends in contact lens- associated microbial keratitis in south India. Ophthalmology 2003;110(1):138-43
15. Bharathi M. J., Ramakrishnan R. et al., Epidemiology of bacterial keratitis in a referral centre in South India, Indian journal of medical microbiology 2003, 21(4):239-45.

16. Prasad S, Nema HV. Mycotic infections of the cornea. IJO 1982;30:81-85.
17. UshaGopinath, Savitri Sharma, PrashantGarg, Gullapalli, N. Rao. Review of epidemiological features, microbiological diagnosis and treatment outcome of microbial keratitis. Experience of over a decade. Ind. J. Ophthalmol: 2009;57:273-79.
18. Frederic Schaefer, Olivier Bruttin, Léonidas Zografos, Bacterial keratitis: a prospective clinical and microbiological study. British journal of ophthalmology 2001;85:842–47.
19. Laila A, Salam MA, Nurjahan B, Intekhab R, Sufikul I, Iftikhar A. Potassium Hydroxide wet preparation for the laboratory diagnosis of suppurative corneal ulcer. Bangladesh Journal of Medical Science 2010; 9(1):27-32
20. Bharathi MJ, Ramakrishnan R, Vasu S, et al. Epidemiological characteristics and laboratory diagnosis of fungal keratitis: a three-year study. Indian J Ophthalmol 2003;51:315–21.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.5

The Prevalence of Glaucoma: Study From the Rural Area of Chhattisgarh, India

Divya Verma[1], Ankur Shrivastav[2]

Abstract

Aim: The main objective of the current study is toinvestigate that the prevalence and type of glaucoma inthe rural area of Chhattisgarh. *Material and methods:* A retrospective study was conducted inthe department of ophthalmology at Lakhiram Agrawal Memorial Govt. Medical College and associated Kirodimal Govt. Hospital, Raigarh, (CG), total 513 patients were screened in the age group of 40 years to above. Some ophthalmic examination was done by the before pre-operative condition, some screening techniques were including such as slit lamp examination, IOP by applanation tonometry, dilated fundus examination, gonioscopy, 90 D examination and visual fields. *Result:* Out of 513 patients, fifty-four (10.52%) were diagnosed to glaucoma / glaucoma suspect, out of 54, 27 (5.26%) patients were POAG, 18 (3.5%) had PACG, 5 (0.97%) had lens induced glaucoma and 4 (0.77%) were glaucoma suspected. *Conclusion:* The finding of the current study concluded that the Performing of a comprehensive eye evaluation for cataract surgery was great importance in the detection of undiagnosed glaucoma. It is the most important causes of the rural area of Chhattisgarh in central India population.

Keywords: Glaucoma; Cataract Surgery; Prevalence.

Introduction

The term glaucomais a group of progressive optic neuropathies; it is characterizedby the degeneration of retinal ganglion cells and resulting from the changes in the optic nerve head. It caused the loss of ganglion cells,therefore related to the level of intraocular pressure [1]. The Cataract and glaucoma are frequently coexisting ocular conditions in the elderly group of the population worldwide; cataract and glaucoma are a natural part of the aging process [2]. People over 60 years of age have affected more common with glaucoma, this is the more common and serious sight-threatening conditions. Glaucoma is responsible for significant ocular morbidity in India [3]. Primarily glaucoma was accountedfor the 2/3rds of the morbidity in India and worldwide [4]. Currently, there is a significant lacuna of studies about cataract and glaucoma in this region of India. Our study is a step toward it with the aim to find out the prevalence of glaucoma in the patientswith cataract who were referred to thehigher study center and institutions.

Author Affiliation: [1]Assistant Professor, Dept. of Ophthalmology, Late Lakhiram Agrawal Memorial Govt. Medical College & Kirodimal Govt. Hospital, Raigarh, Chhattisgarh 496001, India. [2]Associate Professor, AIIMS, Raipur, Chhattisgarh 492099, India.

Corresponding Author: Ankur Shrivastav, Associate Professor, Dept. of Ophthalmology, AIIMS, Raipur, Chhattisgarh 492099, India.

E-mail: bhagatgreat@gmail.com

Received on 16.05.2018, **Accepted on** 09.06.2018

Material & Methods

Research design-

The current study was done in purposive research design.

Sample and Procedure-

For the purpose of our study, we used screening techniques and scientific method for sample selection, total 513 participants involved in a study out of which 54 patients were affected by glaucoma.

The retrospective study was conducted in the department of ophthalmology, at Lakhiram Agrawal Memorial Govt. Medical College and associated Kirodimal Govt. Hospital, Raigarh, Chhattisgarh, India. All the 513 consecutive patients werereferred for cataract surgery in the month of

September to November 2017, before the cataract surgery some screening techniques were done.

The procedure of sampling and screening for cataract surgery: The detailed history and demographical profile were taken using self-made questionnaire, slit lamp examinations were done, ocular co-morbidity, intraocular pressures, fundus examination, gonioscopy, 90D examination, and visual fields were done by appropriate apparatus. The External examination and pupillary evaluation were done in the normal flashlight. The Slit lamp bio-microscopy was doneto rule out any abnormalities of the anterior segment. The anterior chamber depth was graded according to the Van Herick's technique. Intraocular pressure (IOP) was recorded with the Goldmann applanation tonometer under the topical anesthesia. Gonioscopy was performed to examine the irideocorneal angle. The Goldman three mirror lenseswere used and the anglewas graded according to the Shaffer system. The degree of trabecular meshwork pigmentation and other angle abnormalities were recorded. Stereoscopic evaluation of the optic nerve head was performed using a 90 diopter (D) lens at the slit lamp. The vertical and horizontal cup-disc ratios (CDRs) were measured and recorded with the notching, splinter haemorrhages, and peripapillary atrophy.

Statistical analyses-

Purpose of the current study, the data were analyzed by descriptive analyses technique withthe help of the SPSS 22 version.

Table 1: Shows the age and sex distribution in thepatients

Variables		N	n%
Age (years)	40-50	50	9.7
	50-60	143	27.8
	>60	320	62.4
Sex	Male	230	45
	Female	283	55

Table 2: Shows the Glaucoma suspect and Gonioscopy findings in the patients

Variables		n	n%	Mean
Glaucoma Suspect	No	459	89.5	
	Yes	54	10.5	
	OAG		5.26	
	ACG		3.50	
	Lens-induced glaucoma		0.98	
Gonioscopy	Performed	52		
	Not Performed	2		
	IOP (mmHg)			20.1
	VCDR			0.4-0.6

Results

Finding of the result in the present study shows in the different tables.Total 513 subjects were examined (230 men 45%, 283 women 55%) of which 54 (10.52%) patients were suspected of glaucoma, 5.26% have OAG, 3.50% have ACG, 0.78% are glaucoma suspect and 0.98% have Lens induced glaucoma.

Table 1 and Table 2 shows that the males were more commonly involved among OAG and females were more among angle closure disease. Majority of patients with glaucoma were found to be >60yr of age. The mean IOP by Goldman applanation tonometer was 20.1 mmHg. Gonioscopy performed in both eyes of 52 glaucoma suspect subjects. Gonioscopy could not be done in 2 subjects because of corneal opacities. The mean Vertical cup-disc ratio (VCDR) was 0.4-0.6. Majority of cases with OAG was found to be in an early glaucomatous stage while ACG was found in moderately advanced glaucoma stage, which suggests that ocular morbidity and early progression is more common with angle closure disease.

Primary Open Angle Glaucoma-

Table 3 reveals that there were 27 (5.26%) subjects (12 women, 16 men). The mean age was > 60 years. The mean IOP value was 21.2 mm Hg. Mean VCDR 0.4-0.6, fundus could not be seen in 3 subjects because of dense cataract and corneal opacity. Humphrey visual fields 30-2 were done in 20 subjects and advised after cataract surgery in rest. Out of 20 subjects, 14 were atthe early glaucomatous stage, 4 were moderately advanced glaucoma, 1 severe glaucoma and 1 patient withend-stage glaucoma. Pseudo exfoliation was noted in 2 subjects.

Table 3: Shows the sex distribution and examination finding of thePrimaryOpen-Angle Glaucoma in the patients

Variables		N	n%	Mean
Primary Open Angle Glaucoma		27	5.26	
Age				64 years
Sex	Male	15	55.5	
	Female	12	44.5	
	IOP (mmHg)			21.2
	VCDR			0.4-0.6
Staging of Glaucoma (n=20)	early glaucomatous stage	14	70	
	Moderately advanced glaucoma	4	20	
	severe glaucoma	1	5	
	end-stage glaucoma	1	5	

Primary Angle-Closure Glaucoma

Table 4 shows that the primary angle-closure glaucomawas found in 18 subjects (3.50%) (10 women, 8 men); the mean age was between 40 to 50 years. The mean IOP value was 22 mm Hg. The mean VCDR was 0.5-0.6. The fundus could not be seen in 4 subjects because of dense cataract in 3 subjects and 1 has corneal opacity. On gonioscopy, out of 17 patient 3 patients had PAS present. Out of 14 patients, 3 were at the early glaucomatous stage, 10 were moderately advanced glaucoma and 1 patient withend-stage glaucoma.

Table 4: Shows thesex distribution and findings of the primary Angle-Closure Glaucoma

Variables		N	n%	Mean
Primary Angle-Closure Glaucoma		18	3.50	
Age				46 years
Sex	Male	8		
	Female	10		
	IOP (mmHg)			22
	VCDR			0.5-0.6
Staging of Glaucoma (n=14)	early glaucomatous stage	3	21.4	
	Moderately advanced glaucoma	10	71.4	
	severe glaucoma	0	0	
	end-stage glaucoma	1	7.1	

Glaucoma Suspects

Table 5 reveals thatthere were 4 persons have glaucoma suspect (1woman, 3 men). Out ofwhich 2 subjects had ocular hypertension, 1 was diagnosed as PACS, and 1 had suspicious discs but no field changes.

Table 5: Shows the sex distribution and findings of the Glaucoma suspects

Variables		n	n%
Glaucoma Suspects		4	
Sex	Male	3	75
	Female	1	25
	ocular hypertension	2	50
	PACS	1	25
	suspicious discs	1	25

Lens-induced Glaucoma

Table 6 reveals that 5 patients showing the lens induced glaucoma. Fourpatients with phacomorphic glaucoma presented with very high IOP (unrecordably high) were advised urgent cataract surgery after control of IOP. One patient with phacolytic glaucoma presented with IOP 39mm Hg has also advised cataract surgery after controlling IOP.

Table 6: shows the IOP examination findings in the Lens-induced Glaucoma

Variables		n	n%	Mean
Lens-induced Glaucoma		5		
IOP (mmHg)	phacomorphic glaucoma	4	80	Unrecordably high
	photolytic glaucoma	1	20	39

Discussion

Purpose of the present study we have searched the various studies done in this field and various research agencies reports, some reports, and findings were supported our current work. The WHO report estimated that the 47.8% of global blindness is due to glaucoma, the cataract burden was significantly high in the South Asia region with includes India, 51% of blindness is due to the cataract [5]. The cataract surgery is a major cause of avoidable blindness in the developing countries [6]. Cataract surgery and glaucoma are

frequently coexisting ocular conditions in the elderly age population worldwide. Our study findings are similar to the Chennai glaucomastudy, it reported that the glaucoma was detected in 20% of aphakic and 4.3% of pseudophakic eyes in urban population [7]. Other similar studies have found that the age-specific prevalence for the eight population groups was derived by regional models separately for OAG and ACG. Similar findings were obtained fromstudies conducted in different region and countries of the world i.e. Europe OAG [8,9] Europe ACG, [10,11] Africa OAG, [12,13,14] Africa ACG, India OAG, [15,16,17] India ACG, [18,19,20] China and South East Asia OAG, [12,18,19] China and South East Asia ACG, [12,18,19] Japan OAG, [21,22,23] Japan ACG, [24] Latin America OAG, [25,26] Latin America ACG (Europe estimate used), and Middle East/North Africa OAG and ACG. The Glaucoma blindness was estimated by the Foster et al. (2002) and they found that 10% of those with OAG and 25% of those with ACG were assumed to be bilaterally blind in the worldwide [27].

Other studies have estimated that the numbers of glaucoma in worldwideby 2020, 60 million people will have OAG and ACG, and glaucoma will be the second leading causes of the world blindness, These estimates could be done by the surveys of different research in different regions such as North Africa and Middle East Africa, OAG was estimated that the 2.22 million people wereaffected with glaucoma in the United States in 2002 [28]. other studies have predicted that 9.4 million Chinese people had OAG and ACG in 2001 [29]. Another study predicted for the years 2010 that 9.2 million will have either OAG or ACG in China [30]. Another study, based on the major population was suggested that the 12% of world blindness (4.4 million people) is caused by glaucoma [31].

The prevalence of glaucoma in our study is 10.52% of those planned for cataract surgery. If these numbers are similar for the rest of the country this approach would result in detection of a large number of those with undiagnosed glaucoma.

Conclusion

For many people in the country the only point of contact with the eye care system is when they seek or are "screened" for cataract surgery inadequate examination at this time is a lost opportunity to detect and treat other non-cataract ocular pathology, hence our approach in eye camps should be on holistic eye examination and comprehensive treatment for all ocular pathologies including cataract. Finally, the finding of the current study concluded that the Performing of a comprehensive eye evaluation for cataract surgery was great importance in the detection of undiagnosed glaucoma in the rural area of Chhattisgarh in central India population.

Conflict of interest: authors declares no conflict of interest.

References

1. Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: a review. Jama. 2014 May 14;311(18):1901-11.
2. Skalicky SE, Martin KR, Fenwick E, Crowston JG, Goldberg I, McCluskey P. Cataract and quality of life in patients with glaucoma. Clinical & experimental ophthalmology. 2015 May 1;43(4):335-41.
3. Shori R, Prasad GL, Shori C. Prevalence of glaucoma in rural India. Panacea Journal of Medical Sciences. 2016 Dec 30;6(3):125-7.
4. George R, Ramesh SV, Vijaya L. Glaucoma in India: estimated burden of disease. Journal of glaucoma. 2010 Aug 1;19(6):391-7.
5. Vijaya L, George R, Baskaran M, Arvind H, Raju P, Ramesh SV, Kumaramanickavel G, McCarty C. Prevalence of primary open-angle glaucoma in an urban south Indian population and comparison with a rural population: the Chennai Glaucoma Study. Ophthalmology. 2008 Apr 1;115(4):648-54.
6. Foster A. Vision 2020: The Cataract Challenge. Community Eye Health, 2000;13:17-21.
7. Ronnie George, Hemamalini Arvind, M Baskaran, S Ve Ramesh, Prema Raju and LingamVijaya. The Chennai glaucoma study: Prevalence and risk factors for glaucoma in cataract operated eyes in urban Chennai. Indian J Ophthalmol. 2010;58:243–5.
8. World Health Organisation. Global initiative for the elimination of avoidable blindness: An informal consultation. Geneva: *WHO*; 1997.
9. Foster A. Cataract and "Vision 2020- the right to sight" initiative. Br J Ophthalmology, 2001;85:635-9.
10. Bonomi L, Marchini G, Marraffa M, et al. Prevalence of glaucoma and intraocular pressure distribution in a defined population. The Egna-Neumarkt Study. Ophthalmology 1998;105:209–15.
11. Anton A, Andrada MT, Mujica V, et al. Prevalence of primary open-angle glaucoma in a Spanish population. The Segovia Study. J Glaucoma 2004;13:371–6.
12. Bonomi L, Marchini G, Marraffa M, et al. Epidemiology of angle-closure glaucoma. Prevalence, clinical types, and association with peripheral anterior chamber depth in the Egna-Neumarkt glaucoma study. Ophthalmology 2000;107:998–1003.
13. Buhrmann RR, Quigley HA, Barron Y, et al. The prevalence of glaucoma in a rural East African population. Invest Ophthalmol Vis Sci2000;41:40–8.

14. Bourne RRA, Sukudom P, Foster PJ, et al. Prevalence of glaucoma in Thailand: a population-based survey in Rom Klao District, Bangkok. Br J Ophthalmol 2003;87:1069–74.
15. Foster PJ, Baasanhu J, lsbirk PH, et al. Glaucoma in Mongolia. A population-based survey in HO¨ vsgO¨ l Province, Northern Mongolia. Arch Ophthalmol 1996;114:1235–41.
16. Cedrone C, Culasso F, Cesareo M, et al. Prevalence of glaucoma in Ponza, Italy: a comparison with other studies. Ophthalmic Epidemiology 1997;4: 59–72.
17. Dandona L, Dandona R, Srinivas M. Open-angle glaucoma in an urban population in southern India. Ophthalmology 2000;107:1702–9.
18. Giuffre G, Giammanco R, Dardanoni, et al. Prevalence of glaucoma and distribution of intraocular pressure in a population. The Casteldaccia Eye Study. Acta Ophthalmol Scand 1995;73:222–5.
19. Foster PJ, Oen FTS, Machin D, et al. The prevalence of glaucoma in Chinese residents of Singapore. A cross-sectional population survey of the TanjongPagar District. Arch Ophthalmol 2000;118:1105–11.
20. Iwase A, Suzuki Y, Araie M, et al. The prevalence of primary open-angle glaucoma in Japanese. The Tajimi Study. Ophthalmology 2004;111:1641–8.
21. Mitchell P, Smith w, Attebo K, et al. Prevalence of open-angle glaucoma in Australia. The Blue Mountains Eye Study. Ophthalmology 1996;103:1661–9.
22. Jacob A, Thomas R, Koshi SP, et al. Prevalence of primary glaucoma in an urban South Indian population. Indian J Ophthalmol 1998;46:81–6.
23. Quigley HA, West SK, Rodriguez J, et al. The prevalence of glaucoma in a population-based study of Hispanic subjects. Arch Ophthalmol 2001;119:1819–26.
24. Rahman MM, Rahman N, Foster PJ, et al. The prevalence of glaucoma in Bangladesh: a population-based survey in Dhaka division. Br J Ophthalmol 2004;88:1493–7.
25. Rotchford AP, Johnson GJ. Glaucoma in Zulus. A population-based cross-sectional survey in a rural district in South Africa. Arch Ophthalmol 2002;120:471–8.
26. Rotchford AP, Kirwan JF, Muller MA, et al. Temba Glaucoma Study: a population-based cross-sectional survey in urban South Africa. Ophthalmology 2003;110:376–82.
27. Foster PJ, Buhrmann R, Quigley HA, et al. The definition and classification of glaucoma in prevalence surveys. Br J Ophthalmol 2002;86: 238–42.
28. Varma R, Ying-Lai M, Francis BA, et al. Prevalence of open-angle glaucoma and ocular hypertension in Latinos. The Los Angeles Latino Eye Study. Ophthalmology 2004;111:1439–48.
29. Vijaya L, et al. Prevalence of angle-closure glaucoma in a rural South Indian population. (in preparation).
30. Wensor MD, McCarty CA, Stanislavsky YL, et al. The prevalence of glaucoma in the Melbourne Visual Impairment Project. Ophthalmology 1998;105:733–9.
31. David R, Duval DON, Luntz MH. The prevalence and management of glaucoma in an African population. S Afr Arch Ophthalmol 1984;10:55–62.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.6

Effect of Blood Pressure in Progression of Diabetic Retinopathy

Taklikar Anupama R.[1], Nanda Sadanand[2]

Abstract

Objective: To analyze the role of blood pressure in predicting progression of diabetic retinopathy. *Materials and Methods*: This prospective clinical study was done on patients with diabetic retinopathy attending the OPD of department of Ophthalmology & those willing to participate this study. Sample size: 50 patients based on inclusion criteria will be registered, evaluated & followed up subsequently for 12 months. Inclusion criteria Patients with type I OR Type II diabetes who have diabetic retinopathy changes with or without macular edema (according to ETDRS classification). Exclusion criteria 1. Venous & arterial occlusion, post panretinal photocoagulation status, post anti-VEGF injection status, patients with posterior uveitis & glaucoma. 2. End stage patients who would not cooperate for fundoscopy. 3. Patients less than 18 years of age. *Results*: The increased risk of proliferative retinopathy was associated with the presence of hypertension at baseline. 43% of patients in moderate NPDR, 56% of severe group and 47% of very severe NPDR group were hypertensive. *Conclusion*: To conclude, in this study patients having hypertension are at high risk for progression and hence these patients should be followed up at frequent intervals and should be instituted appropriate treatment.

Keywords: Diabetes; Hypertension; Diabetic Retinopathy.

Introduction

Diabetes Mellitus is a heterogeneous group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, insulin resistance, or both. Diabetes is gaining the status of a potential epidemic in India with more than 62 million individuals currently diagnosed with the disease [1,2].

Among the ophthalmic complications are corneal abnormalities, pupillary abnormalities, iris neovascularisation, glaucoma, cataracts and retinopathy. However, the commonest ophthalmic complication remains diabetic retinopathy, although early retinopathy does not have a significant effect on vision, it can progress to a more advanced stage termed proliferative diabetic retinopathy. Due to the increasing incidence of diabetes, the burden of blindness caused by diabetic retinopathy is on the rise. Hence, newer modalities of diagnosis and treatment are also in evolution, with prime focus on early detection and halting the progression.

Prevalence of proliferative diabetic retinopathy & maculopathy was maximum in old age & patient with insulin treatment [3,4,5].

Hypertension aggravates the retinal ischemia caused by diabetic retinopathy. Both systolic and diastolic blood pressure contribute to retinal ischemia which is the central dogma for the retinopathy progression.

In this study, we record Blood pressure in patients with moderate and severe NPDR and observe them for progression during the follow up.

Multiple epidemiological studies have identified hypertension as a risk factor for diabetic retinopathy & diabetic macular edema.

In the UKPDS, tight blood pleasure control (defined as target BP (<150/85mmHg) in patients with type 2 diabetes reduced the rest of microvascular disease by 37% the rate of progression of diabetic retinopathy by 34% & the risk of deterioration of visual acuity by 47%.

Author Affiliation: [1]Professor and Head [2]Post Graduate Student, Department of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103, India.

Corresponding Author: Anupama Raju Taklikar, Professor and Head, Department of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103

E-mail: dranusree67@gmail.com

Received on 19.01.2018, **Accepted on** 09.02.2018

Materials and Methods

This prospective clinical study was done on patients with diabetic retinopathy attending the OPD of department of Ophthalmology & willing to participate this study.

Sample size:

50 patients based on inclusion criteria were registered, evaluated & followed up subsequently for 12 months.

Inclusion criteria:

Patients with type I OR Type II diabetes who have diabetic retinopathy changes with or without macular edema (according to ETDRS classification).

Exclusion criteria:

1. Venous & arterial occlusion, post panretinal photocoagulation status, post anti-VEGF injection status, patients with posterior uveitis & glaucoma.
2. End stage patients who would not cooperate for fundoscopy.
3. Patients less than 18 years of age.

Procedure

History

All patients were screened with a detailed history including type & duration of diabetes, diet history & history about physical activity. History of treatment with oral hypoglycemic agents, insulin & other drug intake was elicited. History of systemic comorbidities like hypertension, coronary artery disease etc & their treatment was enquired about. Previous ophthalmic surgery/laser or other medical treatment history was also taken.

All patients then underwent a thorough systemic & ocular examination.

General Examination

General vital data like pulse, systolic and diastolic blood pressure, peripheral pulses were noted. Systemic examination of CNS, CVS, RS and abdomen was done.

Ocular Examination

Visual acuity (by Snellen's chart) and refraction were measured. Anterior segment evaluation was done with slit lamp biomicroscopy. Intraocular pressure was measured using Applanation tonometry. Diabetic retinopathy was evaluated by a dilated fundus examination using 90D & indirect ophthalmoscopy.

Fundus photographs were taken for documentation and the levels of retinopathy was then classified as per the ETDRS.

A through eye examination by standardised methods was carried out. It includes:

1. Measurement of best corrected visual acuity.
2. Examination of the anterior segment of the eye with a slit lamp biomicroscopy.
3. Fundus examination with direct & indirect ophthalmoscopy & 90D lens through the dilated pupil.
4. Measurement of intraocular pressure.
5. Fundus fluorescein angiography.

Follow up Visits

Every month. During follow up visits - Fasting blood sugar levels, post prandial blood sugar,blood pressure, visual acuity, intraocular pressure, slit lamp biomicroscopy (anterior segment & fundus with +90D), and ophthalmoscopy was done. Any progression of diabetic retinopathy was documented.

Results

Systolic Blood Pressure

In this study, 48% of the patients had their systolic blood pressure in the range of 120-139mmHg, 34% in the range of 140-159mmHg, 16% had their systolic BP<120mmHg and the remaining 2% had BP>160mmHg.

The mean systolic BP was 135.77±16.60 mm of Hg.

Systolic Blood Pressure Vs Baseline Retinopathy

The mean systolic blood pressure in moderate, severe and very severe NPDR were 121.71±13.21, 141.17±15.78, 139.72±13.94 mm of Hg respectively.

Table 1: Systolic Blood Pressure

SBP (mm of Hg)	< 120	120 - 139	140 - 159	≥ 160	TOTAL
No. of Patients	8	24	17	1	50
%	36	48	34	2	100

SBP- Systolic blood pressure.

Table 2: Diastolic Blood Pressure

DBP	No. of Patients	Percentage
< 80	6	12
80 - 89	23	46
90 - 99	19	38
> = 100	2	4
TOTAL	50	100

DBP- Diastolic blood pressure

Diastolic BP Vs Baseline Retinopathy

Table 3: Diastolic BP Vs Baseline Retinopathy

BR in BE	DBP (mm of Hg)									
	< 80	%	80 - 89	%	90 - 99	%	≥100	%	TOTAL	%
Mod NPDR	3	6	8	16	3	6	0	0	14	28
Severe NPDR	2	4	6	12	9	18	1	2	18	36
Very Severe NPDR	1	2	9	18	7	14	1	2	18	36
Total	6	12	23	46	19	38	2	4	50	100

BR- baseline retinopathy, DBP- diastolic blood pressure.

Baseline Retinopathy Vs Retinopathy at the end BE

Table 5: Baseline Retinopathy Vs Retinopathy at the end BE

BR	Retinopathy at end BE									
	MOD NPDR	%	SEV NPDR	%	VERY SEV NPDR	%	PDR	%	total	%
MOD NPDR	10	20	4	8	0	0	0	0	14	28
SEV NPDR	1	2	9	18	8	16	0	0	18	36
VERY SEV NPDR	0	0	0	0	9	18	9	18	18	36
Total	11	22	13	26	17	34	9	18	50	100

BR- Baseline retinopathy, MOD NPDR- moderate non progressive diabetic retinopathy, SEV NPDR- severe non progressive diabetic retinopathy, BE-both eyes

Progression of DR BE

Table 4: Progression of DR BE

Progression of DR BE	No. of Patients	Percentage
Yes	23	46
No	27	54
Total	50	100

DR BE- diabetic retinopathy in both eye.

Diastolic Blood Pressure

The mean diastolic BP was 83.4±7.60 mm of Hg.

Around 54% of the patients participated in the study did not progress to next stage of diabetic retinopathy. The remaining 46% progressed to next level of diabetic retinopathy. In this study, 81% of the patients with systolic BP <140 did not progress whereas 43% of the patients progressed. Around 18% of patients with systolic BP >140 did not progress while 56% of patients showed progression. The mean systolic BP in those who progressed and who did not progress were 143.09± 12.20 and 128.48±16.91 mm of Hg respectively. p value determined by the two tiled chi-square test was 0.005 which was <0.05 meaning that it was statistically significant.

In this study, 62% of patients with diastolic BP <90 did not show progression whereas 38% progressed. About 56% of the patients with diastolic >90 BP progressed to next stage of retinopathy while 44% of the patients did not progress. The mean diastolic BP in patients who showed progression was 86.09±6.56 mm of Hg and that in patients who did not progress was 81.11±7.51 mm. p value was found to be 0.013 which was > 0.05 meaning statistically significant.

About 71% of patients diagnosed as Moderate NPDR in BE at Baseline remained the same at the end while the remaining 22% progressed to severe NPDR. Among patients who were diagnosed to have severe NPDR at baseline, 44% progressed to very severe stage and the remaining 50% remained in the severe NPDR stage. Around 50% of patients who had Very severe NPDR at the beginning of the study progressed to Proliferative diabetic retinopathy and 50% had very severe NPDR.

Discussion

Diabetic retinopathy is one of the potentially blinding condition in middle age and elderly patients. Among the various factors that can influence the progression of diabetic retinopathy, the impact of blood pressure are discussed in this study.

The increased risk of proliferative retinopathy was associated with the presence of hypertension at baseline. 43% of patients in moderate NPDR, 56% of severe group and 47% of very severe NPDR group were hypertensive. Around 11% of severe group and 28% of very severe NPDR group had nephropathy at baseline. 17% of severe group and 17% of very severe NPDR group had coronary artery disease. 2 patient in moderate NPDR group had a previous attack of stroke.

In this study, 48% of the patients had their systolic blood pressure in the range of 120-139mm of Hg, 34% of the patients had their systolic BP in range of 140-159mm of Hg, 16% had their systolic BP <120 mm of Hg and the remaining 2% had BP>160 mm of Hg. The mean systolic BP was 135.77±16.60 mm of Hg. The UKPDS showed that the incidence of retinopathy was associated with systolic blood pressure.

The mean systolic blood pressure in moderate, severe and very severe NPDR were 121.71±13.21, 141.17±15.78, 139.72±13.94 mm of Hg respectively. About 50% of the patients with moderate NPDR had their systolic BP in the range of 120-139 mm of Hg, 43% of the patients fell in the <120 mm of Hg group and remaining 7% had 140-159 mm of Hg.. in the severe NPDR group, 50% of the patients had systolic BP in the range of 120-139 mm of Hg, 39% of the patient's systolic BP was in the range of 140-159 mm of Hg, 6% in <120 mm of Hg group and the remaining 6% in 60 mm of Hg group. In very severe NPDR category, 50% of the patients fell in the 140-159 mm of Hg group, 44% had their systolic BP in the range of 120-139 mm of Hg and 6% fell in <120 mm of Hg group.

In this study, around 46% of patients had diastolic BP in range of 80-89mm of Hg followed by 38% in 90-99 mm of Hg, 12% in <80 mm of Hg and 4% in ≥ 100 mm of Hg. The mean diastolic BP was 83.4±7.60 mm of Hg.

The mean diastolic blood pressure in moderate, severe and very severe NPDR was 80±6.79 mm of Hg, 85±7.86 mm of Hg and 84.44±7.05 mm of Hg respectively. In the moderate NPDR group, 57% of the patients had diastolic BP in the range of 80-89 mm of Hg, 17% of the patient's diastolic BP was < 80 mm of Hg and 17% in the range of 90-99 mm of Hg group. About 50% of the patients with severe NPDR had their diastolic BP in the range of 90-99 mm of Hg, 11% of the patients fell in the <80 mm of Hg group, another 33% of patients fell in the 80-89 mm of Hg and the remaining 6% had their diastolic BP > 100 mm of Hg. In very severe NPDR category, 50% of the patients fell in the 80-89 mm of Hg group, 39% had their systolic BP in the range of 90-99 mm of Hg, 6% fell in <80 mm of Hg group and remaining 6% had diastolic BP >100 mm of Hg.

A 34% reduction in risk of deterioration of retinopathy was achieved by a tight control of blood pressure in the UKPD Study [6].

In the Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR), diastolic blood pressure was a significant predictor of progression of diabetic retinopathy to proliferative diabetic retinopathy over 14 years of follow up in patients with younger onset (type 1) diabetes mellitus, independent of glycosylated haemoglobin and the presence of gross proteinuria. However, neither systolic or diastolic blood pressure nor hypertension at baseline were associated with the incidence and progression of retinopathy in people with type 2 diabetes mellitus

In this study, 81% of the patients with systolic BP <140 did not progress whereas 43% of the patients progressed. Around 18% of patients with systolic BP >140 did not progress while 56% of patients showed progression. The mean systolic BP in those who progressed and who did not progress were 143.09± 12.20 and 128.48±16.91 mm of Hg respectively. p value determined by the two tiled chi-square test was 0.005 which was <0.05 meaning that it was statistically significant. In "Glycemic Exposure and Blood Pressure Influencing Progression and Remission of Diabetic Retinopathy study", SBP was also a significant risk factor for progression to mild BDR from the initial retinopathy-free state and the reduction in SBP by 1 SD (17.28 mmHg) was associated with a 20% increased chance of regression back to the retinopathy-free state.

The study shows that 62% of patients with diastolic BP <90 did not show progression whereas 38% progressed. About 56% of the patients with diastolic BP >90 progressed to next stage of retinopathy while 44% of the patients did not progress. The mean diastolic BP in patients who showed progression was 86.09±6.56 mm of Hg and that in patients who did not progress was 81.11 ±7.51 mm. p value was found to be 0.013 which was > 0.05 meaning statistically significant.

Summary

Around 50 patients with type 2 diabetes mellitus and non proliferative diabetic retinopathy were included in this study in the OPD of department of ophthalmology over a period of 12 months.

The aim was to analyze the factors like glycemic status and blood pressure in predicting progression of diabetic retinopathy.

50 patients were enrolled in the study based on the selection criteria, baseline parameters documented and followed up to look for progression of diabetic retinopathy.

The mean systolic blood pressure in moderate, severe and very severe NPDR were 121.71±13.21, 141.17±15.78, 139.72±13.94 mm of Hg respectively. The mean diastolic blood pressure in moderate, severe and very severe NPDR was 80±6.79 mm of Hg, 85.44±.86 mm of Hg and 84.44±7.05 mm of Hg respectively.

In this study, 81% of the patients with systolic BP <140 did not progress whereas 43% of the patients progressed. Around 18% of patients with systolic BP ≥140 did not progress while 56% of patients showed progression. p value determined was 0.005 which was <0.05 meaning that it was statistically significant.

In this study, 74% of patients with diastolic BP <90 did not show progression whereas 39% progressed. About 61% of the patients with diastolic BP > 90 progressed to next stage of retinopathy while 26% of the patients did not progress. p value was found to be 0.013 which was >0.05 meaning statistically not significant.

Conclusion

To conclude, this study Patients having hypertension are at high risk for progression of diabetic retinopathy and hence these patients should be followed up at frequent intervals and should be instituted appropriate treatment.

References

1. Joshi SR, Parikh RM. India – diabetes capital of the world: now heading towards hypertensions. J Assoc Physicians India. 2007;55:323-4.
2. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. Australas Med J. 2013;6(10):524-31.
3. Klien R, Klien BEK, Moss SE et al. The Wisconsin Epidemological study of Diabetic Retinopathy III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Opthalmol 1984;102:527-32.
4. Klien R, Klien BEK, Moss SE et al. The Wisconsin Epidemological study of Diabetic Retinopathy IV. Diabetic macular edema. Opthalmology 1984;91:1464-74.
5. Eye diseases prevalence research group. The prevalence o diabetic retinopathy in the united states. Arch Ophthalmol 2004;122:522-63.
6. UK prospective diabetes study group. Tight blood pressure control and risk of macro vascular and micro vascular complication in type 2 diabetes. UKPDS 38. Br Med J 1998;317:703-13.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.7

A Clinical Study of Traumatic Cataract and Associated Ocular Injuries

Gnanajyothi C. Bada[1], Satish S. Patil[2]

Abstract

Introduction: Cataract (opacification of the lens) affects vision in a significant way. Traumatic cataract caused by different modes of ocular trauma contributes adequately to the quantum of cataract blindness. The present study was conducted on patients with traumatic cataract to know the demographic status, mode of injury, type of traumatic cataract and associated ocular injuries in these patients. *Methodology:* Traumatic cataract cases (n=50) attending Ophthalmology OPD at Khaja Bande Nawaz Institute of Medical Sciences (KBNIMS), Kalaburagi were included in the study group, based on the inclusion & exclusion criteria. *Results:* Our study showed that maximum number of traumatic cases were found in the age group of 11-20 years. Majority of the patients were males. Total cataract was the most common form of cataract. 82% of them had visual acuity of < 3/60. Among the associated injuries the corneal injuries were most common. *Conclusion:* Traumatic cataract and its associated ocular injuries constitute one of the important causes of ocular morbidity and visual loss. It is absolutely necessary to take preventive steps to curtail incidence of these severe catastrophes to the minimum.

Keywords: Cornea; Traumatic Cataract; Visual Acuity.

Introduction

Cataract (opacification of the lens) affects vision in a significant way. Senile cataract is the commonest form of cataract causing visual impairment in elderly individuals. Traumatic cataract caused by different modes of ocular trauma also contributes adequately to the quantum of cataract blindness. Cataract is by far the commonest complication causing loss of vision following any type of ocular injury [1]. The special importance of traumatic cataract lies in the fact that it occurs mostly in children & young to middle aged adults who still have a long life span left for them to lead an active & useful life. Moreover, senile cataract is easy to manage as there is no structural disturbance to ocular tissues other than the lens, while in traumatic cataract many of the neighbouring tissues like cornea, sclera, iris, vitreous & retina could have sustained injury related damages. All types of ocular injuries including penetrating & blunt injuries can cause cataract. While planning the management of traumatic cataract, the type of trauma, extent of lenticular involvement & associated damage to other ocular structures should be taken into consideration & this goes a long way in determining the ultimate prognosis [2]. The present study was conducted on patients with traumatic cataract attending Ophthalmology OPD to know the demographic status, mode of injury, type of traumatic cataract and associated ocular injuries.

Aims & objectives

1. To estimate the age and sex distribution of traumatic cataract cases, among those attending the OPD.
2. To correlate the mode of injury & type of traumatic cataract.
3. To study associated injuries to other ocular structures in traumatic cataract cases.

Author Affiliation: [1]Assistant Professor, Department of Ophthalmology, Khaja Banda Nawaz Institute of Medical Sciences, Kalaburagi, Karnataka 585104, India. [2]Assistant Professor, Department of Physiology, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka 585105, India.

Corresponding Author: Gnanajyothi C. Bada, Assistant Professor, Department of Ophthalmology, Khaja Banda Nawaz Institute of Medical Sciences, Kalaburagi, Karnataka 585104, India.

E-mail: drgnanajyothi@gmail.com

Received on 02.03.2018, **Accepted on** 02.04.2018

Materials and Methods

Traumatic cataract cases (n=50), attending the Ophthalmology OPD at KBNIMS constituted the study population.

Inclusion Criteria:

1. Age: all age groups
2. Sex: both male and female
3. Patients having traumatic cataract due to blunt injuries.
4. Patients having traumatic cataract due to penetrating injuries.

Exclusion criteria:

1. Traumatic cataract having previous history of posterior segment lesions like retinal detachment, optic atrophy, macular scar etc
2. Traumatic cataract due to electric shock, radiation & chemical injuries.

Methodology:

Initially, personal data like name, age, sex, occupation, address were recorded followed by a detailed history about the mode of ocular injury, object causing injury and subsequent treatment was obtained. A general systemic examination including examination of associated extraocular injuries, if any was performed. Before assessing ocular injury, visual acuity & pupillary reflexes both direct & consensual & EOM examination for strabismus was done. A thorough anterior segment examination of both eyes with slit lamp bio microscopy was done with a special note regarding the type of cataract, density, subluxation & dislocation of lens. Injuries to other ocular structures were carefully examined. Posterior segment was evaluated with an indirect ophthalmoscope & USG B scan was done when posterior segment could not be visualized. IOP was measured with applanation tonometer.

Results

Table 1 shows the age wise distribution of traumatic cataract cases. The youngest age being 5 years and the oldest being 60 years. The maximum number of cases were found in the age group of 11-20 years (38%). Table 2 depicts the sexwise distribution of traumatic cataract cases. Majority of the patients were males which constituted 68%. Male to Female ratio was 2:1. Table 3 shows the analysis of the type of injury. Penetrating injury accounted for 62% and blunt injury for 38% of the traumatic cataract cases. Table 4 shows the distribution of the presentation of the type of traumatic cataract. Majority of the cases presented with total cataract, others presented with rosette cataract, anterior capsular & sub capsular, posterior sub capsular cataract, absorbed cataract and lamellar cataract. Table 5 shows the visual acuity on presentation. 82% of them had visual acuity of < 3/60 out of which majority had only PL positive & PR accurate visual acuity. In 7 cases visual acuity was 3/60 to < 6/60 and only 2 patients had vision > 6/60. Best corrected visual acuity of the uninjured eye was recorded in all patients and was found to be in the range of 6/6 to 6/12, as all cases in the present series had uniocular injury. Table 6 indicates the associated ocular injuries. In thepresent study (n=50), 18 cases had corneal injuries in the form of scars or opacities. Adherent leucoma, injury to the iris in the form of iridodialysis, sphincter pupillae damage and posterior synechiae were also observed. Posterior segment injury in the form of vitreous hemorrhage

Table 1: Age wise distribution of Traumatic Cataract cases.

Age group (years)	No. of Cases	Percentage
<l0	7	14
l1-20	19	38
21-30	11	22
31-40	4	8
41-50	4	8
>5l	5	10
Total	50	100

Table 2: Sex wise distribution of Traumatic Cataract cases.

Sex	No. of cases	Percentage
Males	34	68
Females	16	32
Total	50	100

Table 3: Mode of Injury Causing Traumatic Cataract

Mode of Injury	No. of cases	Percentage
Blunt	19	38
Penetrating	31	62
Total	50	100

Table 4: Type of Traumatic Cataract

Type of Cataract	No. of Cases	Percentage
Anterior capsular & Sub capsular opacity	2	4
Posterior sub capsular opacity	6	12
Rosette cataract	4	8
Absorbed cataract	3	6
Lamellar cataract	3	6
Total cataract	32	64
Total	50	100

Table 5: Visual Acuity(VA) of the injured eye.

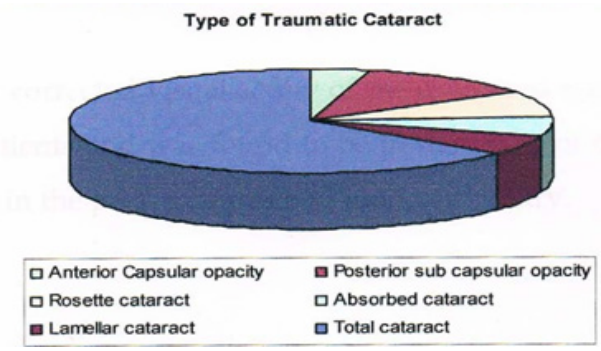
Visual acuity	No. of Cases	Percentage
<3/60	41	82
3/60-< 6/60	7	14
6/60-<6/18	2	4
6/18-6/6	0	0
Total	50	100

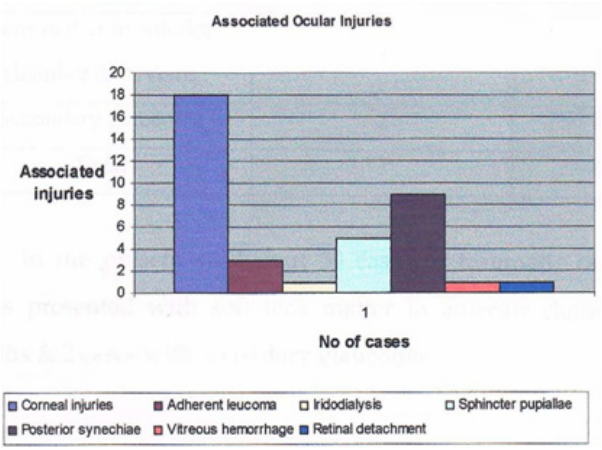
Table 6: Associated Ocular injuries

Associated Ocular Injury	No. of patients	Percentage
Corneal injuries	18	36
Adherent leucoma	3	6
Iridodialysis	1	2
Sphincter pupillae tear	5	10
Posterior synechiae	9	18
Vitreous hemorrhage	1	2
Retinal detachment	1	2
Total	38	76

Table 7: Associated Ocular Complications

Associated ocular Complications	No. of cases	Percentage
Lens matter in anterior chamber &. Uveitis	5	10
Secondary glaucoma	2	4
Total	7	14





was observed in 1 case that had posterior dislocation of lens and retinal detachment. Table 7 analysis the associated ocular complications with traumatic cataract cases, which included the presentation with soft lens matter in anterior chamber & uveitis and secondary glaucoma.

Discussion

Cataract is by far the commonest complication causing visual loss following ocular injuries of moderate to severe grade. Management of this condition is difficult and prognosis depends on the damage to other structures in the anterior and posterior segment.

1. *Age wise distribution of traumatic cataract:*

In the present study, age wise analysis showed that majority of cases occurred in younger age group 11-20 years (38%). Studies done in different parts of the world showed similar increased incidence of traumatic cataract in the younger age group i.e. 10-30 years [2,3,4,5]. This is because of their greater involvement in outdoor activity, dangerous sports and also their work pattern.

2. *Sex wisedistribution:*

Our study shows a male preponderance of traumatic cataract cases. Studies in India and elsewhere also showed maximum cases in males (75-85%) in comparison to females (15-25%) [5,6]. This could be because men are more exposed to ocular trauma as a result of their occupation and they form the wage earning group.

3. *Mode of injury:*

The relative frequency of blunt and penetrating trauma among the traumatic cataract cases showed penetrating trauma to be the commonest mode of injury. Penetrating injury usually leaves a scar on the cornea & in this study 31 cases showed corneal scars of varied sizes and in different corneal positions.Many studies also report that penetrating injury is more commoner [6,7,8].

4. *Type of cataract:*

Majority of cases in the present study presented with a total cataract. Other forms were posterior sub capsular cataract, rosette cataract, anterior capsular & sub capsular, lamellar cataract and absorbed cataract. In a study of 24 traumatic cataract cases, 10 cases had total cataract, 10 had cortical & 4 had posterior sub capsular cataract [5]. A study showed that people with a history of ocular trauma were more likely to have cortical and posterior sub capsular cataracts [9].

5. *VA of the injured eye.*

It is very important to assess the visual acuity because the success of treatment would be judged from the improvement of vision that is ultimately recorded. The VA of the injured eye in the present study in 82% of the cases was <3/60. The Best Corrected VA of the other eye was also recorded

& it was in the range of 6/6 to 6/12 on Snellen's chart. This was because all thecases included in the present series suffered from uniocular injury. In similar studies the VA in majority of the cases of traumatic cataract was also < 3/60 [2,7]. In another study the preoperative visual acuity in the involved eye in majority of the cases was less than 6/60 [10].

6. Associated Ocular injuries

The visual prognosis in traumatic cataract can be poor because of concomitant injury to other ocular structures. The management of traumatic cataract depends on integrity of posterior capsule, zonular apparatus & associated injury to cornea, uveal tissue & posterior segment. In the present study, associated corneal injuries were more common seen in the form of scar or opacity, which could have affected vision by obstructing the visual axis & causing astigmatism. Next in order were injuries of iris and posterior segment. Similar injuries to cornea followed by injury to iris were also more common in other studies done in India and abroad [5,6].

7. Associated complications with traumatic cataract:

In the present study, lens matter in anterior chamber, due to rupture of anterior lens capsuleand uveitis was seen in 5 cases. 2 cases had lens induced secondary glaucoma.In a similar study by Valentina Lacmanovic et al 3 cases had anterior capsular rupture [5].

Conclusion

Traumatic cataract and its associated ocular injuries constitute one of the important causes of ocular morbidity and visual loss. Its importance is especially significant from the fact that the patients are mostly young in age with a long future life ahead. Most of such injuries which occur during play, travel and working in industry are preventable. Hence parents and authorities should take preventive steps to curtail incidence of these severe catastrophes to the minimum.

References

1. Johnstan Stewart. Trans Ophthalmic Society U.K., 1977;91:895.
2. Bhatia IM, Panda A, Sood NN; Management of traumatic cataract; IJO: 1983:31:3:290-93.
3. Bowman RJ, Yorston D, Wood M, Gilbert C, Foster A. Primary intraocular lens implantation for penetrating lens trauma in Africa: Ophthalmology: 1999 Apr;106(4):643-4.
4. Rozsival P, Hakenova. J. Results of 52 operations for traumatic cataract: Cesk Ophthalmol. 1992 Oct; 48(5):325-30.
5. Valentina Lacmanovic Loncar, Ivanka Petric: Surgical treatment, clinical outcomes, & complications of traumatic cataract, Retrospective study. Croatian Medical Journal 2004;45(3):310-13.
6. Singh Daijit, Singh Kamaldeep, Singh Jatinder, Sood Rajiv; The role of intraocular lens in. traumatic cataract: IJO: 1983:31:3:294-97.
7. Michael Eckstein, P Vijayalaxmi, Milind Killedar, Clare Gilbert, Allen Foster: Use of intraocular lenses in children with traumatic cataract in South India: B.J. Ophthalmol 1998;82:911-15.
8. Dakshayani, Rakesh. Analysis of Visual Prognosis after Surgery in Traumatic Cataract. Journal of Evidence Based Medicine and Healthcare; 2014 Oct 15;1(8):1029-46.
9. Wong T.Y., Klein D.E.K., Klein R., Tomany S.C. The relation of ocular trauma to cortical, nuclear, and posterior subcapsular cataracts: The Beaver Dam Eye Study. Br J Ophthalmol, 2002;86:152–55.
10. Krishnamachari M, Rati V, Gupta J. Management of traumatic cataract in children. Jr. of Cat & Ref surgery, 1997;23(1):681-7.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.8

Spectrum of Corneal Ulcers: A Descriptive Study

N. Lakshmi Chowdary[1], T. Pavani[2]

Abstract

Introduction: Corneal ulcer is one of the most common causes of prolonged ocular morbidity and visual impairment in our country. While cataract remains the major cause of reversible visual loss, diseases of the cornea are emerging as an important cause of visual impairment. Corneal lesions were found to be responsible for 9% of all blindness in our country, in a recent national survey by government of India.1 The reported incidenceofcorneal ulceration in South India is 1130 per million population. *Objectives:* To know the etiology of corneal ulcers based on laboratory investigations done in our hospital regarding the type of pathogen and to determine the most common predisposing factor for corneal ulceration. *Methods:* This cross-sectional descriptive study included fifty patients attending Ophthalmology Outpatient Department in NRI medical College and Hospital with corneal ulcers during a period of one year i.e. July 2016 to June 2017. They were examined by slit-lamp and corneal scrapings were performed for cultures and smears by using standard protocols. *Results*: Corneal ulcers are more common inrural population in the age group of 41-60 years. Males are most commonly affected than the females. In 88% patients predisposing factors like injury with vegetative matter, animal material and stone are present. Most of the corneal ulcers are peripherally located and up to mid-stromal involvement. 64% patients had only fungal positive, 30% patients had only bacteria positive and 3 cases were identified as viral corneal ulcers by clinical examination. Among 50 patients 47 patients (94%) healed with corneal opacity. *Conclusion*: Most of the corneal ulcers are seen in the rural population especially farmers who have trauma to the eye with vegetative matter. In this study *Fusarium* was the most common species among the culture positive cases followed by *Aspergillus* species among the fungi. Among the bacteria *Staphylococcus epidermidis* is the most common species followed by *Staphylococcus aureus* and *Pseudomonas* species.

Keywords: Corneal Ulcer; Keratitis; Corneal Scrapings; Culture; Bacteria; Fungi.

Introduction

Corneal infection is a leading cause of ocular morbidity and blindness worldwide [3-8]. Corneal ulcer is one of the most common cause of prolonged ocular morbidity and visual impairment in our country. While cataract remains the major cause of reversible visual loss, diseases of the cornea are emerging as an important cause of visual impairment.Corneal ulceration is a major cause of mono-ocular blindness in developing countries. Surveys in Africa and Asia have confirmed these findings [3-8], and a recent report on the causes of blindness worldwide consistently lists corneal scarring second only to cataract as the major etiology of blindness and visual disability in many of the developing nations in Asia, Africa and the Middle East [9]. Ocular trauma and corneal ulcers annually results in 1.2 to 2 million cases of corneal blindness globally with 90% of them occurring in developing countries [10]. Corneal lesions were found to be responsible for 9% of all blindness in our country, in a recent national survey by government of India [1]. The reported incidence of corneal ulceration in South India is 1130 per million population [2]. In tropical countries like India, corneal ulcer presents as one of

Author Affiliation: [1]Professor & Head [2]Final year PG, Department of Ophthalmology, NRI Medical College & General Hospital, Chinakakani, Mangalagiri Mandal, Guntur District, Andhra Pradesh 522503, India.

Corresponding Author: N. Lakshmi Chowdary, Professor and Head, Department of Ophthalmology NRI Academy of Sciences, Chinakakani Guntur District, Andhra Pradesh 522503, India.

E-mail: laxmieye@gmail.com

Received on 30.06.2018, **Accepted on** 14.07.2018

the major ophthalmic problems. It is very common to see the corneal ulcer even after minor trauma to the eye. If diagnosed and treated early the results are better. Successful treatment of this condition depends upon accurate and rapid identification of the causative organism. We have taken up the study to know the etiology of corneal ulcers basing on investigations done in our hospital regarding the type of pathogen and to determine the most common antecedent factor predisposing to onset of corneal ulceration.

Objectives

To know the etiology of corneal ulcers based on laboratory investigations done in our hospital regarding the type of pathogen and to determine the most common predisposing factor for corneal ulceration.

Materials And Methods

This cross-sectional descriptive study was taken up after taking the approval of Institutional Ethics Committee. 50 patients with the corneal ulcer attending the Outpatient Department of Ophthalmology at NRI General Hospital were included in the study after taking their consent for participation in the study. Patients who are non-compliant and not available for follow up were excluded from the study. Corneal ulceration was defined as loss of corneal epithelium with underlying stromal infiltrate and suppuration associated with signs of inflammation, with or without hypopyon [11]. Each patient was subjected to a detailed history taking. In most of the cases visual acuity where possible was measured using Snellen's chart and all patients underwent thorough slit-lamp bio-microscopic examination by an Ophthalmologist and noting the size of ulcer depth and extent of infiltrations, presence or absence of hypopyon, scleral extension and corneal thinning were noted after staining with wet sterile fluorescein paper strip. Local eye conditions predisposing to corneal ulcerations like lag-ophthalmos, dacryocystitis, trichiasis, dry eyes, surgery and corneal opacity or degeneration were noted. After a detailed ocular examination corneal scrapings were performedunder aseptic conditions by an Ophthalmologist after instillation of 0.5% proparacaine hydrochloride solution using a sterile No. 15 Bard Parker blade from the base of the ulcer as well as from the margins of the corneal ulcer [12]. Corneal material from scraping the ulcer was smeared for Gram's stain, 10% KOH preparation and inoculated on blood agar for culture of bacterial isolates and incubated at 37^0C were evaluated at 24 hours and 48 hours and then discarded if no growth was seen. Sensitivity was done using disc diffusion method iforganisms were isolated. For fungal culture the scrapings were directly inoculated on two slants of Saboraud's dextrose agar medium and incubated at 27^0C, examined daily and discarded at 3 weeks if there were no signs of growth.

Results

Out of 50 corneal ulcer patients 29 (58%) were males and 21 (42%) were 24 patients (48%) were 41-60 years of age,19 (38%) were 21-40 years of age, 4 (8%) were <20 years of age and 3 (6%) were >60 years of age. Majority of patients were in age group of working population i.e from 21-60 yrs. It was least in very young and old patients (Table 1).

Table 1: Age distribution of patients

Age Distributjion of Patients		
Age (Yrs)	**No.**	**%**
<20	4	8
21-40	19	38
41-60	24	48
>60	3	6
Total	50	100

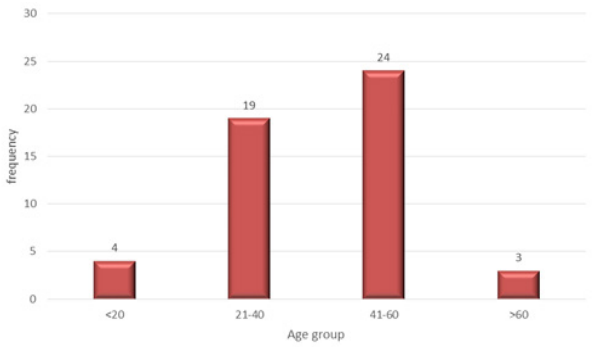


Fig 1: Distribution of study subjects according to age group

24 (48%)of the subjects belong to the productive age group of 41-60 (Fig. 1).

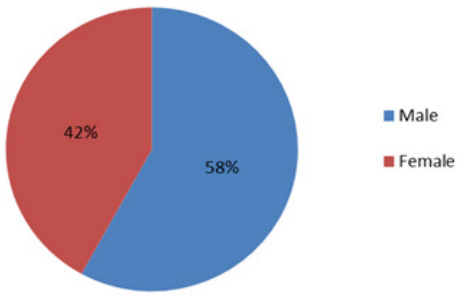


Fig 2: Sex distrubution of the study subjects

58% of the study subjects were males (Fig. 2)

Table 2: Occupation ofpatients with corneal ulceration

Occupation of the Patients		
Occupation	**No.**	**%**
Agriculture	34	68
Homemaker	3	6
Carpenter	2	4
students	5	10
Others	6	12
Total	50	100

Most (68%), of the patients were farmers followed by students who constituted 10% (Table 2).

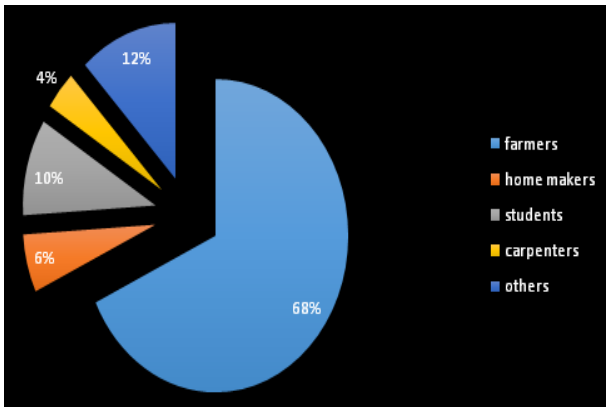


Fig. 3: Occupation of patients with corneal ulceration

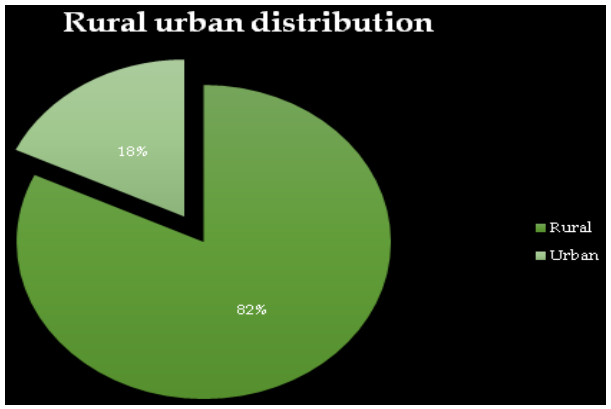


Fig. 4: Pie diagram showing rural and urban distrubution

82% were from rural areas whereas the rest were from urban areas (Fig. 4)

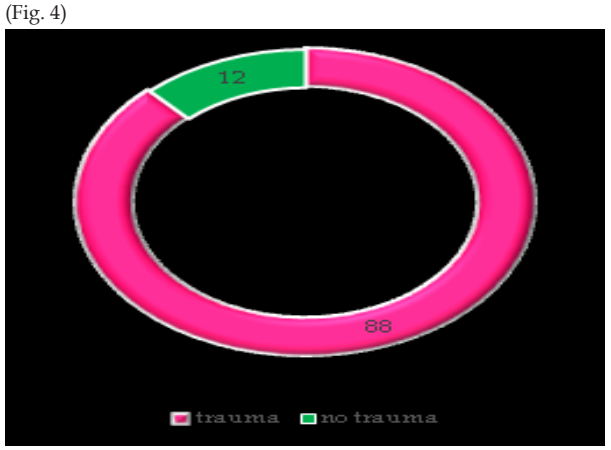


Fig. 5: Distribution of patients according to history of trauma

In 88% of the patients with corneal ulcers there was a history of trauma (Fig. 5).

Table 3: Showing the risk factors for corneal ulcer

Risk factor	No.	%
Vegetative matter	33	75
Stone	6	13.6
Animal agents	5	11.4
Total	44	100

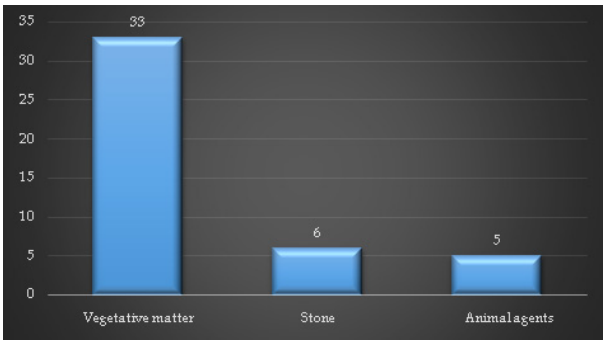


Fig. 6: distribution of the patients according to the type of risk factor

Many patients gave history of trauma to the eye with various agents. 75% of patients had trauma with vegetative matter.12% gave history of fall of stone into the eye. 10% had history of trauma with animal agents like cow tail and finger nail. (Fig. 6)

Table 4: Gram's stain report at first visit.

Gram Stain	No.	%
F	32	64
B	15	30
Not done	3	6
Total	50	100

B- Bacteria, F – Fungal Elements

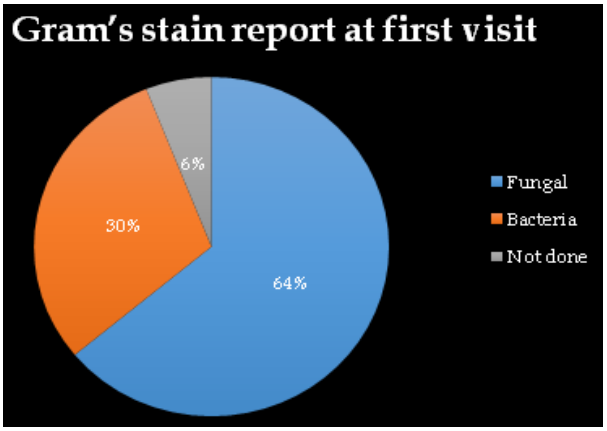


Fig. 7: Gram stain report at first visit.

Fungal culture was positive in 32 (64%) patients and bacterial culture in 15 (30%) patients (Fig. 7).

Table 5: Pathogens isolated from corneal ulcers (n=50)

Etiological Agents	No.	%
Fusarium	18	36
Aspergillus flavus	8	16
Aspergillus fumigatous	6	12
Staphylococcus aureus	4	8
Staphylococcus epidermidis	9	18
Pseudomonas aeruginosa	2	4
Viral	3	6
Total	50	100

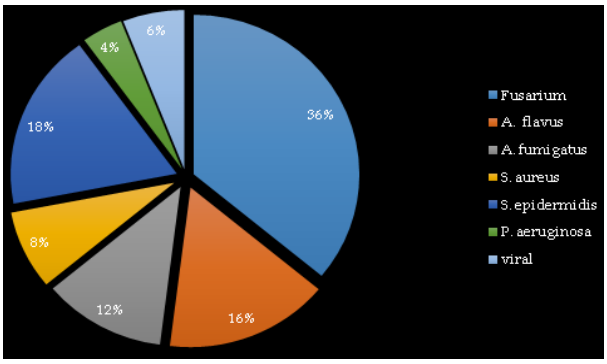


Fig. 8: Pathogens isolated from corneal ulcers.

Table 6: Depth of Infiltration

Depth of infiltration	No.	%
Anterior stroma	16	32
Mid stroma	28	56
Full thickness	6	12
Total no. of patients	50	100

56% of the patients had mid stromal involvement, while 32% had anterior stromal involvement (Table 6).

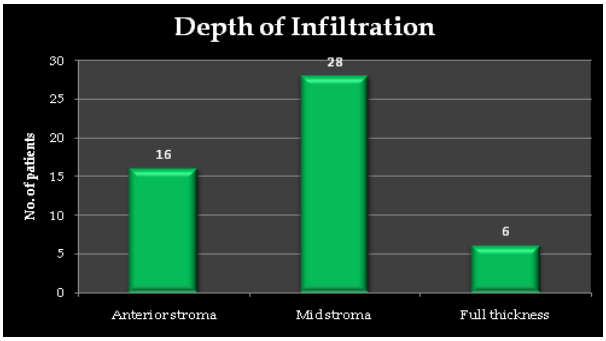


Fig. 9: Depth of infiltration

In this study 56% of study subjects had mid stromal involvement followed by 32% anterior stromal involvement and in 12% of the study subjects full thickness of the cornea was involved (Table 9).

Discussion

Corneal ulcer is a sight threatening disorder presenting in all age groups and either sex world wide. In this study majority of patients were in the working population i.e 41-60 years (48%), followed by 21-40 yrs, >60 yrs and <20 yrs. In Nath et al. study the commonest age group was between 41-50 years which was in agreement with the present study [13]. This has a our considerable socioeconomic impact because this age group people are bread winners of the family. In similar other studies the commonest age group was 31-40 yrs. Regarding the gender of the patients, in this study males (58%) were affected more than females (42%). In other similar studies male preponderance ranged between 65 to 68%. By the nature of their work profile men are more exposed to outdoor activities thereby increasing their vulnerability to the disease. In this study farmers (68%) homemaker (6%), other professions like students (10%), carpenters (4%) and others (12%) which includes other occupations like tradesmen and unemployed individuals. In Bharathi et al. study, [12] farmers contributed to 64.75%, homemaker 5.11%, students 8.11%, tradesman 6.48%, unemployed 1% and labourers 14.52%.

This occupational preponderance was justified because trauma with vegetative matter was an important risk factor for the occurrence of infective keratitis, especially fungal. In this study 41 (82%) were from rural areas whereas the rest of the 9 (18%) were from urban areas.

Table 7: Comparison of rural- urban distribution in different studies.

	Bharathi et al[12] study	Nath R et al[13] study	Present study
Rural	80.27%	87.9%	82%
Urban	19.73%	11.5%	18%

This data coincided well because patients involved in agricultural activity were more commonly from rural area (Table 7).

It is of interest that over 68% of the patients in the study presented for examination during the second week is similar with findings in Nepal [14]. Majority of patients (82%) presented only after 6 days of symptoms. In Bharathi et al. study [12], 46.66% patients reported within 7 days. There was history of trauma in 88% patients with various agents like vegetative matter (75%), stone (13.6%) and other agents like animal tail and finger nail (11.4%). 72% patients had trauma with vegetative matter because most of these patients were engaged in agricultural activity. In Bharathi et al [12] study 92.15 percentage patients had corneal trauma and among them 61.28% were by vegetative matter.

In 12% of the patientsfull thickness of the cornea was involved, 32% had anterior stromal involvement and 56% had mid-stromal involvement. Out of the 6 patients who had full thickness involvement of the cornea, 2 patients eventually had perforation of the cornea at 3-4 weeks inspite of treating with systemic antifungals. The corneal ulcers with anterior stromal involvement started healing earlier (1-2 wks) than the other groups.

Almost 64% of all corneal ulcers with positive cultures were fungal in origin. This figure approaches the fungal isolation rate by Hagan et al. [15] (56%) and Srinivasan et al. [11]. (51.9%).

Table 8: Comparison of common organisms in different studies.

Study	Bharathi et al[12]	Chowdhary et al[16]	Gopinathan etal[15]	Present study
Most common organism	Fusarium	Aspergillus	Fusarium	Fusarium

In this study, Fusarium is the most common organism (36%) the next common organism was Aspergillus flavus (16%), followed by Aspergillus fumigatus (12%). In Chowdhary et al. [16] study, Aspergillus niger was found to be the most common fungal species.

Conclusions

The various demographic factors like age, sex and population were studied and it was found most of the corneal ulcers are seen in the rural population especially farmers who have trauma to the eye with vegetative matter.

KOH mounts were in agreement with fungal culture in 64% of cases and so it can be used as a quick and reliable method to find out fungal etiology of corneal ulcers and treatment can be started immediately without waiting for the culture reports to arrive. Grams staining is a reliable and fast method to suspect bacterial etiology. In this study *Fusarium* was the most common species among the culture positive cases followed by *Aspergillus* species among the fungi. Among the bacteria *Staphylococcus epidermidis* is the most common species followed by *Staphylococcus aureus* and *Pseudomonas* species.

The study shows that in ulcers with deep stromal involvement, only 50% showed signs of healing which again stresses the importance of early recognition of the correct etiology.

Summary

- In this study majority of patients (48%) were in the working population i.e 41-60 years
- Among the patients 58% were males.
- Most of the patients were farmers (74%) and from rural areas (82%).
- Trauma with vegetative matter was a predisposing factor in 75% of cases.
- 12% cases had full thickness involvement of the cornea.
- 64%patients were KOH positive and among them all are culture positive.30% are bacterial and all are culture positive.

References

1. Govt. of India. National Survey on blindness 1999-2001. Report 2002.
2. Gonzales CA, Srinivasan M, Whitcher JP, Smolin G. Incidence of Corneal Ulceration in Madurai Disrict – South India. Ophthalmic Epidemiol 1996;3:156-66.
3. Chirambo MC. Tielsch JM, West KP,Katz J.Blindness and visual impairment in Southern Malawi. Bull WHO 1986;64:567-72.
4. .Chirmbo MC. Causes of blindness among students in blind school institutions in a develoing country. Br J Ophthalmol 1976;60:665-668.
5. Rapoza PA, West SK, Katala SJ, Taylor HR. Prevalence and causes of vision loss in Central Tanzania. Int Ophthalmol 1991;15:123-29.
6. Brilliant LB, Pokhrel RP, Grasset NC, Lepkowski JM, Kolstad A, Hawks W, et al. Epidemiology of blindness in Nepal.Bull WHO 1985;63:375-86.
7. Khan MU, Hague MR, Khan MR. Prevalence and causes of blindness in rural Bangladesh Ind J Med Res 1985;82:257-262.
8. Gilbert CE, Wood M, Waddel K, Foster A. Causes of chilhood blind in Malawi, Kenya and Uganda. Ophthalmic Epidemiol 1995;2:77-84.
9. Thylefors B, Negrel AD, Segaram PR, Dadzie KY. Available data on blindness (update 1994), Ophthalmic Epidemiology 1995;2:5-39.
10. Whitcher JP, Srinivasan M, Upadhyay MP. Corneal blindness: a global perspective. Bulletin of world Health Organization 2001;79:214-21.
11. Srinivasan M, Gonzales CA, George C, Cevallos V. Mascarenhas JM, Ashoka B, et al. Epidemiology and etilogica diagnosis of Corneal Ulceration in Madurai South India, BJO 1997;81:965-71.
12. Bharathi MJ, Ramakrishna R, Vasu S, Meenakshi, Palaniappan R, Aetiological diagnosis of microbial Keratitis in South India – a study of 1618 cases. Indian J Med Microbiol 2002 Jan –Mar;20(1):19-24.
13. Nath R, Baruah S, Saikia L, Devi B, Borthakur AK, Mahanta J. Mycotic Ulcers in Upper Assam Indian J Ophthalmol 2011;59:367-71.
14. Dunlop AA, Wright ED, Howlader SA, Nazrul I, Husain R, McClellan K, Billson FA. Suppurative corneal ulceration in Bangladesh: A studyof 142 cases examining the microbiological diagnosis, clinical, and epidemiological features of bacterial and fungal keratitis. Aust N Z J Ophthalmol. 1994 May;22(2):105-10.
15. Hagan M, Wright E, Newman M, Dolin P, Johnson G. Causes of suppurative keratitis in Ghana.Br J Ophthalmol. 1995;79:1024-8.
16. Chowdhary A, Singh K. Spectrum of fungal keratitis in North India. Cornea. 2005;24:8–15.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.9

Clinical Study of Pseudoexfoliation of Lens

L.R. Murthy[1], Sangeeta Das[2]

Abstract

Pseudoexfoliation [PEX] syndrome is a common age – related disorder of the extracellular matrix that is frequently associated with severe chronic secondary open angle glaucoma and cataract. PEX syndrome may affect up to 30% of people older than 60 in a worldwide distribution and is biomicroscopically diagnosed by abnormal fibrillar deposits on ocular structures that line the aqueous bathed surfaces of the anterior segment. Often associated with the need for intraocular surgery, results of cataract and glaucoma filtering surgery in eyes with PEX in the early stages of disease may be comparable to those in eyes without PEX, in the later stages morbidity is significantly increased due to periocular surgical complications and the outcome is worse. Surgical and postoperative difficulties are often multifactorial and are directly related to the pathological changes of PEX on intraocular structures. Although the visible areas of the anterior capsule are most obviously involved, this is only a small part of the picture and of least significance. Biomicroscopically invisible changes of the zonules and their attachments are of the greatest consequence as they lead to zonular dialysis and subluxation of lens. In relation to the surgical management of these patients, the importance of early recognition of the pathological features, expectations of higher complication rate and having a plan to deal with them, taking adequate time for the surgery, close attention to postoperative follow–up and a well informed patient with realistic expectations cannot be overemphasized.

Keywords: Pseudoexfoliation Syndrome; Zonular Dialysis; Subluxation.

Introduction

Since the past several years, number of ophthalmologists have been intrigued by the dandruff – like greyish white fibrillar material seen at the papillary margin and on the lens surfaces of many eyes, first described by Lindberg [1] in 1917. Malling [2] later noted areas of central and peripheral deposits separated by a clear intermediate zone on the anterior lenticular surface. Vogt [3] associated these findings with open angle glaucoma and proposed the name "glaucoma capsulare" or "exfoliation of the lens capsule". Dvorak – Theobald [4] in 1954 proposed that the lens capsule was not involved pathologically and that the term pseudoexfoliation of the lens capsule was more descriptive to distinguish the condition from capsular delamination or true exfoliation and the term pseudoexfoliation syndrome is commonly used in modern literature. However, more recent ultrastructural studies have suggested that the exfoliative material on the lens capsule is derived, at least in part, form the lens and it has been proposed that this entity be called the "exfoliation syndrome" [5,6,7]. Both terms pseudoexfoliation syndrome and exfoliation syndrome are still commonly used in current literature, Exfoliation syndrome is characterized by the deposition of greyish white fibrillar material in a distinct pattern throughout the ocular anterior segment. The hallmark of exfoliation syndrome is the characteristic pattern of whitish pseudoexfoliation material on the anterior lens capsule which has three zones: a) a translucent, central disc with occasional curled edges b) a clear intermediate zone, corresponding to contact with the moving iris c) a peripheral granular zone, which may have radial striations [6].

Author Affiliation: [1]Professor & Head [2]Associate Professor, Dept. of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

Corresponding Author: Sangeeta Das, Associate Professor, Dept. of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

E-mail: drsangeetadas@yahoo.co.in

Received on 07.07.2018, **Accepted on** 30.07.2018

Exfoliation material also accumulates on the pupillary margin of the iris, iris surface, corneal endothelium, trabecular meshwork, lens zonules and ciliary body. Exfoliation material is also seen on the anterior hyaloid in aphakic eyes and on a posterior – chamber intraocular lens in pseudophakic eyes [8].

Patients who have pseudoexfoliation syndrome tend to have increased pigmentation of the anterior chamber angle. It has been associated with non–guttate endothelial loss and subsequent corneal decompensation.

Ultrastructural evaluations indicate that the exfoliation material can be found in the conjunctiva [9], extraocular muscles, orbital septa, posterior ciliary arteries, vortex veins, and central retinal vessels passing through the optic nerve sheaths. Ultrastructural studies performed on eyes during autopsy suggest that pseudoxfoliation syndrome is a systemic disorder. Exfoliation material has been found in a number of organs, which include skin, lung, gall bladder, liver, myocardium, kidney, bladder, and meninges.

The condition is more common in older age groups and is often found to be associated with raised intraocular pressure and cataract. Phacodonesis and subluxation of the lens is also seen in some patients, due to degenerative changes in the zonular fibers of these individuals [10,11]. The incidence of glaucoma in patients with pseudoexfoliation is as much as 10 to 15 fold higher than in the general population. Compared with eyes with primary open angle glaucoma, eyes with pseudoexfoliation generally have more severe optic disc and visual field damage on diagnosis.

The frequency of ocular hypertension in patients with pseudoexfoliation has been reported to be 5 to 10 times higher than in the general population. The amount of exfoliation material deposited in and around the Trabecular meshwork has been associated with increased intraocular pressure and the presence of glaucoma.

Patients with pseudoexfoliation syndrome have higher rates of intraoperative complications during and after cataract surgery compared to patients without the condition. Zonular attachments in pseudoexfoliation syndrome are weakened due to accumulation of pseudoexfoliative material resulting in higher incidence of lens subluxation, zonular dialysis and vitreous loss. Another factor which may complicate surgery is the reduced response to pharmacological dilatation in patients who have pseudoexfoliation syndrome [12].

Thus, considering the clinical importance of pseudoexfoliation, a study has been carried out in this institution taking into account various aspects of this condition.

Materials and Methods

In the present study 3200 patients of cataract visiting the outpatient department of ophthalmology at our Malla Reddy institute of medical sciences hospital between January 2015 to December 2015 were examined under a hospital based, observational, non – interventional, prospective, non-randomized, clinical study. 185 eyes of 115 patients diagnosed with pseudoexfoliation of lens were studied.

Patients of any age with cataract changes, patients with pseudoexfoliation lens and patients with systemic illness like diabetes, hypertension or ischaemic heart diease with due medical fitness were the inclusion criteria. Patients with evidence of ocular trauma, present or past uveitis and patients with intraocular surgery and laser treatment except for glaucoma were the exclusion criteria.

A detailed medical and ophthalmic history was obtained from each patient and a comprehensive vision and eye examination was carried out using tonometry, pupil reflex examination, Gonioscopy and slit- lamp examination, before and after dilatation of pupil for assessment of the type of cataract and for fundus examination.

Gonioscopy was done in all cases of pseudoexfoliation of lens using Goldman 3 mirror lens to determine the presence of pseudoexfoliation material and pigmentation in angle and type of the angle. 10% phenylephrine eye drops were used for mydriasis. Patients with angle closure were not dilated. Glaucoma capsulare was diagnosed on the basis of Foster's criteria for epidemiological studies. Optic disc and retinal examination was performed using 90D lens. The vertical CD ratio and the presence of focal notching was recorded. Eyes with visual acuity > 6/60, CDR ≥ 0.6 in the presence of assymetry ≥ 0.3 or a neuroretinal rim width reduced to < 0.1 CDR (between 11 to 1 O' clock or 5 to 7 O' clock) underwent automated perimetry on Zeiss Humphrey system.

Keratometry, A scan and intraocular lens power estimation by SRK – II formula was done in all patients of pseudoexfoliation of lens undergoing cataract surgery. Intraoperative complications were determined during surgery. The surgeries were performed under peribulbar anesthesia under strict asepsis.

In cases of pseudoexfoliation of lens with cataract, cataract extraction was performed. Patients with raised IOP were controlled with medical therapy first, and then cataract extraction was performed. In patients with cataract and glaucoma, IOP was

controlled with medical treatment first, and then cataract extraction was performed. Cases not controlled with medical therapy alone, in these patients cataract extraction with trabeculectomy was done. PCIOL implantation was done in the cases possible.

Postoperative evaluations were done on 1st postoperative day, 1st week and at the end of 6th week for UCVA, BCVA, slit lamp biomicroscopy, intraocular pressure, direct and indirect ophthalmoscopy.

Observations and Results

In the present study a total of 3200 patients of cataract visiting the ophthalmology outpatient department during a period of 1 year from January 2015 to December 2015 were examined. 185 eyes of 115 cases had either unilateral or bilateral pseudoexfoliation of lens capsule. The observations made are presented below

Table 1: Distribution of pseudoexfoliation of lens in cataract cases

Total number of patients seen	Pseudoexfoliation cases	Percentage (%)
3200	115	3.593

In the present study PEX of lens was observed in 3.593 % cases of cataract in outpatient department during a period of 1 year (Table 1).

Table 2: Age Distribution of PEX of Lens

Age group (years)	PEX cases total cases – 115 cases	Percentage (%)
41-50	5	4.347
51-60	25	21.739
61-70	54	46.95
71+	31	26.95

The maximum age distribution of PEX is seen between the age group of 61- 70 years while it is quite low below 50 years (Table 2).

Table 3: Sex Distribution of PEX of Lens

Total cases	Males	Females
115	72 (62.60%)	43 (37.39%)

PEX of lens was found predominantly in males 62.60% as compare to females 37.39% (Table 3).

Table 4: Distribution of laterality of PEX of lens

Unilateral		Bilateral
Rt. eye	Lt. eye	
24(20.86%)	21 (18.265)	70 (60.86%)

Total eyes = 24+21+ (70X2) = 185 eyes.

PEX was more commonly found to be bilateral than unilateral. Unilateral cases showed no specific predilection for either eye (Table 4).

Table 5: Distribution of PEX Material at Various Sites

Site	Number of Eyes Total Eyes – 185	Percentage (%)
Corneal endothelium	13	7.02%
Iris crypts	19	10.27%
Papillary margin	161	87.02%
Central disc on anterior lens capsule	86	46.48%
Peripheral band on anterior lens capsule	185	100%
Trabecular meshwork	58	31.355

The presence of PEX material as the peripheral band on the anterior lens capsule was the constant feature and was present in all the 185 eyes (100%), on the pupilary margin it was found in 161 eyes (87.02%) (Table 5).

Table 6: Distribution of PEX of lens in different types of cataract

Type of cataract	Number of eyes Total eyes – 185	Percentage (%)
Nuclear cataract(brown cataract Gr.III.N.S)	61	32.97
Cortical cataract	11	5.94
Cortical cataract + Gr.II.N.S	21	11.35
Cortical cataract + Gr.I.N.S	9	4.86
Intumescent cataract	8	4.32
Mature cataract	20	10.81
Hyper mature cataract	7	3.78
Posterior sub capsular cataract (PSC)	6	3.24
PSC + Gr.II.N.S	25	13.51
Cortical cataract + PSC	9	4.86
Cortical cataract + PSC+ Gr.II.N.S	8	4.32

PEX of lens was found in maximum number of cases of brown cataract (32.9%) (Table 6).

Table 7: Relation of PEX of lens with position of lens

Position of lens	Number of eyes Total eyes - 185	Percentage (%)
Normal	161	87.02
Subluxated	12	6.48
Phacodonesis	12	6.48

12 cases of subluxation and 12 cases of phacodonesis were found out of total of 185 eyes with PEX (Table 7).

Table 8: Relation of PEX of lens with intraocular pressure

Normotensive eyes	Hypertensive eyes (IOP > 21 mm Hg)
116 (62.70%)	69 (37.29%)

37.29% of eyes with PEX of the lens were associated with increased intraocular pressure (Table 8).

Table 9: Results of Gonioscopy in PEX of lens

Angle grade (Shaffer's classification)	Number of eyes Total eyes – 185	Percentage (%)
Wide open angle (Grade 3-4)	156	84.32
Narrow angle (Grade 1-2)	22	11.89
Closed angle (Grade 0)	7	3.78

156 cases of wide open angle, 22 cases of narrow angle and 7 cases closed angle were observed on Gonioscopy (Table 9).

Table 10: Relation of PEX of lens with glaucoma

	Glaucoma	Number of eyes total eyes -185		Percentage (%)	
Pseudoexfoliation	**Open**	**M**	**F**	**M**	**F**
Glaucoma 29 (15.67%)	Angle Glaucoma 23 (12.43%)	15	8	8.10%	4.32%
	Angle Closure Glaucoma 6 (3.24%)	3	3	1.62%	1.62%

29 eyes (15.67%) with PEX were diagnosed with Glaucoma.out of which 23 eyes (12.43%) had open angle Glaucoma and 6 eyes (3.24%) had angle closure Glaucoma (Table 10).

Talge 11: Effect of mydriasis in eyes with PEX of lens

Effect of mydriasis	Number of eyes (Total eyes – 179, 6 eyes were not dilated)	Percentage (%)
Full mydriasis	76	42.45
Partial mydriasis	103	57.45
Rise in intraocular pressure	120	67.03

Rise in IOP was frequently recorded after mydriasis of pupil in 67.03% of eyes.57.45% of eyes with PEX showed heavy deposition of PEX material and thus partial mydriasis (Table 11).

Table 12: Mode of treatment used in PEX of lens

Treatment	Number of eyes Total eyes -185	Percentage (%)
SICS + PCIOL	86	46.48
Phacoemulsification + PCIOL	56	30.27
ECCE + PCIOL	9	4.86
ECCE +PCIOL +TRAB	15	8.108
ECCE + ANT.Vitrectomy	9	4.86
SICS + ANT.Vitrectomy	6	3.24
ICCE +ANT.Vitrectomy	1	0.54
No Treatment	1	0.54
Only Medical Line of Treatment	1	0.54
Refered to Posterior Segment Surgeon (Nucleus Drop)	1	0.54

151 cases underwent cataract extraction with PCIOL implantation, 15 cases cataract extraction with PCIOL implantation with trabeculectomy (Table 12)..

Tabel 13: Intraoperative complications eyes with PEX of lens

Complication	Number of eyes Total eyes – 185	Percentage (%)
Zonular dialysis	12	6.48
Posterior capsular rupture	24	12.97
Vitreous loss	19	10.27
Pigment dispersion	8	4.32
Nucleus drop	1	0.54
Posterior synechiae	7	3.78
Iris prolapsed	4	2.16
Difficulty in performing CCC	6	3.24

Zonular dialysis, posterior capsular rupture and vitreous loss frequently occurred during surgery in cases of PEX of lens (Table 13).

Table 14: Intraoperative complications according to type of surgery

Surgery and no. of surgeries	Posterior capsular rupture	Vitreous loss	Zonular dialysis
ECCE (33)	10(30.30%)	8(24.24%)	2(6.06%)
SICS (92)	11(11.95%)	8(8.69%)	8(8.69%)
Phacoemulsification (56)	3(5.35%)	3(5.35%)	2(3.57%)

Complications like posterior capsular rupture and vitreous loss occurred more in eyes with ECCE and less in eyes with SICS and phacoemulsification (Table 14).

Table 15: Postoperative complications

Complication	Number of eyes	Percentage (%)
Corneal edema	12	6.48
Shallow AC	7	3.78
Uveitis	5	2.70
Hyphaema	3	1.62
IOL decentration	4	2.16
Endothelial decompensation	3	1.62

12 cases had corneal edema and 3 cases went in to endothelial decompensation which were associated with corneal dystrophy (Table 15).

Table 16: postoperative rehabilitation

Visual acuity	Number of eyes	Percentage (%)
No improvement in visual acuity	14	7.56
Upto finger counting 6 meters	9	4.86
6/60 to 6/18	52	28.10
6/12 to 6/6	110	59.45

Six weeks after cataract extraction, most patients showed good visual outcome with 59.45% cases having visual acuity 6/12 or better and 28.10% cases showed visual acuity 6/60 or better as seen above Table 16.

Intra – ocular pressure was well controlled after cataract extraction. This shows that intraocular pressure can be well controlled by cataract extraction.

Poor visual outcome in some cases was due to intraoperative vitreous loss and postoperative complications like corneal, endothelial decompensation and associated glaucoma.

Discussion

Comparing the present study with previous studies, we found that most of the results are in accordance with those in literature.

Although pseudoexfoliation syndrome has worldwide distribution, reported prevalence rates vary extensively. There is a well recognized tendency for the syndrome to cluster both geographically and within racial and ethnic subgroups

Country	Author	Year	Percentage (%)
India	Siva reddy[13]	1970	34.6
	Sood[14]	1968	1.9
	Lamba[15]	1984	7.4
	Arvind H[16]	2003	3.8
Finland	Lind berg[1]	1917	20
Greece	Trantas[17]	1934	13.3
Norway	Horven[18]	1937	17
	Bertelsen[19]	1964	1
	Ring vold[20]	1988	16.9
USA	Irvine[21]	1940	3
	Hiller[22]	1982	2.6
Germany	Aasved[23]	1969	4
South Africa	Bartholomew[24]	1973	
		Over 40	8.1
		5059	7.2
		Over 60	10.3
Present study			3.593

The distribution varies in different countries. The distribution of PEX of lens in the present study is comparable with the study done by Aravind et al. 2003.

The study of literature shows the highest prevalence to occur between 60 to 80 years, average being around 70 years. Tarkkanen (1962) [25], Siva Reddy et al. (1970) [13] and Sood et al (1968) [14] reported the maximum prevalence between 60 to 70 years.

Though Duke – Elder (1969) [26] stated that there was no appreciable sex preference for the occurrence of PEX, studies in India by Sood et al (1968) [14], Siva Reddy et al. (1970) [13] and P.A. Lamba (1984) [15] revealed PEX to predominately occur in males.

The distribution of PEX of lens was more in males in the present study was similar to the study done by others. Most workers have found bilateral cases to be more common than unilateral.

In this study flakes at the pupillary margin were found in 87.02% cases, indicating that it is a common site where exfoliative material gets deposited which is in close comparison with the studies done by other authors. The peripheral band of PEX material is a constant feature and is seen in 100% of cases, which is in accordance with the previous study by Konstas 1993 [27]. This confirms the fact that peripheral band is the most constant feature of PEX of lens and unless its presence is established PEX of lens should not be diagnosed.

PEX is commonly associated with brown cataract which is in accordance with the previous study by Sood et al. [14], Mardin C.Y [28], Rudkin et al. [29] and Rahman et al. [30].

Several studies in literature show that in patients of PEX of lens, there is a tendency for phacodonesis and spontaneous dislocation of the lens and operative dislocation of lens when grasped with forceps. This tendency of the lens for displacement occurs due to changes in zonules, which are extremely weak due to deposition of PEX material. The zonules stretch and tend to break at their attachment to ciliary body.

PEX of lens showed a raised IOP which is comparable to the studies done by other workers.

In the present study, 84.32% cases of wide open angle, 11.89% cases of narrow angle and 3.78%cases of closed angle were found. The percentage of open angle was in close range with the previous studies while that of narrow angle and closed was less as compared to previous studies. Increased Trabecular pigmentation was noted in 97.72% cases, similar to the studies done by other workers.

In the present study 15.67% cases of PEX of lens was diagnosed with glaucoma. Out of 29 cases of PEX glaucoma, 23 cases of open angle glaucoma (12.43%) and 6 cases of angle closure glaucoma (3.24%) were found in the present study. the finding of open angle Glaucoma was comparable to the study done by Roth and Epstein (1980) [31] while the finding in angle closure glaucoma was much lower than this study by Gillies et al (1988) [32].

It can be said that it is difficult to control the glaucoma associated with PEX of lens with medical therapy alone and most of the patients require filtering surgeries.

In accordance with previous studies, this study shows that trabeculectomy is an effective means for control of intraocular pressure in glaucoma capsulare and it should be combined with extracapsular cataract extraction in cases where glaucoma capsulare is associated with cataract. Also, the present study shows that cataract

extraction causes reduction in IOP after cataract surgery in eyes with PEX, similar to the study done by other workers.

PEX patients have increased rates of intraoperative capsular complications, such as posterior capsular rupture, zonular dialysis, and vitreous loss, during cataract surgery.

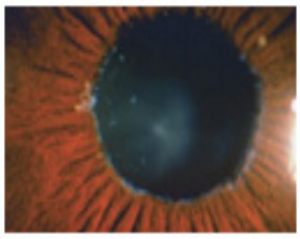


Fig.1: PEX over ant. Lens capsule.

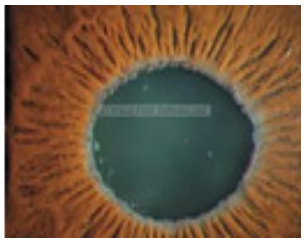


Fig.2: PEX over pupilary Margin.

Fig: 3. Peripheral band of PEX over anterior lens capsule.

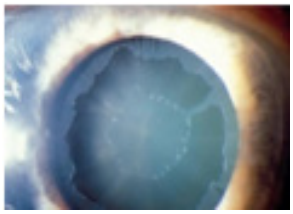


Fig: 4. central disc of PEX Over anterior lens capsule.

Conclusions

In the present study a total of 3200 patients of cataract visiting the ophthalmology outpatient department during the period of 1 year from January 2015 to December 2015 were examined.

1. PEX was present in 185 eyes of 115 cases. PEX of lens was found in 3.593% of patients of cataract during the period of 1 year.
2. The maximum age distribution of PEX of lens was between 61-70 years and was quite less below 50years.
3. PEX of lens was predominantly seen in males 62.60%.
4. PEX of lens was commonly found to be bilateral 60.86%
5. Presence of peripheral band of PEX material on anterior lens capsule was a constant feature and was noted in all cases.
6. PEX of lens was commonly found in brown cataract 32.97.
7. Due to zonular weakness and fragility there is a tendency of spontaneous displacement of the lens from its position. 6.48% cases had subluxation and another 6.48%cases had phacodonesis.
8. 37.29% of eyes with PEX of the lens were associated with increased intraocular pressure.
9. 156 cases of wide open angle, 22 cases of narrow angle and 7 cases closed angle were observed on Gonioscopy.
10. 29 eyes (15.67%) with PEX were diagnosed with Glaucoma,out of which 23 eyes (12.43%) had open angle Glaucoma and 6 eyes (3.24%) had angle closure Glaucoma.
11. Rise in IOP was frequently recorded after mydriasis of pupil in 67.03% of eyes. 57.45% of eyes with PEX showed heavy deposition Of PEX material and thus partial mydriasis .
12. Medical line of therapy could not control IOP in patients with glaucoma capsulare
13. The IOP was well controlled in patients after combined surgery (Trabeculectomy combined with cataract extraction) and was more effective than medical therapy.
14. A reduction in IOP was observed after cataract extraction.
15. PEX of lens was found to be associated with increased intraoperative complications like posterior capsulare rupture, zonular dialysis and vitreous loss.
16. Prognosis depends on the stage of glaucoma, association with subluxation, intraoperative and postoperative complications. More than half (59.45%) cases showed a very good visual prognosis while in 7.56% cases there was no improvement in visual acuity.

Thus in conclusion, PEX of lens is a condition of old age,commonly associated with brown cataract, raised intraocular pressure, open angle glaucoma and increased rates of intraoperative posterior capsular complications.

References

1. Lindberg JG. clinical investigations on depigmentation of the papillary border and translucency of the iris in cases of senile cataract and in normal eyes in elderly persons (1917) (reprinted) Acta ophthalmol 1989;67(suppl 190):1–96.
2. Malling B. Untersuchung Uber das verhlitnis Zwischen Iridocyklitis und Glaukom. acta ophthalmol (Kobenhavn) 1923;1:97.
3. Vogt A. Ein neues Spaltlampenbild des Pupillengebits: Hellblauer Pupillensaumfilz mit Hautchenbildung auf der Linservorderkapsel. Klein Monatsbl Augenheilkd 1925;75;1-12.
4. Dvorak – Theobald G. Pseudo – exfoliation of the lens capsule. Am J Ophthalmol 1954;37:1-12.
5. Sunde OA. Senile exfoliation of the lens capsule. Acta Ophthalmol 1956;45(suppl):27.
6. Layden WE, Shaffer RN. Exfoliation syndrome. Acta Ophthalmol 1974;78:835.

7. Tarkkanen A, Forsius H, eds. Exfoliation syndrome. Acta Ophthalmol 1988;66 (suppl 184), Copenhagen, Scriptor.
8. Ringvold A, Bore J .Pseudoexfoliation pattern on posterior IOL. Acta Ophthalmology 1990;68:353.
9. Streeten BW, Bookman L, Rtich R.et al. Pseudeoxfoliative fibrillopathy in the conjunctiva. A relation to elastic fibers and elastosis. Ophthalmology 1987;94:1439.
10. Futa R, Furoyoshi N. phacodonesis in capsular glaucoma: A clinical and electron microscopic study. Jpn J ophthalmol 1989;33:11.
11. Freissler K, Kuchle M, Naumann GOH. Spontaneous dislocation of the lens in Pseudoexfoliation syndrome. Arch J Ophthalmol 1995;113:1095.
12. Carpel EF. Pupillary dilation in eyes with pseudoexfoliation syndrome. Am J Ophthalmol 1988;105:692-3.
13. Siva reddy P, Ranga reddy P Satapatty P. Orient Arch Ophthalmol 1970;8:143.
14. Sood NN and Ratnaraj A. Pseudoexfoliation of the lens capsule. Orient Arch Ophthalmol 1968;6:62.
15. Lamba PA, Giridhar A. Pseudoexfoliation syndrome.Indian J Ophthalmol 1984;32:169-73.
16. Arvind H, Raju P, Paul PG, et al. Pseudoexfoliation in South India.Br J Ophthalmol 2003;87:132-3.
17. Trantas. Pseudoexfoliation of the lens capsule.Arch Ophthalmol 1929;46:482 [Ann. Oculist (Paris) 1934; 171:610].
18. Horven E. Pseudoexfoliation of the lens capsule. Br J Ophthalmol 1937;21:625.
19. Bertelsen TI, Drablos PA, Flood PR. The socalled senile exfoliation (pseudoexfoliation) of the anterior lens capsule. A product of the lens epithelium. Fibrilliopathia epthliocapsularis. A microscopic, histochemical and electron microscopic investigation. Acta Ophthalmol 1964;42:1096-1113.
20. Ringvold A, Blika S, Elsa t, et al. The prevalence of pseudoexfoliation in three separate municipalities of Middle – Norway. A preliminary report. Acta Ophthalmol 1988;65(suppl182):17-20.
21. Irvine R. Exfoliation of the lens capsule (glaucoma capsularis).Arch Ophthalmol 1940;23:138-60.
22. Hiller R. Sperduto RD and Krueger DE. Pseudoexfoliation, intraocular pressure and senile lens changes in a population based survey. Arch Ophthalmol 1982;100:1080-82.
23. Aasved H. The geographic distribution of fibrillopathia epitheliocapsularis (so called senile exfoliation of pseudoexfoliation of anterior lens capsule). Acta Ophthalmol 1969;47:792.
24. Bartholomew RS. Pseudocapsular exfoliation in Bantu of South Africa. Br J Ophthalmol 1973;55:693.
25. Tarkkanen A. Pesudoexfoliation and cataract extraction. Acta Ophthalmol 1962;42:401-407.
26. Sir Duke Elder S. System of ophthalmology. Vol XI. Sec – I. London, Henry Kimpton publishers, 1969, Pg 45-56.
27. Konstas A, D Mantziris, W Stewart. Dlurnal intraocular pressure in untreated exfoliation and primary open angle glaucoma. Arch Ophthalmol 1997;115:182-182.
28. Mardin CY, Schlotzer – Schrehardt U, Naumann GOH. Early diagnosis of pseudoexfoliation syndrome. A clinical electron microscopy correlation of the central anterior lens capsule (article in German). Kin Monatsbl Augenhelikd 1997;211:296-300.
29. AK Rudkin, K Edussurlya, S Sennanayakae, T Senaratne, D selva, TR Sullivan, RJ Csasson, Prevalence of exfoliation syndrome in central Sri Lanka: the Kandy Eye study.Br J Ophthalmol 2008;92:1595-98.
30. A M Abdul – Rahman, R J Casson, H S Newland, J Muecke, S MaGovern, T H Aung, D Selva, T Aung. Pseudoexfoliation in a rural Burmese population: the Meiktila Eye Study. Br J Ophthalmol 2008; 92:1325-28.
31. Roth M, Epstein DL. Exfoliation syndrome. Am J Ophthalmol 1980;89:477-81.
32. Gillies WE, Brooks AMV. The presentation of acute glaucoma in Pseudoexfoliation of the lens capsule. Aust NZ J Ophthalmol 1988;16:101.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.10

Cross-sectional Study of Myopia among Medical Students

Manjunath D. Patil[1], Mansi Kothekar[2]

Abstract

Introduction: Refractive error is the inability of the optical system to bring an image to the sharp focus on the retina. Myopia is an optical aberration of the eye whereby objects at a distance are not focused onto the retina but brought to a focus in front of the retina, resulting in a blurred image. In India uncorrected refractive errors are second major cause of avoidable blindness. *Materials and methods:* This was a cross-sectional, descriptive study over a period of 2 months to find the incidence of myopia and prevalence of peripheral retinal degenerations among medical students in ARMCH Kumbhari, Solapur. Sample size was calculated by using the formula $n = z^2 * p * q / d^2$, 400 students were included in the study. *Results:* The incidence of myopia among medical students was 278 (69.5%) and 122(30.5%) in non myopic, female dominance, with 52% (209) myopes being females. It was found to be a statistically significant association between female gender with myopia. It is also found that incidence of myopia more observed in female (58.6%) than male (41.4%). Mothers of 23 (5.8%) students were myopic according to the history given by the students. Only 7(1.8%) of them had myopic siblings while the rest 393 (98.2%) students had non myopic siblings. Parents of 35 (8.8%) students underwent fundus examination earlier. while 365 (91.2%) of them had never undergone fundus examination. only 1 (0.2%) had a post herpetic corneal scar, while rest 399 had normal slit lamp findings. Best corrected visual acuity of the right eye of 394 (98.5%) students was upto 6/6, while 6 (1.5%) of them were corrected upto 6/9. prevalence of peripheral retinal degeneration among the 400 students examined was found to be 68 (17%). *Conclusions:* Studies of this kind are helpful in knowing the magnitude of the problem of myopia and retinal degenerations, and to stress upon the need for routine eye examination and fundus examination with indirect ophthalmoscopy among myopes and general population as well.

Keywords: Refractive Error; Myopia; Peripheral Retinal Degeneration; Visual Acuity.

Introduction

Refractive error is the inability of the optical system to bring an image to the sharp focus on the retina. Myopia is an optical aberration of the eye whereby objects at a distance are not focused onto the retina but brought to a focus in front of the retina, resulting in a blurred image. The prevalence of myopia has been reported to be as high as 70-90% in some Asian population, in India the prevalence of myopia is 7-11% in 15 year old and 35% in adults [1].

Myopia is a major cause of visual impairment in both developed and developing world [2]. In India uncorrected refractive errors are second major cause of avoidable blindness. According to the WHO-NPCB survey in 1989, 1.49% population in India is blind of which 7.35% is due to refractive errors which later increased to 19.7% [3]. Three fourth of the visual impairment was attributed to refractive errors in the same survey.

The suspected environmental factors include early age close work seen in highly educated people of the society and their offsprings and individuals with higher intellectual capacity. A study postulated that medical students are a select population with high level of education as well as an above average intelligence which perhaps explains the high prevalence of myopia among medical students [4]. The prevalence of myopia

Author Affiliation: [1]Associate Professor [2]Resident, Dept. of Ophthalmology, Ashwini Rural Medical College & Research Centre, Kumbhari, Solapur, Maharashtra 413006, India.

Corresponding Author: Manjunath D Patil, Associate Professor, Dept of Ophthalmology, Ashwini Rural Medical College & Research Centre, Kumbhari, Solapur, Maharashtra 413006, India.

E-mail: drmanjunath2000@gmail.com

Received on 17.03.2018, **Accepted on** 11.04.2018

among medical students in India ranges from 45-70% in different regions [5].

Myopia is associated with several retinal degenerations that can cause irreversible blindness [6].

High myopia or pathological myopia is associated with globe elongation and refractive error of at least 6 diopters (D) and/or axial length of greater than 25.5mm [7]. Excessive axial elongation of the globe in high myopia can cause mechanical stretching and thinning of the choroid and retinal pigment epithelium (RPE) layers resulting in various retinal degenerative changes [8]. Benign changes include "paving stone" degeneration, "white without pressure" areas, peripheral cystoids degeneration and snow flecks [9].

Individuals with high myopia have increased risks of retinal complications such as peripheral retinal degenerations, retinal tears, rhegmatogenous retinal detachment (RRD), posterior staphyloma, chorioretinal atrophy, retinal pigment epithelial atrophy, lacquer cracks, choroidal neovascularization (CNV) and macular haemorrhage [9,10].

Therefore the detection of these degenerative changes in a silent myopic eye during ocular examination may warrant prophylactic treatment by laser or less commonly by cryotherapy.

This paper describes the salient features and results of my cross sectional study to determine the incidence of myopia and prevalence of peripheral retinal degenerations among medical students of Ashwini Rural Medical College, Hospital and Research centre, Kumbhari.

Our study is one of the unique studies in which incidence of myopia has been co-related with prevalence of peripheral retinal degenerations in medical students.

Materials and Methods

This was a cross-sectional, descriptive study over a period of 2 months to find the incidence of myopia and prevalence of peripheral retinal degenerations among medical in ARMCH Kumbhari, Solapur.

Sample size was calculated by using the formula $n = z^2*p*q/d^2$

Expected prevalence (p) by previous study is 45% [10], and with confidence level of 95%, z=1.96, d= acceptable error 5%, q=1-p, the sample size would be 380; and considering dropout rate 10%, the sample size would be 400.

All the 400 students were included in the study.

Permission was obtained from the institutional ethics committee. The aims and objectives of the study, procedure of examination, and adverse effects of pupillary dilatation were explained to the students and the procedure was carried further. The basic examination was conducted in the ophthalmic outpatient department. Questionnaire was filled accordingly by the students.

The first part of the questionnaire included age and sex of the students, the class in which they study, their parents' occupation and their refractive error, and visual acuity. Visual acuity was measured first of the right eye followed by the left, by using Snellen's visual acuity chart for distant vision and Jaeger's visual acuity chart for near vision. Visual acuity was recorded as the smallest line read on the Snellen's chart with one or no error. All students with visual acuity of < 6/6 were taken for further examination by an ophthalmologist. Anterior segment examination was done by slit lamp examination in all students.

The data in the second part of the questionnaire was entered by the ophthalmologist. Every student was subjected to slit lamp examination, fundus examination by a direct ophthalmoscope and indirect ophthalmoscopy with +20D lens and scleral indentation. Streak retinoscopy was done and best acceptable refraction was prescribed. Objective and subjective refraction performed till best corrected visual acuity achieved, and glasses were then prescribed.

Students who had variable refraction on streak retinoscopy and fundal glow were subjected to cycloplegic refraction by using 1% cyclopentolate eye drops. They were followed up again and prescribed spectacles. Refractive error was expressed as the spherical equivalent (SE). Myopia was defined as SE of at least -0.50DSp, hypermetropia as SE of at least +0.50DSp, astigmatism was diagnosed when the difference in the refraction of the axes in one eye was <0.5.DCy.

Intraocular pressure was measured by Applanation tonometer. Eyes were anaesthetised with a topical anaesthetic agent (proparacaine 0.5%) and stained with sterile fluorescein. The examination was done under blue filter. The pressure ranging from 10-20mm of mercury was considered normal. Peripheral retina was examined by indirect ophthalmoscope with a +20D lens and scleral indentation with full pupillary dilatation by a mydriatic agent (tropicamide + phenylephrine).

Statistical Analysis

Descriptive statistics such as mean, SD and percentage was used. A p-value less than 0.05

were considered as significant. Data analysis was performed by using Microsoft Excel and Epinfo.

Result

Table 1: Incidence of myopia in medical students

Myopia	Frequency	Percentage
Present	278	69.5
Absent	122	30.5
Total	400	100

The incidence of myopia among medical students were 278 (69.5%) and 122(30.5%) were non myopic (Table 1).

Table 2: Sex distribution of subjects with Myopia

Sex	Frequency	Percentage
Female	209	52.2
Male	191	47.8
Total	400	100.0

This study showed a female dominance, with 52% (209) myopes being females while 47.8% (191) were males (Table 2).

Table 3: Relation of incidence of myopia with gender

Myopia	Gender		Total
	Female	Male	
Absent	46 (37.7)	76 (62.3)	122
Present	163 (58.6)	115 (41.4)	278
Total	209	191	400

χ^2 = 14.88, df=1, p<0.0001 highly significant association

It was found to be a statistically significant association between female gender with myopia. It is also found that incidence of myopia more observed in female (58.6%) than male (41.4%) (Table 3).

Table 4: Family history of myopia in Father

Myopic Father	Frequency	Percentage
No	247	61.8
Yes	153	38.2
Total	400	100.0

Of the total students examined, fathers of 153(38.2%) students had myopia. while 247(61.8%) were non myopic (Table 4).

Table 5: Family history of myopia in Mother

Myopic Mother	Frequency	Percentage
No	377	94.2
Yes	23	5.8
Total	400	100.0

Mothers of 23 (5.8%) students were myopic according to the history given by the students (Table 5).

Table 6: Family history of myopic siblings

Myopic Siblings	Frequency	Percentage
No	393	98.2
Yes	7	1.8
Total	400	100.0

Among the 400 students, only 7(1.8%) of them had myopic siblings while the rest 393 (98.2%) students had non myopic siblings (Table 6).

Table 7: Distribution of subject parents who had undergone Fundus Examination

Fundus Exam	Frequency	Percentage
No	365	91.2
Yes	35	8.8
Total	400	100.0

Parents of 35(8.8%) students underwent fundus examination earlier. while 365(91.2%) of them had never undergone fundus examination (Table 7).

Table 8: Distribution of subject according to Slit lamp exam

Slit lamp exam	Frequency	Percentage
corneal scar (PHK)	1	.2
normal	399	99.8
Total	400	100.0

Of the 400 students examined only 1(0.2%) had a post herpetic corneal scar, while rest 399 had normal slit lamp findings (Table 8).

Table 9: Distribution of subject according to UCVA for both eyes

UCVA	Right eye	Percentage	Left eye	Percentage
1/60	1	.2	1	.2
3/60	2	.5	1	.2
4/60	2	.5	2	.5
6/12	21	5.2	12	3.0
6/18	36	9.0	36	9.0
6/24	31	7.8	32	8.0
6/36	40	10.0	42	10.5
6/6	157	39.2	151	37.8
6/60	66	16.5	67	16.8
6/9	35	8.8	47	11.8
FC 1	1	.2	2	.5
FC 1/2	4	1.0	3	.8
FC 2	2	.5	1	.2
FC 3	2	.5	3	.8
Total	400	100.0	400	100.0

Uncorrected visual accuity of right eye in the 400 subjects showed a varied range. 157 (39.2%) of whom had normal vision(6/6), 66(16.5%) had a vision of 6/60, followed by 6/36 and 6/18 in 40(10%) and 36(9%) students respectively. Finger Counting(FC) was reported in a few cases as well(2.2%).

Of the uncorrected visual acuity in the left eye of the 400 students, 151(37.8%) students had a normal vision(6/6), 67(16.8%) had a vision of 6/60 followed by 6/9 (11.8%) and 6/36(10.5%). with a very less incidence of 6/12 (3%). A minor incidence of finger counting was reported here as well (Table 9).

Table 10: Distribution of subject according to BCVA in right eye

BCVA right eye	Frequency	Percentage
6/6	394	98.5
6/9	6	1.5
Total	400	100.0

Best corrected visual acuity of the right eye of 394(98.5%) students was upto 6/6, while 6(1.5%) of them were corrected upto 6/9 (Table 10).

Table 11: Distribution of subject according to BCVA for left eye

BCVA Left eye	Frequency	Percentage
6/6	394	98.5
6/9	6	1.5
Total	400	100.0

Best corrected visual acuity of the left eye showed the same incidence as that of the right eye (Table 11).

Table 12: Prevalence of Peripheral retinal degeneration

Peripheral retinal degeneration	Frequency	Percentage
No	332	83.0
Yes	68	17.0
Total	400	100.0

In present study, prevalence of peripheral retinal degeneration among the 400 students examined was found to be 68 (17%) (Table 12).

Table 13: Relation between prevalence of peripheral retinal degeneration and gender

Peripheral retinal degeneration	Gender		Total
	Female	Male	
No	167	165	332
Yes	42	26	68
Total	209	191	400

$\chi^2 = 2.97$, df=1, p=0.09 Not significant association

There was no statistically significant association between peripheral retinal degeneration and gender (p=0.09) (Table 13).

Discussion

Incidence of myopia:

The incidence of myopia in this study was found to be 69.5%, which was similar to studies conducted by Reddy (68%) [21], and Woo (68.7%) [4]. The incidence was found to be much less in various other studies varying from 28.23% to 51%. Due to the varying refractive error cut offs, different sample populations and different methodologies used, it is difficult to interpret whether this difference indicates an actual increase in incidence.

A much greater incidence was found in a study in Singapore (89.8%) and China (82.2%), as it has been hypothesised that an underlying genetic predisposition may alter eye growth [22].

Association between myopia and gender

Of the students found to be myopic, 52% (209) were female, which was a highly statistically significant association. No such association was found among the studies conducted earlier.

The information regarding the family history of myopia has been gathered in this study and found to have a paternal relation in 153 (38.2%) and maternal relation in 23 (5.8%) of the students. However, whether it is due to genetic predisposition or through just habitual influence, cannot be concluded by the present study.

There was no statistically significant correlation observed between the number of myopic students and family history of myopia in an another study [4].

No significant relation has been found between students and their parents having peripheral retinal degenerations which might be due to the fact that majority of the parents had not undergone fundoscopic examination.

Prevalence of peripheral retinal degenerations:

Of the 400 students examined, 68 (17%) students were found to have peripheral retinal degeneration which was nearly similar to a study conducted by Siyal NA (10%) [6].

Association between peripheral retinal degenerations and gender:

In this study, of the 68 (17%) students with peripheral retinal degenerations, 42 (61.76%) were female and 26 (38.24%) were male similar to a study conducted by Siyal NA in which (60%) were female and (40%) were male [6].

Conclusion

Studies of this kind are helpful in knowing the magnitude of the problem of myopia and retinal degenerations, and to stress upon the need for routine eye examination and fundus examination with indirect ophthalmoscopy among myopes and general population as well.

By conducting such studies awareness is created about the possibility of having peripheral retinal degenerations among normal population as well as myopes; which in turn helps to prevent progression by early diagnosis and intervention by procedures like laser photo-coagulation.

References

1. C.W. Pan, D. Ramamurthy and S.M. Saw. Worldwide prevalence and risk factors for myopia, Ophthalmic and Physiological optics 2012;32(1):3-16.

2. Morgan IG, Ohno-Matsui k, Saw SM. Myopia. Lancet 2012;379:1739-48.
3. Mohan M. NPCB-WHO Report. New-Delhi: Ministry of Health and Family Welfare, Government of India; 1989. National Survey of Blindness- India.
4. Woo WW, Lim KA, Yang H, Lim XY, Leiw F, Lee YS et al. Refractive errors in medical students in Singapore. Singapore medical journal 2004;45: 470-474.
5. R.S. Sood, A. Sood, prevalence of myopia among medical students in western India vis-à-vis the east Asian epidemic, IOSR Journal of dental and medical sciences, 2014;13(1):65-67.
6. Brasil OF, Brasil MV, Japiassu RM. Fundus changes evaluation in degenerative myopia. Arquivos bras Oftalmologia. 200;69(2):203-6.
7. Siyal NA, Sultan Z, Adhi MI. frequency of lattice retinal degenerations in emmetropes and myopes. J Dow Uni health sci 2013;7(1):30-34.
8. Pierro L, Camesasca FI, Mischi M, Brancato R. Peripheral retinal changes and axial myopia. Retina 1992;12:12-7.
9. Karlin DB, Curtin BJ. Peripheral chorioretinal lesions and axial length of myopic eye. AMJ Ophthalmol. 1997;81:625-35.
10. Hyams SW, NeumannE. Peripheral retina in myopia with particular reference to retinal breaks. Br. J Ophthalmol 1969;53:300-6.
11. Yalaka Jayapal Reddy, Ravi Babu, Y Gautham Reddy, YMounika Reddy. A study on prevalence of myopia among medicos of Osmania Medical college, Hyderabad. IOSR Journl of dental and medical sciences. 2015;14:112-17.
12. Yap M, Wu M, Liu ZM, Lee FL, Wang SH. Role of heredity in the genesis of myopia. Ophthalmol Physiol Opt 1993;13:316-9.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.11

Pterygium Excision with Conjunctival Blood Autograft

Shaikhm Reshma[1], Ayisha Afreen[2]

Abstract

Aim: To analyse the outcome of Pterygium excision with conjunctival auto graft with no glue, no sutures technique using autologous blood as tissue adhesive. *Objective:* To analyse a simple, cost effective, less painful and less time consuming technique of conjunctival autograft with autologous blood. *Materials and methods:* A total of 30 patients with primary pterygium in the age group of 30-60 years were included in the study. All patients underwent pterygium excision followed by conjunctival autografting. Autoblood fibrin clot was used as tissue adhesive to secure the conjunctival autograft. Follow up was done after 1 weeks, 4 weeks and 8 weeks postoperatively. Results were good with no recurrence and few complications in all 30 cases. *Results:* 28 out of 30 patients had good primary outcome with no complications (success rate 93.33%). There was no recurrence. Suture related complications can be completely avoided by this technique. *Conclusion:* Autologous blood fibrin clot instead of sutures, during pterygium excision may provide new easy and cost-effective method for securing conjunctival Autograft with complete avoidance of suture related complications and low or nil recurrence .

Keywords: Pterygium Surgery; Conjunctival Auto Graft; Auto Blood Fibrin Clot; Limbal Auto Graft; Fibrin Glue.

Introduction

The word pterygium is derived from the ancient Greek word (pteryx) -wing and (gion) - fin. Pterygium is characterized by a triangular portion of the bulbar conjunctiva encroaching onto the cornea. It is a growth disorder characterized by conjunctivalisation of the cornea due to localized ultraviolet radiation stimulated damage to the limbal stem cells [1]. Destructive pterygial fibroblasts are also responsible for corneal invasion.

A leading theory proposes that there is increased risk of pterygium among people in equatorial regions, due to the damaging effects of ultraviolet radiation, specifically UV-B radiations. The working hypothesis is that these radiations cause mutations in the p53 tumor suppressor gene,leading to abnormal proliferation of limbal epithelium [2].

Author Affiliation: [1]Assistant Professor [2]Postgraduate Student, Dept of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103, India.

Corresponding Author: Reshma Shaikhm, Assistant Professor, Dept of Ophthalmology, Navodaya Medical College, Raichur, Karnataka 584103, India.

E-mail: drreshma_ophtho@yahoo.co.in

Received on 29.11.2018, **Accepted on** 11.01.2018

Method

All the cases had informed written consent and hospital ethical committee approval to study.

Total of 30 cases of primary advancing pterygium were included in the study. Cases of secondary pterygium and pseudopterygium were excluded.

Surgical technique

All cases underwent surgery under peribulbar anesthesia under all aseptic precautions. Pterygium was excised with reverse stripping of the pterygium head. No cautery was used on the bed after excision. The blood was allowed to ooze and form clot in bed. Calipers used to measure size of conjunctival auto graft. Graft size taken was around 0.5 to 1mm more than the measured size of conjuntival autograft, from upper temporal bulbar conjunctiva, without tenon's capsule. Limbal tissue was taken in the auto graft by passing the knife 0.5 to 1 mm in thelimbus to include limbal stem cells. Graft procured was placed over the bare sclera in the correct anatomical orientation and conjunctival edges were opposed with non toothed forceps. A waiting period of 10 mins was allowed. At the end of surgery, eye speculum was removed carefully so

as not to distort the graft. Eye was patched for 12-14 hours.Patients were asked to use post operatively 1% prednisolone acetate eye drops 8 times a day tapering down each week for 8 weeks. Moxifloxacin eye drops for 7 days and Lubricating eye ointment at night for 6-8 weeks. Donor area was left to epithelialize

Patients were followed up at 1st week, 4th weeks and 8thweeks.

Results

All the patients had good primary outcome with success rate of 93.33%. There was graft retraction in one patient for whom secondary sutures were put.There was one graft loss. Suture related complications like post operative pain, foreign body sensation in eye, watering from eye can be completely avoided with this procedure.

Fig. 1: Preoperative.

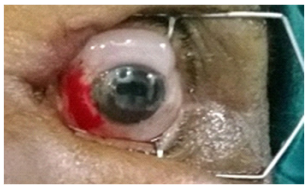


Fig. 2: Excision and fibrin clot.

Fig. 3: Graft placement.

Fig. 4: Post operative 1st week

Table 1: Demographic chart

Number of patients	**30**
Male	19
female	11
Age group	30 to 60 yrs
Average surgical time	12 to 15 mins
Follow up	1st,4th and 8th weeks

Table 2: Results

Primary outcome		
	Graft retraction	1
	Recurrence	nil
	Graft loss	1
Secondary outcome		
	Post op pain	minimum
	Suture related complications	Nil
	Cosmetically	Good
Minor complications		
	Sub conjunctival hemorrhage	0
	Cyst formation	0

Discussion

The prevalence rate of primary pterygium varies from 0.7 to 3% in various populations around the world. .In India, as it falls in the pterygium belt, prevalence is in the range of 0.3 to 29%. Pterygium is more often seen in men than in women as males are exposed to dust and environmental irritants more than women. Usually seen within the interpalpebral fissure and most often on the nasal side. The nasal affinity of the pterygium is attributed to the following factors:-

1. Sparse subconjunctival tissue in the temporal region.
2. Temporal side is exposed to a lesser extent to UV radiation due to greater amount of bowing of outer 2/3 of the upper lids.

Histologically, there is senile elastosis (basophilic degeneration) of subepithelial tissue in the substantiapropria with abnormal collagen fibers. There is dissolution of Bowman's membrane, followed by invasion of the superficial cornea.

There can be presence of stockers line (linear epithelial iron deposition) and Fuchs islets (clusters of pterygial epithelial cells) along the advancing edge of pterygium.

Patient presents with foreign body sensation, discomfort, congestion (redness), irritation and grittiness as the advancing edge of pterygium interferes with precorneal tear film, blurring of vision either because of induced astigmatism or obscuring visual axis.

There can be recurrent episodes of inflammation. If the lesions are extensive and recurrent, it can lead to subconjunctival fibrosis and restricted ocular movements

The indications for surgery include –

- Diminision of vision due to encroachment of visual axis.
- Irregular astigmatism.
- Chronic irritation, recurrent inflammation.
- Restriction of ocular motility.
- Unsighty appearance.
- Neoplastic changes rarely.

There is fairly high risk of recurrence which may be more unsighty. To prevent recurrence conjunctival auto grafting either by use of fibrin glue or sutures is being used.

In this study the possibility of using autologous blood fibrin clot derived from blood oozing out during pterygium excision, to secure the conjunctival autograft was studied.

Pterygium surgery should ideally have a low or no recurrence, minimal complications and be cosmetically acceptable. The evolution of several surgical techniques over the years with recurrence rates varying from 2 to 88% indicates that we are yet to find the ideal procedure.

Surgical procedures are evolved from bare sclera technique in 1960's which is easy to do but have very high recurrence rate [4]. Use of intra operative mitomycin C has a recurrence of 0-43% [3] with devastating ocular complications like sclera melt etc. The simplest technique of bare sclera excision alone proved unsatisfactory because of the high recurrence rates (30–70%) [4,5]. Adjunctive treatment after bare sclera excision with β irradiation reduced recurrence rates to as low as 0.5%–16 [6] but was associated with significant complications such as scleral necrosis. The use of mitomycin C was also associated with complications such as secondary glaucoma, corneal oedema, iritis and corneal perforation, endophthalmitis, and cataract [7-9].

In 1985, Kenyon et al. [10] published a report describing conjunctival autografting as a promising technique in the treatment of pterygium. They documented a recurrence rate of 5.3% in the primary pterygium group. Since then, a number of papers on the success of conjunctival grafting have been published, with varying success rates.

SE Ti at al. [11] reported on recurrence rates in a single surgeon, randomised controlled trial comparing conjunctival autografting with bare sclera excision.In that study, the 1 year recurrence rate for conjunctival autografting in primary cases was 2% (one recurrence in 61 eyes), while no recurrences were noted in the recurrent pterygium cases. This was in marked contrast with cases undergoing bare sclera excision in which the recurrence rates for primary and recurrent groups were 61% and 82% respectively.

Advantages of conjunctival autografting were good cosmetic results, no serious intraoperative complications, thin graft either with or without limbal tissue was sutured to the graft area. Drawbacks were longer surgical time and suture related complications. During the present decade fibrin glue application to fix the graft was developed with elimination of suture related complications [12] and faster surgery but it has its own draw backs like increased cost, not easily available,risk of anaphylactic reactions, viral disease transmission and bio degradable within 3 hours.

Use of patients own autologous blood [13] was based on clotting mechanism of blood coagulation, (but should be used before fibrinolysis occurs) was developed with all the drawbacks eliminated.

Autologous blood availability is not a problem because we can puncture vessels to ooze if quantity of clot is inadequate. This technique has the advantage of easy availability, faster rehabilitation of patient and avoidance of all suture related complications like foreign body sensation in eye or watering of eyes postoperatively can be avoided.

Future studies of larger sample size, follow up period along with graft size are needed to establish reliability of this technique in various situations like bigger grafts etc.

Conclusions

Autologous fibrin in patient's own blood is a useful alternative method for graft fixation in pterygium surgery, which is costeffective, easy to perform, less time consuming with lesser complications.

References

1. Immunohistochemical evidence that human pterygia originates from an invasion of vimentin. Expressing altered limbal epithelial basal cells- Dushka N Reid TN Cure En Res 1994;13:473-81.
2. Ang, L. P. et al. CurrOpinOphthalmol 2007;18:308–313
3. Current concepts and techniques in pterygium treatment. Current opinion ophthalmology. Donald TH Tametal. 2007;18(4):308-18.
4. Cameron ME. Pterygium throughout the world . (Thomas, Springfield). 1965.
5. Youngson RM. Recurrence of pterygium after excision. Br J Ophthalmol 1972;56:120.
6. Mackenzie FD, Hirst LW, Kynaston B, et al. Recurrence rate and complications after beta irradiation for pterygia. Ophthalmology 1991;98:1776–81.
7. Hayasaka S, Noda SN, Yamamoto Y, et al. Postoperative instillation of mitomycin C in the treatment of recurrent pterygium. Am J Ophthalmol 1988;106:715–18.
8. Dunn JP, Seamone CD, Ostler HB, et al. Development of scleral ulceration and calcification after pterygium excision and mitomycin therapy. Am J Ophthalmol 1991;112:343–44.
9. Rubinfeld RS, Pfister RR, Stein RM, et al. Serious complications of topical mitomycin C after pterygium surgery. Ophthalmology 1992;99:1647–54.
10. Kenyon KR, Wagoner MD, Hettinger ME. Conjunctivalautograft transplantation for advanced and recurrent pterygium. Ophthalmology 1985;92:1461–70.
11. S Ti, S Chee, K Dear, and D Tan. Analysis of variation in success rates in conjunctival autografting for primary and recurrent pterygium Br J Ophthalmol. 2000 Apr; 84(4):385–89.
12. Morsicorsena J et al. cornea Pterygium surgery conjunctival auto graft with fibrin adhesive 2006; 25:346.
13. Singh PK et al. Conjunctival auto grafting without fibrin glue or sutures for pterygium surgery-cornea. 2013;32(1):104-07.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.12

Prevalence and Awareness of Color Vision Deficiency in School Children

Sangeeta Das[1], Rajitha Kondam[2], Spandana N[3]

Abstract

Context: There is paucity of data on the topic of color vision deficiency on a large scale. Studies on color vision deficiency in Hyderabad are not found. *Aims:* To study the prevalence and awareness of color blindness in school children of class V to X. *Settings and design:* School based cross sectional study conducted at schools located in Quthbullapur, Hyderabad. *Methods and material:* During the study period a total of 1000 school children belonging to classes V-X were screened for the presence of color vision defect. At the same time their knowledge was also assessed related to color vision defect. Ishihara Chart was used for screening of color vision defect. *Statistical analysis:* Proportions were used to analyze the data. For association study, chi square test was used. P value of less than 0.05 was taken as statistically significant *Results:* Males (1.33%) were more affected with color vision deficiency than the females (0.25%). 752 students had knowledge about color vision deficiency. 248 students could not define color blindness. Out of the 752 children having knowledge, most (87.6%) took precautions for color vision deficiency by various means such as; getting eye check-ups regularly, or having seen the ishihara chart before. Knowledge was directly associated with precautions taken. A large proportion of 87.6% among those who had knowledge took precautions compared to only 9.3% who had no knowledge. This difference was statistically significant. *Conclusion:* The prevalence of color vision deficiency though low is significant. Knowledge levels are not adequate among the children.

Keywords: Prevalence; Awareness; Color Blindness; Spectrum; Disorder.

Introduction

When a person is not able to recognize some colors especially red and green or any other color then the person is said to be suffering from color vision deficiency. Males are more commonly affected as it is an X linked disorder. But some cases do occur in females also [1].

Color blindness is caused by either genetic or acquired factors. Genetically, "colour blindness is an inherited sex linked anomaly. The gene responsible is present on the arm of the X-chromosome and females are carriers. Females will suffer when both X-chromosomes carry the defective gene."[2]

"Congenital color blindness occurs in two forms-total and partial. The former is very rare and is generally associated with nystagmus and a central scotoma." [3]

"Less commonly, color blindness is acquired as a result of eye disease like disorders of the optic nerve, inadequate vitamin A (beta-carotene) in the diet, inflammation of the eye, and cataract. Acquired color blindness is usually blue-yellow." [2]

Incidence of color blindness in males occurs in about 2-2.5% of the population; and in females the defect is present in only 0.4% of the population." [3]

"Inherited deficiencies cannot be cured. In some cases, tinted eyeglasses can be worn to increase contrast between colors. Color vision loss caused by eye disease may be improved with treatment of the disease." [2]

There is paucity of data on the prevalence of color vision deficiency in the general population. Studies on color vision deficiency in Hyderabad are not found. Hence, present study attempts to focus

Author Affiliation: [1,2]Associate Professor [3]MBBS Scholar, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

Corresponding Author: Rajitha Kondam, Associate Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

E-mail: drrajithakondam@gmail.com

Received on 26.05.2018, **Accepted on** 09.06.2018

on prevalence of color vision deficiency in school going children in Hyderabad and their knowledge about color vision deficiency.

Materials and Methods

Study design: Present study was a school based cross sectional study using diagnostic test material.

Setting: It was conducted at schools located in Quthbullapur, Hyderabad.

Study period: From April 2014-August 2014

Sample Size:

A total of 1000 students were screened for the prevalence of color blindness. Sample size of 1000 was taken considering that minimum of this sample would be sufficient for the present study.

Inclusion criteria:

1. Students of both genders
2. Students of classes V – X

Exclusion criteria:

1. Students absent on the day of visit to school
2. Students not willing to participate in the study

Methodology:

The proposal was submitted to the Institutional Ethics Committee before the study was initiated. After their approval Quthbullapur Municipality was selected randomly from among all Municipalities of Greater Hyderabad Municipal Corporation. A list of schools was prepared having classes from class V to class X in the randomly selected Quthbullapur Municipality area. Out of all the schools, 10 schools were randomly selected and permission from the principal/Head Master of the schools was sought. All school heads gave the permission. From each school 100 children were screened i.e. about 16-17 from each class.

During the study period a total of 1000 school children belonging to classes V-X were screened for the presence of color vision defect. At the same time their knowledge was also assessed related to color vision defect.

Ishihara Chart was used to screen all selected children. The amount and type of color vision defect was noted accordingly. The charts were made of poly-chromatic plates and were printed with figures or designs in colored circles with a background of the similarly shaped colored circles. The plates were held in natural daylight at a distance of 40 cm. The individual getting tested had to answer without more than 3 seconds of delay. Thus color vision deficiency was assessed. Those found positive were later once again confirmed using same method as mentioned above.

Following questions were asked to assess knowledge

1. Do you know what color vision deficiency is?
2. What precautions do you take for eye care?

The children were counseled in regards to their career options and how to deal with the disorder. Lastly, awareness was raised and regular eye check-ups and color vision check-ups were encouraged.

Statistical analysis

Proportions were used to analyze the data. For association study, chi square test was used. P value of less than 0.05 was taken as statistically significant.

Results

Table 1 shows prevalence of color blindness among school children. It was observed that there were a higher percentage of males who had color vision deficiency than the females. Out of the 600 male students surveyed, 8 (1.33%) of them had color vision deficiency. Out of the 400 females surveyed, only one (0.25%) had color vision deficiency.

Table 2 shows distribution of children as per knowledge of color blindness. It is seen from the table that out of the 1000 children surveyed between the grades of V-X, 752 students had knowledge about color vision deficiency. 248 students could not define color blindness. That being said, a total of 75.2% of students had the minimal knowledge whereas 24.8% did not have any knowledge.

Table 1: Prevalence of color blindness among school children

Color blindness	Male		Female		Total	
	Number	%	Number	%	Number	%
Yes	8	1.33	1	0.25	9	0.9
No	592	98.67	399	99.75	991	99.1
Total	600	60	400	40	1000	100

Table 2: Distribution of children as per knowledge of color blindness

Knowledge of color blindness	Number	%
Yes	752	75.2
No	248	24.8
Total	1000	100

Table 3: Distribution of children as per precautions taken to prevent color blindness

Precautions taken to prevent color blindness	Number	%
Yes	659	87.6
No	93	12.4
Total	752	100

Table 4: Association between knowledge and precautions taken

Knowledge of color blindness	Precautions taken		Total	Chi square	P value
	Yes	No			
Yes	659 (87.6%)	93 (12.4%)	752 (75.2%)	524.4	< 0.0001
No	23 (9.3%)	225 (90.7%)	248 (24.8%)		
Total	659 (65.9%)	341 (34.1%)	1000 (100%)		

Table 3 shows distribution of children as per precautions taken to prevent color blindness. From the above table, it is seen that out of the 752 children having knowledge, most (87.6%) took precautions for color vision deficiency by various means such as; getting eye check-ups regularly, or having seen the ishihara chart before. The remaining 12.4% of students did not take any precautions regarding color vision defects.

Table 4 shows association between knowledge and precautions taken. Knowledge was directly associated with precautions taken. A large proportion of 87.6% among those who had knowledge took precautions compared to only 9.3% who had no knowledge. This difference was statistically significant.

Discussion

The research which revolved around the prevalence of color blindness in school children was important and necessary to both identify visually disabled children as well as to raise awareness while providing proper counseling. A thousand students were sampled in a cross-sectional study (600 males and 400 females) between the classes of V-X. An ishihara chart with pseudoisochromatic color plates was used to identify any color vision defects. Six plates were used with 3 chances for each plate. Results showed a male preponderance (1.33%) with color vision deficiency followed by a lower percentage for females (0.25%). These results were in accordance with the theoretical hypothesis that females may be carriers due to two X chromosomes whereas males are largely affected due to a lack of carrier state. It was also noted that children who did not have any knowledge about this visual disability did not take precautions.

It is seen that out of all the students surveyed between the classes of V-X, the male children seemed to have a higher preponderance to color vision deficiency than the females. The same results were seen in other studies conducted regarding the prevalence of color blindness among a group of individuals [4]. The female percentage of having color vision deficiency was dismal, having little or no value. For instance, in a study conducted by Moghaddam, "color vision deficiency in girls and boys was 0.2 and 1.6% (p = 0.02), respectively." [4] These results are very similar to this study with the female percentage having a difference of .05 and the male percentage having a difference of 0.27. Since color blindness is an X-linked disorder due to the homologous nature of color vision pigment genes, the incidence is higher in males than females. Females may be either carriers or may be having color defects. Males cannot be carriers as they only have one Y and one X chromosome. Thus, in almost all studies conducted regarding this topic have the same male preponderance and support the theory with their evidence. It is also observed that students who were aware and had knowledge about color blindness had taken steps by either regular eye check-ups or by having seen and done the Ishihara tests before. On the other hand, students who had no knowledge about the topic did not take any steps.

Ramchandran N et al. [5] wrote a review which discussed the necessity of importance of color vision screening among school children. They concluded that "the most commonly used screening test (using Ishihara pseudoisochromatic plates) performs well with respect to detecting red-green color vision deficiencies".

Shrestha RK et al. [6] carried out a study on color vision defects among the school going children. They screened 2001 children using Ishihara chart. Overall prevalence of color vision deficiency was 2.1% which is more than our finding of 0.9%. The prevalence among males was 3.9% whereas

it was zero in females as reported by the authors. We found one female student with color vision defect. The authors concluded that the prevalence of color vision deficiency was significantly more in Nepal

Shah A et al. [7] carried out a study in Manipur, among Muslim community. They found a very high prevalence of color blindness i.e. 8.73% among males and 1.69% among females. They studied six different populations and found that highest rates were observed among Meitei population amounting to 14.93% in males and 2.5% in females while they observed lowest rates of color blindness of 3.75% in males and zero percent in females among Naga populations. The authors concluded that their prevalence was very high compared to all other studies. They attributed this to the high prevalence of consanguineous marriages among Muslims. This particular aspect of consanguineous marriage was not included in the present study.

Al-Aqtum MT et al. [8] conducted a study on color blindness in Jordan among 1418 university students. They used Ishihara chart to screen the students for color blindness. They reported that overall 23 (1.6%) students were found to have color blindness with males affected more 19 (8.7%) than females 4 (0.3%). Among four females with color blindness one was having Protanomaly, one was with protanopia and two were with Deuteranomaly. Among 19 males found with color blindness four were having Protanomaly, three with protanopia, eight were having Deuteranomaly and four were having deuteranopia.

Conclusion

In total, color vision deficiency has a high incidence in the male population because of a lack of carrier state due to a single X chromosome. Next, female individuals had a lower rate of color vision deficiency. Children who were aware of the disability had taken precautions such as attending regular eye check-ups and having done the Ishihara chart unlike the students who were not aware. The students with a lack of knowledge had a dismal percentage regarding precaution taking. To conclude, this research has helped to raise awareness of color blindness and urged children who had not passed the tests to consider carrier options appropriate and suitable to their disability. They were encouraged to live and grow in acceptance with the disorder and properly counseled.

Key messages: All schools should have screening for color vision deficiency and identified children should be educated to understand the severity of the problem and accept it positively.

References

1. Nema HV, Nema Nitin. Textbook of Ophthalmology, 6th ed. Jaypee Brothers, Medical Publication. 2012. pp.13.
2. American Medical Association. Complete Medical Encyclopedia. 1st ed. Random House Reference, New York. 2013.pp.388.
3. Jain AK. Textbook of Physiology, Vol 2. 5th ed. Avichal Publishing Company, Sirmour (HP). 2012. pp.1154-1157.
4. Momeni-Moghaddam H, Ng JS, Robabi H, Yaghubi F. Color vision deficiency in Zahedan, Iran: lower than expected. Optom Vis Sci 2014;91(11):1372-6.
5. Ramachandran N, Wilson GA, Wilson N. Is screening for congenital color vision deficiency in school students worthwhile? A review. Clin Exp Optom 2014;97(6):499-506.
6. Shrestha RK, Joshi MR, Shakya S, Ghising R. Color vision defects in school going children. J Nepal Med Assoc 2010;50(180):264-6.
7. Shah A, Hussain R, Fareed MD, Afzal MD. Prevalence of red green color vision defects among Muslim males and females of Manipur, India. Iran J Public Health 2013;42(1):16-24.
8. Al-Aqtum MT, Al-Qawasmeh MH. Prevalence of color blindness in young Jordanians. Ophthalmologica 2001;215(1):39-42.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.13

Awareness of Eye Donation among Nursing Students

Shadakshari SM[1], Gagan YM[2]

Abstract

Background: Corneal blindness is one of the important types of blindness that can be prevented by proper health care, education and conventionally cured by corneal transplantation for which awareness regarding eye donation is essential. *Objectives:* To assess the awareness about eye donation among nursing students. *Methods:* It was a cross-sectional observational study. *Settings:* BLDE nursing college, Bijapur, Karnataka, India. A total of 380 students of nursing students of BLDE nursing college, Bijapur, were involved in this study. A semi-structured questionnaire was used to collect the data from the students. *Results:* Majority (72%) of students were aware that eyes could be donated and 28% were not aware about eye donation. 28% knew the ideal time for eye donation. 93% were willing to donate eyes and 12% had already pledged their eyes. Perceived reasons for not pledging eyes by the students were: lack of awareness (32%), the unacceptable idea of separating the eyes from the body (54%), objection by family members (68%) and religious beliefs (25%).*Conclusion:* This study revealed that nursing students were well aware of eye donation and most of them inclined to sign-up for eye donation. The information about awareness and willingness for eye donation could help in developing strategies to increase procurement of corneas for dealing with corneal blindness. The reasons for not donating eyes need to be considered while creating awareness about eye donation in the community. The nursing students can be actively involved as volunteers in eye donation campaigns. They can also contribute by participating in creating awareness and motivating the people for eye donation.

Keywords: Awareness; Eye Donation; Nursing Students; Corneal Blindness; Corneal Transplantation.

Introduction

Corneal diseases are a significant cause of visual impairment and blindness in the developing world [1].

Globally, bilateral corneal blindness is estimated to be 4.9 million persons or 12% of 39 million blind, utilizing WHO 2010 global blindness data and WHO 2002 sub-region causes (updated by 2010 data) to define regional prevalence [2].

Nearly 80% of all corneal blindness is avoidable [3]. In India, the total number of overall treatable corneal blindness is about 3.1 million, children constituting 35% of the burden [4].

Author Affiliation: [1]Associate Professor [2]Assistant Professor, Department of Ophthalmology, B.L.D.E, University, Bijapur, Karnataka 586103, India.

Corresponding Author: Gagan YM, Assistant Professor, Dept. of Ophthalmology, B.L.D.E, University, Bijapur, Karnataka 586103, India.

E-mail: gagan.ym@gmail.com

Received on 15.11.2017, **Accepted on** 23.11.2018

There are approximately 18.7 million people blind in India [5]. Among them 1,90,000 are blind due to bilateral corneal disease [6]. Every year, another 20,000 join to the list [7].

According to the Eye Bank Association of India, the current cornea procurement rate in India is 22,000 per year. It is estimated that a significant proportion of donor corneas are unsuitable for corneal transplantation [8]. Based upon our current ratio of available safe donor eyes, we would need 277,000 donor eyes to perform 100,000 corneal transplants in a year in India [9]. A shortage of transplantable corneas is common and has been the subject of much attention. To increase procurement of cornea, raising the level of public education on eye donation is an important first step. Soliciting for actual eye donation at the time of death is a necessary and accepted practice [9]. Though the factors affecting procurement of corneas and the public attitude towards eye donation have recently received attention in the developed world, not much has been published from the developing world [9].

This study was focused to assess the awareness among the nursing students who will be part of health services in our country. Their knowledge about eye donation can play an important role in eye donation campaigns and for effective implementation of health programs. Hence this study was conducted with objective of studying the knowledge and attitude of eye donation among nursing students.

Materials and Methods

It was a Cross-sectional observational study done during Aug-Oct 2014 at BLDE nursing college, Bijapur, Karnataka. Total 380 nursing students participated in the study.

After obtaining institutional ethical clearance, permission from principal of nursing college and informed consent, a semi-structured questionnaire was administered for collecting the necessary information. The questionnaire contained questions on awareness regarding eye donation, knowledge regarding eye donation, reasons for donating and not donating eyes and willingness to donate eyes. A programme on awareness on eye donation was done after the study.

Results

Out of 380 students, 137 (36%) were males and 243 (64%) were females. (Table 1) Age varied from 16 to 24 years old.

Table 1: Sex distribution

Sex		Total
Male	Female	
137 (36%)	243 (64%)	390 (100%)

Table 2: Responses to the questionnaire on eye donation (n=380)

Questions	Response -Yes Number (%)	Response- No Number (%)
Eyes can be donated	283 (72)	107(28)
Eyes can be donated only after death	268 (70.5)	112 (29.5)
Knows Ideal time for eye donation (within 6hrs after death)	107 (28)	273 (72)
Donated eyes is used for corneal grafting	29 (8)	351 (92)
Knows contact place for eye donation	205 (54)	175 (46)
There is shortage of eye donors in India	174 (46)	206 (54)
Knows any person who has donated eyes	67 (18)	313 (82)
Knows any person who has received eyes	0 (0)	380 (100)
Willing to donate eyes	352 (93)	28 (7)
Already pledged to donate	45 (12)	335 (88)

In this study, 72% of students were aware that eyes could be donated and 28% were not aware about eye donation. 28% knew the ideal time for eye donation and 54% knew the contact place for eye donation. 8% knew that donated eyes are used for corneal grafting. 46% knew that there is shortage of donors in India. 93% were willing to donate eyes and 12% had already pledged their eyes (Table 2).

Perceived reasons for not pledging eyes by the students were: lack of awareness (32%), the unacceptable idea of separating the eyes from the body (54%), objection by family members (68%) and religious beliefs (25%) (Table 3).

Source of awareness: doctors (71%), family members (41%), friends (56%) (Table 4).

Discussion

In this study, 72% of the students were aware that eyes could be donated. In study conducted by Singh P et al among hospital staff, 97% of them had good to good knowledge about transplantation of various human organs [10]. In study conducted by Gupta A et al among students of a nursing college in Bangalore, 96.8% were aware of eye donation [11]. In another study conducted by Nekar S Manjunath et al among college students of Hubli city, Karnataka, 96% of the students were aware of eye donation [12]. In a study conducted by Krishnaiah S et al among general population showed the awareness level on eye donation to be 73.8% [1].

Table 3: Distribution of perceived reasons for not donating eyes (n=28)*

Questions	Number	Percentage (%)
Lack of awareness	9	32
Unacceptable idea of separating the eyes from the body	15	54
Objection by family members	19	68
Religious beliefs	7	25

*Multiple responses

Table 4: Distribution of source of awareness (n=283)*

Source of awareness	Number	Percentage (%)
Doctors	201	71
Family members	116	41
Friends	159	56
Radio	21	7
Television	91	32
Newspaper	38	13
Magazine	48	17
Poster	79	28
Pamphlets	45	16
Internet	163	57

*Multiple responses

Only 50.7% had knowledge on eye donation in a study conducted by Priyadarshan B et al among the south Indian population [13].

In this study, 28% knew that the ideal time for donation is within 6 hours of death, 8% knew that the donated eye is used for corneal grafting and, 43.9% knew about the appropriate place for an eye donation.

Dhaliwal U observed that 79.6% of medical students knew that eyes can be donated after death and 63.3% knew that it should be done within 6 hours [14]. 46% of the students agreed that there is a shortage of eye donors and 93% were willing to donate their eyes. 12% of the students had already pledged their eyes. Dandona R et al. showed that 87.8% of the students were willing to donate the eyes [15].

Tandon R et al. observed that 73.8% were aware of eye donations and only 44.9% were willing to pledge their eyes [16].

Lack of awareness, dislike of disfiguring the body, objection by family members and religious beliefs were the reasons for not donating the eyes. Similar reasons were also reported in other studies [16,17].

Conclusion

This study revealed that nursing students were aware of eye donation and most of them inclined to sign-up for eye donation. But the knowledge regarding the place of eye donation, time limit to collect cornea and whom to contact and when to contact was still not known clearly. Among the students who were not willing to donate eyes the major reason was lack of awareness, dislike of disfiguring the body, objection by family members and religious belief.

This study shows that only a few had pledged eyes, but majority of the students were ready to donate the eyes. The information about awareness and willingness for eye donation could help in developing strategies to increase procurement of corneas for dealing with corneal blindness. We also need to educate students to overcome social stigma regarding eye donation. The reasons for not donating eyes need to be considered while creating awareness about eye donation in the community. The nursing students can be actively involved as volunteers in eye donation campaigns. They can also contribute by participating in creating awareness and motivating the people for eye donation.

References

1. Krishnaiah S, Kovai V, Nutheti R, Shamanna BR, Thomas R, Rao GN. Awareness of eye donation in the rural population of India. Indian J Ophthalmol 2004;52:73-8.
2. Pascolini D, Mariotti SP. Global estimates of visual impairment 2010. Br J Ophthalmol 2012;96:614-8.
3. Garg P, Krishna PV, Stratis AK, Gopinathan U. The value of corneal transplantation in reducing blindness. Eye (Lond). 2005 Oct;19(10):1106-14.
4. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Nanda A, Srinivas M et al. Is current eye-carepolicy focus almost exclusively on cataract adequate to deal with blindness in India? Lancet 1998;351:1312-16.
5. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Nanda A, Srinivas M et al. Is current eye-carepolicy focus almost exclusively on cataract adequate to deal with blindness in India? Lancet 1998;351:1312-16.
6. India. National Program for the Control of Blindness. Report of National Program for the Control of Blindness, India and World Health Organisation. [Publisher Unknown] 1986-89.
7. Saini JS, Reddy MK, Jain AK, Ravinder MS, Jhaveria S, Raghuram L. Perspectives in eye banking. Indian J Ophthalmol 1996;44:47-55.
8. Dandona R, Dandona L, Naduvilath TJ, McCarty CA, Rao GN. Awareness of eye donation in an urban population in India. Aust N Z J Ophthalmol 1999;27:166-9.
9. Saini JS. Realistic Targets and Strategies in Eye Banking. Indian J Ophthalmol 1997;45:141-2.
10. Singh P, Kumar A, Pandey CM, Chandra H. Level of awareness about transplantation, brain death and cadaveric organ donation in hospital staff in India. Prog Transplant 2002;12:289-92.
11. Gupta A, Jain S, Jain T, Gupta K. Awareness and Perception Regarding Eye Donation in Students of a Nursing College in Bangalore. Indian Journal of Community Med 2009;34:122-5.
12. Nekar S Manjunath, LokareLaxmikant, Gokhale A Sunil, GodboleManeesha, S Y Mulkipatil, Mahesh V. Awareness of eye donation among college students of Hubli city, Karnataka. International Journal of Biomedical Research2012;3(04):201-204.
13. Priyadarshan B, Srinivasan M, Padmavathi A, Selvam R, Saradha R, Nirmalan PK. Awareness of eye donation in an adult population of southern India. A pilot study. Indian J Ophthalmol 2003;51:101-4.
14. Dhaliwal U. Enhancing eye donation rates. Training students to be motivators. Indian J Ophthalmol 2002;50:209-12.
15. Dandona R, Dandona L, Naduvilath TJ, McCarty CA, Rao GN. Awareness of eye donation in an urban population in India. Aust NZ J Ophthalmol 1999;27:166-9.

16. Tandon R, Verma K, Vanathi M, Pandey RM, Vajpayee RB. Factors affecting eye donation from post-mortem cases in a tertiary care hospital. Cornea 2004;23:597-601.
17. Phadke KD, Anandh U. Ethics of paid organ donation. PediatrNephrol 2002;17:309-11.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.14

Computer Vision Syndrome among Medical Undergraduates at MRIMS, Hyderabad, Telangana

Sangeeta Das[1], Renu Shukla Dubey[2]

Abstract

Context: Computer vision syndrome not only affects physical health but also affects the quality of life significantly. It also hampers productivity of work. *Aims:* To study the prevalence of symptoms of computer vision syndrome (CVS) among medical students. *Settings and design:* Institution based cross sectional study was carried out at MRIMS, Hyderabad. *Methods and material:* 164 Medical students fit as per inclusion and exclusion criteria were given self administered questionnaires. Only completely filled questionnaires were analyzed for presence of CVS. *Statistical analysis:* The data was analyzed using chi square for proportions and student's t test for mean values. *Results:* Though the use of VDU (87.8%) was very high but the awareness was seen only among 15.2% of the users. The most common symptom was eye strain (43.9%). Though the prevalence of symptoms of CVS was more but its association with working on VDUs was not found to be statistically significant for any of the symptoms. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant. Eyestrain and watering were found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. *Conclusion:* Though majority was using VDU, the level of awareness was very low. Prevalence of symptoms of CVS was very high.

Keywords: Eyestrain; Headache; Glare; Redness; Watering.

Introduction

Now a days use of visual display units (VDUs) like desktop, laptop, tabs, smart phones etc has acquired an important part in our day to day life. It has now been considered as necessity rather than luxury. All adults working in offices use computers. All students use smart phones or laptops. Students must learn to use these visual display units for academic purposes. They have changed the today's pace of life. With all these advantages, there are disadvantages too. Increased and indiscriminate use can lead to a number of health problems. The groups of ocular complaints caused due to computers are referred to as computer vision syndrome (CVS). It has been defined as "complex of eye and vision problems related to the activities which stress the near vision and which are experienced in relation to or during the use of computers" [1].

The symptoms related to computer vision syndrome are eyestrain, headache, burning of eyes, neck and shoulder pain, blurred vision at distance, glare, colored haloes around light, flashes of light before eyes, redness, watering, photophobia, contact lens discomfort etc. they can be divided into categories like asthenopic, ocular surface related, visual and extra-ocular [2].

It has been estimated that all over the world, around 60 million populations may have been suffering from computer vision syndrome. Incidence is estimated at around one million cases every year [3].

Computer vision syndrome not only affects physical health but also affects the quality of life

Author Affiliation: [1]Associate Professor [2]Assistant Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

Corresponding Author: Renu Shukla Dubey, Assistant Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana 500055, India.

E-mail: drrenushukla@gmail.com

Received on 06.07.2018, **Accepted on** 09.08.2018

significantly. It also hampers productivity of work. It has been stated that of all the patients attending the outpatient department of ophthalmology, nearly 14% are due to computer vision syndrome. Moreover it has been documented that these persons are not aware about the cause of the condition [4].

The most common visual display units used by medical students are smart phone. They also experience symptoms of computer vision syndrome. But they may not be aware about the computer vision syndrome. Hence, present study was carried out among randomly selected medical students from a medical college located in South India to study the prevalence and symptoms associated with computer vision syndrome.

Material and Methods:

Study design: Present study was Institution based cross sectional study.

Settings: Present study was carried out at Malla Reddy Institute of Medical Sciences, Hyderabad.

Study duration: The study duration was for four months from January 2018 to April 2018.

Ethical Considerations: Institutional Ethics Committee permission was obtained. Informed consent was taken from medical students.

Sample size:

Based on the findings of the previous studies, it was estimated that the CVS prevalence ranges from 75-90% [5].

Hence taking prevalence of CVS as 90%, with 95% confidence interval and 5% absolute precision the sample size came out to be 139. Adding non response rate of 15% the sample size was rounded to 160. Finally we could study 164 students.

Following formula [6] was used to calculate the sample size for the present study based on above estimates

Sample size = $Z (1-\alpha/2)^2 \times p (1 - p) / d^2$

$Z (1 - \alpha/2)$ = is standard normal variate = 1.96 (95% confidence interval)

p = Expected proportion in population based on previous studies or pilot studies = 90%

d = Absolute error or precision = 5%

Inclusion criteria:

1. Medical students belonging to final MBBS Part I & II
2. Medical students willing to participate in the present study
3. Apparently healthy students

Exclusion criteria:

1. Medical students not willing to participate in the present study
2. Already known cases of eye disease or any other severe health problem

Methodology:

Medical students belonging to final year MBBS of Part I and Part II were the study population for the present study. There were a total of 263 such students. All students were screened for presence of any eye diseases so that those with eye diseases or any other severe health problems can be excluded from the present study. This exclusion helped to remove the bias that the symptoms were not due to computer vision syndrome. During screening, 21 students were excluded who had some form of health problem or eye disease as per exclusion criteria.

Remaining students were explained the nature of the study and we asked them their verbal consent to participate in the present study. At this stage, 36 students did not consent to participate and hence were excluded. Thus at this stage there were 206 medical students who were fit for the present study and were ready to participate.

Each student was given self administered study questionnaire (which was prepared based on review of literature). They were asked to fill the details and consult in case of any doubt while answering the study questionnaire. At this stage while screening the questionnaires we found that 42 questionnaires were either not completely filled or were not legible. Hence these 42 were excluded. Thus finally we had 164 questionnaires left for final analysis which was more than the sample size calculated for the present study.

Statistical analysis:

The data was entered in the Microsoft Excel Worksheet. Statistical tests like Yate's corrected chi square were used for proportions and student's "t" test was used for mean values. Two tailed p value was considered and if it was more than 0.05, then it was taken as statistically not significant.

Results

Table 1 shows age and sex wise distribution of study subjects. Females were more than males. Majority were in the age group of 23-25 years followed by 20-22 years. In higher age range, males outnumbered females. This may be due the more failures among boys than girls in the medical curriculum.

Table 2 shows proportion of students using visual display units (VDU) (Computer/mobile/iPad) and exposure in mean years. Majority i.e. 87.8% were using some or the other form of VDU. Only 12.2% denied use of it. On an average the students were using the VDU since eight years and their daily average use amounted to almost four hours per day.

Table 3 shows awareness about computer vision syndrome (CVS). Though the use of VDU was very high but the awareness was seen only among 15.2% of the users.

Table 4 shows symptoms distribution of CVS. The most common symptom was eye strain in 43.9% of the students followed by headache in 42.7%. Tired, burning eyes was seen in 31.7% of the students. Flashes of light before eyes were seen among least i.e. three students only.

Table 5 shows association of working on VDUs with various important symptoms of CVS. Though the prevalence of symptoms of CVS was more but its

Table 1: Age and sex wise distribution of study subjects

Age (years)	Male		Female		Total	
	Number	%	Number	%	Number	%
20-22	25	39.7	38	60.3	63	38.4
23-25	33	42.9	44	57.1	77	46.9
26-28	17	70.8	07	29.2	24	14.7
Total	75	45.7	89	54.3	164	100

Table 2: Proportion of students using visual display units (VDU) (Computer/mobile/iPad) and exposure in mean years

Students using visual display units	Number	%	Mean Exposure (years)	Mean hours of work per day
Yes	144	87.8	8.08±3.9	3.9±1.5
No	020	12.2		
Total	164	100		

Table 3: Awareness about computer vision syndrome (CVS)

Awareness about computer vision syndrome	Number	%
Yes	25	15.2
No	139	84.8
Total	164	100

Table 4: Symptoms distribution of CVS

Symptoms	Yes		No	
	Number	%	Number	%
Eyestrain	72	43.9	92	56.1
Headache	70	42.7	94	57.3
Tired, burning eyes	52	31.7	112	68.3
Neck and shoulder pain	40	24.4	124	75.6
Blurred vision at distance	54	32.9	110	67.1
Glare	10	6.1	154	93.9
Colored halos around light	09	5.5	155	94.5
Flashes of light before eyes	03	1.8	161	98.2
Redness	19	11.6	145	88.4
Watering	35	21.3	129	78.7
Photophobia	16	9.8	148	90.2
Contact lens discomfort	09	5.5	155	94.5

Table 5: Association of working on VDUs with various important symptoms of CVS

Symptoms		Working on VDUs		Chi square	P value
		Yes	No		
Eyestrain	Yes	65 (90.3%)	7 (9.7%)	0.3791	0.5381
	No	79 (85.9%)	13 (14.1%)		
Headache	Yes	62 (88.6%)	8 (11.4%)	0.0003116	0.9859
	No	82 (87.2%)	12 (12.8%)		
Tired, burning eyes	Yes	45 (88.6%)	7 (11.4%)	0.00661	0.9352
	No	99 (88.4%)	13 (11.6%)		
Neck & shoulder pain	Yes	35 (87.5%)	5 (12.5%)	0.05123	0.8209
	No	108 (87.8%)	15 (12.2%)		
Blurred vision at distance	Yes	51 (94.4%)	3 (5.6%)	2.455	0.1172
	No	93 (84.5%)	17 (15.5%)		
Watering	Yes	33 (94.3%)	2 (5.7%)	1.088	0.2985
	No	110 (85.9%)	18 (14.1%)		

Table 6: Association of exposure to VDU (months) with various important symptoms of CVS

Symptoms		Total number (N)	Mean exposure to VDU (months)	T value	P value
Eyestrain	Yes	65	95.87±48.11	0.3931	0.6948
	No	79	92.82±44.82		
Headache	Yes	62	93.00±49.10	0.3537	0.7241
	No	82	95.75±43.89		
Tired, burning eyes	Yes	45	100.08±43.80	0.9683	0.3345
	No	99	92.06±47.05		
Neck & shoulder pain	Yes	35	101.77±50.75	1.0629	0.2896
	No	108	92.25±44.45		
Blurred vision at distance	Yes	51	97.80±46.52	0.6305	0.5294
	No	93	92.73±45.95		
Watering	Yes	33	105.93±54.16	1.6220	0.1070
	No	110	91.18±43.06		

Table 7: Association of working on VDU per day (hours) with various important symptoms of CVS

Symptoms		Total number (N)	Mean duration of working on VDU per day (hours)	T value	P value
Eyestrain	Yes	65	4.27±1.48	2.1308	0.0348
	No	79	3.72±1.59		
Headache	Yes	62	3.91±1.58	0.1853	0.8532
	No	82	3.96±1.62		
Tired, burning eyes	Yes	45	4.15±1.56	1.0766	0.2835
	No	99	3.84±1.62		
Neck & shoulder pain	Yes	35	4.08±1.60	0.5757	0.5658
	No	108	3.9±1.61		
Blurred vision at distance	Yes	51	4.13±1.61	1.0827	0.2809
	No	93	3.83±1.58		
Watering	Yes	33	4.45±1.57	2.0455	0.0427
	No	110	3.80±1.61		

association with working on VDUs was not found to be statistically significant for any of the symptoms.

Table 6 shows association of exposure to VDU (months) with various important symptoms of CVS. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant.

Table 7 shows association of working on VDU per day (hours) with various important symptoms of CVS. Eyestrain was found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. Similar findings were observed for complaint like watering. But other symptoms did not show statistically significant difference.

Discussion

Majority were in the age group of 23-25 years

followed by 20-22 years. In higher age range, males outnumbered females. This may be due the more failures among boys than girls in the medical curriculum. Majority i.e. 87.8% were using some or the other form of VDU. Only 12.2% denied use of it. On an average the students were using the VDU since eight years and their daily average use amounted to almost four hours per day. Though the use of VDU was very high but the awareness was seen only among 15.2% of the users. The most common symptom was eye strain in 43.9% of the students followed by headache in 42.7%. Tired, burning eyes was seen in 31.7% of the students. Flashes of light before eyes were seen among least i.e. three students only. Though the prevalence of symptoms of CVS was more but its association with working on VDUs was not found to be statistically significant for any of the symptoms. The total mean exposure to VDU for all symptoms was more among those with positive symptoms but the difference was not found to be statistically significant. Eyestrain was found to be significantly more among those whose mean duration of working on VDU was more than four hours compared to those who worked for less than four hours daily. Similar findings were observed for complaint like watering. But other symptoms did not show statistically significant difference.

Ranasinghe P et al. [7] in their study among 2210 subjects the mean age was 30.8 years. Majority were males. Prevalence of CVS found in their study was 67.4%. Females were 1.28 times more likely to develop CVS than males. The risk of CVS was 1.07 times more in subjects with longer duration of occupation. Daily users were 1.1 times more at risk of CVS. The odds were 4.49 for those with already having any eye disease. Of all the factors they found that only longer duration of occupation and already having eye disease were significant risk factors of CVS. Whereas in our study we found that working for more than four hours per day was a significant risk factor.

Soumya HV et al. [8] in their study noted that 83.5% of the subjects told that they have vision related problems. We found that it was 43.9%. Because their study was carried out among daily computer users and our study was among medical students. That is why we reported lesser prevalence of CVS. The authors noted that there was association between longer duration of computer which is similar to the present study finding. The awareness level was more in their study i.e. 38.8% compared to only 15.2% in the present study.

Noreen K et al. [9] found that mean age was 20.16 years among 198 respondents. The prevalence of symptoms of CVS was 67.2% which is more than the present study of 43.9%. The authors stated that the use of computers for more than four hours was significant risk factors for symptoms of CVS which is similar to the present study findings.

Assefa NL [10] carried out a study among 304 bank workers who were regularly using computer. They found that the prevalence of CVS was 73% in their study. The prevalence of blurred vision was 42.4% which is higher than present study finding (32.9%). The prevalence of headache was 23% which is lower than the present study finding (42.7%). They noted that risk of CVS was 2.3 times more among those who were not sitting properly. The risk of CVS was two times more who were using computer continuously for more than 20 minutes. We also found that using computer for more than four hours a day was significant risk factor for CVS.

Al Dokhayel S et al. [11] reported that prevalence of headache was 42.1% which is similar to our finding of 42.7%. They reported lesser prevalence of neck and shoulder pain (11.8%) whereas we found it almost doubles i.e. 24.4%. the authors found that using the device for more than five hours was a significant risk factor which is similar to our finding.

Reddy SC et al. [12] studied 795 students of age 18-25 years in Malaysia. They reported a very high prevalence of symptoms of 89.9% while we reported highest rate of 43.9%. But they showed that headache was present only in 19.7% whereas we found that headache was present in slightly more proportions i.e. 42.7%. Their prevalence of eye strain was also low i.e. 16.4% compared to our 43.9%. Like our finding of using computer for more than four hours authors also noted use of device for more than two hours per day was a significant risk factor.

Al Rashidi SH et al. [13] studied 634 students whose average age was 21 years. In their study males were the majority but in our study females were the majority. The authors also reported like present study finding that use of gadget for more than 2-4 hours was a significant risk factor for CVS.

Mowatt L et al. [14] carried out a study among 499 students. Like in the present study, majority were females. Neck pain was reported by 75.1% of students in their study while our 24.4% students reported neck and shoulder pain. Reported eye strain was also more in their study (67%) compared to present study (43.9%).

Logaraj M et al. [15] found a prevalence of 81.9% of CVS among engineering students and 78.6% among medical students. The risk of developing red eye was 1.2 times more among students who used the device continuously for 4-6 hours. We also

found that continuous use of device for more than four hours was a significant risk factor.

Conclusion

The prevalence of symptoms of computer vision syndrome was high in the present study. Though majority of medical students were using some form of visual display units, the awareness related to the occurrence of computer vision syndrome was very low. Using the device for more than four hours per day was a significant risk factor for development of symptoms of computer vision syndrome. Hence, medical students should be made aware about the risk of computer vision syndrome. They should be alerted to reduce the use.

Key messages: As the awareness of CVS was very low, it is necessary that medical students be made aware of CVS and also counseled regarding use of VDUs appropriately so that their efficiency can be preserved for patient welfare.

References

1. Akinbinu TR, Mashalla YJ. Knowledge of computer vision syndrome among computer users in the workplace in Abuja, Nigeria. J Physiol Pathophysiol 2013;4:58-63.
2. Blehm C, Vishnu S, Khattak A, Mitra S, Yee RW. Computer vision syndrome: a review. Survey Ophthalmol 2005;50:253-62.
3. Shrivastava SR, Bobhate PS. Computer related health problems among software professionals in Mumbai: A cross-sectional study. Int J Health Allied Sci 2012;1:74.
4. Erven. Computer vision syndrome in 21 century. J Am Optom Assoc 1987;10:15-20.
5. Hayes JR, Sheedy JE, Stelmack JA, Heaney CA. Computer use, symptoms, and quality of life. Optom Vis Sci. 2007;84(8):738–44.
6. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med 2013;35:121-6.
7. Ranasinghe P, Wathurapatha WS, Perera YS, Lamabadusuriya DS, Kulatunga S, Jayawardana N et al. Computer vision syndrome among computer office workers in a developing country: an evaluation of prevalence and risk factors. BMC Res Notes 2016;9:150.
8. Soumya HV, Anita TG, Shashikala, Praveen K, Snigdha M, Rajendra R. A study of computer vision syndrome at the workplace - prevalence and causative factors. Int J Contemporary Med Res 2016;3 (8):2375-7.
9. Noreen K, Zunaira B, Tehreem F, Tahira Z. Prevalence of Computer Vision Syndrome and Its Associated Risk Factors among Under Graduate Medical Students. Pak J Ophthalmol 2016;32(3):140-6.
10. Assefa NL, Weldemichael DZ, Alemu HW, Anbesse DH. Prevalence and associated factors of computer vision syndrome among bank workers in Gondar City, northwest Ethiopia, 2015. Available from: https://www.dovepress.com/prevalence-and-associated-factors-of-computer-vision-syndrome-among-ba-peer-reviewed-fulltext-article-OPTO Accessed on 15-3-2018.
11. Al-Dokhayel S, Al-Tawil L, Zeitouni L, Qadoumi T, Hussein S, Ahamed SS. Prevelance of self-reported computer vision syndrome (CVS) symptoms and its associated factors among King Saud University (KSU) female students. J Gen Pract 2016;4:5(Suppl):50.
12. Reddy SC, Low CK, Lim YP, Low LL, Mardina F, Nursaleha MP. Computer vision syndrome: A study of knowledge and practices in university students. Nepal J Ophthalmol 2013;5(2)L161-8.
13. Al Rashidi SH, Alhumaidan H. Computer vision syndrome prevalence, knowledge and associated factors among Saudi Arabia University Students: Is it a serious problem? Int J Health Sci (Qassim). 2017;11(5):17-19.
14. Mowatt L, Gordon C, Santosh ABR, Jones T. Computer vision syndrome and ergonomic practices among undergraduate university students. Int J Clin Pract 2018;72(1):Epub 2017 Oct 5.
15. Logaraj M, Madhupriya V, Hegde SK. Computer Vision Syndrome and Associated Factors among Medical and Engineering Students in Chennai. Ann Med Health Sci Res 2014;4(2):179-85.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.15

Estimation of Mean Nd:YAG Laser Capsulotomy Energy Levels for Different Grades of Posterior Capsular Opacification: A Comparative Study.

Sonam S. Rathod[1], Surendra P. Wadgaonkar[2], Sanjay V. Vaghmare[3], Preeti A. Patil[4]

Abstract

Background: Patients who have PCO with significantly reduced visual acuity need posterior capsulotomy to improve vision. Nd:YAG laser for posterior capsulotomy is a widely used, safe, non-invasive, and effective procedure with minimal complications. The aim of this study is to estimate mean energy levels for Nd:YAG laser capsulotomy in various subtypes of PCO (membranous, fibrous,and fibro-membranous). *Setting And Design:* This is a prospective comparative study at a rural based, tertiary level hospital. *Methods And Materials:* This study has been performed at our institute between September 2013 and September 2015 after taking clearance from the ethics committee. 100 eyes of 100 patients with PCO were considered for Nd:YAG laser capsulotomy after minimum period of 6 months following uncomplicated extracapsular cataract extraction.Statistical analysis was done by the unpaired t-test using SPSS software. *Results:* In our study, the mean initial and mean summated laser energy levels were different for different subtypes of PCO. There was a significant difference in mean initial laser energy levels for different subtypes of PCO ($p<0.001$). Mean initial laser energy level was minimum for membranous PCO (1.4 mJ) followed by fibro-membranous PCO (2.2 mJ) and maximum for fibrous PCO (3.2 mJ), whereas the mean summated energy level for membranous was 25.22 mJ, for fibrous 51.48 mJ and for fibro-membranous was 70.08 mJ. The mean summated laser energy level was maximum for fibro-membranous PCO despite having a comparatively lower mean initial energy level (2.2 mJ). It was significantly higher for bag-sulcus fixated IOLs (75.67 mJ) and sulcus fixated IOLs (55.76 mJ) than bag fixated IOLs (52 mJ) (ANOVA=0.035). *Conclusion:* The mean initial laser energy level and the mean summated laser energy level is different for different subtypes of PCO. The latter is higher for fibro-membranous type of PCO than fibrous and membrane

Keywords: Laser Capsulotomy; Posterior Capsular Opacification (Pco); Mean Energy Levels; Surgical Capsulotomy.

Introduction

After cataract or posterior capsular opacification (PCO) is the most common delayed complication after ECCE surgery with or without PC-IOL and is reported to occur in 16 to 50 percent of patients [1]. Visually significant PCO is defined as that post-operative best corrected visual acuity, which is decreased by two lines on the Snellen's chart [3,4].

Apple et al. described two clinically distinguishable morphlogical forms of PCO: Fibrous type PCO and Elschnig pearl type PCO [5,6].

Patients who have PCO with significantly reduced visual acuity need posterior capsulotomy, I.e., opening up of the posterior capsule so as to improve vision. Posterior capsulotomy can be done by two ways: Neodymium doped yttrium aluminum garnet (Nd:YAG) laser capsulotomy and Surgical capsulotomy.

Nd:YAG laser for posterior capsulotomy is widely used and it has been gradually replacing surgical capsulotomy because it is safe, non-invasive and effective procedure with minimal complications like vitreous loss and endophthalmitis as compared to surgical capsulotomy [1,7,8,21,22,23].

Author Affiliation: [1]Senior Resident, Department of Ophthalmology ESIC Hospital, Andheri, Mumbai, Maharashtra 400093, India. [2]Professor & Head [3,4]Associate Professor, Department of Ophthalmology, A.C.P.M. Medical College, Dhule, Maharashtra 424002, India.

Corresponding Author: Surendra Wadgaonkar, Professor & Head, Department of Ophthalmology, A.C.P.M. Medical College, Dhule, Maharashtra 424002, India.

E-mail: surendrawadgaonkar@gmail.com

Received on 06.07.2018, **Accepted on** 09.08.2018

In Nd:YAG laser capsulotomy, a small opening is created in the center of the opacified posterior capsule by a Nd:YAG laser pulse with energy of a few millijoules (mJ) for a duration of a few nanoseconds [9]. Various factors such as IOL fixation, subtype of PCO etc. can affect the energy levels used for capsulotomy. Studies recommend a lower starting energy level for capsulotomy to minimize complications [10,11].

Till date, only few studies have analysed the impact of PCO subtypes on laser energy levels which are required for capsulotomy.

Aims And Objectives

1. To estimate mean energy levels for Nd:YAG laser capsulotomy in various subtypes of PCO (membranous, fibrous and fibro-membranous).

Materials and Methods

The study has been performed in our institute between September 2013 and September 2015.100 eyes of 100 patients withPCO were considered for Nd:YAG laser capsulotomy after a minimum period of 6 months following uncomplicated extracapsular cataract extraction. Before Nd:YAG laser capsulotomy, all patients were analysed in following manner:

History:

Demographic information like name, age, sex, occupation, address was obtained from each patient.

Visual acuity:

Visual acuity of all the patients was recorded using Snellen's chart or illiterate E chart, of both the eyes.

Slit lamp examination

Slit lamp examination was done for examination of the anterior segment. The extent and intensity of the subtypes of PCO (membranous i.e. pearl, fibrous and fibro-membranous) was evaluated by slit-lamp grading. Many slit lamp grading systems exist but none of them have been proven to be gold standard.[12] We used the slit lamp grading criteria described by Kruger et al. [13] in 2000. Kruger et al. used grading system 0 to 3 for the evaluation of PCO. Grade 0= absent, Grade 1=very mild, Grade 2= moderate, Grade 3= dense white. The capsule behind the optic was evaluated within a central area of 3 mm diameter and also was evaluated in the periphery. Distinction was given to the grading of elschnig pearls and fibrosis [13].

Grading criteria was important in deciding the initial energy level for subtypes of PCO, necessary for Nd:YAG laser capsulotomy [14].

Tonometry: Intraocular Pressure was measured by using Goldmann applanation tonometer. Normal range of IOP was considered to have range of 10-21 mm of mercury (mmHg).

Fundus examination:

Fundus was examined using direct or indirect ophthalmoscope to rule out the cause of reduced vision other than PCO. Ultrasound B-scan was done in patients with dense PCO.

Patient selection was done by following criteria

Inclusion criteria:

1. Patients operated by ECCE with posterior chamber intraocular lens implantation.
2. Patients with significant PCO.
3. Age between 40 to 80 years.

Exclusion criteria:

1. Patients operated by ECCE without intraocular lens implantation.
2. Past history of any ocular surgery other than cataract.
3. Any clinical evidence suggestive of glaucoma.
4. Any other anterior or posterior segment pathology.
5. Eyes with any ocular adnexal disorder.
6. History of diabetes, pemphigus, collagen vascular diseases, stevens johnson's syndrome or immunocompromised status.

Preparation of the patient:

After complete evaluation, patient was taken for Nd: YAG laser Capsulotomy under topical anesthesia with dilated pupil .

Capsulotomy technique:

The opening was created in a cruciate pattern. The energy and pulses were increased gradually according to the thickness of capsule until an opening was created. The starting initial energy level, number of pulses used to create capsulotomy and the mean laser energy level were noted in each case.

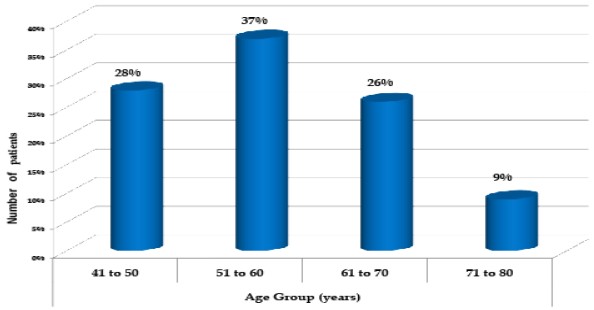
Post laser follow-up:

Following the capsulotomy, all patients were routinely given topical antibiotics-steroid combinations and topical anti-glaucoma drops (Beta blocker timolol eye drops twice a day) for 2 weeks. Patients were reviewed after an hour for tonometry and slit lamp biomicroscopy. Anterior chamber reactions were examined. IOP assessment was done after an hour, 1 week, 1 month and 6 months post procedure.Any rise in IOP was noted. If it was raised for a few hours and returned to normal within 7 days, the patient was said to have a 'transient IOP rise'. Persistent IOP rise was labelled if sustained high IOP values were observed on follow up visits. Patients were also assessed for visual acuity, and any incidence of iritis, retinal detachment and cystoid macular edema was looked out for.

Age distribution:

Table 1/Fig.1: Age group wise distribution of patients undergoing Nd:YAG laser capsulotomy.

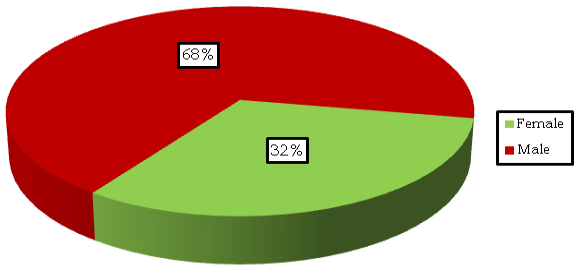
Age Group	Frequency	Percent
41 to 50	28	28.0
51 to 60	37	37.0
61 to 70	26	26.0
71 to 80	9	9.0
Total	100	100.0



Sex Distribution:

Table 2/Fig.2: Sex wise distribution of patients undergoing Nd:YAG laser capsulotomy.

Sex	Frequency	Percent
Female	32	32.0
Male	68	68.0
Total	100	100.0



Results

Table 1 shows that out of 100 patients with PCO, a large number of patients (37%) were between 51 and 60 years of age. Mean age in the study was 58 years with 9.07 SD and ranging within 42 to 79 years.

Table 2 shows that 68% were male and 32% were females.

Table 3 shows that the mean interval between surgery and onset of PCO was 23.52 months with 11.95 months standard deviation. The interval was within 8 months to 60 months duration.

Table 4 shows that in membranous PCO, maximum number of patients (77.8%) needed 0.5-1.5mJ initial energy levels for capsulotomy.

In fibrous PCO, maximum number of patients (57.1%) required 2.6-3.5 mJ of intial energy.

In fibro-membranous PCO, 75% of patients required 1.6- 2.5 mJ of initial energy.

The initial energy level was significantly different for different subtypes of PCO ($p<0.001$).

Table 5 shows that in membranous PCO, maximum number (81.5%) of patients needed summated energy levels between 21 to 30 mJ. In fibrous PCO, maximum number (33.3%) of patients required summated energy levels between 51 to 60 mJ and in fibro-membranous PCO, maximum number (34.6%) of patients needed summated energy levels between 71 to 80mJ.

The summated energy levels were significantly different for different subtypes of PCO ($p<0.001$).

Table 6 shows that the mean initial laser energy level for membranous PCO was 1.433 mJ, for fibrous PCO 3.276mJ, and for fibro-membranous PCO 2.269 mJ.

Mean summated laser energy level for membranous PCO was 25.22 mJ, for fibrous PCO was 51.48 mJ and for fibro-membranous PCO was 70 mJ.

Table 3: Mean interval between cataract surgery and onset of PCO.

	N	Minimum	Maximum	Mean	Standard Deviation
Interval between surgery and onset of PCO (Months)	100	8	60	23.52	11.95

The mean initial energy level and the mean summated energy level was significantly different (P<0.001) for different subtypes of PCO.

Table 7 shows that before Nd:YAG laser capsulotomy, VA of patients was either 6/12 or less than that. After the procedure, the VA improved to 6/6 in 36% and to 6/9 in 37% of the patients. None of the patients were having VA less than 6/18.

Discussion

Nd:YAG laser capsulotomy is the treatment of choice for PCO[8,15] which appears to be a safe, non-invasive, and an effective procedure. In Nd:YAG laser capsulotomy, opening is created in the opacified posterior capsule by pulses of few millijoules of energy. Our aim of the present study was to analyzed the energy level of Nd:YAG laser capsulotomy in various subtypes of PCO. Grading of PCO was done on slit lamp to know the

Table 4/Fig.3: Initial laser energy level (mJ) for different subtypes of posterior capsule opacification (PCO).

Initial Energy (mJ)	Type of PCO			Total
	Membranous	Fibrous	Fibro-membranous	
0.5 to 1.5	21 77.8%	-	-	21 21.0%
1.6 to 2.5	6 22.2%	5 23.8%	39 75.0%	50 50.0%
2.6 to 3.5	-	12 57.1%	13 25.0%	25 25.0%
3.6 to 4.5	-	3 14.3%	-	3 3.0%
4.6 to 5.5	-	1 4.8%	-	1 1.0%
Total	27 100.0%	21 100.0%	52 100.0%	100 100.0%

Chi-Square Tests

	Value	df	P value
Pearson Chi-Square	100.802	8	<0.001

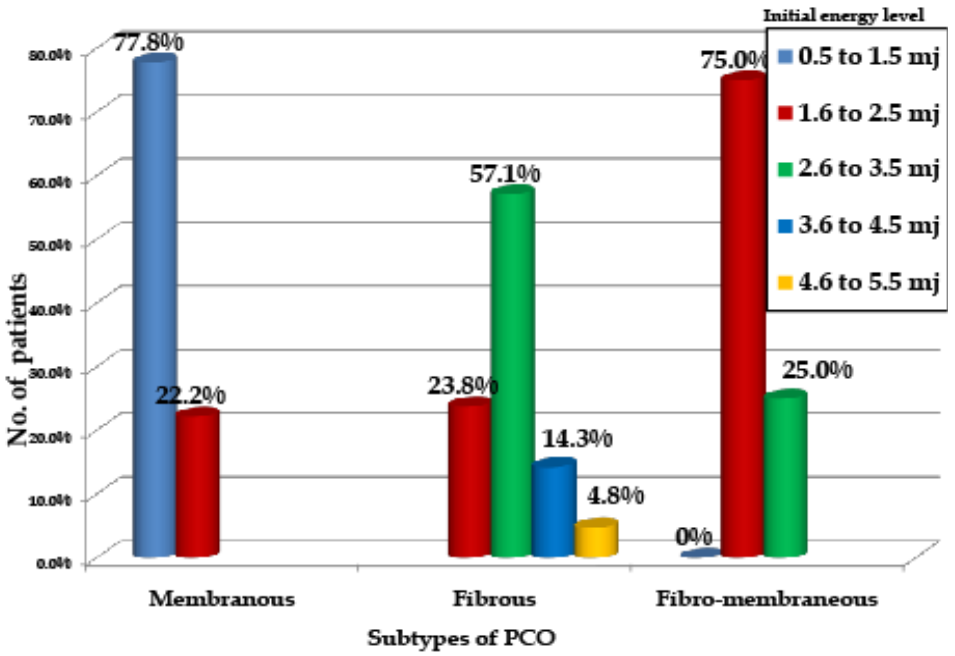


Table 5/Fig. 4: Summated laser energy level (mJ) for subtypes of PCO.

Summated Energy (mJ)	Type of PCO			Total
	Membranous	Fibrous	Fibro-membranous	
21 to 30	22	-	-	22
	81.5%			22.0%
31 to 40	4	5	1	10
	14.8%	23.8%	1.9%	10.0%
41 to 50	1	5	3	9
	3.7%	23.8%	5.8%	9.0%
51 to 60	-	7	6	13
		33.3%	11.5%	13.0%
61 to 70	-	-	15	15
			28.8%	15.0%
71 to 80	-	2	18	20
		9.5%	34.6%	20.0%
81 to 90	-	2	9	11
		9.5%	17.3%	11.0%
Total	27	21	52	100
	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	P value
Pearson Chi-Square	115.186	12	<0.001

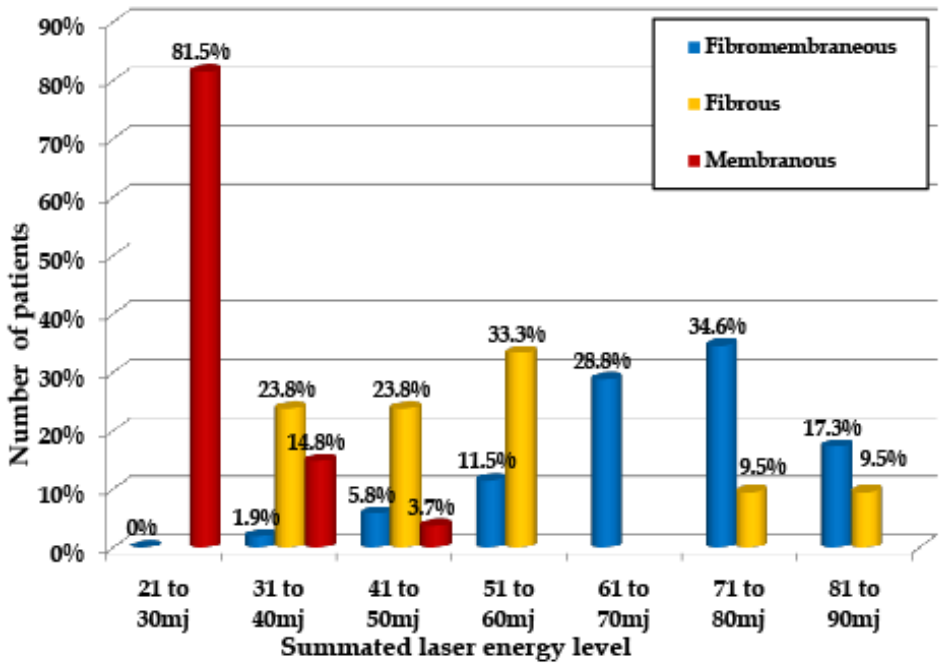
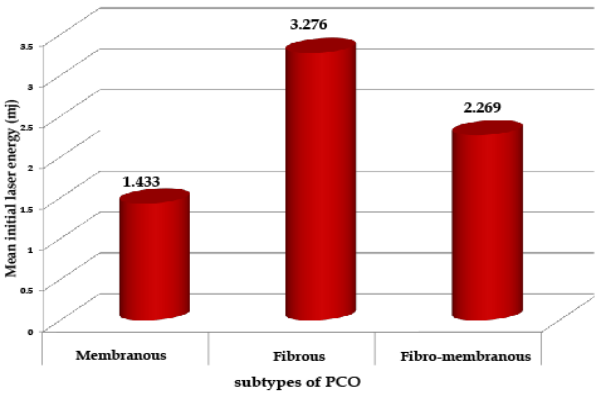


Table 6/Fig. 5: Mean initial laser energy level (mJ) and mean summated laser energy level (mJ) in different subtypes of PCO.

Energy level (mJ)		N	Mean	S.D	Minimum	Maximum
Initial	Membranous	27	1.433	0.543	0.6	2.4
	Fibrous	21	3.276	0.715	2.2	5.0
	Fibro-membranous	52	2.269	0.456	1.6	3.2
	Total	100	2.255	0.833	0.6	5.0
summated	Membranous	27	25.22	4.77	21	41
	Fibrous	21	51.48	15.06	32	86
	Fibro-membranous	52	70.08	11.26	38	90
	Total	100	54.06	21.91	21	90

Anova

Anova	Sum of Squares	df	Mean Square	F	P value
Initial laser energy level	40.139	2	20.069	68.285	<0.001
Summated laser energy level	35934.043	2	17967.021	150.273	<0.001



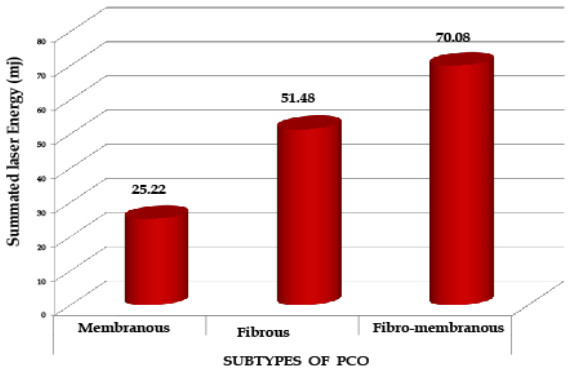
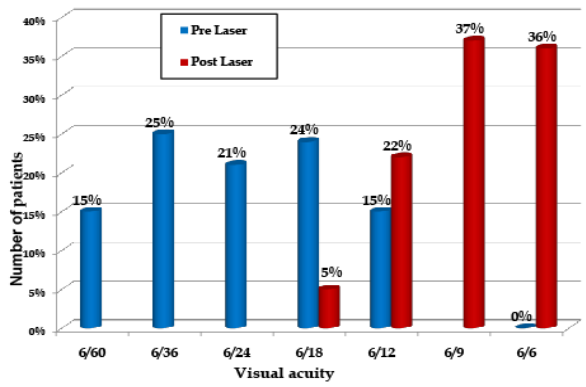


Table 7/Fig. 6: Visual acuity (VA) in pre and post Nd:YAG laser capsulotomy.

Visual acuity	Pre Laser		Post Laser	
	N	%	N	%
6/60	15	15.0%	0	0
6/36	25	25.0%	0	0
6/24	21	21.0%	0	0
6/18	24	24.0%	5	5.0%
6/12	15	15.0%	22	22.0%
6/9	0	0%	37	37.0%
6/6	0	0%	36	36.0%
Total	100	100.0	100	100.0



density of PCO and to set the initial energy for laser capsulotomy.

A total of 100 patients having PCO after cataract surgery were evaluated in the present study. Maximum number of patients (37%) were in the age group of 51 to 60 years with a mean age of 58 years. Burq et al. showed a mean age of 59.5±6.2 years.[16]

In our study, male patients were more in number (68%) than females(32%). In the study by Bari K N (2013) [17], 57% were males and 43% were females. Tayyab et al. reported almost similar sex ratio [18].

In our study, visual acuities of 6/6 or 6/9 were achieved in 73% patients(6/6 in 36% and 6/9 in 37%). Patients with a visual acuity 6/60 were 15% and post procedure the number dropped to zero. For those with a visual acuity 6/36, the number post procedure was zero as well from. In 2014, Khan WA et al. conducted a study on 200 patients and reported that visual acuity 6/6 or 6/9 was achieved in 76.5% patients [19]. Dawood et al. reported the visual acuity was improved in 93.92% and no improvement was seen in 6.08% of patients [20].

In our study, grading of subtypes of PCO was done, so as to know the density of PCO. Mean initial laser energy level for Grade 1 was 1.431± 0.397 mJ, for Grade 2 PCO 2.331±0.305 mJ and for Grade 3 PCO was 3.3±0.561 mJ. The mean initial laser energy level was significantly different in the three grades of PCO ($p<0.001$).

A retrospective study by Bhargava et al. (2012) showed that the required initial and summated laser energy levels depend on thickness of PCO. The mean initial energy level for membranous, fibrous and fibro-membranous PCO was 1.8 mJ, 3.1 mJ, 2.7 mJ respectively and mean summated energy was 22.80 mJ, 80.06 mJ and 80.48 mJ respectively. It was observed that maximum mean summated laser energy(80.48 mJ) was required for fibro-membranous type of PCO despite of lower mean initial energy level (2.7 mJ) [14].

Bhargava et al. (2015)evaluated the Nd:YAG laser capsulotomy energy levels for PCO in 474 patients. The total laser energy levels were significantly higher for fibrous and fibro-membranous types of PCO [10].

Auffarth et al. (2000) examined 172 patients for estimation of energy level required for Nd:YAG laser capsulotomy. The average total energy level required for capsulotomy was 12.7±9.4 mJ. Also, 26 patients required repeat capsulotomy which indicates that high mean energy level was required for thicker PCO [21].

In our study, the mean initial and mean summated laser energy level was different for different subtypes of PCO. There was a significant difference in mean initial laser energy level for different subtypes of PCO ($p<0.001$). Mean initial laser energy level was minimum for membranous PCO (1.4 mJ) followed by fibro-membranous PCO (2.2 mJ) and maximum for fibrous PCO (3.2 mJ).

In our study, the mean initial and mean summated laser energy levels were different for different subtypes of PCO.

There was a significant difference in the mean summated laser energy level for subtypes of PCO ($p<0.001$). Mean summated laser energy level for membranous was 25.22 mJ, for fibrous 51.48 mJ and for fibro-membranous was 70.08 mJ. Mean summated laser energy level was maximum for fibro-membranous PCO despite of lower mean initial energy level (2.2 mJ). Mean summated laser energy level was significantly higher for bag-sulcus fixated IOL's (75.67 mJ) and sulcus fixated IOLs (55.76 mJ) than bag fixated IOLs (52 mJ) (ANOVA=0.035).

Conclusion

PCO is a common complication after cataract surgery. Nd:YAG laser capsulotomy is the treatment of choice for PCO. PCO can be managed safely by Nd:YAG laser capsulotomy with improvement in visual acuity. Mean initial laser energy level and mean summated laser energy level is different for different subtypes of PCO. Mean summated energy level is higher for fibro-membranous type of PCO than fibrous and membranous (pearl) type of PCO. Grading of PCO is important to know the density of PCO and to estimate an initial laser energy level in various subtypes of PCO.

References

1. Zia Chaudhari, M. Vanathi, Post graduate ophthalmology, 1st edition,volume 2,20121, page no.2238, Jypee publication.
2. Apple DJ, Solomon D K, Tetz M R etal,. Posterior capsule opacification. Surv ohthalmol. 1992;37;73-116.
3. Sundelin K, Sjostrand J. Posterior Capsule Opacification, 5 years after ECCE. J Cat Ref Surgery. 1999;24:1632-5.
4. L.C.Dutta, Modern 0phthalmology, 3rd edition, 2005, page 424, Jypee publication
5. Apple DJ, Solomon KD, Tetz MR, Assia EI, Holland EY, et al. Posterior capsule opacification. Surv Ophthalmol. 1992;37(2): 73-116.
6. Pandey SK, Apple DJ, Werner L, Maloof AJ, Milverton EJ. Posterior capsule opacification: a review of the aetiopathogenesis, experimental and clinical studies and factors for prevention. Indian J Ophthalmol. 2004;52(2):99–112.
7. Shah GR, Gills JP, Durham DG, Ausmus WH. Three thousand YAG lasers in posterior capsulotomies: an analysis of complications and comparison to polishing and surgical discission. Ophthalmic Surg. 1986;17(8):473–7.
8. L.C.Dutta, Modern 0phthalmology, 3rd edition, 2005, page 426, Jypee publication.
9. Aron-Rosa D, Aron JJ, Griesemann M, Thyzel R. Use of the neodymium- YAG laser to open the posterior capsule after lens implant surgery: a preliminary report. J Am Intraocul Implant Soc. 1980;6(4):352-4.
10. Bhargava R, Kumar P, Phogat H, Chaudhary P. NeodymiumYttrium Aluminium Garnet Laser Capsulotomy Energy Levels for Posterior Capsule Opacification. J Ophthalmic Vis Res. 2015;10(1):37-42.
11. Zia Chaudhari, M.Vanathi,Post graduate ophthalmology, 1st edition,volume 2,20121, pageno. 2239, Jypee publication.
12. Tayyab AA, Sahi TN, Ajmal M, Ullah ZM, Javed MA. Frequency of posterior capsular opacification

following PMMA vs Silicon Posterior chamber IOL implantation with phacoemulsification.Pak J. Ophthalmology. 2004;20(3):96-99.

13. Kruger AJ, Schauersberger J, Abela C, et al. Two year results: sharp versus rounded optic edges on silicon lenses. J Cataract Refract Surg. 2000;26:566-70
14. Bhargava R, Kumar P, Prakash A, Chaudhary KP. Estimation of mean Nd:YAG laser capsulotomy energy levels for membranous and fibrous posterior capsular opacification. Nepal J Ophthalmol. 2012;4:10813.
15. Khan WA, Tarar SH. Nd-Yag Laser Capsulotomy Efficacy vs Complications. Ophthalmology Update April-June 2014;12(2):101-103.
16. Dawood Z, Mirza SA, Qadeer A. Review of 560 cases of Yag laser capsulotomy. J Liaquat Uni Med Health Sci. 2007;6(1):3-7.
17. Slomovic AR, Parrish RK 2nd. Acute elevations of intraocular pressure following Nd:YAG laser posterior capsulotomy. Ophthalmology 1985;92:973-6.
18. Hasan KS, Adhi MI, Aziz M, Shah N, Farooqui M. Nd:YAG Laser Posterior Capsulotomy. Pak J Ophthalmol. 1996;12(1):3-7.
19. Aslam TM, Dhillon B, Werghi N, Taguri A, Wadood A. Systems of Analysis of posterior capsule opacification.Br JO phthalmol. 2002;86(10):1181-6.
20. Awan AA, Kazmi SH, Bukhari SA. Intraocular Pressure Changes after Nd-YAG Laser Capsulotomy. J Ayub Med Coll Abottabad. 2001;13(2):3-4.
21. Auffarth GU, Nimsgern C, Tetz MR, Volcker HE. Analysis of energy levels for Nd: YAG laser capsulotomy in secondary cataract. Ophthalmology. 2000;97:14.
22. Gayton J L, Sanders V, Vander Karrm, Raanan Ma, Piggybacking intraocular implants to correct pseudophakia refractive error.Ophthalmology 1999 Jan;106;56-9.
23. Fenzel R E, Gills JP 3rd, Gills JP.Piggy back intraocular lens implantation. Curr op in ophthalmol. 2000;11:73.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.16

A study of Industrial Eye Injuries in Western Rajasthan

Tek Chand[1], Arvind Chauhan[2]

Abstract

Background: Ocular injuries attain great socioeconomic importance in Ophthalmology due to industrialization in developing country like India. So, this study was planned to evaluate pattern of ocular manifestation of injuries, the modes of clinical presentation, their management and the visual outcome in Western Rajasthan. *Material and Methods:* This prospective study was conducted in all patients aged more than 18 years of industrial ocular injuries, who presented to Mathura Das Mathur Hospital, Jodhpur between September 2013 to September 2015. Detailed clinical history including type of industry, the nature of work, regarding the causation, the hours of work daily, time of occurrence, activity at the time of injury, nature/chemical composition of foreign body or chemical, time lapsed after injury etc. Detailed clinical examination was done. *Results:* A total of 52 patients of industrial ocular injuries were enrolled in study. Mean age of the patients was 31.25 years. All patients were males. 78.85% of the patients did not use any kind of ocular protection during work. Maximum number of patients with ocular injury came from steel industry (32.69%), followed by handicraft industry (30.76%), and stone mining (21.15%). 75% of all patients had significantly corneal foreign body injury and 15.38% had chemical injury. *Conclusion:* In Western Rajasthan, industrial ocular injuries were predominantly found in males. Most of the patients worked at steel industries and most of injury occurred to welders. Corneal foreign body was most common mechanical type of injury in industry confined to mostly anterior segment of eye.

Keywords: Industry; Ocular; Cornea; Vision.

Introduction

The eyeball is set into the orbit, a socket surrounded by a strong, bony ridge. These structures are well suited for protecting the eyes from injury. Despite this, injuries of the eye because of sports, road traffic accidents, agricultural and non-agricultural are not uncommon. These injuries are not free from short-term and long-term morbidity. The incidence of ocular injuries is constantly on the rise in this modern era of industrialization and lead to a significant proportion of eye injuries at workplace [1]. It is difficult to accurately measure or even estimate the incidence of eye injuries. Worldwide, there are approximately 1.6 million people who have become blind, 2.3 million who have become bilaterally visually impaired and 19 million with unilateral visual loss due to eye injuries. In the era of modern mechanised societies, trauma is the commonest cause of unilateral blindness. From the international perspective, an estimated 5,00,000 blinding eye injuries occur annually worldwide [2]. In an Indian survey, injuries were found to be the cause of blindness in 11.8% of the total blind subjects [3]. Occupational eye injuries are more common in younger men and comprise 70% of all the ocular injuries. Males have a 2.2 to 5.5 times higher risk of ocular injuries than females [4]. In India, the annual incidence is 9.75 severe eye injuries per 1,000 adults. The prevalence is higher in rural areas (4.5%) than in urban areas (3.97%) [5]. In developing countries like India,

Author Affiliation: [1]Consultant Ophthalmologist cum Medical Officer, Department of Ophthalmology, Government District Hospital, Sri Ganganagar, Rajasthan 335001, India. [2]Professor & Head, Department of Ophthalmology Dr. S N Medical College, Jodhpur, Rajasthan 342001, India.

Corresponding Author: Tek Chand, Consultant Ophthalmologist cum Medical Officer, Department of Ophthalmology, Government District Hospital, Sri Ganganagar, Rajasthan 335001, India.

E-mail: drtcchahal@yahoo.com

Received on 28.07.2018, **Accepted on** 28.08.2018

activities such as agriculture, carpentry, grinding, chiselling, hammering, welding, handicraft, automotive industries are responsible for many eye injuries. In a five year study of open globe injuries, 33% were occupation related and 79.06% of these were young adults [6]. Because of this reason ocular injuries attain great socioeconomic importance in Ophthalmology.

In this modern era of industrialization in our developing country where simple protective measures are not in use like wearing protective glasses lead to increase number of patients with ocular manifestation of injuries. So, this study was planned to evaluate pattern of ocular manifestation of injuries, the modes of clinical presentation, their management and the visual outcome in western Rajasthan region of India.

Materials & Methods

This prospective study was conducted in department of Ophthalmology only after approval from the Institutional ethics committee. All patients aged more than 18 years of industrial ocular injuries, who presented to Mathura Das Mathur Hospital, Jodhpur during emergency and out-patient department between September 2013 to September 2015 were enrolled in this study. All Ocular injuries caused by other than any industry i.e sports activities, at home, road traffic accidents and intentional altercations were excluded out. Data was collected from patient or attendants of patient in a standard clinical performa. Before starting the study all patients included in study were given patient information sheet and written informed consent was obtained from each patient in local language.

Detailed clinical history including type of industry, the nature of work, regarding the causation, the hours of work daily, time of occurrence, activity at the time of injury, nature / chemical composition of foreign body or chemical, time lapsed after injury, any previous visual impairment, previous eye check-ups or any ocular surgery or any ocular intervention or ocular trauma or general surgery and the use of power glasses use of spectacles, protective glasses, shields, helmets and face protectors was asked. Any associated systemic diseases and alcohol consumption at time of injury was also asked.

Detailed clinical examination was done with torch light, double eversion of eyelids by Desmarre's retractor, slit lamp examination. Pupillary light reflex direct and consensual, relative afferent pupil defect (APD) if any was noted. Absence of APD was a crucial indicator of good gross vision. Laterality (eye involved in injury), closed/ open globe injury/chemical injury (whether injury compromised the regularity of the globe or not was noted), vision at the time of injury, type of injury sustained were noted. On slit lamp examination presence of any sand particle/ metallic foreign body/carbon soot/lime particles on cornea/conjunctiva/ or fornices were noted. Intraocular pressure (IOP) was recorded by non contact tonometer (NCT) preoperatively only in those cases where the wound was sealed and anterior chamber well formed and all postoperative cases. USG B-Scan was done for posterior segment in cases where optical media not clear. Optical coherence tomography (OCT), anterior segment optical oherence tomography was done for angle of anterior chamber and iris. Keratometry was done to evaluate the Intraocular lens power in case of traumatic cataract. If there is a foreign body on cornea or conjunctiva detected that was removed under topical anaesthesia. Other procedures or treatment as per the type of injury to patients were done. Other routine investigations were performed. All examination/investigations/procedures were done in the department of Ophthalmology under the direct guidance and supervision of experts. Follow up at regular intervals of 1 week for first 2 weeks there after every 3 weeks for 3 months and up to 1 year.

Data was expressed in numbers and percentages. Chi-Square test was used wherever applicable. A "p" value of <0.05 was considered to be statistically significant.

Results

A total of 52 patients of industrial ocular injuries were enrolled in study during the study period. Mean age of the patients was 31.25 years with age range of 19 year to 50 year (Table 1). All patients in present study were males. None of female presented with ocular industrial injuries. 92.3% of patients have closed globe injuries and 7.7% have open globe injuries. Eight patients (15.38%) have bilateral injuries. Right eye was injured in 23 (44.23%) patients and left eye in 21 (40.38%) patients. Only 21.15% used some kind of ocular protection during work. 78.85% of the patients did not use any kind of ocular protection during work. 71.15% of patients presented within 24 hours of ocular injury. 28.85% of patients presented late (>24hours). Maximum number of patients with ocular injury came from steel industry (32.69%), followed by handicraft industry (30.76%), stone mining (21.15%) (Table 1).

Table 1: Socio-demographic characteristics of ocular injury patients

	Numbers (%) n=52
Sex	
Male	52 (100)
Female	0
Age (in years)	
15-20	07 (13.46)
21-25	07 (13.46)
25-30	12 (23.07)
31-35	11 (21.15)
36-40	08 (15.38)
>40	07 (13.46)
Types of industries	
Cement	01 (1.92)
Chemical	02 (3.84)
Handicraft	16 (30.76)
Marble	01 (1.92)
Steel	17 (32.69)
Stone mine	11 (21.15)
Machine part manufacturing	01 (1.92)
Tractor repairing	01 (1.92)
Truck body building	02 (3.84)

Maximum number of ocular injuries occurred during welding work (30.76%) followed by quarrying (21.15%). (Table 2)

Table 2: Ocular injury with respect to nature of works

Nature of works	Number (%) n=52
Assembly workers	05 (9.61)
Chemical handler	04 (7.69)
Diamond stone maker	01 (1.97)
Labourer	01 (1.97)
Labourer painter	02 (3.84)
Labourer carpanter	04 (7.69)
Labourer Welder	15 (30.76)
Labourer grinder	03 (5.91)
Machine tool operators	05 (9.61)
Quarry workers	11 (21.15)
Shift incharge	01 (1.97)

75% of all patients had significantly corneal foreign body injury and 15.38% have chemical injury. (Table 3)

Table 3: Distribution of patients according to types of injury

Type of injury	Number (%) n=52	Corneal vs others P value
Corneal foreign body	39 (75)	P<0.0001
Globe rupture	1 (1.92)	
Chemical injury	8 (15.38)	
Intraocular foreign body, lid tear	1 (1.92)	
Conjuctival foreign body	1 (1.92)	
Corneal tear, traumatic cataract	2 (3.84)	

Table 4: Correlation between types of industries with types of injury

Types of Industry	Corneal Foreign body	Globe rupture	Chemical injury	Intraocular foreign body, lid tear	Conjuctival Foreign body	Corneal tear, traumatic cataract
Cement	01	00	00	00	00	00
Chemical	00	00	02	00	00	00
Handicrafts	10	00	05	00	00	01
Steel	15	00	00	01	01	00
Stone mine	08	01	01	00	00	01
Others	05	00	00	00	00	00
Total	39	1	8	1	1	02

Corneal foreign bodies were most common ocular injuries in all type of industries except chemical industries. Corneal foreign bodies were found most common in steel industries (15) followed by handicraft (10) and stone mine (08). (Table 4)

Table 5: Correlation between nature of work with types of eye injury

Nature of works	Corneal Foreign body	Globe rupture	Chemical injury	Intraocular foreign body, lid tear	Conjuctival Foreign body	Corneal tear, traumatic cataract
Cutting	07	01	00	00	00	01
Grinding	13	00	00	00	00	00
Hammering	02	00	01	00	00	01
Chemical	00	00	04	00	00	00
Machine operation	04	00	00	01	00	00
Welding	11	00	00	00	01	00
Others	02	00	03	00	00	00
Total	39	1	8	1	1	02

During grinding, all 13 patients had corneal foreign bodies. During welding, 11/12 patients have corneal foreign bodies except one who have conjunctival foreign body. During cutting, 7/9 patients have corneal foreign bodies, 1/9 have globe rupture, 1/9 have corneal tear. (Table 5)

Discussion

Eye injuries are a major and under recognized cause of disabling ocular morbidity that especially affect the young. The public health importance of such ocular trauma is undeniable. Injuries generate a significant and often unnecessary toll in terms of medical care, human suffering, long-term disability, productivity loss, rehabilitation services, and socioeconomic cost [7]. In present study majority of the ocular injuries were found in the 26 to 30 years age group followed by 31 to 35 age groups. These findings were similar to that of other studies which reported that a high number of males were affected as compared to the females varying from 80-90% [3,8,9]. This may be due to under training of patients in their respective areas and hence were more exposed to the injuries due to ignorance or inexperience or accidentally. All patients were males. This could be due to less number of women in the industries, women being employed in less dangerous departments or women being very careful in their work and adhering to the safety measures.

Most of the patients presented to trauma centre within 24 hrs. Only one patient presented late i.e. after 120 hrs. This patient was being treated for the same problem somewhere else. The presentation to the clinic was also early in a majority of the cases in a study done by Biradar et al. [4]. This shows that eye injuries are real ophthalmic emergencies which demand prompt and early attention. The presentation to the hospital is influenced by the type and severity of the injury.

Most of the patients did not use any kind of protection gear. Only 21.15% patients were using protective gear. These all were welders. Similar findings were found in Biradar et al. study [4]. 12.3% had an injury in spite of wearing protection at the time of the injury. 15.38% patients had bilateral injuries. Right eye was injured in 44.23% and left eye in 40.38% patients. 9.2% cases had injuries in both eyes as a result of chemical splashing in Biradar et al. study [4]. This indicates that chemical injuries were the most common cause of the bilateral eye injuries. Most of the ocular injuries in present study occurred in steel and handicraft followed by mining industries. In Biradar et al. study, the place of work at which the injuries occurred was mostly workshops followed by textile mills [4].

Welders were the most prone to injury followed by quarry workers and machine tool operators. In Biradar et al. study, machine tool operators or mechanics constituted a major part of the patients in the study [4]. Similar results were reported by other studies with occupational injuries [9-12]. A majority of the injuries occurred when the subject was grinding, followed by welding, and cutting. In present study only one patient was bystander (not involved directly in activity) and exposed to chemical accidentally. In Biradar et al. study, the injury occurred while handling hot metals in 7.7% cases [4]. 4.6% were bystanders when the injury occurred. Patients who were working in other industries apart from the chemical industry were also exposed to chemicals at work. For example, chemicals such as bleach, caustic soda and other acids are used in the textile industry during the processing of yarn and during the dyeing and finishing of the garments. Similarly, various chemicals are used in the tools and during the stages of cleaning, treatment and polishing.

Mechanical injuries are broadly classified as open globe and closed globe injuries. 90% of mechanical injuries were closed globe injuries and 10% were open globe injuries. Open globe injuries include IOFB (Intraocular Foreign Body), globe rupture, penetrating injuries and injury to lens i.e. Traumatic Cataract. Closed globe injuries include superficial foreign body on cornea or conjunctiva or lid tear. Closed globe injuries include contusion, lamellar laceration and superficial foreign body [13]. The injuries which were caused by machines or mechanical forces formed the major proportion of the injuries.

All mechanical injuries were involving anterior segment except one which involved posterior segment. In Biradar et al. study also, majority of the cases had an injury in the structures in the anterior segment, while the posterior segment injuries were less [4]. This was similar to the findings of other authors who have reported a higher incidence in the anterior segment of the eye than in the posterior segment. The most common involvement was of the anterior segment structures. The cornea was the most commonly involved site, followed by the conjunctiva, lens and eyelids. In the cornea, the most common was foreign body followed by chemical burn and corneal tear. Shallowing of the anterior chamber and hyphema, iris prolapse, and cataract were most common lens change following open globe injury. Biradar et al. study had also shown cornea as the most commonly involved site [4]. Retinal oedema and tear were the common posterior segment changes. Other studies had also reported highest incidence of injuries in the cornea followed by the iris and the eyelids [9,11,14]. Mukherjee et al. also reported the cornea as the most common site of perforation in 62.21% [15].

Visual acuity at presentation ranged from 6/6 to perception of light negative in affected eye. Most

of the patients had 6/9 vision which were mostly affected by corneal foreign bodies. The presenting visual acuity of the injuries was associated with the type of injury, the experience of the work, the time of presentation and with the wearing of protective gear [4].

Conclusion

In Western Rajasthan, industrial ocular injuries were predominantly found in males. Most of the patients worked at steel industries and most of injury occurred to welders. Mechanical type of injury in industry confined to mostly anterior segment of eye that predominantly involved cornea i.e. corneal foreign body was most common. Most of these workers are not using eye protection/ safety measures. So in our developing country there is an urgent need to step up the safety precautions to prevent such disabling eye injuries. Improved machines, provision of adequate illumination at work, selection of trained workers with adequate vision and alertness, periodic testing for alcohol and finally making the use of eye protection mandatory are some of the steps along with education and knowledge of hazards, that can be taken towards this goal. So by updating the knowledge about industrial eye injuries, we can help Government to make policies and their implementation into industries. The ultimate goal is to prevent secondary complications and to maximize the patients' visual prognosis, so as to enable the patients to carry on their normal activities and occupations. This study can guide researchers to carry out a large scale study at state or national level to assess the epidemiology of ocular industrial injuries.

References

1. Thompson GL, Mollan SP. Occupational eye injuries: a continuing problem. Occupational Medicine 2009;59:123-5.
2. Macewen CJ. Ocular injuries. Jr R Coll Surg 1999;44:317-23.
3. Mavli AS, Sisodiya RS. A retrospective study of industrial eye injuries. International Journal of Medical and Health Research 2016;2(3):49-51.
4. Biradar SP, Arvind HS. A Study on Industrial Eye Injuries. Journal of Clinical and Diagnostic Research 2011;5(5):1076-81.
5. Vats S, Murthy GVS, Chandra M, Gupta SK, Vashist P, Gogoi M. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. Indian Journal of Ophthalmology 2008;56(4):313-6.
6. Vasu U, Vasnaik A, Battu Rr, Kurian M, George S. Occupational open globe injuries. Indian J Ophthalmol 2001;49:43-7.
7. Serrano JC, Chalela P, Arias JD. Epidemiology of Childhood Ocular Trauma in a Northeastern Colombian Region. Arch Ophthalmol 2003;121:1439-45.
8. Lambah P. Adult eye injuries at Wolverhampton. Trans Ophthal Sec 1968;88:661-73.
9. Malik SRK, Gupta AK. A study on pattern of ocular injuries in Delhi. All Ind Oph Sec 1968;16:178-82.
10. Shukla B, Khanna BA study on ocular injuries. Ind J Ophthal 1983;131:439-40.
11. Kavol R, Teller J, Belkin M, Romem M, Yanko L, Savir H. The Israeli ocular injury study. Arch Ophthalmol 1988;106:776-9.
12. Dannenberg AL, Parver LM, Brechner PJ, Khoo L. Penetrating eye injuries in the work place. The National eye Trauma system registry. Arch Ophthal 1992;110:842-48.
13. Scott R. The injured eye. Philos Trans R Soc Lond B Biol Sci 2011; 366(1562):251–60.
14. Shukla IM, Verma RN. A clinical study of ocular injuries. Ind J Ophthal 1979.pp.33-6.
15. Mukherjee AK, Saini JS, Dabral SM. Visually significant corneal opacity. Ind J Ophthalmol 1984; 32:269-71.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.17

Trabeculectomy and Trabecular Aspiration to Treat Pseudoexfoliation Glaucoma: A Randomised Control Trial

Usha B.R.[1], K. Kanthamani[2], Meghana C. Reddy[3]

Abstract

Objective: To find the effectiveness of trabecular aspiration in reducing (IOP) Intraocular pressure in patients with pseudoexfoliation syndrome. *Materials and Methods:* The patients with pseudoexfoliation glaucoma visiting ophthalmology Outpatient department of R.L. Jalappa hospital were taken for this study. 44 patients out of 56 patients came for the followup. The patients were consecutively segregated into 2 groups. Group 1 underwent trabecular aspiration and Group 2 underwent trabeculectomy. Trabecular aspiration was done with trabecular aspiration probe directed against trabecular meshwork at 6 o' clock position. Suction pressure between 100 to 200 mm Hg was applied over 5 to 6 clock hours. Trabeculectomy was done in group 2 patients. In this technique a fistula was created to allow aqueous outflow from anterior chamber to subtenons space under guard of scleral flap. It is a prospective randomised control trial. Both the group patients were followed for 1 week, 2 weeks,1 month, 2 months and 3 months. Intraoperative and postoperative complications like hyphaema,shallow anterior chamber were noted. *Results:* The mean IOP was 16.27 mm Hg and 12.6 mm Hg in Group 1 and Group 2 respectively on first postoperative day. The p value of < 0.001 showed IOP was statistically significant between the two groups. First postoperative week showed mean IOP 16.18 mmHg in group 1 and 12.36 mm Hg in group 2. p value being <0.001 showed the difference between IOP in two groups was statistically significant even upto three months. *Conclusion:* The IOP reduction was more in trabeculectomy group than trabecular aspiration group. Complications such as hyphaema and shallow anterior chamber were seen in trabeculectomy group.

Keywords: Trabecular aspiration,Trabeculectomy

Introduction

Pseudoexfoliation glaucoma is associated with exfoliation syndrome which is characterized by greyish white flecks on pupillary border.It is the most common open angle type with blockage of the trabecular meshwork by exfoliation material and pigments [1,2]. Assuming that the main pathogenic factor in pseudoexfoliation glaucoma is obstruction of filtering pores of trabecular meshwork which becomes increasingly clogged by deposits of pigments and exfoliation material,a surgical procedure relieving the uveal meshwork of its debris should be reasonable and effective [3]. Trabeculectomy as filtering procedure is used for pseudoexfoliation glaucoma [4,5].

Author Affiliation: [1]Assistant Professor [2]Professor and Head [3]Post graduate student, Department of Ophthalmology, Sri Devaraj Urs Medical College, Kolar, Karnataka 563101, India.

Corresponding Author: K. Kanthamani, Professor and Head, Department of Ophthalmology, Sri Devaraj Urs Medical College, Kolar, Karnataka 563101, India.

E-mail: drushamahesh@gmail.com

Received on 14.04.2018, **Accepted on** 05.05.2018

Objective

To find the effectiveness of trabecular aspiration in reducing intraocular pressure in patients with pseudoexfoliation glaucoma

Materials And Methods

Forty-four (44) patients out of 56 patients with pseudoexfoliation glaucoma came for follow up.Consecutively patients were segregated into two groups. Group 1 patients underwent trabecular aspiration and Group 2 patients underwent trabeculectomy. This is a prospective randomized control trial.

Inclusion Criteria

Patients with pseudoexfoliation glaucoma

Exclusion Criteria

1. High grade cataract
2. Glaucoma other than pseudoexfoliation glaucoma
3. Diabetes Mellitus
4. Hypertension
5. History of uveitis
6. History of herpetic keratitis
7. Ocular trauma
8. Previous intraocular surgery.

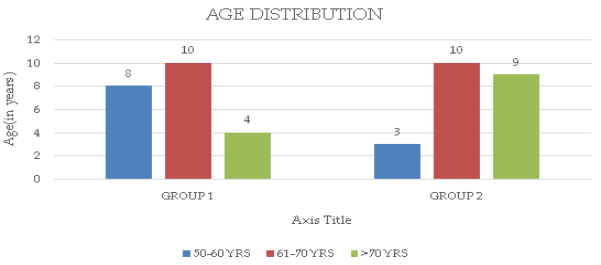
Each group underwent preoperative evaluation like measurement of Best corrected visual acuity (BCVA). Distant vision was recorded by Snellens chart. Visual field analysis was done using Humphrey visual field analyser, intraocular pressure was measured by Goldmann applanation tonometry, gonioscopy was done by using Goldmann single mirror. Fundus evaluation was done using +90 Dioptreslit lamp biomicroscopy. All patients underwent routine random blood sugar level examination. Treatment before surgery included oral Acetazolamide 250 mg,mannitol infusion if necessary in few patients. All surgeries were performed by a single surgeon under peribulbar local anaesthesia. Digital pressure for 10-15 mins was applied and prophylactic antibiotic ciprofloxacin 0.3% eye dropsfour times per day was given topically one day before surgery. Trabecular aspiration was performed in all Group 1 patients under the operating microscope.Under aseptic precautions 1% hydroxy methyl cellulose viscoelastic substance was injected into the anterior chamber through sideport at 9'0 clock region. The trabecular aspirator with aspiration probe 400 µ introduced into the anterior chamber through a clear corneal incision at 12'0 region and directed against the trabecular meshwork in 6'0 position aspirating 5 to 6 clock hours inferiorly.Suction pressure was maintained for 100- 200 mm Hg during the procedure. The wound was closed with 10-0 monofilament nylon suture. The remaining viscoelastic was evacuated by gentle irrigation with basal salt solution which also served to reform the anterior chamber. 0.5 ml of 50 mg gentamycin mixed with 2mg dexamethasone was injected in subconjunctival space. Informed consent were taken from all the patients. Trabeculectomy was done in Group 2 patients. Under peribulbar anaesthesia limbal based conjunctival peritomy was done. 4mm x 5mm superficial scleral flap was made at 11-12'0 region superiorly and extended little towards the cornea. The inner scleral flap of triangular shape 2mmx3mm was excised along trabecular meshwork. Broad based iridectomy was done.Superficial scleral flap was closed by 10-0 vicryl at three sites. Conjunctiva was closed with 10-0 nylonsuture. Through paracentesis balanced salt solution was pushed into the anterior chamber to see the elevation of bleb.0.5 ml of 50 mg gentamycin with 2 mg dexamethasone was given to all patients subconjunctivally at the end of surgery. After the surgery the two groups were followed accordingly 1st week, 2nd week, 1 month and 3 months. Many of the patients did not turnup for 6th month followup, hence duration of followup was only for 3 months after surgery.

Results

Age of the patients ranged from 56 to 83 years and 60 to 85 years in Group 1 and 2 respectively. (Table 1 and Graph 1)

Table 1: Age Distribution

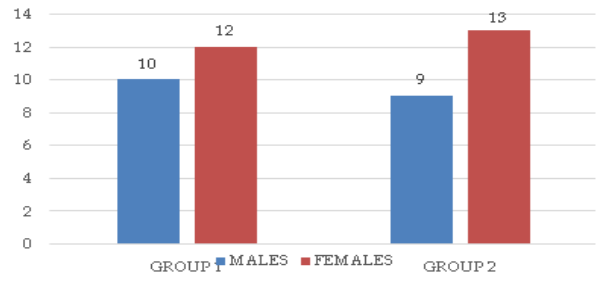
Age	Group 1	Group 2
50-60	8	3
61-70	10	10
>70	4	9



Graph 1:

Table 2: Sex Distribution

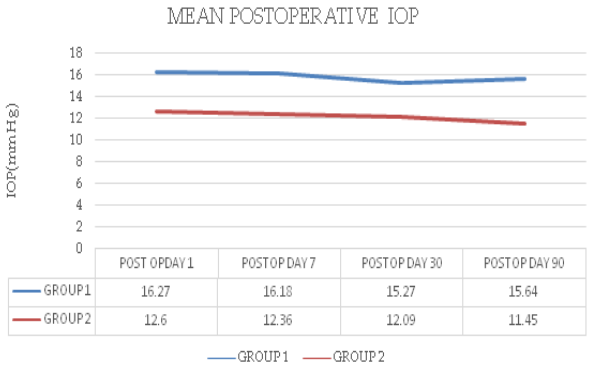
	Group 1	Group 2
Males	10	9
Females	12	13



Graph 2:
Group 2 consists of 10 males and 12 females and group 2 consists of 9 males and 13 females (Table 2 and Graph 2)

Table 3: Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean	P-Value
Pre OP IOP	Trabecular Aspiration	22	31.64	4.170	.889	< 0.001
	Trabeculectomy	22	13.09	3.006	.641	
Post Op Iop Day 1	Trabecular Aspiration	22	16.27	2.492	.531	< 0.001
	Trabeculectomy	22	12.64	3.230	.689	
Post Op Iop At 1 Week	Trabecular Aspiration	22	16.18	2.039	.435	< 0.001
	Trabeculectomy	22	12.36	2.871	.612	
Post Op Iop At 1 Month	Trabecular Aspiration	22	15.27	2.354	.502	< 0.001
	Trabeculectomy	22	12.09	2.266	.483	
Post Op Iop At 3 Months	Trabecular Aspiration	22	15.64	2.279	.486	< 0.001
	Trabeculectomy	22	11.45	2.324	.496	



Graph 3:

Statistical analysis was done by Student t test. The mean IOP was 16.27 mm Hg and 12.6 mm Hg in Group 1 and Group 2 respectively on first postoperative day. The p value of < 0.001 showed IOP was statistically significant between the two groups. First postoperative week showed mean IOP to be 16.18 mmHg in group 1 and 12.36 mm Hg in group 2. P value being <0.001 showed the difference between IOP in two groups was statistically significant. One month postoperatively the mean IOP was 15.27 mm Hg in group 1 and 12.09 mm Hg in Group 2. p value of <0.001 showed the intraocular pressure in Group 2 statistically significant than group 1. At the end of postoperative three months the mean IOP was 15.64 mm Hg in group 1 and 11.45 mm Hg in group 2. P value of <0.001 suggests that IOP is statistically significant between Group 1 and 2 (Table 3, Graph 3).

Table 4:

Complications	group		Total
	Trabecular Aspiration	Trabeculectomy	
Hyphaema	0	2	2
NIL	22	19	40
Shallow Ac	0	1	1
Total	22	22	44

Two patients had hyphaema and shallow AC (Anterior chamber) in Group 2 (Table 4).

Discussion

Secondary pseudoexfoliation glaucoma is more common in kolar district and commonly causes open angle glaucoma. Pseudoexfoliation debris blocks trabecular meshwork pores which impedes aqueous outflow.

Postoperative problems like fibrin deposition, uveitis, cataract, synechiae formation, pupillary block, vitreous loss, hyphaema, shallow anterior chamber are seen more in trabeculectomy group. Trabecular aspiration is a new concept in nonfiltering surgery in pseudoexfoliation glaucoma. The main advantage of trabecular aspiration over trabeculectomy is that it facilitates the aqueous outflow in conventional drainage system rather than creating a fistula. The high vacuum aspirates the intratrabecular pseudoexfoliate materials and clears the obstructive pathology for drainage of aqueous humor.

In our study we would have studied the post-operative IOP variation between 2 groups upto 2 years, since the patients are noncompliant for regular followup we noted the IOP upto 3 months.

Though the IOP on trabecular aspiration is more when compared to trabeculectomy group, topical antiglaucoma medication was not given in group 1 as the IOP was within the range.For hyphaema cases, Acetazolamide 250 mg BD and Timolol 0.5% BD were given for initial one week. There was no corneal haze, choroidal effusion in both the groups. 1 case had shallow anterior chamber on first postoperative day in Group 2 and formed on fourth postoperative day. We considered success or failure according to individualized target pressures and not on the basis of uniform IOP cut off. In this context, success rate is taken into account that the absolute IOP reducing capacity will be always higher in filtering procedure than in non filtering procedure.

Conclusion

The IOP reduction was more in trabeculectomy group than trabecular aspiration group. Complications such as hyphaema and shallow anterior chamber were seen in trabeculectomy group.

References

1. A.M. Prince, R. Ritch. Clinical signs of the pseudoexfoliation syndrome. Ophthalmology. 1983;93:803–07.
2. L.P. Repo, M. E. Teräsvirta, E. J. Tuovinen. Generalized peripheral iris transluminance in the pseudoexfoliation syndrome. Ophthalmology. 1990;97:1027-29.
3. K Necip, A Cigdem,Y Kemal, T Mehmet. Comparision of the efficacy and safety of selective laser trabeculoplasty in cases with primary open angle glaucoma and pseudoexfoliative glaucoma. Kaohsiung journal of medical sciences. 2013;29:500-04.
4. R. Sampaolesi, J. Zarate, O. Croxato.The chamber angle in exfoliation syndrome. Clinical and Acta Pathological Findings. Ophthalmol Suppl. 1988;184:48–53.
5. J. H. Seland. The ultrastructural changes in the exfoliation syndrome. Acta Ophthalmol Suppl. 1988;84:28–34.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.18

Awareness about Diabetes Mellitus and it's Ocular Manifestations in Indian Population

Vasudha Damle[1], Prakash Chand Agarwal[2]

Abstract

Context: Awareness about diabetes mellitus and it's ocular manifestations. *Aim:* To know the awareness about diabetes mellitus, it's complications and ocular manifestations in Indian population. *Settings and design:* Survey done through Questionnaire in diabetic patients attending health camps and OPD in medical college. *Methods & material:* Total 1114 diabetic patients, 566 males and 548 females, were included in this survey. The awareness about diabetes mellitus, it's complications, association with systemic diseases, role of family history, ocular manifestations, overall attitude and approach towards treatment, awareness about reversible and irreversible blindness was evaluated through questionnaire. *Statistical analysis:* Statistical software SPSS version 20 was used and all the data entered in excel sheet and interpreted. *Results:* Overall awareness about involvement of different organs was not good. Positive response received as follows: eyes (27.6%), kidney (35.9%), heart (28%), foot (33.8%), brain (22.3%), gums and teeth (17.2%), skin (19.4%) and nerves (22.3%). It was statistically significant. Poor orientation about diabetic retinopathy, it's treatment and not consulting ophthalmologist for treatment was noticed though not significant statistically. *Conclusion:* Poor awareness about diabetes mellitus, it's association with systemic diseases, ocular manifestations and various complications is the root cause of many life threatening complications. Timely intervention with the help of experts can save many lives.

Keywords: Awareness; Diabetic Retinopathy; International Diabetic Federation; Fundus Fluorscein Angiography (FFA); & Nephropathy.

Introduction

India is world's second largest capital for diabetes mellitus (DM). Rapid socioeconomic development, changes in life style and improper eating habits are the probable reasons. Total 425 million diabetic people in the world and 82 million people are in South East Asia. India is one of the 6 countries of the International Diabetic Federation South East Asia (IDFSEA) region [19]. In 2017, 72 million cases were reported in India and a figure of 151 million is expected in 2045. Fifty % of them remain undiagnosed and 4.6 million deaths occur every year [4,19].

Author Affiliation: [1]Assistant Professor [2]Professor & Head, Dept of Ophthalmology, RKDF Medical College H & RC, Bhopal, Madhya Pradesh 462026, India.

Corresponding Author: Prakash Chand Agarwal, Professor & Head, Dept of Ophthalmology, RKDF Medical College H & RC, Bhopal, Madhya Pradesh 462026, India.

E-mail: drprakash.eyecare@gmail.com

Received on 26.06.2018, **Accepted on** 07.07.2018

Somewhere lack of awareness is a major problem apart from cost of treatment. Surveys done so far are restricted to small areas, not done at state or national level. Indian Council of Medical Research India Diabetes Study (ICMR-INDIAB study) and study of prevalence of diabetic retinopathy (DR) done by AIOS are larger group studies [1,3].

In this survey, we tried to assess the awareness of patients about diabetes mellitus, then it's association with systemic diseases, ocular manifestations and patients approach and attitude toward treatment. So all these surveys may have global relevance and can improve the compliance towards treatment and so can save many lives [20].

Methods and Material

Total 1114 diabetic patients were included in this study attending health camps and OPD in medical college. Protocol was approved by institutional ethics committee. Questionnaire was given to them and on the basis of answered questions, analysis

was done. Record was kept about unanswered questions also. Apart from personal profile different types of questions asked in questionnaire are as follows:

1. Since how many years you are suffering from diabetes?
2. Are your family members are also suffering from the problem? Yes or No
3. Are you aware about complications of diabetes mellitus? Yes or No
4. Which organs are affected? Eyes/ kidney/ heart/ foot brain/ teeth& gums/skin/brain/ nerves
5. Do you take oral tablets or insulin?
6. How many times in a year you consult your physician?
7. Are you suffering from any other disease? High BP/ Thyroid disorder/Obesity/Heart disease
8. Are you suffering from any eye problems like diminished vision? Yes or No
9. Do you know that it can lead to blindness? Yes or No
10. Do you know that at least once in a year eye check up is required? Yes or No
11. Are you made aware about diabetic retinopathy by your Doctor? Yes or No
12. How you got the knowledge about diabetic retinopathy? News paper/ Magazine/ Physician/Internet or other patients
13. Are you suffering from any other eye disease? Yes or No
14. Have you ever gone through fluorescein angiography? Yes or No
15. Have you gone for laser treatment? Yes or No
16. Do you know any patient who is blind due to diabetes mellitus? Yes or No
17. Are you aware that blindness due to diabetes is preventable? Yes or No
18. Do you know that total blindness cannot be cured? Yes or No

Statistical Analysis

In present study questionnaire was given to the patient and all data was entered in excel sheet. Statistical analysis was done by using statistical software SPSS version 20, test of significance applied whenever applicable. p value <.05 considered to be significant.

Results

All the patients were known diabetic patients and total 1114 patients were included. There were 566 males and 548 females. Only 59.6% knew that diabetes can have complications despite the fact that they all were diabetic patients. Being a multisystem disorder, awareness towards involvement of different organs as mentioned by patient is as follows: Eyes (27.6%), kidney (35.9%), heart (28%), foot (33.8%), brain (22.3%), gums and teeth (17.2%), skin (19.4%) and nerves (22.3%). (Table 2). It was statistically significant.

Along with diabetes 30.2% were having hypertension, 15.8 % had thyroid disease, 22.3% had obesity, 12.2% had cardiac disease and 51 % had positive family history (Table 3).

Patients taking insulin were 26.3% while 73.97% patients were on oral treatment (Table 4 A). 50.08% patients consulted their physician less than once in a year, 36.6% patients consulted once in a year and only 13.28% patients consulted their physician more than once in a year (Table 4 B).

Only 53.3% patients had symptoms related to eyes, 32.9% consulted doctor for counselling of DR while 64.9% didn't consult a doctor. Most of the information about diabetic retinopathy (DR) was gained from magazine (27.3%), from newspaper (19.4%), internet (9.3%) and through patients in 10.1% patients. Total 14.4% patient had DR,

Table 1: Demographic Profile

	Male	Female	Total
No.of Patients	566 (50.8%)	548(49.2%)	1114
Age group			
20 - 30 years	20	18	38
31 - 40 years	58	56	114
41 - 50 years	178	172	350
51 - 60 years	152	147	299
61- 70 years	158	155	313
Mean age	47.502	47.628	47.564

Difference 0.126, Standard error 0.661, 95% CI, -1.1706 to 1.4226, t-statistic .191, p = 0.8488, DF=11123

Table 2: Awareness about involvement of different organs

S No	Involvement of organs	Yes	No	Not answered
1	Awareness of complications of DM	664 (59.6%)	202(18.1%)	248(22.3%)
2	Ocular involvement	307(27.6%)	790(70.9%)	17(1.5%)
3	kidney	400(35.9%)	690(61.9%)	24(2.2%)
4	Heart involvement	312(28%)	770(69.1%)	32(2.9%)
5	Foot	376(33.8%)	714(64.1%)	24(2.2%)
6	Brain	248(22.3%)	842(75.6%)	24(2.2%)
7	Gums and teeth	192(17.2%)	890(79.9%)	32(2.9%)
8	Skin	216(19.4%)	858(77%)	40(3.6%)
9	Nerves	248(22.3%)	818(73.4%)	48(4.3%)

chi-square = 0.177E+04 degrees of freedom = 16 probability = 0.000

This means there was statistically significant difference in involvement of different organs as per participant's awareness

Table 3: Showing Associated diseases

S No		Yes	No	Not answered
1	Associated Hypertension	336(30.2%)	778(69.8%)	Nil
2	Thyroid disease	176(15.8%)	898(80.6%)	40(3.6%)
3	Obesity	248(22.3%)	826(74.1%)	40(3.6%)
4	Cardiac Disease	136(12.2%)	954(85.6%)	24(2.2%)
5	Family history	568(51%)	538(48.3%)	8(0.7%)

Table 4: Treatment schedule

Treatment given	
On Insulin	290(26.3%)
On oral drugs	824(73.97%)
Frequency of visit to physician	
< Once in a year	558(50.08%)
Once a year	408(36.6%)
> Once in a year	148(13.28%)

Table 5: Details related to ocular involvement

S No	objective	Yes	No	Not answered
1	Having eye symptoms	594(53.3%)	512(46%)	08(0.7%)
2	Awareness about possibility of diabetic retinopathy	396(35.5%)	710(63.7%)	8(0.7%)
3	Awareness about DR screening for early detection	59(5.3%)	1047(94%)	8(0.7%)
4	Doctor counselling for DR	367(32.9%)	723(64.9%)	24(2.2%)
5	Information by Magzine	304(27.3%)	762(68.4%)	48(4.3%)
6	By news paper	216(19.4%)	858(77%)	40(3.6%)
7	By Doctor	0	0	0
8	Internet	104(9.3%)	962(86.4%)	48(4.3%)
9	Through other patients	112(10.1%)	946(84.9%)	56(5.6%)
10	Visiting eye doctor	116(10.4%)		48(4.3%)
11	optometrist	950(85.3%)		
12	Do you have DR	160(14.4%)	472(42.4%)	482(43.3%)
13	Underwent FFA	168(15.1%)	898(80.6%)	48(4.3%)
14	Underwent laser Treatment	136(12.2%)	970(87.1%)	8(0.7%)
15	Do you know any patient with blindness due to DR	288(25.9%)	818(73.4%)	8(0.7%)
16	Do you know DR is treatable in early stage	259(23.2%)	815(73.2%)	40(3.6%)
17	DR Is irreversible	98(8.8%)	408(36.6%)	608(54.57%)

80.65% patients didn't go for fundus fluorescein angiography (FFA) and 87.1% didn't go for laser treatment. Only 8.8 % patients were aware that DR is irreversible and 23.2% knew that it is treatable in early stage. (Table 5)

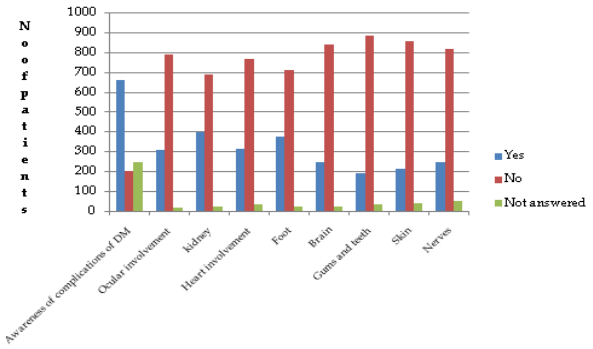


Fig. 1: Awareness about involvement of different organs

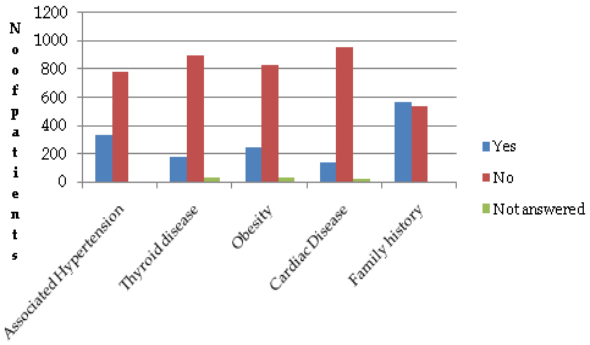


Fig. 2: Showing associated diseases

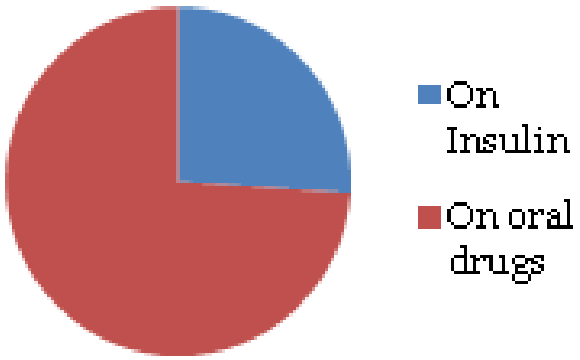


Fig. 3A: Pie chart to show percentage of patients on oral treatment & insulin

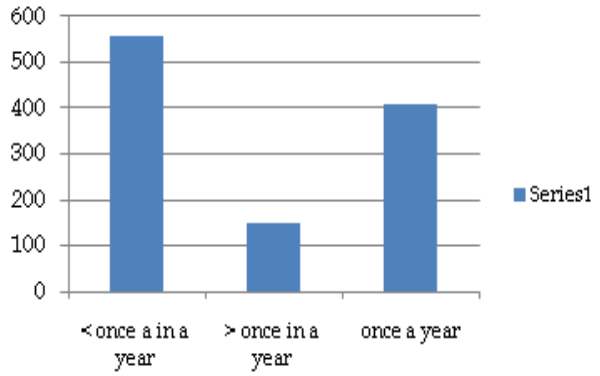


Fig. 3B: Showing frequency of visit to a doctor

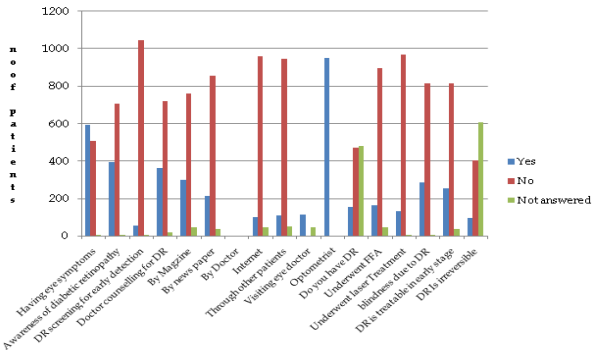


Fig. 4: Details related to ocular involvement

Discussion

This study was performed in city of Bhopal on diabetic patients coming to OPD in campus of medical college and was not restricted to any particular socioeconomic group and irrespective of any educational background survey was done in an unbiased manner. All these patients were known diabetics.

We found poor awareness amongst females. Secondly despite the fact they all were known diabetics, only 59.6% patients were aware about the complications of diabetes mellitus and only 50.08 % patients consulted a doctor less than once in a year so it should be more frequent.

Association of diabetes mellitus with other systemic diseases was not found statistically significant. Family history was found in 51 % patients. Being a multi-organ disease, awareness needs to be created about microvascular complications such as DR or nephropathy, macrovascular complications like strokes, cardiac arrest, then neuropathies, diabetic foot, involvement of skin etc.

Duration of diabetes influences the prevalence of DR in patients [6,15]. In the Wisconsin epidemiological study, prevalence of DR varied from 28.8% for duration of <5 years to 77.8% for duration of 15 years or more [9]. Apart from this high systolic blood pressure, higher glycosylated Hb are also affecting the prevalence of diabetic retinopathy [5]. Advancing age affects BDR more than PDR.

In our survey only 27.6% patients were aware about ocular involvement and 70.9% were not aware. Most of the patient received information through news paper and magazine. Something very alarming that 85.35% consulted the optometrist and only 10.41% an Ophthalmologist. Forty three % didn't answer about DR, so there is a likely possibility that some of them might be suffering from the disease but not screened properly.

Secondly all the patients whether having DR or not, question comes that how many of them knew about lasers and FFA or in early stage it is

preventable or DR can lead to blindness [8,12,13]. Only 35.55% were aware about possibility of DR and 5.31% knew the importance of screening for DR. Only 23.2% patients were aware that DR can be treated in early stage and 73.2% were not aware, 25.9% patients were aware that diabetic retinopathy can lead to blindness and 73.4% were not aware.

Yearly fundus examination and preventive treatment are suggested by Diabetic retinopathy Study group (DRS group) and Early Treatment Diabetic Retinopathy Study Research Group (ETDRS) but poorly followed [2,17]. In developing country like India cost may be the reason but at the same time some of the richest countries also face this situation [18]. Iceland set an ideal example. In 25 years blindness from DR has decreased from 2.4% to 0.5% just by systematic screening [16].

It doesn't require new inventions in diagnosis or treatment as far as prevention of blindness from DR is concerned and there is nothing short on the part of technology. It's mainly the Awareness about the disease.

Most of the surveys were restricted to small areas not done at national or state level. A study done by Indian Council of Medical Research India Diabetes Study (ICMR-INDIAB study), only 4 regions were covered in it's 1st phase (November 2008 to April 2010) and later phase it included remaining states. Another attempt by AIOS to know the prevalence of DR, also involved a larger area. Lack of awareness was a major drawback [1,3,11].

The different government projects like National programme for control of blindness (NPCB), The National Program for Control of Diabetes, Cardiovascular Disease and Stroke, diabetes educators, National Diabetes Educator's Program (NDEP), Certificate Course in Evidence Based Diabetes Management (CCEBDM) are not only able to create awareness at national level, helped the organisations in treatment part also [7,10,14].

So in nutshell, there is a strong need to generate awareness through experts about symptoms, factors affecting progression of diabetic retinopathy, at what stage blindness is reversible and how routine retinal checkups, good glycemic control, FFA and lasers can help in preventing blindness.

Conclusion

There is a strong need for comprehensive diabetes education through awareness programs and if done at larger scale may have a global relevance also as this information can help other developing countries too, might be facing similar problems.

Good glycemic control, knowledge about glycosylated Hb, eating habits, life style problems and encouraging physical activity can check many complications. Being a multisystem disorder, knowledge about involvement of each and every organ is essential. As far as blindness from retinopathy is concerned, awareness about use of lasers, FFA and yearly fundus examination can save many eyes.

Acknowledgement: I acknowledge the efforts of Dr. Sanjeev Kumar Gupta, Associate Professor, Community Medicine, RKDF Medical College H & RC who helped me in statistical analysis. My sincere thanks to all the patients for their cooperation, department of Ophthalmology, RKDF Medical College and my family members for a great moral support.

Key Message: It's lack of awareness not always lack of technology making people blind or causing disastrous complications in diabetes mellitus.

Conflict of Interest: Nil

References

1. Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. Indian J Endocrinol Metab. 2014;18(3):379-85.
2. Early Treatment Diabetic Retinopathy Study Research Group. Photocoagulation for diabetic macular edema. Early Treatment Diabetic Retinopathy Study report number 1Arch Ophthalmol. 1985;103(12):1796-806
3. Gadkari SS, Maskati QB, Nayak BK. Prevalence of diabetic retinopathy in India: The All India Ophthalmological Society Diabetic Retinopathy Eye Screening Study 2014. Indian J Ophthalmol 2016;64:38-44
4. Harris MI, Eastman RC. Early detection of undiagnosed diabetes mellitus: A US perspective. Diabetes Metab Res Rev. 2000;16:230–6
5. Jenchitr W1, Samaiporn S, Lertmeemongkolchai P, Chongwiriyanurak T, Anujaree P, Chayaboon D, Pohikamjorn A. Prevalence of diabetic retinopathy in relation to duration of diabetes mellitus in community hospitals of Lampang. J Med Assoc Thai 2004;87(11):1321-6.
6. Jerneld B, Algvere P. Relationship of duration and onset of diabetes to prevalence of diabetic retinopathy. Am J Ophthalmol. 1986;102(4):431-7.
7. Joshi S, Joshi SR, Mohan V. Methodology and feasibility of a structured education program for

diabetes education in India: The National Diabetes Educator Program. Indian J Endocrinol Metab. 2013;17:396-401.

8. Kahn HA, Hiller R. Blindness caused by diabetic retinopathy. Am J Ophthalmol 1974;78:58–67.
9. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy. III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Ophthalmol 1984;102:527-32.
10. Ministry of Health and Family Welfare. National Programme for Prevention and Control of Diabetes, Cardiovascular Disease and Stroke. A Manual for Medical Officers. [Last accessed on 2013 Jul4] Available from :http: //www .whoindia. org/ Link Files/ NMH_ Resources _ COMBINED_ MANUAL21formedical_officer.pdf .
11. Mohan D, Raj D, Shanthirani CS, Datta M, Unwin NC, Kapur A, et al. Awareness and knowledge of diabetes in Chennai – The Chennai Urban Rural Epidemiology Study [CURES-9] J Assoc Physicians India. 2005;53:283–7.
12. Porta M, Allione A. Current approaches and perspectives in the medical treatment of diabetic retinopathy. Pharmacol Ther 2004;103:167–77.
13. Prevention of Blindness from Diabetic Retinopathy. Report of a WHO Consultation, Geneva; November, 2005.
14. Public Health Foundation of India. Certificate Course in Evidence Based Diabetes Management (CCEBDM) [Last accessed on 2013 Jul 4]. Available from: http://www.ccebdm.org/ccebdm.php .
15. Raman R, Rani PK, Reddi Rachepalle S, Gnanamoorthy P, Uthra S Kumaramanickavel G, et al. Prevalence of diabetic retinopathy in India: Sankara Nethralaya diabetic retinopathy epidemiology and molecular genetics study report 2. Ophthalmology 2009;116:311-8.
16. Stefansson E, Bek T, Porta M, et al. Screening and prevention of diabetic blindness. Acta Ophthalmol Scand 2000;78:374–85.
17. TDRSR Group. Photocoagulation treatment of proliferative diabetic retinopathy. Clinical application of Diabetic Retinopathy Study (DRS) findings, DRS Report Number 8. Ophthalmology 1981;88:583–600.
18. Trautner C, Icks A, Haastert B, et al.Incidence of blindness in relation to diabetes. A population-based study. Diabetes Care 1997;20:1147–53.
19. Unwin N, Whiting D, Guariguata L, Ghyoot G, Gan D, editors. Diabetes Atlas. 5th ed. Brussels, Belgium: International Diabetes Federation; International Diabetes Federation; 2011.pp.11–74.
20. Visser A, Snoek F. Perspectives on education and counseling for diabetes patients. Patient Educ Couns. 2004;53:251–5.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.19

Comparison of Optical Coherence Tomography and Humphrey Visual Field in Early Glaucoma Diagnosis: Observational Study

Usha B.R.[1], K. Kanthamani[2], Meghana C. Reddy[3], Nithiya J. Babu[4]

Abstract

Objective: To study the diagnostic accuracy of Retinal nerve fibre layer (RNFL) thickness and perimetric field defects in early diagnosis of Primary open angle glaucoma(POAG). *Materials and Methods:* Eyes fulfilling inclusion criteria were selected for this study from ophthalmology glaucoma clinic outpatient department at R.L. Jalappa Hospital. Informed consent was take from all patients. They were divided into 3 groups. Group I consists of 23 glaucoma suspect eyes.Group II consists of 23 eyes with early glaucoma. Group III consists of 23 normal eyes. Each patient underwent best corrected visual acuity (BCVA), Intraocular pressure (IOP) estimation, slit lamp examination, fundus examination particularly for Cup Disc ratio (C/D), gonioscopy, Optical Coherence Tomography (spectral) and Humphrey Visual Field (HVF) - 750. Superior, inferior, nasal, temporal, average RFNL thickness compared among all groups. Mean deviation (MD) and pattern standard deviation (PSD) of Humphrey visual field analysis statistically comparedwith RFNL thickness. Statistical analysis was made by ANOVA test. *Results:* The mean intra ocular pressure was 18.9mmHg, 21.56mmHg, 12.0mmHg in group I, II, III respectively. The mean C/D ratio was 0.90, 0.98, 0.4 in these three consecutive groups. Average RNFL thickness was 94.2microns, 72.33 microns, 112.23microns in three consecutive groups. The mean of mean deviation (MD) and the mean of pattern standard deviation (PSD) in group I showed -0.73 and 1.70 respectively. The mean MD and the mean PSD in group II showed -3.58 and 9.20 respectively. The mean MD and the mean PSD in group III showed -0.215 and 1.272 respectively. *Conclusion:* OCT is superior in diagnosis of glaucoma particularly in suspect groups. RNFL thickness measured by OCT discriminates better between glaucomatous, glaucoma suspect and normal eyes.

Keywords: OCP; HFA.

Introduction

Glaucoma is a progressive optic neuropathy characterized by retinal ganglion cell loss and associated morphological changes of optic nerve and nerve fibre layer [1]. It is the main cause of irreversible legal blindness. Structural damage is accompanied by visual function changes. In the initial stages glaucoma induces structural alteration such as apoptosis of ganglion cells, nerve fibre loss, optic disc alteration which is asymptomatic and cannot be diagnosed clinically until functional changes are detected such as early scotomas in visual field. Therefore, early diagnosis of glaucoma before visual field alterations helps in accurate treatment with goal to maintain and preserve visual functions and minimum damage.

Optical Coherence Tomography (OCT) is a modern imaging technology using low coherence tomography to provide high resolution cross-sectional images to retinal nerve fibre and optic nerve head [2,3]. It is most sensitive method for detection of early glaucomatous nerve damage that precede optic disc and visual field damage [4,5].

Objective of the Study

To study the diagnostic accuracy of optic disc nerve fibre layer thickness and perimetric visual field defects in early diagnosis of POAG.

Author Affiliation: [1]Assistant Professor [2]Professor and Head [3,4]Postgraduate Student, Department of ophthalmology, Sri Devaraj Urs Medical College,Tamaka, Kolar, Karnataka 563101, India.

Corresponding Author: K. Kanthamani, Professor and Head, Department of Ophthalmology, Sri Devaraj Urs Medical College, Kolar, Karnataka 563101, India.

E-mail: drushamahesh@gmail.com

Received on 14.04.2018, **Accepted on** 05.05.2018

Materials and Methods

Group I consist of 23 glaucomatous suspect eyes. Group II consists of early glaucoma eyes and Group III consists of 23 normal eyes.

This is an observational study.

Inclusion Criteria

Subjects of 18 years of age or older.

Exclusion Criteria

1. Subjects with history of intraocular surgery
2. History of ocular trauma
3. History of diabetes mellitus
4. History of hypertension
5. Pathological disorder affecting visual field
6. Pathological changes in posterior segment
7. Colour blindness
8. Refractive media opacity.

Each of the patients of the 3 groups underwent standard ophthalmic examination like best corrected visual acuity (BCVA), intraocular pressure (IOP) estimation, slit lamp examination, fundus examination particularly for Cup Disc ratio (C/D), Optical Coherence Tomography (stratus) and Humphrey Visual Fields (HVF) - 750.

For suspect group (Group I).

1. BCVA 6/12 and more.
2. IOP> 21 mg on at least 2 occasions or
3. C/D ≥ 0.6 or C/D asymmetry0.2 between2 eyes.
4. Normal perimetry .
5. Open angle by gonioscopy

For early glaucoma group (Group II).

1. BCVA 6/12 or more.
2. IOP ≥ 21 mmHg on at least 2 occasions, multiple IOP fluctuations per day ≥ 8mmHg
3. C/D > 0.6 and asymmetry 0.2 between eyes.
4. Patients irrespective of antiglaucoma medications.
5. Open angle by Gonioscopy.
6. Abnormal perimetry as defined by Anderson criteria.

Anderson Criteria

Abnormal perimetry is defined as sensitivity of 3 non-edge points <5% of general population. 1 among 3 scotomasshowing probability of <1%. Glaucoma hemifield test is abnormal. HFA-750 done under Swedish Interactive Threshold Algorithm (SITA) standard strategy, central 30-2. Near vision was corrected with the glasses. Target size III was used. PSD and MD were noted in all patients compared with each group and results were analysed. Visual field used for analysis satisfied the following criteria: fixation losses <25% and false positive and false negative response <20%. For each reliable field, mean deviation (MD) and PSD were recorded. All subjects underwent Spectral domain OCT. To obtain OCT images with the best quality, all subjects pupil was dilated with 1% tropicamide. The fast RNFL thickness 3.4 detecting program was used. Superior (46-135 degrees), inferior (226-315 degrees), temporal (316-345 degrees) and nasal (136-225 degrees) RNFL thickness were compared between the three groups. 23 eyes of 18 patients,23 eyes of 15 patients & 23 eyes of 11 patients are divided into group I, II, III respectively.

In group I age ranges from 44 to 72 eyes

In group II age ranges from 40years to 68 years.

In group IIIage ranges from 42 years to 70 years.

Table 1: Age Distribution

Age	Group I	Group II	Group III
40-50 years	5	6	8
51-60 years	7	1	8
61-70 years	9	15	7
>70 years	2	1	1

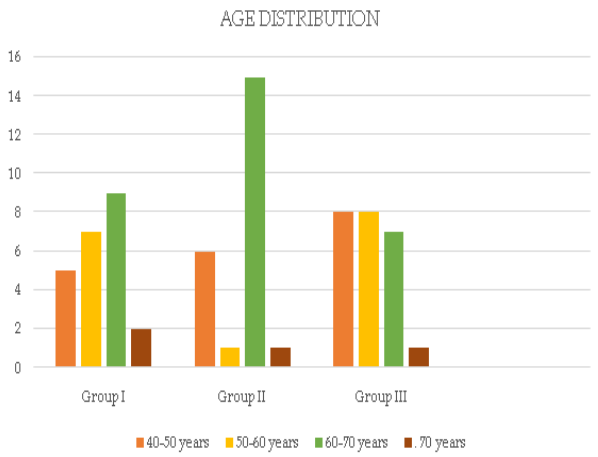
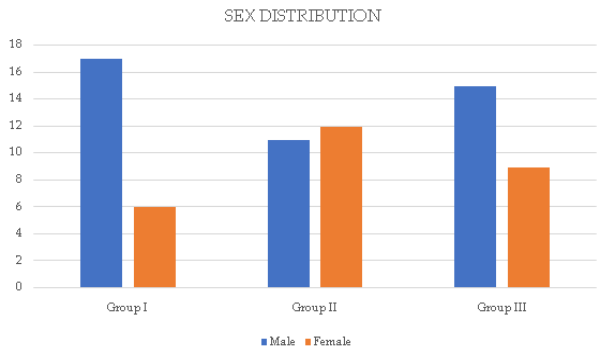


Table 2: Sex Distribution

	Group I	Group II	Group III
Male	17	11	15
Female	6	12	9



Males are more in group 1 followed by group III and group II

Statistical analysis was done by ANOVA test.

Fisher value correlation coefficient to find the relationship between variables. p value <0.05 was considered statistically significant and p value> 0.05 was considered statistically not significant.

Table 3:

Variables in each groups.	No.	Mean	Std. Deviation	Minimum	Maximum
Age in years	1	23	58.70	9.484	42	72
	2	23	59.09	9.742	40	68
	3	24	57.25	9.692	42	70
	Total	70	58.33	9.534	40	72
C/D (Cup/Disc)	1	23	.9087	1.26918	.40	6.70
	2	23	.9843	1.00025	.30	.80
	3	24	.4000	.08847	.20	.50
	Total	70	.7591	1.04107	.20	6.70
Average RNFL in microns	1	23	94.204348	16.4756978	49.7000	120.2000
	2	23	72.334783	24.3891669	44.6000	168.8000
	3	24	112.233333	7.8973120	98.8000	130.3000
	Total	70	93.200000	23.8423141	44.6000	168.8000
Inferior RNFL in microns	1	23	110.565	17.5287	61.0	132.0
	2	23	84.591	21.1872	6.6	114.0
	3	24	128.750	8.3938	108.0	148.0
	Total	70	108.266	24.4769	6.6	148.0
Superior RNFL in microns	1	23	111.57	16.973	68	138
	2	23	86.43	12.064	66	112
	3	24	129.42	8.490	112	148
	Total	70	109.43	21.886	66	148
Nasal RNFL in microns	1	23	77.00	13.181	41	98
	2	23	56.43	11.889	32	82
	3	24	93.00	9.367	78	110
	Total	70	75.73	18.923	32	110
Temporal RNFL in microns	1	23	70.74	13.632	32	88
	2	23	49.96	12.758	20	74
	3	24	86.96	8.518	74	106
	Total	70	69.47	19.214	20	106
Mean deviation (MD)	1	23	-.732609	1.0477735	-2.8000	1.0600
	2	23	-3.586957	.5101732	-4.8000	-2.8000
	3	24	.215000	.2225543	-.1200	1.1000
	Total	70	-1.345571	1.7596769	-4.8000	1.1000
Pattern standard deviation (PSD)	1	23	1.702609	.7056410	.8000	2.9000
	2	23	9.208696	13.7480218	3.4000	57.0000
	3	24	1.272500	.1475672	1.0100	1.6000
	Total	70	4.021429	8.5918224	.8000	57.0000
Intra ocular pressure (IOP) in mmHg	1	23	18.95652	4.587317	12.000	26.000
	2	23	21.56522	3.952285	16.000	30.000
	3	24	12.00000	2.766256	8.000	18.000
	Total	70	17.42857	5.565347	8.000	30.000

Table 4:

ANOVA

		Sum of Squares	df	Mean Square	Fisher value	Significance
Average RNFL In microns	Between Groups	18730.845	2	9365.422	30.620	.000
	Within Groups	20492.615	67	305.860		
	Total	39223.460	69			
Inferior RNFL in microns	Between Groups	23083.147	2	11541.574	42.358	.000
	Within Groups	18255.870	67	272.476		
	Total	41339.018	69			
Superior RNFL In microns	Between Groups	21854.005	2	10927.003	65.384	.000
	Within Groups	11197.138	67	167.121		
	Total	33051.143	69			
Nasal RNFL In microns	Between Groups	15758.191	2	7879.095	58.985	.000
	Within Groups	8949.652	67	133.577		
	Total	24707.843	69			
Temporal RNFL In microns	Between Groups	16135.093	2	8067.547	57.882	.000
	Within Groups	9338.350	67	139.378		
	Total	25473.443	69			
Means deviation(MD)	Between Groups	182.638	2	91.319	197.256	.000
	Within Groups	31.018	67	.463		
	Total	213.656	69			
Pattern standard deviation(PSD)	Between Groups	923.906	2	461.953	7.423	.001
	Within Groups	4169.634	67	62.233		
	Total	5093.539	69			
Intra ocular pressure(IOP)	Between Groups	1154.534	2	577.267	39.361	.000
	Within Groups	982.609	67	14.666		
	Total	2137.143	69			

Table 5:

Dependent Variable	Individual (I) group	Other group(J)	Mean Difference (I-J)	Std. Error	p value
C/D	1	2	-.07565	.30143	.969
		3	.50870	.29827	.241
	2	1	.07565	.30143	.969
		3	.58435	.29827	.155
	3	1	-.50870	.29827	.241
		2	-.58435	.29827	.155
Average(RNFL)	1	2	21.8695652*	5.1571809	.000
		3	-18.0289855*	5.1031776	.003
	2	1	-21.8695652*	5.1571809	.000
		3	-39.8985507*	5.1031776	.000
	3	1	18.0289855*	5.1031776	.003
		2	39.8985507*	5.1031776	.000
Inferior RNFL in microns	1	2	25.9739*	4.8676	.000
		3	-18.1848*	4.8166	.002
	2	1	-25.9739*	4.8676	.000
		3	-44.1587*	4.8166	.000
	3	1	18.1848*	4.8166	.002
		2	44.1587*	4.8166	.000
Superior RNFL in microns	1	2	25.130*	3.812	.000
		3	-17.851*	3.772	.000
	2	1	-25.130*	3.812	.000
		3	-42.982*	3.772	.000
	3	1	17.851*	3.772	.000
		2	42.982*	3.772	.000

Dependent Variable	Individual (I) group	Other group(J)	Mean Difference (I-J)	Std. Error	p value
Nasal RNFL In microns	1	2	20.565*	3.408	.000
		3	-16.000*	3.372	.000
	2	1	-20.565*	3.408	.000
		3	-36.565*	3.372	.000
	3	1	16.000*	3.372	.000
		2	36.565*	3.372	.000
Temporal RNFL In microns	1	2	20.783*	3.481	.000
		3	-16.219*	3.445	.000
	2	1	-20.783*	3.481	.000
		3	-37.002*	3.445	.000
	3	1	16.219*	3.445	.000
		2	37.002*	3.445	.000
Mean deviation(MD)	1	2	2.8543478*	.2006399	.000
		3	-.9476087*	.1985389	.000
	2	1	-2.8543478*	.2006399	.000
		3	-3.8019565*	.1985389	.000
	3	1	.9476087*	.1985389	.000
		2	3.8019565*	.1985389	.000
Pattern standard deviation(PSD)	1	2	-7.5060870*	2.3262834	.008
		3	.4301087	2.3019237	.983
	2	1	7.5060870*	2.3262834	.008
		3	7.9361957*	2.3019237	.004
	3	1	-.4301087	2.3019237	.983
		2	-7.9361957*	2.3019237	.004
Intra ocular pressure(IOP)	1	2	-2.608696	1.129286	.077
		3	6.956522*	1.117461	.000
	2	1	2.608696	1.129286	.077
		3	9.565217*	1.117461	.000
	3	1	-6.956522*	1.117461	.000
		2	-9.565217*	1.117461	.000

In glaucoma suspect (group I) which includes disc suspect and ocular hypertension, the mean Cup Disc ratio is 0.9, average RNFL thickness 94.2µ. The minimum average RNFL thickness varies from minimum 49.7µ to maximum 120.2µ. The mean inferior RNFL thickness is 110.56µ. The mean superior RNFL thickness is 111.57µ. The mean nasal RNFL thickness 77.00µ and mean temporal RNFL thickness is 70.74µ which follows double hump pattern in OCT. 8 eyes had IOP equal to or higher than 21 mmHg on atleasttwo different occasions without optic disc abnormalities. Cup disc ratio was not statistically significant between the three groups. 4.35% i.e, one eye had glaucomatous changes in HFA and 13.04% (3 eyes) of 23 eyes had OCT changes in suspect group. The glaucomatous HFA showed focal defects in nasal aspect.Oneeye withOCT abnormalityhad HFA changes. 2 eyes showed OCT abnormality for glaucoma but not related to field defect. The mean MD was - 0.73 and the mean PSD was 1.702. The mean IOP in group I was 18.95.

In glaucoma group II the mean RNFL thickness measured by OCT was outside normal limits in all patients. The mean C/D was 0.75. The mean average RNFL thickness of group II was 72.33µ. The mean inferior, mean superior, mean nasal and mean temporal RNFL thickness was 84.5µ, 86.4 µ, 56.4µ and 49.9µ respectively. This group also follows double hump pattern in OCT. The mean MD and mean PSD in group II was - 3.5 and 9.2086 respectively.The mean IOP in group II was 21.56 mmHg.

In normal group III the mean C/D was 0.4, average RNFL thickness was 112.34µ. The mean inferior RNFL, mean superior RNFL, mean nasal RNFL and mean temporal RNFL thickness was 128.75µ, 129.42µ, 93µ and 86.96µ. The mean IOP in this group was 12mm Hg. The mean MD and mean PSD was 0.215 and 1.272 respectively.There were no OCT and HFA changes.

Statistical analysis was done by ANOVA to know the significance between these groups.

In group I, average RNFL thickness showed statistically significant difference between group II and group III with p value being 0.00 and 0.003. In group I Superior, inferior, nasal, temporal RNFL thickness showed statistically significant with group II p value being 0.000.

In group II, average, inferior, superior, nasal and temporal RNFL thickness showed statistically significant difference between group I with p value 0.000.

In group III, the average thickness of RNFL showed statistically significant difference between group I and II with the p value 0.003 and 0.000 respectively. In group III inferior RNFL thickness showed statistically significant difference with group I p value being 0.002. In group III Superior, inferior, nasal, temporal RNFL thickness showed statistically significant difference with group I and II with p value of 0.000.

The mean deviation showed statistically significant difference between all the groups. The Pattern standard deviation (PSD) in group I did not show statistical significance with group II and group III with p value 0.008 and 0.953.

Discussion

Glaucoma leads to irreversible blindness but early diagnosis and treatment are essential for controlling the disease and reducing the vision loss. OCT is considered as an objective investigation not that provides quantitative information about RNFL thickness, In addition there are no effects of refractive error and corneal birefringence on OCT information.

In our study, there was significant difference in RNFL thickness among suspect group, early glaucoma and suspect group.

RNFL thickness measured by OCT is a good tool for differentiating glaucoma from normal eyes. P Sihotaand R Sony [6] found the average RNFL thickness followed by inferior RNFL thickness had the highest power to discriminate glaucomatous and normal eyes. Chen H Y and Huang M L [7] showed that the inferior RNFL was the best parameter for differentiation. In our study 50% followed ISNT rule in group I, 60% in group II and 61% in group III. In ISNT rule, inferior RNFL fibres are thick followed by superior, nasal and temporal.

Our study showed statistically significant correlation between MD, PSD and average RNFL thickness (1.060, 2.900 and p value 0.000). In our study inferior RNFL thickness was the best parameter for differentiation.

The limitation of our study was sample size is less.

Results

The mean intra ocular pressure was 18.9 mmHg, 21.56 mmHg, 12.0mmHg in group I, II, III respectively. The mean C/D ratio was 0.90, 0.78, 0.4 in these three consecutive groups. Average RNFL thickness was 94.2microns, 72.33 microns, 112.23microns in three consecutive groups. The mean of mean deviation (MD) and the mean of pattern standard deviation (PSD) in group 1 showed -0.73 and 1.70 respectively. The mean MD and the mean PSD in group II showed -3.58 and 9.20 respectively. The mean MD and the mean PSD in group III showed -0.215 and 1.272 respectively.

Conclusion

OCT is superior in diagnosis of glaucoma particularly in suspect groups. RNFL thickness measured by OCT discriminates better between glaucomatous, glaucoma suspect and normal eyes

References

1. P. Maria, B.K. Patrycja, H.M. Marta, P.Z. Hanna, G.Andrzej. Application of optical coherence tomography in glaucoma suspect eyes. In Deparment of Ophthalmology, Wroclaw medical University, Wroclaw, Poland; 2012.pp.78-88.
2. B.A Tarek, B.Christopher, B.Catherine, A.Payam, Z.MLinda. Retinal nerve fibre layer thickness measured with optical coherence tomography is related to visual function in glaucomatous eyes. American Academy of Opthalmology 2003;110:2185-191.
3. M.H. Amir, T.J. Andrew, Z.M. Linda, G.A. Christopher, L.M Jeffrey. The relationship between visual field index and Estimated number of retinal ganglion cells in glaucoma. Hamilton glaucoma centre, Department of Ophthalmology 2013;8:1-7.
4. W. Gadi, S.S. Joel, P.L. Lori, A.Ali, B.A. Siobahn. Optical coherence tomography macular and peripapillary retinal nerve fibre layer measurements and automated visual fields.American Journal Of Ophthalmology 2004;138:218-25.
5. PI Niles, D.S. Grennfield, M.Sahi, N.Bhardwaj, S.M.Iverson. Detection of progressive macular thickness loss using optical coherence tomography in glaucoma suspects and glaucomatous eyes. Bascom Palmer Eye Institute, Department Of Ophthalmology, University of Miami 2012;26:983-91.
6. Naithani P, Sihota R, Sony P, Dada T, Gupta V, et al. Evaluation of optical coherence tomography and Heidelberg retinal tomography parameters in detecting early and moderate glaucoma. Investigaoph vis sci. 2007 July;48(7):3138-45.
7. Chen H-Y, Huang M-L, Wang I-J, Chen W-C. Correlation between stratus OCT and GDX VCC in early glaucoma, ocular hypertension and glaucoma suspect eyes. Journal of optometry. 2012;5(1):24-30.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.20

A study of B-Scan Ultrasonography in Detecting Posterior Segment Pathologies in Senile Mature Cataracts

Madhu Chanchlani

Abstract

Purpose: To study the role of B-scans ultrasound in detection of posterior segment pathology in cases of senile mature cataract. *Material and method*: This study was conducted in Department of Ophthalmology, Chirayu Medical College and Hospital, Bhopal from October 2012 to October 2017. The study included 1600 patients of mature cataract evaluated with B-Scan Ultrasonography for posterior segment lesions. *Results*: The cases were divided according to age ranging from 0-80 years. Male predominance was seen with sex ratio 1.37:1 (M:F). In this study Posterior staphyloma was seen in 62 (3.87%) cases, Vitreous hemorrhage in 28 (1.75%), Vitreous membrane in 30(1.87%), Chorioretinal Thickening in 25 (1.56%), and Retinal detachment 20 (1.12%) cases. Out of 1600 patients 320 (20.1%) were having ocular and systemic risk factors like hypertension, diabetes, increased IOP, uveitis. *Conclusion*: From, the present study it was noted that B-scan is very efficient tool in diagnosing various ocular abnormalities. Preoperative posterior segment evaluation with ultrasound in patients with hypermature cataract may influence the surgical results and postoperative visual prognosis.

Keywords: B-Scan; Vitreous Hemorrhage; Chorioretinal Thickening.

Introduction

B-scan ultrasonography is a important investigation modality for evaluating the posterior segment in patients with advanced cataracts. In developing countries like India many patients never had an ophthalmic consultation till they present to the hospital for operations [1]. Posterior segment abnormalities using ultrasound prior to cataract surgery helps to detect postoperative visual prognosis. The superficial location of eye with its fluid composition and the advent of high frequency ultrasound make USG ideal for imaging the eye [2]. Ophthalmic ultrasonography has become the important accurate diagnostic imaging study for direct assessment of lesions of posterior segment having opaque ocular media caused by corneal opacities, anterior chamber opacities, dense cataracts, vitreous hemorrhage. USG of eye could also be done at the patient's bedside; dynamic study is also possible with ultrasound system [3,4]. In developing countries, USG has the advantage of being cheap, easily available and affordable, devoid of any ionizing radiation.Careful ophthalmic imaging using ultrasound may result in finer pre-operative detail regarding lens support structures, and may therefore give the surgeon the advantage when planning surgery [5]. We aimed to study the incidence of posterior segment abnormalities in eyes with advanced cataracts precluding a direct visualization of fundus prior to cataract surgery.

Author Affiliation: Associate Professor, Department of Ophthalmology, Chirayu Medical College, Bhopal, Madhya Pradesh 462030, India

Corresponding Author: Madhu Chanchlani, Associate Professor, Department of Ophthalmology, Chirayu Medical College, Bhopal, Madhya Pradesh 462030, India

E-mail: roshanchanchlani@gmail.com

Received on 23.04.2018, **Accepted on** 05.05.2018

Material and Methods

This study was conducted in Department of Ophthalmology, Chirayu Medical College and Hospital, Bhopal from October 2012 to October 2017.The study included 1600 patients of mature cataract evaluated with B-Scan Ultrasonography for posterior segment lesions was done and theses cases were also evaluated with slit lamp examination and tonometry.Ethical clearance was obtained from institutional review board.

Inclusion criteria

The patients with suspected posterior segment pathology having an opaque ocular media .

Exclusion criteria

The patients with traumatic globe and having active bleeding with other pathologies were excluded.

The patients having opaque media in the form of corneal, lenticular, or vitreous opacity were examined for B-scan evaluation and the patients having clear ocular media but having posterior segment pathologies involving retina, optic nerve, choroid, or sclera were also subjected for B-scan evaluation. Ocular examination with slit lamp was performed to make provisional clinical diagnosis. The patients were subjected to B-scan USG after obtaining informed written consent. The patients were examined in supine position. A coupling gel was applied upon the closed eyelids on which the linear array ultrasound probe was placed. After instructing the patient to keep the eye still as if he is staring at the ceiling, and the scanning was commenced. Gain settings were adjusted as per the requirement.Both eyes were scanned.

Observations

Table 1: Demographic data of 1600 Patients.

Sex	Urban	Rural	Total
Male	273	652	925
Female	265	410	675
Total	538	1062	1600

Table 2: Frequency of posterior segment pathology

Posterior Segment Lesions Frequency (n%)	Frequency (n%)
No Pathology	1440(90)
Posterior Staphyloma	62 (3.87)
Vitreous hemorrhage	28 (1.75)
Vitreous membrane	30 (1.87)
Chorioretinal Thickening	25 (1.56)
Retinal detachment	20 (1.12)
Total	1600 (100)

Discussion

In 1958 with the introduction of B-scanning techniques, Baum & Greenwood created a new application of ultrasound in the sectional study of globe and orbit using real time in evaluation of the eye both voluntary and voluntary movements may be studied [6].

In present study, maximum abnormalities were seen in 6th decade, similar observations were observed in a study in America in the year 2000 [7].

Males in our study having more incidence approach hospitals relatively earlier. Ali and Rehman reported posterior segment lesions in 11% non-traumatic cataract patients and in 65.85% patients with traumatic cataract [8].

In the study by Haile and Mengistu 66% incidence of detectable abnormalities of posterior segment were seen which was very high as compared to our findings of 10% [9].

A recent study showed that the results of ultrasonography influenced surgical management in only 7% of eyes with cataract as compared with 17% of eyes with non-cataract. Media opacities, posterior staphyloma was found in 15 (3.52%) cases in our series which was higher than in other study where the incidence was (0.73%) [6].

In our study the incidence of Vitreous hemorrhages was 1.64% which was less in comparison to a study where in non-traumatic cases it was present in 2.5% cases [8].

Retinal detachment in our study was seen in 0.94% cases and in another study it was noted in 1.5% [9].

In a recent study done out of the 90 positive cases, 25 (3%) had retinal detachment 14 (2%) had posterior vitreous detachment, and 24 (3%) had vitreous hemorrhage [10].

Among the clinical and systemic features in patient studied in our setup, diabetes mellitus and young age were associated with a greater incidence of abnormalities on Bscan.

In a study by Anteby et al. in non-traumatic cataract group retinal detachment was observed in 3.9%, vitreous hemorrhage in 2.5% and posterior staphyloma 7.6% [11].

Posterior staphyloma was observed in low incidence as compared to this study. i.e. 7.6% vs 3.87%. In another study done by Mendes et al. out of 289 patients with medium to profound opacity of the lens 77.5% presented with vitreous detachment [12].

In 30.1% of the patients, the ultrasound revealed eye abnormalities that could compromise the function of the eye after surgery. The most common of these abnormalities was vitreous opacities (12.1%) followed by retinal detachment (9.3%).

Our study observations were markedly less than these observations which could be due to the fact that they examined the patients evaluated during cataract surgery.

Conclusion

Ultrasonographic examination can provide information regarding the posterior segment pathology.We concluded that two dimensional B-scan ultrasound could be used as one of the diagnostic tools for the detection of hidden posterior segment lesions which can help in planning for operation.

References

1. Salman A, Parmer P, Vanila CG, Thomas PA, Jesudasan CA. Is a ultrasonography essential before surgery in eyes with a advanced cataracts? J Postgrad Med. 2006;51(1):19-22.
2. Bedi DG, Gombus DS, Chaan SN, Singh S. Sonography of the eye. Am J Roentgenol 2006;187:1061-72.
3. Sharma OP. Orbital sonography with its clinico-surgical correlation. Indian J Radiol Imaging 2005;15:537-54.
4. Qureshi MA, Laghari K. Role of B-scan ultrasonography in pre-operative cataract patients. Int J Health Sci (Qassim) 2010;4:31-37.
5. Perry LJ. The evaluation of patients with traumatic cataracts by ultrasound technologies. Semin Ophthalmol 2012;27:121-124.
6. Baum G, Greenwood I. The application of ultrasonic locating technique to ophthalmology. Arch Ophthalmol. 1958;60:263-79.
7. American academy of Opthalmology. Lens and cataract, San Francisco. 2000.
8. Ali SI, Rehman H. Role of B-scan in preoperative detection of posterior segment pathologies in cataract patients. Pak J Ophthalmol 1997;13:108-12
9. Haile M, Mengistu Z. B-Scan ultrasonography in ophthalmic disease. East Afr Med J 1996;73:703-07.
10. Qureshi MA, Laghari K. Role of B-Scan Ultrasonography in Pre Operative Cataract Patients Int J Health Sci (Qassim) 2010;4:31-37.
11. Anteby II, Blumenthal EZ, Zamir E, Waindim P. The role of preoperative ultrasonography for patients with dense cataract: a retrospective study of 509 cases. Ophthalmic Surg Lasers 1998;29:114-118.
12. Mendes MH, Betinjane AJ, Cavalcante Ade S, Cheng CT, Kara-José N. Ultrasonographic findings in patients examined in cataract detection-and-treatment campaigns: a retrospective study. Clinics (Sao Paulo) 2009;64:637-40.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.21

Clinical Outcome of Suture versus Fibrin Glue for Pterygium Excision

Mamata Choudhury[1], Jayapal Reddy[2]

Abstract

Aim of the study: To compare the clinical outcome of 8-0 vicryl suture versus fibrin glue in cases of pterygium excision with conjunctival autograft. *Materials and Methods*: A comparative prospective study was performed in forty eyes in forty patients in primary pterygium. The patient age ranged from thirty to sixty five years. They were randomly divided into two groups. Group A (20 eyes) who underwent pterygium excision with conjunctival autograft using 8-0 vicryl and Group B (20 eyes) with fibrin glue. Mean follow up period was for six months. Clinical assessment was done on first, seventh, thirtieth day and at the end of three months and six months. *Results:* The average surgical time for suture group was 30.56 minutes and in fibrin glue group it was 15.52 minutes. Postoperative symptoms like pain and foreign body sensation were significantly less in fibrin group compared to the suture group. Recurrence rates were not statistically different between the two groups. *Conclusion:* Use of fibrin glue in pterygium surgery gives postoperative comfort and also reduces surgical time.

Keywords: Pterygium Surgery; Conjunctival Autograft; Fibrin Glue.

Introduction

Pterygium is a wing shaped fold of conjunctiva encroaching on to the cornea. Prolonged exposure to hot, dry and dusty environments predisposes to the development of pterygium [1]. The main histopathological change in pterygium is elastotic degeneration of conjunctival collagen. Pterygium occurs mostly on nasal side, which can be attributed to light coming to the temporal cornea and being focused on the nasal cornea. Conjunctival autograft is the treatment of choice for pterygium surgery and this surgical procedure helps in preventing recurrence [2]. Fibrin glue when is used for pterygium surgery gives less postoperative pain and foreign body sensation [3]. There is paucity of published data comparing fibrin glue versus suture in pterygium surgery from the Indian subcontinent. Hence we conducted this study.

Author Affiliation: [1]Associate Professor [2]Professor and Head, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research center, Hyderabad, Telangana 500068, India.

Corresponding Author: Mamata Choudhury, Associate Professor, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research center, Hyderabad, Telangana 500068, India.

E-mail: anilmamata@gmail.com

Received on 13.10.2017, **Accepted on** 30.10.2017

Materials and Methods

Institutional ethics committee clearance was obtained before starting the study. This was a prospective study done in the department of Ophthalmology, Kamineni Institute of Medical Sciences and Sri Nethralaya, Hyderabad. Forty patients who presented at the outpatient department were included in the study after counselling. Informed consent was taken from all the patients. Patients were from age group of thirty to sixty five years.

Inclusion criteria

1. Primary nasal and temporal pterygium encroaching > one mm onto cornea
2. Uncomplicated pterygium

Pterygium was graded according to corneal involvement. (Grade 1: crossing limbus; Grade 2: midway between limbus and pupil; Grade 3: reaching up to pupillary margin and Grade 4: crossing pupillary margin) [4].

Exclusion criteria

1. Recurrent pterygium

Detailed clinical history was taken. Complete general, systemic and local examination and routine investigations were done for all the patients.

All the patients were explained about the advantages of fibrin glue. The patients were divided into two groups depending upon the spending capacity for the surgery. Group- A had twenty patients ie, twenty eyes for suture technique (suture group), and Group - B had twenty patients ie, twenty eyes for fibrin glue technique (fibrin glue group). In all cases visual acuity, slit lamp examination of anterior segment, dilated fundus examination and intraocular pressure recording was done. All surgeries were done by single experienced surgeon under operating microscope.

Peribulbar anaesthesia with 3 ml of 2% xylocaine and 0.5% bupivicaine 5ml of with 150 units/ml of hyaluronidase was given in all patients. Whole pterygium was removed starting from conjunctival side to corneal side. Corneal bed was scraped for any remnant of pterygium. Bare sclera length and breadth were measured with a caliper. Superior bulbar conjunctiva was infiltrated with ringers lactate. Only conjunctival epithelium was excised and tenon's capsule was left behind. Conjunctiva with epithelium side up was put on bare sclera and sutured with 8-0 vicryl in Group A. In Group –B patients, glue (Baxter Company) was prepared in two syringes. In one syringe thrombin and in other syringe fibrin was taken. Initially few drops of thrombin were put and then few drops of fibrin were put on scleral bed and immediately conjunctival graft was put. By using a Macpherson forcep the graft was sealed. Subconjunctival injection decadron 0.5 cc was given. The duration of the surgical procedure was noted in both the groups.

Post operatively, topical prednisolone eye drops six times daily for one week followed by 4x2x1 for three weeks, an antibiotic drop (moxifloxacilin) for two weeks, 0.5% carboxymethylcellulose four times daily for one month were administered. Patients were examined on postoperative day one and were followed up at 1 week, 4weeks, 3months and 6 months. Patients were asked about any feeling of watering from the eyes, pain and/or foreign body sensation and were examined for any complications.

Observations and Results

A total of forty patients (forty eyes) underwent surgical excision for pterygium, and all patients completed the 6-month follow-up (Table l).

Table 1: Demographic data of patients in suture group and fibrin glue group

Case details	Group A	Group B
Number of cases	20	20
Age in years	44.4	46.8
Male	68	66
Female	32	34
Rural background	78	76
Urban background	22	24
Pterygium classification		
Grade 1	8	6
Grade 2	12	14
Maximum follow up period in months	8	8
Minimum follow up period in months	6	6

Fig. 1: Primary temporal pterygium

Fig. 2: Pterygium excision with conjunctival autograft with fibrin glue (Six month postoperative picture of same patient)

Fig. 3: Pterygium excision with conjunctival autograft with glue of same patient (Six month postoperative)

Table 2: Postoperative symptoms of patients in suture group and fibrin group

Symptoms	Day – 1		Day – 7	
	Group A (suture)	Group B (glue)	Group A (suture)	Group B (glue)
Watering	20	0	0	0
Chemosis	5	0	0	0
Foreign body sensation	20	0	10	0
Pain	20	0	0	0

Table 3: Complications associated with Pterygium excision in the suture group and fibrin glue group (3 Months and 6 Months)

Complications	3 Months		6 Months	
	Group A	Group B	Group A	Group B
Dehiscence	0	0	0	0
Ridge	3	0	3	0
Subgraft hemorrhage	4	2	0	0
Contracture	0	2	0	2
Recurrence	0	0	0	0
Total	12	5	3	2

Average operative time was 15.52 minutes (range, 15-20 minutes) in the fibrin glue group and 30.56 minutes (range, 30-40 minutes) in the vicryl suture group. The operating time was significantly less in the glue group versus suture group ($p = 0$). Patient complaints of pain, foreign body sensation, stinging and watering were scored for each group, All the four complaint scores on the first and seventh days were significantly lower in fibrin group (for chemosis and photophobia ($p = 0.001$) for pain and watering ($p < 0.001$). (Table 2)

Preoperative best corrected visual acuity (BCVA) in suture group was 6/6 in 24% of cases and 6/9 in 66% cases, 6/ 12 in 10% cases and for glue group 6/6 in 14% cases, 6/9 in 76% cases and 6/ 12 in 10% of cases . BCVA day 1 postoperative was (suture group 6/6 in 72% cases, 6/9 in 28% cases and for glue group 6/6 in 100% cases ($p = 0.83$). BCVA at 1 month after the operation was 6/6 in both groups. Corneal astigmatism was (suture group = 2.256 diopters) {glue group = 2.372 diopters) significantly reduced in the both group to (suture group = 0.382 diopters) (glue group = 0.362 diopters. There was no significant difference noted between the two groups with regard to postoperative correction of BCVA and corneal astigmatism. There were 4 episodes of small subconjunctival hemorrhage in the suture group (8%) and 2 in glue group. In 2 cases sutures needed to be removed because of suture irritation. Retraction of graft was seen in 2 cases in glue group. Ridges were seen in 3 cases in suture group. There were no other complications recorded.

Discussion

Pterygium surgery has possibility of recurrences. Thus, one can aim to reduce the number of recurrences by including the limbal stem cells in conjunctival autograft. There are several kinds of surgery for pterygium. Excision of the pterygium with conjunctival autografting is considered to be the procedure of choice in terms of efficacy and long-term stability [5]. The transplantation of conjunctivo-limbal autograft helps to cover the LSC deficiency [6]. Care should be taken to include the limbal part while harvesting the graft so that stem cells are included. Adjunctive therapies such as mitomycin C and excimer laser have also been used to decrease the recurrence rate of pterygium in spite of potentially sight-threatening side effects [7,8].

Treatment of pterygium with conjunctival autografts or amniotic membrane grafts after pterygium excision is reported to have the best and comparable success rates. These grafts have traditionally been affixed to the bare sclera bed using sutures. The presence of these sutures is believed to initiate a mild inflammatory response giving rise to symptoms of pain, grittiness and watering postoperatively and therefore, negating the purpose of the surgical intervention. The time consumption for the placement of sutures during surgery and the need to remove them later on makes it a lengthy and tedious process. Fibrin glue is a blood-derived product which consists of a fibrinogen component and a thrombin component. It imitates the final stages of the coagulation cascade when two components are mixed. Fibrin glue has also found its application in neurosurgery for the repair of dural leaks and for the treatment of atrophic rhinitis. In the field of ophthalmology, fibrin glue is being used in strabismus surgery, corneal surgery, amniotic membrane transplantation and conjunctival closure following pterygium [9,10]. There was no significant difference between the preoperative and postoperative BCVA between two groups Furthermore, there was no significant difference between the degrees of correction of corneal astigmatism between the two groups. This suggested that both the techniques are equally good in these aspects. There were four episodes of subconjunctival hemorrhage in the suture group. Uy et al. [11] in their series of 22 patients, used fibrin glue in 11 patients, and 10/0 nylon suture in other 11 patients and compared the two groups in terms of postoperative pain, foreign body sensation, and watering complaints. They concluded that all the complaints were significantly less in fibrin group. A significant difference was noted between the incidence of pain, photophobia, chemosis, and watering among the day 1 postoperative patients

of fibrin glue group versus the suture group. Our findings correlate with the other studies suggesting all symptoms are significantly less in fibrin glue group. All the postoperative patients recovered by day 14 postoperative in the suture group. The recurrence rate of pterygium, depending on the surgery type such as glue-assisted or suture-assisted autografting, has been a matter of controversy. Some reports [12] documented that the fibrin glue group showed lower recurrence rates than the suture group. Hall et al. [13] reported similar recurrence rates for the two groups. In our study, the small number of cohort patients and a short follow-up period could not determine the long-term recurrence rate of glue-assisted pterygium surgery. Nevertheless, we believe that less inflammation in the earlier postoperative stage may be related to a small chance of recurrence; this hypothesis corresponds with the result of a previous report on the correlation between inflammation and recurrence [6]. In our study, there were no cases of recurrence in both the groups were observrd at 6 months follow-up . There was no recurrence in Group B. Yuksel et al. [14] conducted a prospective study on 58 cases and observed patient symptoms were significantly less in the fibrin glue group as compared to the suture group. There were 2 cases and 1 case of recurrence in the suture group and fibrin glue group, respectively. Farid and coworkers [15] conducted a retrospective study to evaluate the rate of recurrence after pterygium excision with autograft in 47 eyes. The recurrence rate in tissue adhesive group was 3.7% compared to 20% in suture group (P = 0.035). However, according to Marticorena et al.[16], Uy et al. [11] and Koranyi et al. [12] there was no recurrence in either group. Regarding other complications in glue-assisted pterygium surgeries, previous reports did not present much difference between glue-assisted and conventional pterygium surgeries.

Conclusion

The use of fibrin glue to attach the free conjunctival autograft in pterygium surgery produces shorter operating time, less postoperative discomfort and no recurrence rate compared to 8-0 vicryl sutures. Shorter surgery time logically translates into lower infection risk and also saves valuable operating theater time. The patient stands to benefit on account of an earlier return to normal life due to greater postoperative comfort.

References

1. Kaufman SC, Jacob DS, Lee WB, Deng SX, Rosenblatt MI, Shtein RM; Options and adjuvants in surgery for pterygium; A report by the American Academy of Ophthalmology. Ophthalmology 2013;120(1): 201-08.
2. Prabhasawat P, Barton K, Burkett G, Tseng SC. Comparison of conjunctival autografts, amniotic membrane grafts and primary closure for pterygium excision. Ophthalmology 1997;104;974-85.
3. Karalezli A, Kucukerdonmez C, Akova YA, Altan – Yaycloglu R, Borazan M. Fibrin glue versus sutures for conjunctival autografting in pterygium surgery; A prospective comparative study. Br J Ophthalmol 2008;92;1206-10.
4. Kodavoor SK, Dandapani R, Tiwari NN, Ramamurthy S. Double –head pterygium excision with modified technique of vertically split-conjunctival autograft. Indian J Ophthalmology 2017;65;700-4.
5. Ang LP, Chua JL, Tan Dt. Current Concepts and techniques in pterygium treatment. Curr Opin Ophthalmol 2007;18:308-13.
6. Coroneo MT, Di Girolamo N, Wakefield D. The pathogenesis of pterygia. Curr Opin Ophgthamol 1999;10282-8.
7. Talu H, Tasindi E, Ciftci F, Yildiz TF. Excimer laser phototherapeutic keratectomy for recurrent pterygium. J Cataract Refract Surgery 1998;24;1326-32.
8. Lewallen S. A randomized trial of conjunctival autografting for pterygium in the tropics. Ophthalmology 1989;96:1612-4.
9. Lagoutte FM, Gauthier L, Comte PR. A fibrin sealant for perforated and preperforated coreal ulcers. Br. J Ophthalmol 1989;73:757-61.
10. Hick S, Demers PE, Brunette I, La C, Mabon M, Duchesne B. Amniotic membrane Transplantation and fibrin glue in the management of corneal ulcers and perforations: A review of 33 Cases. Cornea 2005;24:369-77.
11. Uy HS, Reyes JM, Flores JD, Lim Bon Siong R. Comparison of fibrin glue and sutures for attaching conjunctival autografts after pterygium excision. Ophthalmology. 2005 Apr;112(4):667-71.
12. Koranyi G, Seregard S, Kopp ED. The cut and paste method for primary pterygium surgery long term follow up. Acta Ophthalmol Scand 2005;83:298-301.
13. Hall RC, Logan AJ, Wells AP. Comparison of fibrin glue with sutures for pterygium excision surgery with conjunctival autografts. Clin Experiment Ophthalmol 2009;37:584–9.
14. Yuksel B, Unsal SK, Onat S. Comparison of fibrin glue and suture technique in pterygium surgery performed with limbal autograft. Int J Ophthalmology 2010;3;316-20.
15. Farid M, Pirnazar Jr. Pterygium recurrence after excision with conjunctival autograft: A comparison of fibrin tissue adhesive to absorbable sutures. Cornea 2009;28:43-5.
16. 16. Marticorena J, Rodriguez-Ares M T, Tourino R. Pterygium surgery: conjunctival autograft using a fibrin adhesive. Cornea. 2006;25(1)34–36.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.22

Pterygium Excision with Sutureless, Glueless Conjunctival Autografting: Our Experience.

Madhu Chanchlani

Abstract

Background: Pterygium is a wing shaped conjuctival encroachment onto the cornea generally situated on nasal side. *Aim:* To see the results of pterygium excision with sutureless glueless conjunctival autografting in urban and rural population of central India. *Study Design*: Prospective study. *Place and Duration of Study:* The Study was conducted in the Department of Ophthalmology, Chirayu Medical College and hospital for a period of two years from October 2014 to October 2016. *Material and method*: 150 cases of uncomplicated pterygia were examined and diagnosed with slit lamp. All nasal pterygia were included. Pterygium was excised and autologous conjunctival graft without suture or glue were performed. Grafts were taken from inferotemporal area. Follow up was done on 1st day, 7th day, 30th day and 6th month. *Result:* In our study 108 (72%) were Males and 42 (28%) were Females. Most the patients belonged to lower socioeconomic group and were outdoor workers. Majority of the pterygium examined were nasal Grade 1 was observed in 37 (25%) whereas grade 2 was seen in 98 (65%). The operation time was 15 to 20 minutes. There were 3 recurrences. Out of 150 patients 2 patients had graft loss and 5 patients had graft retraction. 90% of the patients were highly satisfied. *Conclusion:* No glue, no suture conjunctival grafting in pterygium surgery takes short surgical time, easy to perform excellent cosmetic outcome.

Keywords: Pterygium Surgery; Sutureless Glueless Conjunctival Autografting.

Introduction

Pterygium is basically degenerative as well as hyperplastic condition of conjunctiva. The subconjunctival tissue undergoes elastotic degeneration and proliferates as vascularized granular tissue under epithelium which ultimately encroaches cornea [1]. This process causes redness, irritation and visual disturbances by disrupting the normal smooth surface of cornea [2]. It is common in tropical countries where there is more exposure to heat, dust, wind. It may invade the cornea leading to corneal opacity [3]. Conjuctival grafts using autologous blood or sutures can be employed to avoid recurrence. Recent introduction of patient's own blood (autologous blood) for fixation of conjunctival flap has proven to be effective with good results. To help the graft adhere to the scleral bed commercially available fibrin glues from pooled human plasma is commonly used,but it carries a risk of transmissible diseases like hepatitis A and parvovirus [4,5]. To prevent this in our study we used autologous blood serum easy way to procure fibrin for graft adhesion.

Author Affiliation: Associate Professor, Department of Ophthalmology, Chirayu Medical College, Bhopal, Madhya Pradesh 462030, India

Corresponding Author: Madhu Chanchlani, Associate Professor, Department of Ophthalmology, Chirayu Medical College, Bhopal, Madhya Pradesh 462030, India

E-mail: roshanchanchlani@gmail.com

Received on 30.03.2018, **Accepted on** 11.04.2018

Materials And Methods

The present study was conducted at the Department of Ophthalmology Chirayu medical College and hospital Bhopal. A total number of 150 cases with pterygium classified as grade 1,2 and 3 were selected from out-patient department (OPD) for surgical intervention during the period of two years from October 2014 to October 2016. The following points were tabulated as under name, age, sex, address, occupation, history, general examination, local examination.

Inclusion criteria: Symptomatic patients more than

20 years of age and patients with compromised visual axis were included. Informed consent was taken from the patient before performing the surgery. *Surgical technique:* All cases underwent surgery under peribulbar anaesthesia with 2% xylocaine with adrenaline and 0.5% bupivacaine under all aseptic precaution. Pterygium mass was excised. The blood was allowed to form a clot over the bare sclera. Caliper was used to measure the size of the bare sclera. Conjunctival graft was taken from superotemporal bulbar conjunctiva. Graft size taken was 1mm more than the size of bare sclera. Limbal tissue was taken in the autograft . Conjunctival graft was placed over the bare sclera in proper anatomical orientation. A waiting period of 8-10 minute was allowed. Eye was patched for 16-18 hours. Patient was asked to asked to use moxifloxacin eye drop 4 times for 2 weeks, 1% prednisolone acetate eye drop 4 times a day tapering down each week for 4 weeks and lubricating eye drop 4 times for 1 month. Postoperative workup. Post operative followup was done for all cases on the 1st day, 7th day, 30th day and 6 months. They were examined for pain and discomfort, graft dislocation, graft retraction, cosmetic view and other post operative complications. Result of the study was expressed in terms of mean and percentages. Fischer exact test was used to test the stastical significance and p value less than 0.05 was considered statistically significant.

Observations

Table 1: Grades of Pterygium n-150

Grades of Pterygium	Percentage
1. Midway between limbus and pupil border	25% (37)
2. Extends up to pupil border	65% (98)
3. Crosses pupil	10% (15)

Table 2: Results of autologous blood for pterygium n-150

No of eyes	150
Location	nasal
Gender,M:F	108:42
Operation time	15-20min
Ocular discomfort	10 patients
Recurrence	03 patients
Graft loss	02 patients
Graft retraction	05 patients
Follow up	6 months

Table 3: Patient satisfaction 4-8 weeks n-150

Patient satisfaction grades	
0= Unsatisfied	Nil
1= Low satisfaction	Nil
2= Moderate satisfaction	10%
3= Highly satisfied	90%

Results

In our study 108 (72%) were Males and 42 (28%) were Females. Most the patients belonged to lower socioeconomic group and were outdoor workers. Majority of the pterygium examined were nasal Grade 1 was observed in 37 (25%). Whereas grade 2 was seen in 98 (65%). Out of 150 patients 2 had graft loss, 5 patients had graft retretraction and 3 patients had recurrence. All these patients were postoperatively observed for day 1, 7 and after 1 and 6 month.

Discussion

Pterygium is ocular surface disorder which is common in tropical areas. Pterygium is commonly seen in patients above 20 years with highest prevalence in more than 40 years of age. Male gender and high sun exposure are strong and independent factors related to development of pterygium. Majority of patients were in our study were outdoor workers like farmers, labourers. Nasal presentation being more common is seen due to transmission of UV light from temporal side of cornea through the stroma on to the nasal aspect of eye, perhaps explaining why these lesions are more common nasally. Various treatment modalities are available In order to reduce the incidence of recurrence variety of techniques, such as amniotic membrane graft conjunctival autograft, and limbal conjunctival transplant and use of fibrin glue have been tried [6,7]. Sutureless glueless conjunctival autografting in pterygium surgery is a simple technique with less surgical time. In this study approximately 15-20 minutes were required for each case. This noble technique is also less costly as no requirement of suture or glue. also according to Sridhar et al. there is no role of suture in wound healing and may traumatise adjacent tissue as well [8]. Our study was a non-randomised study performed among a small population with a relatively shorter period of follow up for 6 months. However, one article comparing four commonly used techniques for pterygium surgery reported mean time of any complication including recurrence was 4 months [9]. Plasma derived products such as fibrin glue may cause hypersensitivity reactions. To prevent this in our study we used autologous blood serum easy way to procure fibrin for graft adhesion [10]. In our study 5 cases of graft retraction were found on 7th day of followup. This was due to the contraction of the subconjuctival tissue in the process of scar formation. Graft loss was there in 2 patients. Till the 6th month of followup

only 3 patients had recurrence of pterygium. All the patients were happy and satisfied. The main disadvantage of the autologous blood is the risk of graft loss in the immediate postoperative period. Graft loss is usually seen in first 24 to 48 hours. One of the important advantages seen with autologous blood was that this procedure was cosmetically better, pain and foreign body sensation was less prominent in early post operative period as compared to autograft with sutures. In the current clinical settings of rural India, patients are difficult to follow-up for a long period of time due to various financial and logistical limitations which makes it difficult to assess true recurrence. In India, majority of the population resides in the rural area; hence more study needs to be done in the area.

Conclusion

In conclusion, the use of autologous blood for the attachment of conjunctival autografts in pterygium surgery is an effective procedure to reduce the risk of recurrences. Also Autologous blood in pterygium surgery is an economical alternative to fibrin glue. This technique not only shortens there operating surgical time but also delivers good results and can be a safe alternative to fibrin.

References

1. Gerstenblith, Adam T and Rabinowitz, Michael P. The Wills eye manual: office and emergency room diagnosis and treatment of eye disease. 6th edition, Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia, 2012.
2. Kunimoto, Derek Y, Kanitkar, Kunal D and Makar, Mary. The Wills eye manual: office and emergency room diagnosis and treatment of eye disease. 4th edition, Philadelphia: Lippincott Williams & Wilkins, 2004.
3. Allan BD, Short P, Crawford GJ, Barrett GD, Constable IJ. Pterygium excision with conjunctival autografting: an effective and safe technique. Br J Ophthalmol. 1993;77:698-701.
4. Chan SM, Boisjoly H. Advances in the use of adhesives in ophthalmology. Curr Opin Ophthalmol 2004;15:305-10.
5. Biedner B, Rosenthal G. Conjunctival closure in strabismus surgery: Vicryl.
6. Tananuvat N, Martin T. The results of amniotic membrane transplantation for primary pterygium compared with conjunctival autograft. Cornea 2004;23:458-63.
7. Prabhasawat P, Barton K, Burkett G, et al. Comparison of conjunctiva lautografts, amniotic membrane grafts, and primary closure for pterygium excision. Ophthalmology 1997;104:974-85.
8. Sridhar MS, Bansal A K, Rao GN. Surgically induced necrotizing scleritis after pterygium excision and conjunctivalautograft. Cornea 2002;21:305.
9. Alpay A, Ugurbas S H, Erdogan B. Comparing techniques for pterygium surgery. Clin Ophthalmol 2009;3:69-74.
10. Singh PK, Singh S, Vyas C, Singh M. Conjuctival autografting without fibrin glue or sutures for pterygium surgery. Cornea 2013;32:104-7.

Original Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.23

Prevalence and Risk Factors of Diabetic Retinopathy in Diabetic Patients Visiting a Medical College Hospital in Telangana, India

Mamata Choudhury[1], Y. Jayapal Reddy[2]

Abstract

Aims: To study the prevalence and risk factors of diabetic retinopathy in diabetic patients attending a medical college hospital inTelangana. *Methods:* A total of 630 diabetic patients were evaluated for presence of diabetic retinopathy. Diabetic retinopathy is classified into non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Various risk factors associated with diabetic retinopathy were recorded. Investigations included, blood sugar, serum lipids, complete blood count, ECG, Renal function tests. *Results:* DR was detected in 84 patients (13.3%). NPDR was seen in 78 patients (12.4%) and PDR in 6 patients (0.9%). It was found that level of glycemic control and duration of diabetes, hyperlipidemia were important risk factors for the occurrence of retinopathy. *Conclusion:* Strict glycemic control, lowering of serum lipids is effective in lowering the incidence of retinopathy in diabetic patients. Hypertension was not related to the occurrence of retinopathy. Efforts should be made to find out more risk factors in diabetic retinopathy.

Keywords: Diabetic Retinopathy; Prevalence; Risk Factors.

Introduction

Among all the countries of the world, India has the highest number of diabetic patients according to statistics from the International Diabetes Federation (IDF). As per 2015 data of IDF India had 69.1 million diabetics. By the year 2030, over 100 million people in India are likely to suffer from diabetes [1].

Indians are more susceptible to diabetes mellitus due to various factors. Genetics plays an important role and it is said that in general Indians are four times more likely to develop diabetes than Europeans, based solely on genetic basis. Also there are many social and cultural contributors like diet that is rich in carbohydrates and saturated fats. Indian diet has excess of calories and sugar leading to obesity, which is a risk factor for diabetes. Migration of people from rural areas to urban areas and also change in lifestyle are important factors. The younger generations tend to have a sedentary lifestyle and excess consumption of processed sugary foods thereby increasing the risk of diabetes.

Diabetic Retinopathy is the leading cause of blindness in India both in urban and rural population. The increasing prevalence of diabetes mellitus (DM) in India emphasizes need for epidemiologic studies on diabetes-related complications [2]. Diabetic retinopathy (DR) is one of the complications of diabetes, which affects the microvasculature of retina. It is the leading cause for visual impairment. It is shown to cause visual impairment in more than 86% type 1 diabetic patients and in 33% type 2 diabetic patients [3,4]. In epidemiological studies which have been done in the past, it has been seen that nearly all type 1patients and 75% type 2 patients develop DR within 15 to 20 years of being diagnosed as having DM [5].

Prevalence of DR in India varies from study to study. Raman et al found a prevalence of retinopathy in 18% in diabetic population whereas Agrawal et al found a prevalence of 28.9% in type 2 diabetic population [6,7]. Some population

Author Affiliation: [1]Associate Professor [2]Professor and Head Dept of Ophthalmology, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, Telangana 500068, India.

Corresponding Author: Mamata Choudhury, Associate Professor, Dept of Ophthalmology, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, Telangana 500068, India.

E-mail: anilmamata@gmail.com

Received on 06.11.2017, **Accepted on** 23.11.2017

and hospital based studies have been conducted in northern [7] and southern [8] parts of India to estimate the prevalence of DR in type 2 diabetic population. There is paucity in the literature regarding the prevalence of diabetic retinopathy in South Indian population. With above context, a hospital-based, cross-sectional study was designed to find out prevalence of diabetic retinopathy and also the risk factors of DR in the diabetic population.

Aim of the study

To study the prevalence and risk factors for diabetic retinopathy in diabetic patients attending a medical college hospital in Telangana.

Materials and Methods

This was a prospective study conducted in the department of Ophthalmology at Kamineni Academy of Medical Sciences, Hyderabad over a period of one year from

In this study a total of 630 individuals with history of diabetes mellitus for more than 3 months were included. All the cases were from out-patient department of Ophthalmology from our institute. Institutional ethics committee clearance was obtained before starting the study. Informed consent was obtained from all the patients.

These 630 diabetic patients who reported for check-up were examined as out-patients for the presence or absence of diabetic retinopathy. A full medical history was taken including age of patient, duration of diabetes, treatment details, history of hypertension, and hyperlipidemia. Fasting blood glucose of each patient was estimated after an overnight fast of eight hours. Diabetic control was graded as Normal (<100 mg/ dl), Moderate control (100-126 mg/dl) and High (>126 mg/dl). Glycosylated hemoglobin assay was done in all the cases. Hypertension was recorded to be present when the systolic blood pressure was > 140 mm Hg or when diastolic blood pressure was >90 mm Hg or when patient gave history of hypertension controlled with medications. Hyperlipidemia was graded as present when total cholesterol was > 200 mg/ dl or when patient was on medications for hyperlipidemia. Data on demographic variables (age, gender, race) smoking status, diet, physical activity level and family history of diabetes were obtained by direct interview. Visual acuity and slit lamp examination and intraocular pressure (IOP) recording was done in all the patients. The pupil of each eye was dilated using tropicamide (0.5%) and phenylephrine 10% eye drops followed by detailed fundus examination with direct and indirect ophthalmoscopy. Binocular indirect ophthalmoscopy was done with a 20 D lens with the patient in supine position. Findings were noted and patients were categorized according to findings; as to whether diabetic retinopathy was present or absent. If present, retinopathy was classified according to non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Presence of diabetic macular edema was noted. If present, it was further classified into clinically significant macular edema (CSME) or non-significant. DR patients were classified according to the grading in the worse eye.

Observations and Results

Of the 630 diabetic patients, 536 (85%) were males and 94 (14%) were females.

Table 1: Percentage distribution of the sample according to age.

Age (in years)	No. of cases	Percentage (%)
31 – 40	48	7.6%
41 – 50	155	24.6%
51 – 60	287	45.5%
61 – 70	118	18.7%
71 – 80	22	3.4%
Total	630	100%

Most commonly affected age group was 51 to 60 years with 45.5% cases (Table 1).

Type of retinopathy: DR was detected in total 84 (13.3%) patients. Of this Non-proliferative DR (NPDR) was present in 78 (12.4%) and Proliferative DR (PDR) in 6 patients (0.9%)

Table 2: Comparison of diabetic retinopathy based on duration of diabetes

Duration of diabetes (in years)	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percentage (%)	No. of cases	Percentage (%)
0 - 5	199	190	95.5	9	4.5
6 - 10	285	251	84.6	34	15.4
11 - 15	77	61	79.3	16	20.7
16 - 20	46	31	67.4	15	32.6
>20	23	13	56.6	10	43.4
Total	630	546	86.6%	84	13.3%

The highest risk for development of diabetic retinopathy was in those patients having diabetes for > 10 years. There was significant association between duration of diabetes and development of diabetic retinopathy (Table 2).

Diabetes and hypertension: A total of 294 (46.6%) patients with diabetes had associated hypertension and of this 42 (14.2%) patients had DR. There was no significant association between DR and hypertension in this study.

Table 3: Comparison of diabetic retinopathy based on hyperlipidemia

Hyperlipidemia	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percent (%)	No. of cases	Percent (%)
Present	70	39	55.7%	31	44.3%
Absent	566	510	90.6%	53	9.4%
Total	630	549	87.1%	84	13.3%

Of the total diabetics 70 (11.1%) had hyperlipidemia. Of this 31 (44.3%) patients had diabetic retinopathy. There was significant association between hyperlipidemia and DR

Table 4: Comparison of diabetic retinopathy based on fasting blood glucose

FBS	No. of cases with diabetes	DR absent		DR present	
		No. of cases	Percent (%)	No. of cases	Percent (%)
Normal	238	230	96.6%	8	3.4%
Moderate control	190	170	89.5%	20	10.5%
High	202	146	72.3%	56	27.7%
Total	630	546	86.6%	84	13.3%

The incidence of diabetic retinopathy was more in uncontrolled diabetics

Discussion

Diabetic retinopathy is one of the few ophthalmic diseases that have a defined preventive measure to delay progression of the disease and consequent visual loss. Apart from visual morbidity, presence of diabetic retinopathy may indicate microcirculatory dysfunction in other organ systems [9,10].

Narendran et al [11] studied diabetic retinopathy in urban and rural south Indian population and found a prevalence of 26.2%. The Chennai Urban Rural Epidemiology study (CURES 1) reported a prevalence rate of 17.6% which is much lower than in other groups [8]. In a study from south India, the prevalence of diabetic retinopathy in type 2 diabetics in urban locations was 10.84% [12]. Mahesh et al have shown prevalence of diabetic retinopathy as 20.12% in urban and rural South India [13].

In the present study, we observed diabetic retinopathy in 13.3 % patients which is lower compared to most studies. It may be due to racial and demographic factors. Guidelines issued by the Vision 2020 and developed by Aravind eye care system had estimated prevalence for diabetic retinopathy as 11% in all cases of diabetes mellitus for all states in India for 2007 [14].

Specificity of direct and indirect ophthalmoscopy used in this study to detect retinopathy is high but sensitivity is low (34-50%) particularly for early retinopathy. Systematic screening for retinopathy using automated retinal image analysis is emerging as an important screening tool for early detection of diabetic retinopathy [15].

In this study a number of risk factors were investigated and it was found that many were significantly related to retinopathy. These included duration of diabetes, presence of hyperlipidemia and increased level of fasting blood sugar.

Increase in prevalence of diabetes mellitus in Indian urban population has been observed due to life style changes that are related to changes in socioeconomic status as well [16]. Several studies from the world and India have also tried to find out prevalence of different complications of diabetes mellitus.

Duration of diabetes and retinopathy are closely associated. A study by Raman et al showed that the duration of diabetes was single most common predictor which affected severity of diabetic retinopathy [6]. According to our findings, diabetic retinopathy may appear as early as 0-5 years of having diabetes and more than 43% of patients develop retinopathy after 20 years of having the disease. So our study shows duration of diabetes is definitely a risk factor for developing diabetic retinopathy. The results also suggest that annual retinal examination and early detection of diabetic retinopathy could considerably reduce the risk of visual loss in diabetic patients.

Some studies indicated that hypertension was a risk factor for retinopathy in diabetes mellitus [17,18].

The UK Prospective Diabetes Study (UKPDS) reported that intensive control of blood pressure significantly reduced the incidence of diabetic retinopathy [19]. In the present study, hypertension was not a significant risk factor for diabetic retinopathy. This difference in our study may be probably due to good control of hypertension.

The degree of glycemic control proved to be an important factor in our study consistent with other studies. Many studies have shown that higher plasma glucose level can be considered a significant risk factor for diabetic retinopathy [20,21,22].

Our study showed significant association of hyperlipidemia (Total cholesterol) and retinopathy which is consistent with some studies. In the Chennai urban rural epidemiological study, serum lipids were higher in patients with diabetic retinopathy than those without retinopathy [8]. There are conflicting reports in the literature regarding the effect of lipid profile on retinopathy.

The limitations of our study were that it was a cross-sectional investigation and the sample size was small. Fundus fluorescein angiography was not used to find out diabetic retinopathy.

Conclusion

More screening camps to detect diabetic retinopathy should be done to have a population based research. Awareness about retinopathy, good control of blood sugar and cholesterol will decrease the incidence of diabetic retinopathy. Hypertention is not the risk factor.

References

1. International Diabetes Federation, Diabetes Atlas. 6th edition .2013
2. Mohan V, Shanthirani CS, Deepa R. Glucose intolerance (diabetes and IGT) in a selected South Indian population with special reference to family history, obesity and life style factors: The Chennai Urban Population Study (CUPS 14). J Assoc Physicians India. 2003;51:771–77.
3. Klein R, Klein BE, Moss SE. Visual impairment in diabetes. Ophthalmology 1984;91:1–9.
4. Dwyer MS, Melton J, Ballard DJ, Palumbo PJ, Trautmann JC. Incidence of diabetic retinopathy and blindness: a population based study in Rochester. Minnesota. Diabetes Care 1985;8:316 –22.
5. Klein R, Klein BE, Moss SE, Davis MD, De Mets DL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy II. Prevalence and risk of diabetic retinopathy when age at diagnosis is less than 30 years. Arch Ophthalmol 1984;102:520-26.
6. Raman R, Rani PK, Reddi RS, Gnanamoorthy P, Uthra S, Kumaramanickavel G, et al. Prevalence of diabetic retinopathy in India: SankaraNethralaya Diabetic Retinopathy Epidemiology and Molecular Genetics Study report 2. Ophthalmology 2009;116(2):311-18.
7. Agrawal RP, Ranka M, Beniwal R, Gothwal SR, Jain GC, Kochar DK et al. Prevalence of diabetic retinopathy in type 2 diabetes in relation to risk factors: Hospital based study. Int J Diab Dev Countries 2003;23:16-19.
8. Rema M, Premkumar S, Anitha B, Deepa R, Pradeepa R, Mohan V. Prevalence of diabetic retinopathy in urban India: The Chennai Urban Rural Epidemiology Study (CURES) Eye Study, I. Invest Ophthalmol Vis Sci. 2005;6:2328-33.
9. Cheung N, Wong TY. Diabetic retinopathy and systemic vascular complications. ProgRetin Eye Res 2008;27(2):161–76.
10. Liew G, Wong TY, Mitchell P, Cheung N, Wang JJ: Retinopathy predicts coronary heart disease mortality. Heart 2008;95(5):391–94.
11. Narendran V, John RK, Raghuram A, Ravindran RD, Nirmalan PK, Thulasiraj RD. Diabetic retinopathy among self-reported diabetics in southern India: a population based assessment. Br J Ophthalmol 2002;86:1014-18.
12. Namperumalsamy P et al. Prevalence and risk factors for diabetic retinopathy in the population of over 30 years of age in Theni district of South India. Br J Ophtha lmol. 1999;83(8):937-40.
13. Mahesh G, Giridhar A, Saikumar SJ, Anna Elisa, Ramkumar, Bhat S. Prevalence of Diabetic Retinopathy in a Rural Population of South India. AIOC Proceedings. Community/social opthalmology session: 2009.pp.142-45.
14. Guidelines for the Compressive Management of Diabetic Retinopathy in India. A VISION 2020 the Right to Sight India. Publication July 2008.
15. Valverde C, Garcia M, Hornero R, Lopez-Galvez MI. Automated detection of diabetic retinopathy in retinal images. Indian J Ophthalmol 2016;64:26-32.
16. Mohan V, Shanthirani S, Deepa R, Premalatha G, Sastry NG, Saroja R. Intra-urban differences in the prevalence of the metabolic syndrome in southern India: the Chennai Urban Population Study. Diabet Med. 2001;18:280–87.
17. Wong TY, Cheung N, Tay WT, Wang JJ, Aung T, Saw SM, et al. Prevalence and risk factors for diabetic retinopathy: the Singapore Malay Eye Study. Ophthalmology 2008;115(11):1869–75.
18. Tapp RJ, Shaw JE, Harper CA, de Courten MP, Balkau B, McCarty DJ, et al. The prevalence of and factors associated with diabetic retinopathy in the Australian population. Diabetes Care 2003; 26(6):1731–37.

19. Stratton IM, Cull CA, Adler AI, Matthews DR, Neil HA, Holman RR. Additive effects of glycaemia and blood pressure exposure on risk of complications in type 2 diabetes: a prospective observational study (UKPDS 75). Diabetologia 2006;49(8):1761–69.
20. Kim JH, Kwon HS, Park YM, Lee JH, Kim MS, Yoon KH, et al. Prevalence and associated factors of diabetic retinopathy in rural Korea: the chungju metabolic disease cohort study. J Korean Med Sci 2011;26(8):1068.
21. Mohamed Q, Gillies MC, Wong TY. Management of diabetic retinopathy: a systematic review. JAMA 2007;298(8):902–16.
22. Zhang X, Saaddine JB, Chou CF, Cotch MF, Cheng YJ, Geiss LS, et al. Prevalence of diabetic retinopathy in the United States, 2005–2008. JAMA 2010;304(6):649–56.

Review Article

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.24

Assessment of Inner and Outer Retinal Layer Changes in Diabetic Retinopathy

Sandeep Saxena[1], Sukriti Ahuja[2], Ankita[3], Manila Khatri[4]

Abstract

Spectral domain-Optical coherence tomography (SD-OCT) provides information about the in-vivo histology of the retina. Diabetic retinopathy is associated with structural changes within the retina. Recently, disorganization of the inner retinal layers has also been shown to correlate with the final visual outcome.These changes can be observed by OCT, and correlate with the visual acuity. Accurate evaluation of the second hyper reflective band in the macular region, Ellipsoid Zone, on OCT is highly significant for providing valuable information regarding disease state and visual prognosis in diabetic retinopathy.We report on the most current and accepted information regarding this disorganization of inner retinal layers and outer retinal layers and its accurate clinical evaluation

Keywords: Retina; Retinal Layer; Diabetic Retinopathy.

Introduction

Diabetic retinopathy is one of the leading causes of vision loss worldwide [1]. Optical coherence tomography (OCT) provides information about the *in-vivo* histology of the retina. Diabetic retinopathy (DR) results in structural changes within the retina that can be observed by OCT imaging. These structural changes correlate with the severity of vision loss [2]. On spectral domain optical coherence tomography (SD-OCT), a good correlation has been observed between macular thickness parameters and visual acuity (VA) [3,4].

A significant association between disorganization of microstructural architecture of retina and impairment of VA has been observed in Diabetic Macular Edema (DME). Disorganization of retinal inner layers (DRIL) and disruption of outer retinal layers (ORL) contribute to significant decrease in VA in DME (Table 1).

Table 1

DRIL	ORL
Ganglion cell layer (GCL)	External limiting membrane (ELM)
Inner plexiform layer (IPL)	Ellipsoid zone (EZ)
Inner nuclear layer (INL)	Cone outer segment tips (COST)
Outer plexiform layer (OPL)	Retinal pigment epithelium (RPE)

Author Affiliation: [1]Professor [2,3,4]Resident, Department of Ophthalmology, King George Medical University, Lucknow Uttar Pradesh 226003, India.

Corresponding Author: Sandeep Saxena, Professor, Department of Ophthalmology, King George Medical University, Lucknow Uttar Pradesh 226003, India.

E-mail: sandeepsaxena2020@yahoo.com

Received on 19.03.2018, **Accepted on** 02.04.2018

Disorganization of Retinal Inner Layers

DRIL has emerged as an important parameter on SD-OCT in DME evaluation. It is defined as the horizontal extent for which any boundaries between the four inner retinal layers are not identified. These layers include: ganglion cell–inner plexiform

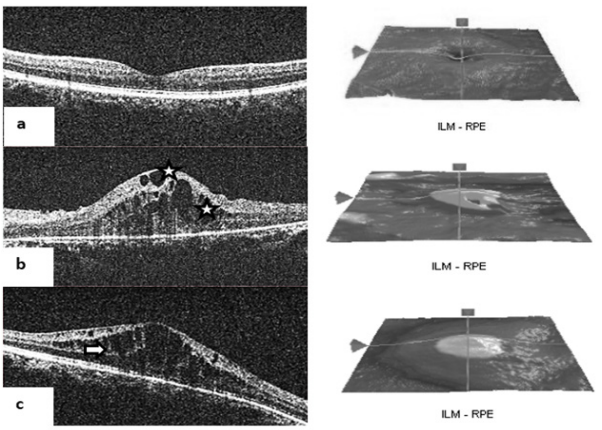


Fig. 1: (a) SD-OCT cross-sectional image shows normal OCT and ILM-RPE overlay map shows normal macular thickness.
(b) SD-OCT cross-sectional image shows cystic spaces in inner retina (*star*) and ILM-RPE overlay map shows increased macular thickness.
(c) SD-OCT cross-sectional image shows extensive cystic changes in inner retina (*arrow*) and ILM-RPE overlay map shows increased macular thickness.

layer complex (GCL+ IPL), inner nuclear layer (INL) and outer plexiform layer (OPL) (Figure 1). It has been established as a non-invasive predictor of VA in eyes with center-involving and center-sparing DME.

Various studies have been conducted in order to evaluate the association of changes in DRIL with VA. On SD-OCT, the 1-mm-wide retinal area centered on the fovea was evaluated by masked graders for DRIL extent, cysts, hyperreflective foci, microaneurysms, cone outer segment tip visibility and external limiting membrane or photoreceptor disorganization and reflectivity. The study concluded thatan early change in DRIL was associated with a substantial decrease in VA. [5]

The correlation of DRIL with VA after the resolution of macular edema in diabetics was further established. Central 1500-µm macular region was analyzedfor changes, including cysts, DRIL length and extent, and outer retinal layers disorganization. VA after DME resolution correlated with baseline VA. It was found that the patients whose DRIL resolved, both early and late, showed improvement in their VA compared with non-resolvers, whose VA worsened. The study concluded that the presence of DRIL at baseline and its resolution pattern may be associated with subsequent VA improvement after resolution of center-involved DME [6].

The mean ganglion cell layer and mean retinal nerve fiber layer are also observed to be thinner in patients with DR as compared to patients with no DR. Thus, a significant thinning of different inner cell layers and the central retina is present in patients with early DR compared to normal eyes [7].

Outer Retinal Layers

Outer retina has four discrete bands. External limiting membrane (ELM) is the innermost layer present as a linear confluence of junctional complexes between Muller cells and photoreceptors. The ellipsoid zone (EZ) is the second hyper reflective layer.The third layer is the interdigitationzone (IZ) between cone outer segment tips and apical processes of Retinal Pigment Epithelium (RPE). The highly-reflective outermost band represents the RPE/ Bruch's complex [8,9]

In the year 2011, Spaide and Curcio highlighted that the second band initially ascribed as inner segment-outer segment junction (IS-OS) of photoreceptor was principally the EZ of the photoreceptor [10]. With the cellular level resolution obtained by OCT, multivariate analysis demonstrated statistically significant relationship between VA and percentage disorganization of EZ. Furthermore, macular volume change was also found to be significantly associated with visual acuity [11].

An association has been found between the status of the ELM prior to treatment and visual outcomes post treatment in pathologies like epiretinal membranes, age-related macular degeneration and DME. [12-14] ELM is considered as third blood barrier and is formed by zonulae adherens and tight junctions. The shortening of the photo receptor inner segment might be asecondary consequence of the fragmented ELM, therefore disorganization of the ELM is noted earlier than EZ disorganization.Our earlier research has highlighted the importance of an intact ELM at the fovea for retinal photoreceptor microstructures integrity and visual acuity.

Our previous studies have also highlighted a positive correlation between the increase in serum vascular endothelial growth factor (VEGF) and Intercellular adhesion molecule-1 (ICAM-1) levels with severity of diabetic retinopathy. A positive correlation was observed between the grades of ELM and EZ disruption and the levels of VEGF and ICAM-1. Also, the grades of ELM and EZ disruption significantly correlate with decrease in VA [15].

Recently, a significant correlationbetween the macular thickness parameters, disorganization of EZ and the increase in severity of diabetic retinopathy has also been documented (Figure 2). It was observed that severity of DR was associated with increase in disorganization of EZ. 'Global' disorganization of EZ was more prominent in proliferative diabetic retinopathy as compared to non-proliferative diabetic retinopathy. The decrease in VA was observed to be significantly associated

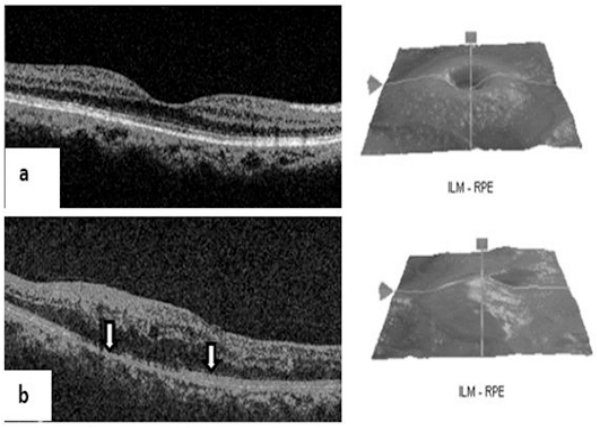


Fig. 2: (a) SD-OCT cross-sectional image shows normal outer retinal layers in OCT and ILM-RPE overlay map shows normal macular thickness.
(b) SD-OCT cross-sectional image shows disrupted ellipsoid zone in the outer retina (arrow) and ILM-RPE overlay map shows increased macular thickness.

with increased disorganization of EZ and severity of retinopathy [16].

Factors affecting integrity of Ellipsoid zone:

The advanced glycation end products lead to an increase in ICAM-1 and VEGF levels. ICAM-1 further causes an increase in the leucocyte adhesion to retinal endothelial cells, which results in retinal micro vascular injury. Increased VEGF levels lead to the breakdown of blood retinal barrier. Increase in the levels of N-CML, ICAM-1 and VEGF results in EZ and ELM disorganization [17]. Increased levels of plasma lipooxygenase, nitric oxide (NO) and decreased levels of reduced glutathione GSH are also associated with in-vivo structural changes in EZ [18].

Retinal pigment epithelium:

Retinal pigmented epithelium (RPE) is a constituent of the outer blood retina barrier and is considered important for the maintenance of the integrity of retina. An increase in the plasma levels of Lipid peroxide, NO and decrease in the plasma levels of GSH, EZ disorganization and RPE topographic alteration showed a significant association with increased severity of diabetic retinopathy [17]. Single layer retinal pigment epithelial map has been used to evaluate the topographic alterations in RPE [18].

Factors affecting topography of RPE:

Increase nitric oxide levels are responsible for RPE damage and thus, cause breakdown of the blood retinal barrier in diabetics. RPE is responsible for transport of ions, retinal proteins, growth factors and metabolism of the photoreceptor layer. NO leads to decreased rod outer segment phagocytosis by RPE cells.

Exogenous NO also leads to an inhibition of RPE cell proliferation. Neuronal retina and photoreceptors are the most affected intraocular tissues when RPE is damaged. Increased levels of NO and LPO were found to be a significantly association with VA and topographic alterations in RPE [18].

Classification Systems For Outer Retinal Layer Disruption

Various classification systems have been devised in DR to prognosticate visual acuity.

1. Maheshwary et al graded disorganization from grade 0-2. [15]

i) Grade 0: intact EZ

ii) Grade 1: focal EZ disorganization of 200 microns or less.

iii) Grade 2: EZ disorganization more than 200 microns.

Grades from each patient's horizontal and vertical scan were added to yield a global disorganization scale. Percentage disorganization of photoreceptors EZ was an important predictor of visual acuity among DME patients.

2. Classification system for ELM and EZ Disorganization was given by Jain et al [13]

i) Grade 0: no disorganization

ii) Grade 1: elm disrupted EZ junction intact.

iii) Grade 2: both ELM and EZ junction disrupted

3. In the study by Sharma et al., a simplified, comprehensive and physician-friendly approach of grading EZ disorganization was developed [16]. EZ is graded on horizontal and vertical scans as 'focal' and 'global'.

i) Grade 0: Intact EZ.

ii) Grade 1: Focal disorganization (localized, subfoveal EZ disorganization)

iii) Grade 2: global disorganization (generalized EZ disorganization throughout the macular cube).

4. Study by Sharma et al proposed another classification system for RPE alterations in diabetic retinopathy [16].

i) Grade 0: No RPE alterations

ii) Grade 1: RPE alterations in up to two quadrants

iii) Grade 2: RPE alterations in more than two quadrants.

Conclusion

DRIL and ORL are important predictors of VA in patients with Diabetic retinopathy. The integrity of outer and inner layers on OCT correlates well with final visual acuity and response to treatment in DME.

Financial Disclosures- None

Conflicts of Interest – None

Acknowledgements - None

References

1. Bjork S, Kapur A, King H, Nair J, Ramachandran A. Global policy: aspects of diabetes in India. Health Policy 2003;66:61-72.
2. Nunes S, Pereira I, Santos A, Bernardes R, Cunha-Vaz J. Central retinal thickness measured with HD-

OCT shows a weak correlation with visual acuity in eyes with CSME. Br J Ophthalmol 2010;94:1201-04.

3. Kim BY, Smith SD, Kaiser PK. Optical coherence tomographic patterns of diabetic macular edema. Am J Ophthalmol 2006;142:405-12.
4. Strøm C, Sander B, Larsen N, Larsen M, Lund-Andersen H. Diabetic macular edema assessed with optical coherence tomography and stereo fundus photography. Invest Ophthalmol Vis Sci 2002;43:241-45.
5. Sun JK, Lin MM, Lammer J, Prager S, Sarangi R, Silva PS, Aiello LP. Disorganization of the retinal inner layers as a predictor of visual acuity in eyes with center-involved diabetic macular edema. JAMA ophthalmology. 2014 Nov 1;132(11):1309-16.
6. Radwan SH, Soliman AZ, Tokarev J, Zhang L, van Kuijk FJ, Koozekanani DD. Association of Disorganization of Retinal Inner Layers With Vision After Resolution of Center-Involved Diabetic Macular Edema. JAMA Ophthalmol. 2015;133(7): 820–25. doi:10.1001/jamaophthalmol.2015.0972
7. Rodrigues EB, Urias MG, Penha FM, Badaró E, Novais E, Meirelles R, Farah ME. Diabetes induces changes in neuroretina before retinal vessels: a spectral-domain optical coherence tomography study. International Journal of Retina and Vitreous. 2015 Apr 15;1(1):4.
8. Drexler W, Sattmann H, Hermann B, Ko TH, Stur M et al. Enhanced visualization of macular pathology with the use of ultrahigh-resolution optical coherence tomography. Arch Ophthalmol 2003;121:695-706.
9. Ko TH, Fujimoto JG, Duker JS, Paunescu LA, Drexler W et al. Comparison of ultrahigh- and standard- resolution optical coherence tomography for imaging macular hole pathology and repair. Ophthalmology 2004;111:2033-43.
10. Spaide RF, Curcio CA. Anatomical correlates to the bands seen in the outer retina by optical coherence tomography: literature review and model. Retina 2011;31:1609-19.
11. Maheshwary AS, Oster SF, Yuson RM, et al. The association between percent disorganization of the photoreceptor inner segment/outer segment and visual acuity in diabetic macular edema. Am J Ophthalmol. 2010;150:63–67.
12. Theodossiadis PG, Theodossiadis GP, Charonis A, EmfietzoglouI,Grigoropoulos VG, et al. The photoreceptor layer as a prognostic factor for visual acuity in the secondary epiretinal membrane after retinal detachment surgery: Imaging analysis by spectral-domain optical coherence tomography. Am J Ophthalmol. 2011;151:973-80.
13. Kwon YH, Lee DK, Kim HE, Kwon OW. Predictive findings of visual outcome in spectral domain optical coherence tomography after ranibizumab treatment in age-related macular degeneration. Korean J Ophthalmol. 2014;28:386-92.
14. Uji A, Murakami T, Nishijima K, Akagi T, Horii T, et al. Association between hyperreflective foci in the outer retina, status of photoreceptor layer, and visual acuity in diabetic macular edema.Am J Ophthalmol. 2012;153:710-7, 717. e1.
15. Jain A, Saxena S, Khanna VK, et al. Status of serum VEGF and ICAM-1 and its association with external limiting membrane and inner segment–outer segment junction disorganization in type 2 diabetes mellitus. Mol Vis. 2013;19:1760–68.
16. Sharma SR, Saxena S, Mishra N, et al. The association of grades of photoreceptor inner segment-ellipsoid band disorganization with severity of retinopathy in type 2 diabetes mellitus. J Case Rep Stud. 2014;2:205.
17. Saxena S, Mishra N et al. Increased Serum N-CML, VGEF and ICAM-1is associated with Photoreceptor Inner Segment Ellipsoid Disorganization in Diabetic Retinopathy. JSM Biotechnol Bioeng 2014;2:1039.
18. Sharma SR, Saxena S et al. Nitric Oxide and oxidative stress is associatedwith severity of diabetic retinopathy and retinal structures alterations.Clinical & Experimental Opthalmology 2015;43:429-36.
19. Saxena S, Meyer CH, Sharma SR. Topographic assessment of retinal pigment epithelium detachment in central serous chorioretinopathy by three-dimensional optical coherence tomography single-layer retinal pigment epithelium map. Journal of Ocular Biology, Diseases, and Informatics. 2012;5(2):44-47. doi:10.1007/s12177-013-9099-0.

Case report

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.25

Letrozole Induced Central Serous Chorioretinopathy: A Rare Case Report.

S. Sivaranjani[1], Neha khanna[2]

Abstract

Title: Letrozole induced central serous chorioretinopathy- a rare case report. *Purpose:* To report a case of letrozole induced central serous chorioretinopathy. *Methods:* This is a case report. *Results:* A 59 years old female presented with diminished vision in right eye. On examination she had central serous chorioretinopathy in right eye and was not responding to anti VEGF and treated with focal laser. *Conclusion:* Letrozole induced central serous chorioretinopathy has not been reported before. It may be prudent for oncologist to have an ophthalmology consultation for their patients on letrozole to understand whether this is indeed rare or under reported.

Keywords: Central Serous Chorioretinopathy; Letrozole; Focal Laser.

Introduction

Central serous chorioretinopathy is a relatively common retinal disease characterized by the accumulation of subretinal fluid at the posterior pole of the fundus, creating a circumscribed area of serous retinal detachment [1]. It typically affects young and middle-aged men with no previous medical or family history and no systemic symptoms or signs. However, it has been noted that central serous chorioretinopathy is associated with different conditions, well known is exposure to corticosteroids. Tamoxifen a selective estrogen receptor modulator (SERM) is the commonly used drug in breast cancer [2]. In recent years in order to reduce the tamoxifen related ocular side effects aromatase inhibitors (AIs) such as anastrozole, letrozole, and exemestane have been increasingly prescribed to postmenopausal breast cancer patients as adjuvant endocrine therapy [3]. We present a case of central serous chorioretinopathy in a breast cancer patient treated with letrozole.

Author Affiliation: [1,2]Fellow, Department of Vitreoretinal Surgery, Nethradhama Superspeciality Eye Hospital, Jayanagar, Bangalore, Karnataka 560082, India.

Corresponding Author: S. Sivaranjani, Fellow, Department of Vitreoretinal Surgery, Nethradhama Superspeciality Eye Hospital, Jayanagar, Bangalore, Karnataka 560082, India.

E-mail: drsivaranjani.s@gmail.com

Received on 02.08.2018, **Accepted on**

Case report

A 59 years old female, average built and nourished, complained of seeing black spots in front of her right eye for a few days. Her best corrected vision was 6/18 in the right eye and 6/6 in the left eye. Anterior segment was normal, and dilated fundus evaluation revealed bilateral drusen with right eye sub retinal fluid (SRF). The sub retinal fluid with drusen in right eye was confirmed and quantified using optical coherence tomography (OCT). Diagnosed as wet age related macular degeneration and one dose of intra vitreal injection ranibizumab 0.5mg/0.05 ml was given. After a month no reduction in SRF was noted in OCT. Fundus fluorescein angiography with indocyanin green angiography was done whose features suggestive of central serous chorioretinopathy. Based on angiography findings focal laser was done in right eye. On follow up, one month after laser reduction in SRF was noted in OCT.

Discussion

Drug-induced CSCR is well established, but treatment with AIs leading to CSCR has not been reported. SERMs like tamoxifen are well known for their ocular side effects like dryness, cataract, crystalline retinopathy and macular edema [4]. AIs like anastrozole have been shown to be associated with retinal hemorrhages which may be the result of excessive traction on the retina, caused

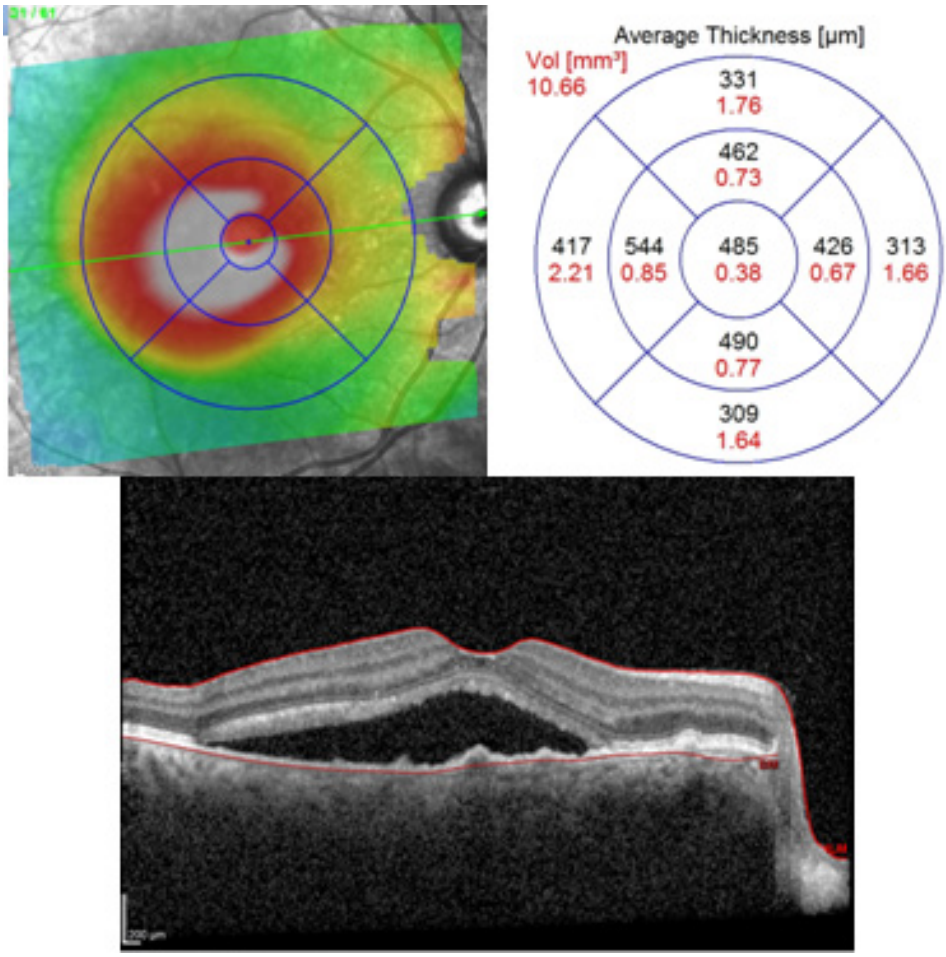


Fig. 1: OCT of the patient showing subretinal fluid before focal laser.

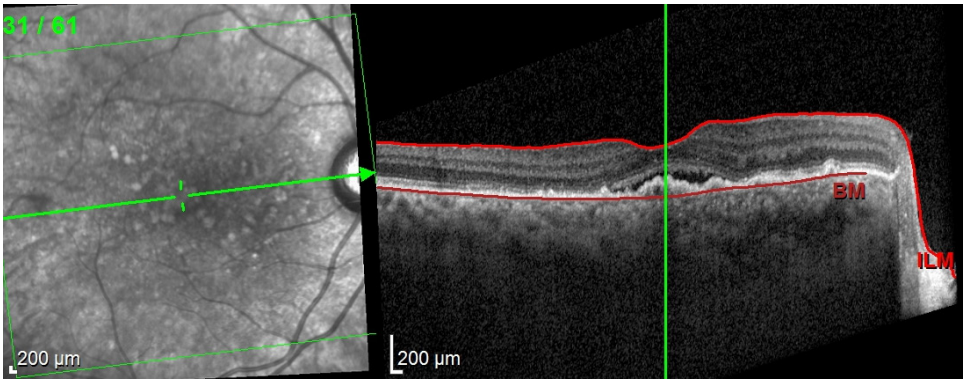


Fig. 2: OCT of the patient showing resolving subretinal fluid after focal laser.

by estrogen depletion and associated age related posterior vitreous detachment [5]. However, to the best of our knowledge, AIs use has never been associated with CSCR in the past. Letrozole is commonly used in infertility treatment. In recent years AIs have been increasingly prescribed to postmenopausal breast cancer patients as adjuvant endocrine therapy, sometimes after two to three years of tamoxifen treatment [6]. Our patient had four cycles of chemotherapy (paclitaxel 120 mg) followed by oral letrozole 2.5 mg for the past three years. Estrogen receptors alpha and beta are expressed in retinal pigment epithelium, neurosensory retina and choroid. So estrogen has neuro protective effect in retina which will be lost by inhibitors of estrogen synthesis like aromatase inhibitors [7]. It is proven that letrozole and bevacizumab have synergistic effect in breast cancer treatment [8]. The mechanism is letrozole inhibits estrogen synthesis which is responsible for angiogenesis and bevacizumab mediated anti angiogenesis effect [9]. So neovascularisation is

haltered in the tumour. But the same synergestic effect in retinal new vessels has not been studied. This synergistic effect of ranibizumab and AIs in CSCR is not supported in our patient. Further studies about Anti VEGF in AIs induced CSCR may fill the gaps of knowledge about treatment issues and may ultimately change the approach to the treatment.

Conclusion

In conclusion, we report a very rare case of letrozole induced CSCR in a post menopausal woman who did not respond to ranibizumab but responded to focal laser. It may be prudent for oncologist to have an ophthalmology consultation for their patients on AIs to understand whether this is indeed rare or under reported. In addition, patients may also be warned to get ophthalmic consultation if they experience blurred vision or dark spots.

Acknowledgement: I would like to express my special thanks of gratitude to my teacher (Dr Kadri Venkatesh) who gave me the golden opportunity to study this rare case with so much of interest which also helped me in understanding the topic in detail.

Secondly I would also like to thank my family and friends for always supporting me in accompalishing this project with in the limited time frame.

Key Messages: Drug-induced central serous chorioretinopathy (CSCR) is a well-established entity. We report a rare case of central serous chorioretinopathy in a breast cancer patient who is on treatment with letrozole a aromatase inhibitor. Letrozole associated CSCR was not responding to anti VEGF and subsequently treated with focal laser. To the best of our knowledge, this is the first case report of letrozole induced CSCR.

Source(s) of support: NIL

Conflicting Interest: NIL

Referrences

1. Liegl R, Ulbig MW. Central serous chorioretinopathy. Ophthalmologica 2014;232:65-76.
2. Shih V, Chan A, Xie F, Ko Y. Economic Evaluation of Anastrozole Versus Tamoxifen for Early Stage Breast Cancer in Singapore. Value Health Reg Issues 2012;1:46-53.
3. Rocchi A, Verma S. Anastrozole is cost-effective vs tamoxifen as initial adjuvant therapy in early breast cancer. Canadian perspectives on the ATAC completed-treatment analysis. Support Care Cancer. 2006;14:917-927.
4. Alvin Eisner, Shiuh Wen Luoh. Breast cancer medications and vision: Effects of treatments for early stage Disease. Curr Eye Res 2011;36:867–85.
5. Goodman, Alice. Emerging data on side effects of aromatase inhibitors. Oncology Times 2008;30: 40–41.
6. Miller WR. Aromatase inhibitors and breast cancer. Minerva Endocrinol 2006;31:27-46.
7. Marilita M Moschos, Irini P Chatziralli, Flora Zagouri, George C Zografos. Macular edema due to letrozole: A first case report. Clin Exp Optom 2012;95:646–50.
8. A Leary, M Dowsett. Combination therapy with aromatase inhibitors: the next era of breast cancer treatment. Bri J Cancer. 2006;95:661–66.
9. Bushnell CD et al. Advancing the study of stroke in women: summary and recommendations for future research from an NINDS-Sponsored Multidisciplinary Working Group. Stroke. 2006;37:2387-99.

Case report

Ophthalmology and Allied Sciences
Volume 4 Number 2, May - August 2018
DOI: http://dx.doi.org/10.21088/oas.2454.7816.4218.26

Embolic Central Retinal Artery Occlusion with Spared Cilio-Retinal Artery Caused by Triamcinolone Acetonide Suspension Injection into the Temporo-Mandibular Joint: Case Report and Review of Literature.

Sanjiv Kumar Gupta[1], Ajai Kumar[2], Siddhartha Bose[3], Preeti Singh[4]

Abstract

We report a case of central retinal artery occlusion after Triamcinolone Acetonide suspension (TMA) injection into Temporomandibular joint (TMJ) and review of relevant literature. *Case description:* A 25-year old male presented with sudden painful vision loss in right eye immediately after TMA injection into right TMJ 24 hours prior to presentation. It was associated with transient dizziness and nausea. At presentation, his vision in the right eye was hand movement and projection of rays full. A complete ophthalmic examination was performed. Anterior segment examination was unremarkable, except for relative afferent pupillary defect in the right eye. Other than that, there was pale edematous retina with marked arteriolar thinning with intra-arterial TMA seen in few of the blocked arterioles and a cherry red spot at the macula. Treatment in form of ocular massage, hyperbaric oxygen therapy and oral Prednisolone (Omnacortil) 1.5mg/ kg as well as topical Difluprednate 0.05% (Diflucor), Bromfenac 0.09% (Unibrom) and Brimonidine 0.1% (Alphagan-P) was instituted, and patient was kept under observation for 1 week and followed up for one month, when the visual recovery was poor with final best corrected visual acuity at 6/60 on Snellen's chart. *Literature review:* Several cases have been reported which show severe irreversible visual loss following intralesional corticosteroid injection in the head and neck area. *Clinical relevance:* Intra-articular injection into the TMJ should be given with caution and informed consent for the same must be taken before the procedure as it may cause irreversible, sight-threatening complication.

Keywords: Crao; Central Retinal Artery Occlusion; Triamcinolone Acetonide Suspension; Arterial Embolism; Vision Loss; Vascular Occlusion; Injection Complication.

Introduction

The central retinal artery (CRA) is a branch of the ophthalmic artery (OA), which is the first branch of the internal carotid artery and it supplies blood to the inner retinal layers [1]. The outer retina is supplied by the chorio-capillaris of the choroid which are supplied by the posterior short ciliary arteries which also originates from the OA [2].

Author Affiliation: [1]Professor [3,4]Junior Resident, Department of Ophthalmology, King George's Medical University, Lucknow, Uttar Pradesh 226003, India. [2]Senior Surgeon, Retina unit, Jan Kalyan Eye Hospital, Indira Nagar, Lucknow, Uttar Pradesh 226016, India.

Corresponding Author: Sanjiv Kumar Gupta, Department of Ophthalmology King George Medical University, Lucknow, Uttar Pradesh 226013, India.

E-mail: sanjiv204@gmail.com

Received on 14.06.2018, **Accepted on** 25.07.2018

Central retinal artery occlusion (CRAO) which usually occurs due to emboli in the blood circulation is an ophthalmic emergency and the ocular analogue of cerebral stroke [3]. Anatomical studies show that the narrowest part of the CRA lumen is where it pierces the dural sheath of the optic nerve and that this was the most common location where CRAO occurred [4]. A prospective study of 260 eyes with CRAO showed that the subjects have profound monocular irreversible visual loss, with 80% of patients having a final visual acuity (VA) of 20/400 or worse [5].

In few individuals, there may be an anatomical variation, that is, the presence of a cilioretinal artery. It usually supplies the papillo-macular bundle which is essential for central vision. A study on 1000 consecutive patients, using fundus fluorescein angiography (FFA), found a cilioretinal artery to be present in 49.5% of patients [6]. In these

patients, the macula may still be perfused in acute CRAO, thus preserving a small island of central vision.

Conclusions from studies done on rhesus monkeys show no detectable damage was done with CRAO of 97 min. However, between 105 and 240 min there was a variable degree of partial retinal recovery seen on visual-evoked potential. At 240 min, complete or almost total optic nerve atrophy and nerve fiber damage resulting in massive irreversible retinal damage was found in all eyes. The exact retinal tolerance time when irreversible damage occurs appears to be no longer than 4 hrs [7].

Current options for therapy include the so-called 'standard' therapies, such as sublingual isosorbide dinitrate, systemic pentoxifylline or inhalation of carbogen, hyperbaric oxygen, ocular massage, globe compression, intravenous acetazolamide and mannitol, anterior chamber paracentesis, and methylprednisolone. However, none of these therapies has been shown to be better than placebo [8].

Case report

A 25-year old young male was referred to us with sudden painful vision loss in his right eye. One day prior to presentation, he had received intra-articular injection of Triamcinolone Acetonide suspension 4% (TMA) into the right temporomandibular joint TMJ for non-infective arthritis (as per his records). Immediately after the injection, he had an episode of dizziness with nausea and inability to see with the right eye. Dizziness and nausea resolved spontaneously but the visual loss persisted. The patient did not give any history of systemic illnesses. When he first visited our clinic, the best corrected visual acuity in the right eye was hand motion and projection of rays full, while the left eye was at 6/6. Anterior and posterior segment examination of left eye was unremarkable while right eye had a relative afferent pupillary defect and on fundus examination of the right eye, the entire retina was pale and edematous retina with marked arteriolar thinning with TMA emboli seen in few blocked arterioles barring a small well perfused area inferior to macula (Figure 1) with a foveal cherry red spot.

The optical coherence tomography (OCT) revealed thickening of the Retinal Nerve Fiber Layer (RNFL), which confirms edema of the retinal tissue (Figure 2). Visual prognosis was explained and despite retinal ischemia time of 4 hours had elapsed, a trial of ocular massage and hyperbaric

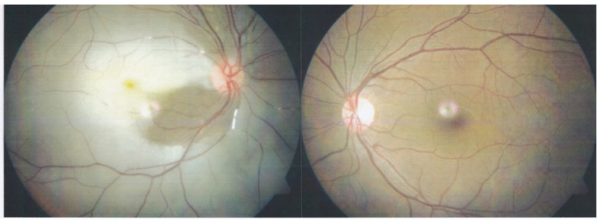


Fig. 1: Fundus photograph of the subject showing CRAO (Central Retinal Artery Occlusion) with spared cilioretinal artery (red arrow) in the Right eye. Left eye fundus is normal in appearance. Note the TMA emboli in the arterioles (Blue arrows).

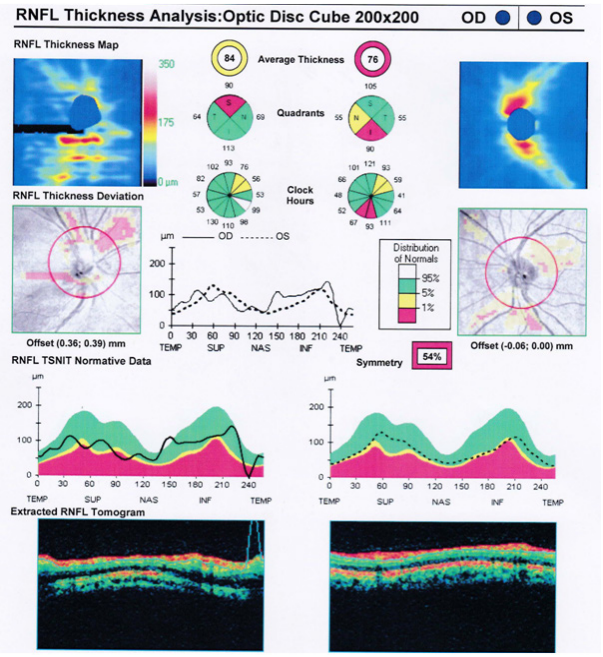


Fig. 2: Optical coherence tomography (OCT) Retinal Nerve Fiber Layer (RNFL) of the right and left eyes showing edematous retinal tissue in the peripapillary are in the right eye and normal left eye.

oxygen therapy was administered, but there was no change seen in location of impacted emboli or visual status after 24 hours of therapy. A Carotid Artery Doppler to look for the source of embolism was planned but the patient did not consent. Treatment with oral Prednisolone (Omnacortil) 1.5mg/kg body weight, topical Difluprednate 0.05% (Diflucor), Bromfenac 0.09% (Unibrom) and Brimonidine 0.1% (Alphagan-P) was started Patient was recalled after 1 week and subsequently at 1 month. The visual acuity had minor improvement, with best corrected visual acuity of 6/60 on Snellen's chart attributable to the small area of preserved retina due to the cilio-retinal artery.

Discussion

There have been few single case reports of this type of embolization of retinal arterial circulation caused by accidental injection of TMA suspension into adjacent arterial blood vessels. Similar incident of central retinal artery occlusion has been reported with severe vision loss after intra-articular injection of TMA suspension into TMJ and maxillary soft tissue [9,10]. There was no improvement in vision despite treatment in both case reports.

Embolization of retinal and choroidal arterial circulation has been reported during orbital injection of TMA for thyroid-associated ophthalmopathy [11]. They have reported limited visual gain after immediate aggressive therapy with oxygen supplementation and vasodilator therapy. Similarly, a posterior sub-tenon injection caused not only CRAO due to TMA emboli in arterial circulation but was also accompanied with retro-bulbar hemorrhage and severe ipsilateral vision loss with limited recovery at one month [12].

Subcutaneous triamcinolone acetonide steroid injection at the site of a keloid on the left earlobe caused temporary left-sided facial numbness, diaphoresis, dizziness, hypoesthesia of the left side of the mouth and tongue, left upper lid ptosis, and nearly complete vision loss in left eye in a patient with complete recovery after several hours. Though, they have not described the findings of the retinal circulation and fundus findings [13]. Sever irreversible bilateral CRAO has been reported due to forehead intradermal injection of TMA suspension for treatment of cosmetic skin lesion [14,15].

Intra oral injection of TMA in submucosal fibrous scar in the left mandibular retromolar pad has been reported to cause ipsilateral multiple Branch Retinal Occlusions and ocular ischemic syndrome due to involvement of anterior and posterior choroidal circulation also [16]. The visual recovery was reported to be poor after one month after the event. Similar occlusion of retinal and choroidal arterial circulation and subsequent severe irreversible vision loss and retinal atrophy has been reported after TMA injection in nasal mucosa and nasal concha [17,18].

Conclusions

Injection of TMA suspension in the region of head and neck should be done judiciously with informed consent regarding complications which can occur as per the available case reports. Arrangement should be there to manage any such situation which may arise due to accidental intraarterial injection, including vasodilators (Nitroglycerine, Carbogen (95% oxygen and 5% Carbondioxide)), ocular massage and paracentesis to minimize the damage. During the procedure adequate suction should be created in the suction before injecting the suspension to make sure that there is no blood drawn in the syringe. This will confirm that the syringe is not in intravascular space. The injection speed should be slow and with low pressure. After the injection has been administered, patient should be kept under observation for a while before sending the patient away.

Conflict of Interest: No potential conflict of interest relevant to this article was reported.

Acknowledgments: None

References

1. Singh S, Dass R. The central artery of the retina I. Origin and course. Br J Ophthalmol 1960;44: 193.
2. Hayreh SS. Acute retinal arterial occlusive disorders. Prog Retin Eye Res 2011;30:359–94.
3. DD Varma, S Cugati, AW Lee and CS Chen. A review of central retinal artery occlusion: clinical presentation and management. Eye 2013;27:688–97.
4. Hayreh S. Pathogenesis of occlusion of the central retinal vessels. Am J Ophthalmol 1971; 72:998.
5. Hayreh SS, Zimmerman MB. Central retinal artery occlusion: visual outcome. Am J Ophthalmol 2005;140(3):376–91.
6. Justice Jr J, Lehmann RP. Cilioretinal arteries: a study based on review of stereo fundus photographs and fluorescein angiographic findings. Arch Ophthalmol 1976;94:1355.
7. Hayreh SS, Zimmerman MB, Kimura A, Sanon A. Central retinal artery occlusion. Retinal survival time. Exp Eye Res 2004;78:723–36.
8. Fraser SG, Adams W. Interventions for acute non-arteritic central retinal artery occlusion. Cochrane Database Syst Rev 2009; 1: CD001989.
9. Nripen Gaur, Pallavi Singh, Rohan Chawla, Brijesh Takkar. Triamcinolone emboli leading to central retinal artery occlusion: a multimodal imaging study. BMJ Case Reports 2017: published online 22 February 2017, doi:10.1136/bcr-2016-218908.
10. Nianiaris NA, Mandelcorn M, Baker G. Retinal and choroidal embolization following soft-tissue maxillary injection of corticosteroids. Can J Ophthalmol. 1995 Oct;30(6):321-3. PubMed PMID: 8574981.
11. Li G, Xu D, Hu Z, Li H. Embolic retinal and choroidal vascular occlusion after peribulbar triamcinolone injection: A case report. NA.,

ed. Medicine. 2018;97(17):e0467. doi:10.1097/MD.0000000000010467.

12. Moshfeghi DM, Lowder CY, Roth DB, Kaiser PK. Retinal and choroidal vascular occlusion after posterior sub-tenon triamcinolone injection. Am J Ophthalmol. 2002 Jul;134(1):132-4. PubMed PMID: 12095826.
13. Chavala SH, Williamson JF, Postel EA. Embolic central retinal artery occlusion after subcutaneous auricular steroid injection. Lancet. 2016 May 28;387(10034):2235. doi: 10.1016/S0140-6736(15)00980-0.
14. Liu OG, Chunming L, Juanjuan W, Xiaoyan X. Central retinal artery occlusion and cerebral inrfaction following forehead injection with a corticosteroid suspension for vitiligo. Indian J Dermatol Venereol Leprol. 2014 Mar-Apr;80(2):177-9. doi: 10.4103/0378-6323.129416.
15. Edwards AO. Central retinal artery occlusion following forehead injection with a corticosteroid suspension. Pediatr Dermatol 2008;25:460-1.
16. McEwan G, Hofmeister E, Kubis K, Blade K. Monocular embolic retinal arteriolar occlusions after ipsilateral intraoral triamcinolone injection. J Neuroophthalmol. 2010 Mar;30(1):98-9. doi: 10.1097/WNO.0b013e3181ce8048. PubMed PMID: 20182219.
17. Hirata A, Kubo M, Okinami S. Severe retinal atrophy due to retinal and choroidal vascular occlusion following triamcinolone injection into the nasal mucosa. Jpn J Ophthalmol. 2008 Nov-Dec;52(6):510-511. doi: 10.1007/s10384-008-0596-9. Epub 2008 Dec 17. PubMed PMID: 19089579.
18. Martin PA, Church CA, Petti GH Jr, Hedayi R. Visual loss after intraturbinate steroid injection. Otolaryngol Head Neck Surg. 2003 Feb;128(2):280-1. PubMed PMID: 12601327.

Guidelines for Authors

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journal" developed by international committee of medical Journal Editors

Types of Manuscripts and Limits

Original articles: Up to 3000 words excluding references and abstract and up to 10 references.

Review articles: Up to 2500 words excluding references and abstract and up to 10 references.

Case reports: Up to 1000 words excluding references and abstract and up to 10 references.

Online Submission of the Manuscripts

Articles can also be submitted online from http://rfppl.co.in/customer_index.php.

I) First Page File: Prepare the title page, covering letter, acknowledgement, etc. using a word processor program. All information which can reveal your identity should be here. use text/rtf/doc/PDF files. Do not zip the files.

2) Article file: The main text of the article, beginning from Abstract till References (including tables) should be in this file. Do not include any information (such as acknowledgement, your name in page headers, etc.) in this file. Use text/rtf/doc/PDF files. Do not zip the files. Limit the file size to 400 Kb. Do not incorporate images in the file. If file size is large, graphs can be submitted as images separately without incorporating them in the article file to reduce the size of the file.

3) Images: Submit good quality color images. Each image should be less than 100 Kb in size. Size of the image can be reduced by decreasing the actual height and width of the images (keep up to 400 pixels or 3 inches). All image formats (jpeg, tiff, gif, bmp, png, eps etc.) are acceptable; jpeg is most suitable.

Legends: Legends for the figures/images should be included at the end of the article file.

If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks from submission. Hard copies of the images (3 sets), for articles submitted online, should be sent to the journal office at the time of submission of a revised manuscript. Editorial office: Red Flower Publication Pvt. Ltd., 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi – 110 091, India, Phone: 91-11-22754205, 45796900, 22756995. E-mail: author@rfppl.co.in. Submission page: http://rfppl.co.in/article_submission_system.php?mid=5.

Preparation of the Manuscript

The text of observational and experimental articles should be divided into sections with the headings: Introduction, Methods, Results, Discussion, References, Tables, Figures, Figure legends, and Acknowledgment. Do not make subheadings in these sections.

Title Page

The title page should carry

1) Type of manuscript (e.g. Original article, Review article, Case Report)

2) The title of the article, should be concise and informative;

3) Running title or short title not more than 50 characters;

4) The name by which each contributor is known (Last name, First name and initials of middle name), with his or her highest academic degree(s) and institutional affiliation;

5) The name of the department(s) and institution(s) to which the work should be attributed;

6) The name, address, phone numbers, facsimile numbers and e-mail address of the contributor responsible for correspondence about the manuscript; should be mentoined.

7) The total number of pages, total number of photographs and word counts separately for abstract and for the text (excluding the references and abstract);

8) Source(s) of support in the form of grants, equipment, drugs, or all of these;

9) Acknowledgement, if any; and

l0) If the manuscript was presented as part at a meeting, the organization, place, and exact date on which it was read.

Abstract Page

The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

Introduction

State the background of the study and purpose of the study and summarize the rationale for the study or observation.

Methods

The methods section should include only information that was available at the time the plan or protocol for the study was written such as study approach, design, type of sample, sample size, sampling technique, setting of the study, description of data collection tools and methods; all information obtained during the conduct of the study belongs in the Results section.

Reports of randomized clinical trials should be based on the CONSORT Statement (http:// www. consort-statement. org). When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 (available at http://www.wma. net/e/policy/l7-c_e.html).

Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical details can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

Discussion

Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

References

List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

More information about other reference types is available at www.nlm.nih.gov/bsd/uniform_requirements.html, but observes some minor deviations (no full stop after journal title, no issue or date after volume, etc).

Tables

Tables should be self-explanatory and should not duplicate textual material.

Tables with more than 10 columns and 25 rows are not acceptable.

Table numbers should be in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.

Explain in footnotes all non-standard abbreviations that are used in each table.

For footnotes use the following symbols, in this sequence: *, ¶, †, ‡‡,

Illustrations (Figures)

Graphics files are welcome if supplied as Tiff, EPS, or PowerPoint files of minimum 1200x1600 pixel size. The minimum line weight for line art is 0.5 point for optimal printing.

When possible, please place symbol legends below the figure instead of to the side.

Original color figures can be printed in color at the editor's and publisher's discretion provided the author agrees to pay.

Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations.

Sending a revised manuscript

While submitting a revised manuscript, contributors are requested to include, along with single copy of the final revised manuscript, a photocopy of the revised manuscript with the changes underlined in red and copy of the comments with the point to point clarification to each comment. The manuscript number should be written on each of these documents. If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks of submission. Hard copies of images should be sent to the office of the journal. There is no need to send printed manuscript for articles submitted online.

Reprints

Journal provides no free printed reprints, however a author copy is sent to the main author and additional copies are available on payment (ask to the journal office).

Copyrights

The whole of the literary matter in the journal is copyright and cannot be reproduced without the written permission.

Declaration

A declaration should be submitted stating that the manuscript represents valid work and that neither this manuscript nor one with substantially similar content under the present authorship has been published or is being considered for publication elsewhere and the authorship of this article will not be contested by any one whose name (s) is/are not listed here, and that the order of authorship as placed in the manuscript is final and accepted by the co-authors. Declarations should be signed by all the authors in the order in which they are mentioned in the original manuscript. Matters appearing in the Journal are covered by copyright but no objection will be made to their reproduction provided permission is obtained from the Editor prior to publication and due acknowledgment of the source is made.

Approval of Ethics Committee

We need the Ethics committee approval letter from an Institutional ethical committee (IEC) or an institutional review board (IRB) to publish your Research article or author should submit a statement that the study does not require ethics approval along with evidence. The evidence could either be consent from patients is available and there are no ethics issues in the paper or a letter from an IRB stating that the study in question does not require ethics approval.

Abbreviations

Standard abbreviations should be used and be spelt out when first used in the text. Abbreviations should not be used in the title or abstract.

Checklist

- Manuscript Title
- Covering letter: Signed by all contributors
- Previous publication/ presentations mentioned, Source of funding mentioned
- Conflicts of interest disclosed

Authors

- Middle name initials provided.
- Author for correspondence, with e-mail address provided.
- Number of contributors restricted as per the instructions.
- Identity not revealed in paper except title page (e.g.name of the institute in Methods, citing previous study as 'our study')

Presentation and Format

- Double spacing
- Margins 2.5 cm from all four sides
- Title page contains all the desired information. Running title provided (not more than 50 characters)
- Abstract page contains the full title of the manuscript
- Abstract provided: Structured abstract provided for an original article.
- Key words provided (three or more)
- Introduction of 75-100 words
- Headings in title case (not ALL CAPITALS). References cited in square brackets
- References according to the journal's instructions

Language and grammar

- Uniformly American English
- Abbreviations spelt out in full for the first time. Numerals from 1 to l0 spelt out
- Numerals at the beginning of the sentence spelt out

Tables and figures

- No repetition of data in tables and graphs and in text.
- Actual numbers from which graphs drawn, provided.
- Figures necessary and of good quality (color)
- Table and figure numbers in Arabic letters (not Roman).
- Labels pasted on back of the photographs (no names written)
- Figure legends provided (not more than 40 words)
- Patients' privacy maintained, (if not permission taken)
- Credit note for borrowed figures/tables provided
- Manuscript provided on a CDROM (with double spacing)

Submitting the Manuscript

- Is the journal editor's contact information current?
- Is the cover letter included with the manuscript? Does the letter:

1. Include the author's postal address, e-mail address, telephone number, and fax number for future correspondence?
2. State that the manuscript is original, not previously published, and not under concurrent consideration elsewhere?
3. Inform the journal editor of the existence of any similar published manuscripts written by the author?
4. Mention any supplemental material you are submitting for the online version of your article. Contributors' Form (to be modified as applicable and one signed copy attached with the manuscript)

Revised Rates for 2018 (Institutional)

Title of the Journal	Frequency	India(INR) Print Only	India(INR) Online Only	Outside India(USD) Print Only	Outside India(USD) Online Only
Community and Public Health Nursing	Triannual	5500	5000	430	391
Dermatology International	Semiannual	5500	5000	430	391
Gastroenterology International	Semiannual	6000	5500	469	430
Indian Journal of Agriculture Business	Semiannual	5500	5000	413	375
Indian Journal of Anatomy	Bi-monthly	8500	8000	664	625
Indian Journal of Ancient Medicine and Yoga	Quarterly	8000	7500	625	586
Indian Journal of Anesthesia and Analgesia	Monthly	7500	7000	586	547
Indian Journal of Biology	Semiannual	5500	5000	430	391
Indian Journal of Cancer Education and Research	Semiannual	9000	8500	703	664
Indian Journal of Communicable Diseases	Semiannual	8500	8000	664	625
Indian Journal of Dental Education	Quarterly	5500	5000	430	391
Indian Journal of Diabetes and Endocrinology	Semiannual	8000	7500	597	560
Indian Journal of Emergency Medicine	Quarterly	12500	12000	977	938
Indian Journal of Forensic Medicine and Pathology	Quarterly	16000	15500	1250	1211
Indian Journal of Forensic Odontology	Semiannual	5500	5000	430	391
Indian Journal of Genetics and Molecular Research	Semiannual	7000	6500	547	508
Indian Journal of Hospital Administration	Semiannual	7000	6500	547	508
Indian Journal of Hospital Infection	Semiannual	12500	12000	938	901
Indian Journal of Law and Human Behavior	Semiannual	6000	5500	469	430
Indian Journal of Legal Medicine	Semiannual	8500	8000	607	550
Indian Journal of Library and Information Science	Triannual	9500	9000	742	703
Indian Journal of Maternal-Fetal & Neonatal Medicine	Semiannual	9500	9000	742	703
Indian Journal of Medical & Health Sciences	Semiannual	7000	6500	547	508
Indian Journal of Obstetrics and Gynecology	Bi-monthly	9500	9000	742	703
Indian Journal of Pathology: Research and Practice	Monthly	12000	11500	938	898
Indian Journal of Plant and Soil	Semiannual	6500	6000	508	469
Indian Journal of Preventive Medicine	Semiannual	7000	6500	547	508
Indian Journal of Research in Anthropology	Semiannual	12500	12000	977	938
Indian Journal of Surgical Nursing	Triannual	5500	5000	430	391
Indian Journal of Trauma and Emergency Pediatrics	Quarterly	9500	9000	742	703
Indian Journal of Waste Management	Semiannual	9500	8500	742	664
International Journal of Food, Nutrition & Dietetics	Triannual	5500	5000	430	391
International Journal of Neurology and Neurosurgery	Quarterly	10500	10000	820	781
International Journal of Pediatric Nursing	Triannual	5500	5000	430	391
International Journal of Political Science	Semiannual	6000	5500	450	413
International Journal of Practical Nursing	Triannual	5500	5000	430	391
International Physiology	Triannual	7500	7000	586	547
Journal of Animal Feed Science and Technology	Semiannual	7800	7300	609	570
Journal of Cardiovascular Medicine and Surgery	Quarterly	10000	9500	781	742
Journal of Forensic Chemistry and Toxicology	Semiannual	9500	9000	742	703
Journal of Global Medical Education and Research	Semiannual	5900	5500	440	410
Journal of Global Public Health	Semiannual	12000	11500	896	858
Journal of Microbiology and Related Research	Semiannual	8500	8000	664	625
Journal of Nurse Midwifery and Maternal Health	Triannual	5500	5000	430	391
Journal of Orthopedic Education	Triannual	5500	5000	430	391
Journal of Pharmaceutical and Medicinal Chemistry	Semiannual	16500	16000	1289	1250
Journal of Plastic Surgery and Transplantation	Semiannual	26400	25900	2063	2023
Journal of Practical Biochemistry and Biophysics	Semiannual	7000	6500	547	508
Journal of Psychiatric Nursing	Triannual	5500	5000	430	391
Journal of Social Welfare and Management	Triannual	7500	7000	586	547
Medical Drugs and Devices Research	Semiannual	2000	1800	156.25	140.63
New Indian Journal of Surgery	Bi-monthly	8000	7500	625	586
Ophthalmology and Allied Sciences	Triannual	6000	5500	469	430
Otolaryngology International	Semiannual	5500	5000	430	391
Pediatric Education and Research	Triannual	7500	7000	586	547
Physiotherapy and Occupational Therapy Journal	Quarterly	9000	8500	703	664
RFP Indian Journal of Medical Psychiatry	Semiannual	8000	7500	625	586
RFP Journal of Gerontology and Geriatric Nursing	Semiannual	5500	5000	430	391
Urology, Nephrology and Andrology International	Semiannual	7500	7000	586	547

Terms of Supply:

1. Agency discount 10%. Issues will be sent directly to the end user, otherwise foreign rates will be charged.
2. All back volumes of all journals are available at current rates.
3. All Journals are available free online with print order within the subscription period.
4. All legal disputes subject to Delhi jurisdiction.
5. Cancellations are not accepted orders once processed.
6. Demand draft / cheque should be issued in favour of "**Red Flower Publication Pvt. Ltd.**" payable at **Delhi**
7. Full pre-payment is required. It can be done through online (http://rfppl.co.in/subscribe.php?mid=7).
8. No claims will be entertained if not reported within 6 months of the publishing date.
9. Orders and payments are to be sent to our office address as given above.
10. Postage & Handling is included in the subscription rates.
11. Subscription period is accepted on calendar year basis (i.e. Jan to Dec). However orders may be placed any time throughout the year.

Order from

Red Flower Publication Pvt. Ltd., 48/41-42, DSIDC, Pocket-II, Mayur Vihar Phase-I, Delhi - 110 091 (India),
Mobile: 8130750089, Phone: 91-11-45796900, 22754205, 22756995 E-mail: sales@rfppl.co.in, Website: www.rfppl.co.in

Instructions to Authors

Submission to the journal must comply with the Guidelines for Authors.
Non-compliant submission will be returned to the author for correction.

To access the online submission system and for the most up-to-date version of the Guide for Authors please visit:

http://www.rfppl.co.in

Technical problems or general questions on publishing with OAS are supported by Red Flower Publication Pvt. Ltd's Author Support team (http://rfppl.co.in/article_submission_system.php?mid=5#)

Alternatively, please contact the Journal's Editorial Office for further assistance.

Editorial Manager
Red Flower Publication Pvt. Ltd.
48/41-42, DSIDC, Pocket-II
Mayur Vihar Phase-I
Delhi - 110 091(India)
Mobile: 9821671871, Phone: 91-11-22754205, 45796900, 22756995
E-mail: author@rfppl.co.in