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Assessment of Risk Factors for Presenile Cataract among Patients Attending Tertiary Care Hospital, Amreli, Gujarat

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Abstract

Introduction: Cataract is one of the common causes for preventable blindness amongst adults in India. Presenile cataract is cataract occurring before age of 55 years.

Objective: To assess risk factors present in patients with presenile cataract.

Materials and Method: Study was conducted amongst patients attending tertiary care hospital at Amreli. Duration of study was May 2020 to October 2020. Eligible patients with presenile cataract who gave consent were included in the study. A total of 150 participants aged 18 to 55 years were included in th study. Confirmed presenile cataract cases were interviewed for questions related to risk factors.

Result: Out of 150 study participants, 80% had atleast one possible risk factors present. Top 5 most common risk factors present amongst participants in the present study were tobacco consumption 34 (22.7%), followed by obesity 14 (9.3%), diabetes 13 (8.7%), auto-immune disorder 10 (6.7%) and thyroid disorder 7 (4.7%). Most participants had unilateral cataract (104; 69.3%) while posterior sub-capsular cataract (66; 44.0%) was most common variety of cataract followed by combined cataract type (42; 28%) found amongst the participants.

Conclusion: Four out of every five study participants with presenile cataract had some form of possible risk factor present. Presence of possible risk factor may increase incidence of presenile cataract.

Keywords: Myopia; Non Communicable disease; Presenile cataract; Tobacco.

Introduction

Cataract is clouding of lens in the eye caused by degenerative changes leading to decrease in vision.[1,2] One of the major causes of preventable blindness in country like India is Cataract.[3,4] Cataract accounts for almost 48% of total blindness in world and around 51% in Southeast Asian region which includes India.[5] Cataract is second major cause for visual impairment after refractive error.[6]

Presenile cataract refers to occurrence of cataract before the age of 55 years.[4,7] Various risk factors have been found to be associated to presenile cataract which includes diabetes mellitus, hypertension, prolonged use of steroids, trauma, exposure to ultraviolet light, family history, refractive error, etc.[4,6] Certain studies from India have shown that Indian population is at more risk to develop presenile cataract due to environmental factors or genetic predisposition compared to population of developed countries like United States.[8] There are estimates that delaying the onset of cataract by 10 years could reduce the need for surgery by 45%. Therefore primary and secondary prevention of cataract is an optimal approach and could be more cost effective than cataract surgery in preventable blindness.[4] If cataract is left untreated it ultimately may even endanger jobs and quality of life of

patients which is very significant in economically productive age group. Moreover cataract surgeries are a form of economic burden especially in developing country like India.

Hence present study was conducted to assess risk factors amongst population resulting in presenile cataract. If these risk factors could be identified and modified it may reduce incidence of presenile cataract. Certain studies can be found worldwide assessing risk factors for presenile cataract, however no study could be found to have been conducted in Gujarat state. Also large number of possible risk factors for presenile cataract were explored in the present study.

Objective

Primary Objective: To assess risk factor present in patients with presenile cataract.

Secondary Objective: To find statistical association between identified risk factors and type of presenile cataract.

Materials and Methodology

Present cross-sectional study was hospital based study carried out at a tertiary care hospital at Amreli district, Gujarat. Patients between age of 18 to 55 years attending the ophthalmology department, diagnosed with presenile cataract and who were willing to participate in the study were included in the study. Study duration was May 2020 to October 2020. Convenient and feasible sample size of 150 participants to be included in the study was decided.

Exclusion criteria: Intellectually disabled, Congenital cataract patient.

Self prepared questionnaire was used. Pilot study of questionnaire was done amongst 10% of sample size i.e. 15 participants before the start of actual study for validation. Questions related to socio-demographic profile of participants, possible factors leading to presenile cataract such as prevalent disease, medications taken regularly, addiction, family history, history of ocular trauma were inquired. Ophthalmic examination was also carried out to assess type of cataract. Visual acuity, ocular pressure, slit lamp examination, fundus examination were also carried out. Patient in whom none of the risk factor was present was classified as idiopathic presenile cataract.

For socio-economic classification of participant, modified Prasad classification was used.[9] All India Consumer Pricing Index (Industrial worker) was taken as 338 (August 2020).[10] For classification of BMI of participants, standard medical textbook was used.[11]

Data entry was done in MS Excel 2007 and analysis was done in MS Excel 2007 and Statistical Package for Social Science Statistics version.[20] Test applied were frequency, percentage, measures of distribution and measures of statistical association like Pearson chi-square, Fisher's exact and Contingency coefficient.

Result

In present study, 150 participants were included in the study. Basic characteristic details of all the participants are given in Table 1. Mean age of participants was 41.88 + 0.654.

Table 1: Basic characteristic details of all participants (n=150).

Category	Sub-category	Frequency (%)
Age	18–21 years	3 (2.0)
	22–31 years	9 (6.0)
	32–41 years	49 (32.7)
	42–51 years	71 (47.3)
	52–55 years	18 (12.0)
Gender	Male	97 (64.6)
	Female	53 (35.4)
Education (last completed)	Illiterate	4 (2.7)
	Primary	56 (37.3)
	Secondary	65 (43.3)
	Higher secondary	18 (12.0)
	Graduate or above	7 (4.7)
Occupation	Student	10 (6.7)
	Self-employed	60 (40.0)
	Employed / Job	44 (29.3)
	Homemaker	27 (18.0)
	Unemployed / Retired	9 (6.0)
Residence	Urban	79 (52.7)
	Rural	71 (47.3)
Socio-economic classification (Accd. to modified BJ Prasad classification)*	Class I (Upper)	0 (0.0%)
	Class II (Upper Middle)	30 (20.0%)
	Class III (Middle)	48 (32.0%)
	Class IV (Lower Middle)	54 (36.0%)
	Class V (Lower)	18 (12.0%)

* AICPI (IW)- 338 (August 2020)[10]

Presence of non-ophthalmic co-morbidities was informed by 53 (35.3%) participants. Details about these co-morbidities and treatment taken are given

in Table 2. All participants were known case with co-morbidity and were not newly diagnosed while present study. Autoimmune disorder collectively in below table includes Rheumatoid arthritis, Systemic lupus erythematosus, and Psoriasis.

Table 2: Non-ophthalmic co-morbidity details of participants (n=53)*.

Co-morbidity	Treatment taken	Frequency	%
BMI- Overweight (n=14)	Yes	10	71.4
	No	4	28.6
Hypertension (n=6)	Yes	3	50.0
	No	3	50.0
Diabetes mellitus (n=13)	Yes	7	53.8
	No	6	46.2
Thyroid disorder (n=7)	Yes	6	85.7
	No	1	14.3
Auto-immune disorder (n=10)	Yes	6	60.0
	No	4	40.0
Asthma (n=3)	Yes	1	33.3
	No	2	66.7
None (n=97)	No	97	100.0

*multiple response allowed.

Myopia was reported by 5 (3.3%) participants amongst whom 4 (80.0%) participants regularly used spectacles. Consumption of systemic steroids atleast once during last five years was informed by 6 (4.0%) participants. Majority of participants 4 (66.7%) informed auto-immune disorder as reason for consumption of systemic steroids. 4 (66.7%) participants informed of taking systemic steroids for more than 1 year. Intake of Aspirin was informed by 1 (0.7%) participant and Statin by 1 (0.7%) participant. Exposure to high degree of bright light (sunlight, welding, etc) since many years was informed by 4 (2.7%) participants as a part of their occupation.

On inquiry about addiction, 21 (14.0%) participants were addicted to tobacco chewing while 13 (8.7%) participants to tobacco smoking. Positive family history regarding presenile cataract was informed by 5 (3.3%) participants. Past history of major ocular trauma was informed by 5 (3.3%) participants.

Ophthalmological examination of participants revealed 104 (69.3%) participants had unilateral presenile cataract while 46 (30.7%) had bilateral presenile cataract. Details about type of presenile cataract of participants during ophthalmological examination are given in Fig. 1.

Table 3: Statistical association between socio-demographic indicators and type of presenile cataract.

Socio-demographic profile indicator	Category	Type of presenile cataract				Total	Statistical value (p value)
		Combined	Cortical	Nuclear	Posterior subcapsular		
Age (in years)	18–21	1	1	0	1	3	12.795 (0.304)@
	22–31	5	1	0	3	9	
	32–41	12	4	6	27	49	
	42–51	21	15	10	25	71	
	52–55	3	4	1	10	18	
Gender	Female	20	9	3	21	53	0.187 (0.141)#
	Male	22	16	14	45	97	
Occupation	Student	3	1	1	5	10	0.467 (<0.001)#
	Self-employed	10	8	4	38	60	
	Employed / Job	15	10	7	12	44	
	Homemaker	14	6	5	2	27	
	Unemployed	0	0	0	9	9	
Residence	Urban	21	18	8	32	79	0.172 (0.215)#
	Rural	21	7	9	34	71	
Socio-economic classification	Class II (Upper Middle)	8	4	4	14	30	0.965 (1.000)@
	Class III (Middle)	14	9	5	20	48	
	Class IV (Lower Middle)	15	9	6	24	54	
	Class V (Lower)	5	3	2	8	18	

Contingency coefficient @ Fisher's exact.

Table 4: Statistical associations between socio-demographic indicators and eye involvement due to presenile cataract.

Socio-demographic profile indicator	Category	Eye involvement with presenile cataract		Total	Statistical value (p value)
		Unilateral	Bilateral		
Age (in years)	18–21	0	3	3	7.401 (0.099)@
	22–31	7	2	9	
	32–41	37	12	49	
	42–51	49	22	71	
	52–55	11	7	18	
Gender	Female	32	21	53	3.092 (0.059)#
	Male	72	25	97	
Occupation	Student	4	6	10	7.653 (0.098)@
	Self-employed	47	13	60	
	Employed / Job	27	17	44	
	Homemaker	19	8	27	
	Unemployed	7	2	9	
Residence	Urban	47	32	79	7.600 (0.005)#
	Rural	57	14	71	
Socio-economic classification	Class II (Upper Middle)	16	14	30	4.620 (0.209)#
	Class III (Middle)	36	12	48	
	Class IV (Lower Middle)	39	15	54	
	Class V (Lower)	13	5	18	

@ Fisher's exact # Pearson Chi-square.

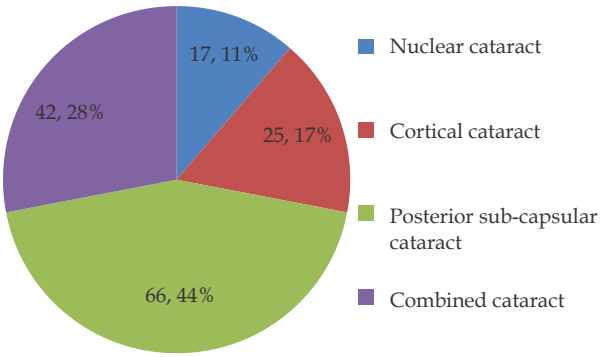

Fig. 1: Type of presenile cataract amongst study participants (n-150).

Other ophthalmological examination revealed, visual acuity of less than 6/60 was present in 133 (88.7%) participants, normal cornea was present in 126 (84.0%) participants, A/C was normal in 144 (96.0%) participants and ocular pressure was normal in 146 (97.3%) participants. Squint was present in 9 (6.0%) participants and amongst them divergent variety of squint was most commonly seen in 6 (66.7%) participants. Fundus examination revealed normal fundus in 139 (92.7%) participants.

No specific cause (idiopathic) for presenile cataract was identified in 29 (19.3%) participants while 121 (80.7%) had atleast one possible risk factor present. Statistical associations between socio-demographic indicators and type of presenile cataract have been given in Table 3. No statistical association was obtained between presence of co-morbidity and type of pre-senile cataract (Contingency coefficient value–0.116; p value–0.57). Similarly no statistical association was obtained between addiction and type of pre-senile cataract (Contingency coefficient value–0.054; p value–0.949).

Statistical associations between socio-demographic indicators and eye involvement due to presenile cataract have been given in Table 4. No statistical association was obtained between presence of co-morbidity and eye involvement due to pre-senile cataract (Pearson Chi-square value–0.158; p value–0.419). Similarly no statistical association was obtained between addiction and eye involvement due to pre-senile cataract (Pearson Chi–square value–0.059; p value–0.482).

Discussion

The greater the exposure to risk factors, higher the chance of development of cataract at young age.[12] A total of 150 participants meeting the inclusion criteria and giving consent for participation in the study were included. Almost four out of five participants had atleast one possible risk factor present. In the present study in terms of socio-demographic profile, 42–51 age group (71; 47.3%), males (97; 64.6%), self employed including labourers (60; 40.0%), urban residing population

(79; 52.7%) and lower middle class (54; 36.0%) were most commonly affected.

Top 5 most common risk factors present amongst participants in the present study were tobacco consumption 34 (22.7%), followed by obesity 14 (9.3%), diabetes 13 (8.7%), auto-immune disorder 10 (6.7%) and thyroid disorder 7 (4.7%). Due to absence of risk factors, no specific cause for presenile cataract was identified in 29 (19.3%) participants. They were classified as idiopathic presenile cataract. Most participants had unilateral cataract (104; 69.3%) and posterior sub-capsular cataract (66; 44.0%) was most common variety of cataract followed by combined cataract type (42; 28%) found amongst the participants.

Occupation of participant was statistically associated with type of presenile cataract. Those self employed and unemployed participants had more commonly posterior capsular type of presenile cataract while homemaker and employed including labourer had combined form of presenile cataract more commonly. Similarly residence of participants had statistical association with number of eye involvement due to presenile cataract. In rural unilateral involvement was more common while in urban, unilateral and bilateral eye involvement with presenile cataract were almost nearly equal. These may be due to less pollution in rural areas.

Studies done at Madhya Pradesh and Kerala found female preponderance for presenile cataract.[4,13] However in present study, male preponderance was found for presenile cataract.

In the study done at Madhya Pradesh it was found that 65.9% participants had idiopathic cause for presenile cataract.[4] Similarly 38.0% participants were classified as idiopathic in Kerala based study.[6] However in present study, idiopathic cause was classified amongst only 19.3% participants which is quite less compared to other two studies. These may have been due to exploring more number of possible risk factors leading to presenile cataract.

In the study done at Madhya Pradesh it was found that tobacco consumption was highest risk factor present followed by diabetes.[4] In present study also same result was obtained. While in Kerala based study, diabetes was found to be most common risk factor.[6]

In Kerala based study, posterior subcapsular cataract was most common.[6] Similar results were also seen in study done in western India and southern India.[12,14] In present study also posterior subcapsular cataract was the most common form of presenile cataract amongst participants. Possible explanation as also given in other article 6 is that in Posterior subcapsular cataract patient may develop early visual impairment and hence early reporting of cataract may occur.

Conclusion

Risk factor presence among participant with presenile cataract was more common. Co-morbidities like obesity, diabetes, auto-immune disorder were commonly seen amongst presenile cataract participants. Unilateral eye involvement with presenile cataract was more common amongst study participants. Posterior subcapsular type of presenile cataract was most commonly seen amongst study participants.

Recommendation: Large scale longitudinal study can be carried out to further identify risk factors of pre-senile cataract and they should be addressed so that incidence of presenile cataract can be reduced.

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External versus Endoscopic Endonasal Dacryocystorhinostomy: Our Experience

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Abstract

Aims and Objectives: The present study was conducted to compare the success rate of external and endonasal endoscopic dacryocxystorhinostomy (DCR) for acquired nasolacrimal duct (NLD) obstruction.

Material and Methods: It was a prospective study performed in the department of Ophthalmology and department of otorhinoloaryngology at Ananta Institute of Medical Sciences, Rajsamand, Rajasthan during the period of 4 years from February 2016 to February 2020. A total of 120 patients with the clinical diagnosis of chronic dacryocystitis and nasolocrimal duct obstruction were included in the study. 40 patients underwent external DCR and 80 patients underwent endonasal DCR.

Results: Total 120 patients were included in the study out of which 104 (86.66%) were female and 16 (13.33%) were male. The age of the patients ranges from 20 years to 70 years with the mean age of 52.5 years. Postoperative anatomical patency of NLD was achieved in 95% in external DCR group and 93.75% in Endonasal DCR group. Long term anatomical patency of NLD and symptom relief (assessed 6 months after surgery) was achieved in 87.5% patients in external DCR group and 86.25% patients in endonasal DCR group. The total incidence of complications in external and endonasal DCR group was 12.5% and 10% respectively.

Conclusion: Dacryocystorhinostomy (DCR) is the treatment of choice for nasolacrimal duct obstruction and can be done by external or endonasal endoscopic approach. Both the procedures have similar results with minimal complications.

Keywords: chronic dacryocystitis; Nasolacrimal duct; Endonasal, Lacrimal sac; Dacryocystorhinostomy.

Introduction

Dacryocystorhinostomy (DCR) is the most accepted procedure for nasolacrimal duct obstruction. It can be done with external (Ex) or endonasal (En) access. The basic indication is same in all cases and either route can be used.

External DCR was first described by Toti in 1904.[1] It is performed through a cutaneous incision to access the lacrimal sac. The procedure was later modified by suturing of mucosal flaps and thus creating an epithelial lined fistula.[2] The procedure gained popularity among ophthalmologists due to its efficacy and relatively low complication rates.

Endonasal approach for DCR was first introduced by Caldwell in 1893 and was modified later by West in 1910 and Halle in 1914.[3,4,5] The endonasal approach gained momentum only after advancement of new endoscopy system and techniques.[6] It has advantage of direct visualization under endoscopic guidance. This approach avoids an external scar and neurovascular disruption along the tract exposing the lacrimal sac.

The success rate of both the procedures is ranges from 63% to 97%.[7,8] The wide range of success is likely due to surgical variability, patient demographics, and lack of standardized outcome measures in the medical literature. The present study aimed to compare success rates of DCR surgery performed by external versus endoscopic routes and to appraise the results for anatomical as well as functional patency.

Materials and Method

The present study was a prospective study performed in the department of Ophthalmology and department of otorhinoloaryngology at Ananta Institute of Medical Sciences, Rajsamand, Rajasthan during the period of 4 years from February 2016 to February 2020. A total of 120 patients with the clinical diagnosis of chronic dacryocystitis and nasolocrimal duct obstruction and undergoing either external or endoscopic DCR surgery were included in the study.

Pre operative syringing was performed in all the study participants to check the patency of nasolacrimal drainage system along with complete nasal and ophthalmic examination.

Well informed written consent was taken from all the study participants. Both the types of procedures were explained to the patients in details with their advantages and disadvantages.

Inclusion criteria

All the patients attended Eye or ENT OPD with the clinical diagnosis of chronic dacryocystitis with nasolacrimal duct blockage.

Exclusion criteria

1. Patients having history of similar procedure done in the past.
2. Patients who refused to give consent.

Out of 120 patients, 40 patients underwent external DCR and 80 patients underwent endonasal DCR.

Surgical Procedure

A. *External DCR:* All the external DCR surgeries were performed under local anesthesia with sedation, in some cases. After making a curvilinear incision over anterior lacrimal crest, medial palpebral ligament was identified and orbicularis oculi was separated. Periosteum was separated from bone using Freer's elevator and then reflected and lacrimal sac was dissected carefully to expose lacrimal fossa. Bony ostium of sufficient size was then created using Kerrison bone punch. Bowman's probe was passed through lower punctum to tent the sac and then using the probe as guide, an H-shaped incision was made right across the sac from fundus to the nasolacrimal duct to make anterior and posterior flaps. Posterior flap was then cut. Nasal mucosa was cut to make anterior and posterior flaps. Subsequently anterior to anterior and posterior to posterior flaps were sutured with 2 to 3 interrupted sutures by 6–0 vicryl.

B. *Endonasal DCR:* Endonasal DCR surgery was performed either under general or local anesthesia. Nasal cavity was packed with gauge soaked in 4% xylocaine with 1:200,000 adrenaline, 15 minutes before the procedure. Both 0^{o} and 30^{o} nasal endoscopes were used. The nasal mucosa anterior to uncinate process was infiltrated with 2% xylocaine with 1:200,000 adrenaline. Using the sickle knife a rectangular cuff of mucosa of 10mm x 5mm just anterior to superior half of the uncinate process was incised. The mucoperichondrium flap then elevated using freer's elevator. Ascending process of maxilla and adjacent lacrimal bone was then exposed. Bony process overlying sac and NLD which are usually ascending process of maxilla, lacrimal bone and agar nasii were then removed using 2–3 mm kerrison. The bone removal was then continued nasally to expose the lacrimal sac. Lacrimal probing was done to tent the medial wall of sac. The sac was then slit open with an angled knife. The medial wall of sac was then removed with a tissue punch. Syringing was done with saline to confirm the free flow and patency. All the patients were taught and advised to perform alkaline nasal douching for at least 10 days after surgery. Also regular massaging over sac area was advised postoperatively for 10 days.

Assessment

Assessment was done by comparing the success

of both the procedures in terms of long term anatomical patency of NLD and symptom relief. Secondary assessment was done by comparing the incidence of complications in both the procedures.

Ethical clearance

Ethical clearance was obtained from institutional ethical committee.

Statistical analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS) software, version 19.0. Data of both the groups were compared and analyzed by Chi-square test or Student's t-test.

Results

120 patients chronic dacryocystitis were included in the study out of which 104 (86.66%) were female and 16 (13.33%) were male. The age of the patients ranges from 20 years to 70 years with the mean age of 52.5 years. Demographics between the two study groups were similar.

The surgical success was defined as objective success based on demonstration of patent NLD through syringing and subjective success based on the improvement in patient's symptoms.

Anatomical patency of NLD was achieved in 38 (95%) of 40 patients of external DCR group and 75 (93.75%) of 80 patients in Endonasal DCR group. The difference was not statistically significant.

Long term anatomical patency of NLD and symptom relief (assessed 6 months after surgery) was achieved in 35 (87.5%) patients in external DCR group and 69 (86.25%) patients in endonasal DCR group. This difference was also not significant. (Table 1).

Table 1: Assessment of success of procedure.

Assessment	External DCR	Endonasal DCR	P-value
Anatomical Patency	38/40 (95%)	75/80 (93.75%)	0.7161
Long term anatomical patency and symptom relief	35/40 (87.5%)	69/80 (86.25%)	0.5904

The complications were minor and incidence was low in both types of procedures. (Table 2) Among the external DCR participants, 1 patient had wound hemorrhage, 2 patients had infraorbital ecchymosis, 1 had external hypertrophied scar and 1 patient had wound dehiscence. Thus total incidence of complications in external DCR group was 12.5%.

Table 2: Incidence of complications among participants.

Complications	External DCR	Endonasal DCR
Hemorrhage	1	1
Nasal Synechiae formation	–	3
Infraorbital ecchymosis	2	3
External hypertrophied scar	1	–
Granulation at ostium	–	1
Wound dehiscence	1	–
Total	5 (12.5%)	8 (10%)

In the endonasal group, the incidence of complication was 10% in which 1 patient had epistaxis, 3 patients had synechiaes formation which were excised on follow up as outdoor procedure, 3 patients had postoperative infraorbital ecchymosis which was self-relieved in few days and 1 patient had developed granulation at site of ostium which was also healed without any intervention.

Discussion

External DCR was considered as treatment of choice for nasolacrimal duct obstruction for long time. This procedure has advantages of direct visualization of anatomy while performing surgery and a good success rate. However, the procedure also has the disadvantages of external visible scar and potential of injury to medial canthal structures.

Over the last few decades, endonasal endoscopic DCR has replaced external DCR as treatment of choice for NLD blockage because of its comparable long term success rate and advantage of minimally invasive approach with no external scar. However, this procedure requires costly sophisticated endoscopic instruments with expertise in the field.

In present study, 120 patients of NLD blockage were included out of which 104 (86.66%) were female and 16 (13.33%) were male. The age of the patients ranges from 20 years to 70 years with the mean age of 52.5 years.

Guy J Ben Simon et al performed a similar study in 2005 and included 143 patients in the study with 48 male (33.56%) and 95 female (66.43%) with the mean age of 63 years.[9] Similar study by R Karim et al in 2011 included 202 patients with 62.4% female patients and mean age of 69 years.[10]

In present study, anatomical patency of NLD was achieved in 38 (95%) of 40 patients of external DCR group and 75 (93.75%) of 80 patients in Endonasal DCR group. Long term anatomical patency of NLD and symptom relief (assessed 6 months after surgery) was achieved in 35 (87.5%) patients in external DCR group and 69 (86.25%) patients in endonasal DCR group. Both the differences were not statistical significant.

Similar results were obtained in the studies performed in the past. Karim R et al performed the similar study and found long term success rate of 81.6% in external DCR group and 82.3% in endonasal group.[10] Similar results were obtained in the studies done by Saroj Gupta et al in 2007 and Khan MKH et al in 2016.[11,12] Guy J Ben Simon found the relatively higher success rate in endonasal DCR group (83.7%) than external DCR group (70%).[9]

In present study, the complications were less and minor in both the groups. The incidence rate of complications was 12.5% and 10% in external and endonasal DCR group respectively. Common complications include hemorrhage, nasal synechiae formation, external scar, wound dehiscence, infraorbital ecchymosis and granulation at ostium. All the complications were easily handled in the outdoor. Similar complications with comparable incidence rate were found in studies performed in the past.[9,10,13,14]

Conclusion

Dacryocystohinostomy (DCR) is the treatment of choice for acquired nasolacrimal duct obstruction. DCR can be performed by external or endonasal route. Both the routes has similar success rate as well as low complication rates. Endonasal procedure offers distinct advantages over external procedure that it leaves no external scar and preserves lacrimal pump system with minimal intraoperative bleeding. However, endoscopic DCR is an expensive procedure as it requires costly endoscopic instruments and also requires proper training to expertise the procedure. While offering the treatment options, the patient must also be thoroughly explained about both the procedures with possible advantages and disadvantages of both the procedures.

Conflict of interest: No conflicts of interest exist for these authors. No relevant financial relationship exists between the authors and procedures or products used in this manuscript.

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Prevalence and Severity of Dry Eye in Type 2 Diabetes Mellitus Patients

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Abstract

Purpose: This current study was done to find out the prevalence and severity of dry eyes in patients of type 2 diabetes and also to study the association of dry eyes with the stages of diabetic retinopathy.

Methods: This is a hospital based prospective cross sectional observational study involving 382 patients attending the ophthalmology OPD and in-patient department at R L Jalappa Hospital attached to Sri Devaraj Urs Medical college, Tamaka, Kolar from December 2017 to May 2019.

Results: In the present study majority of the patients (58.6%) were males. Most of the patients (30.8%) were aged more than 66 years with 46% of patients had duration of diabetes for more than five years The results of the present study showed 35.3% prevalence of dry eye syndrome among patients with type 2 diabetes mellitus. Among 135 patients with dry eye 79.2% had dry eye severity of grade 1 or 2 who were classified according to DEWS I criteria.

Conclusion: Dry eye syndrome in patient with type 2 diabetes mellitus was significantly associated with increasing age and longer duration. Also there was significant association of diabetic retinopathy noted with dry eye disease severity.

Keywords: Diabetes mellitus; Dry eye disease; Diabetic retinopathy; Schirmer's test; Tear film break up time; Dry Eye Workshop 1(DEWS 1).

Introduction

Diabetes mellitus (DM) is the most common metabolic disease worldwide and its hallmark is hyperglycaemia. According to estimates of the World Health Organization, the number of people worldwide living with DM is estimated to be 422 million by the year 2014. Changes in dietary habits, obesity and physical inactivity are responsible for spreading this epidemic into the developing countries.

Diabetes is often associated with several significant ocular conditions, such as diabetic retinopathy (DR), refractive changes, cataracts, nerve palsies, glaucoma and macular edema. However, one of the most common ocular complications associated with diabetes is dry eye. With the rising incidence of diabetes mellitus, these ocular diseases will be an ever greater worldwide health issue in the near future than it is already today.

DM has been identified as one of the leading systemic risk factors for dry eye syndrome (DES). DES causes discomforts like burning, foreign body sensation, visual disturbance due to tear film instability and corneal scaring with potential damage to the ocular surface like corneal and conjunctival epithelial alterations, persistent epithelial defects, accompanied by increased osmolality of tear film and inflammation of the ocular surface.[1]

It had been suggested that one or more of the following initial events may lead to the alterations in the tear film and ocular surface of diabetic patients: a) chronic hyperglycemia, b) corneal nerve damage and c) impairment of insulin action.

Ocular surface examination is often ignored and much importance is given to retinopathy. There have also been discrepancies in the prevalence reported in the literature, due to a lack of consensus about appropriate diagnostic criteria and differences in the parameters and research methodology applied.[2]

Hence the present study will aim to evaluate the clinical aspects of dry eye syndrome in type 2 diabetes mellitus and also the relationship with possible associated risk factors.

Objectives

1. To determine the prevalence of dry eye syndrome in type 2 diabetes mellitus patients.
2. To document the severity of Dry eye among type 2 diabetes mellitus patients.
3. To compare dry eye characteristics with diabetic retinopathy stages.

Methods

This is a cross sectional observational study conducted in the department of ophthalmology, R L Jalappa hospital and research center attached to Sri Devraj Urs medical college, Kolar, from December 2017 to May 2019 After obtaining clearance from Institutional Ethics Committee.

A total of 382 patients diagnosed with type 2 diabetes mellitus were included in this study.

Study Design: Cross sectional observational study.

Inclusion Critera

Type 2 diabetic mellitus patients.

Exclusion Criteria

Patients

1. Who has undergone ocular surgery in the past.
2. Who wear contact lens.
3. On any drugs known to produce dry eye, Topical (Betaxolol, Olapatidine, Naphazoline, Miotics or Mydriatics , Ketorolac) or Systemic (Beta blockers, anti-histaminics, Anti-psychotics).
4. With any other ocular disorder known to produce dry eye (Lid abnormalities, Vitamin A deficiency, Post Steven Johnsons, Vernal keratoconjuctivitis, Post ocular chemical burns).
5. With associated systemic diseases associated other than diabetes mellitus (RA, SLE, Thyroid disorders).

Method of Collection of Data

A. Demographic details, duration of diabetes and visual acuity by Snellen's chart will be recorded, followed by assessment of diabetic status by fasting blood sugar (FBS), post prandial blood sugar (PPBS), glycated hemoglobin (Hb1Ac).

B. The presenting symptoms of dry eyes was obtained through a five item dry eye questionnaire (DEQ 5) of ocular symptoms relating to dry eye.[4]

C. Tear film assessment will be done and classified according to Dry Eye Workshop (DEWS) severity grading scheme. Conjunctival and corneal staining is done by flourescein stain and Shirmer's test is done using Whatman filter paper strip.

D. Diabetic retinopathy was determined through fundus examination and graded clinically using the "Early Treatment of Diabetic Retinopathy Study"(ETDRS) classification for diabetic retinopathy. (Table 1)

- Grade 0: No apparent retinopathy.
- Grade 1: Mild non-proliferative retinopathy (NPDR) –few micro aneurysms.
- Grade 2: Moderate NPDR –micro aneurysms, intra-retinal hemorrhages or venous beading.
- Grade 3: Severe NPDR – based on the 4:2:1 rule of the ETDRS, hemorrhages in all 4 quadrants, venous beading in two quadrants or intraretinal microvascular abnormalities (IRMA) in one quadrant.
- Grade 4: Proliferative diabetic retinopathy (PDR) – characterized by neovascularization of the disc or elsewhere.
- Grade 5 : Advanced diabetic eye disease-characterized by proliferative changes with dense haemorrhage, tractional retinal detachment or rubeosis iridis.

Following this, diagnostic tests namely, Meibomian gland dysfuntion grading, Schirmer's test, tear film break up time, rose Bengal test and Flouresein staining were done to rule out the diagnosis of dryeye.

Results

In our study 22 number of patients were aged between 35–45, 79 patients were between 46 to 55 years, 163 patients were between 56 to 65, 94 patients were between 66 to 75, 21 patients were between 76 to 85 and 3 patients were aged more than 86 years. In our study 58% that is 224 number patients were males and the rest 158 number of patients were females.

In our study group maximum of patients 214 were having diabetes less than 5 years, 101 patients were having diabetes since 6–10 years, 46 patients were having diabetes since 11–15 years, 13 patients were having diabetes since 16–20 years, 3 patients were having diabetes since 21 to 25 years and the rest 5 patients were having since more than 26 years.

Dry eye symptoms were assessed using the dry eye questionnaire 5. According to which patients score of 6 or more were considered as having dry eye disease. In our study of 382 patients 128 patients scored 6 or more and these patients were considered as having dry eye disease according to DEQ-5.

In our study most of the patients had visual acquity of 6/6 (69% in right eye and 69.1% in left eye) that is 0.0 according to logMAR charting of vision, 87 and 83 patients had vision 0.1 to 0.4, 17 and 23 had 0.5 to 0.8, 12 and 12 had 0.9 or above vision in right eye and left eye respectively according log MAR visual acuity charting.

In our study population 40.3% of patients had diabetic retinopathy changes in one or both the eyes. Among these 69 had mild NPDR, 47 had moderate NPDR, 21 had severe NPDR, 15 had PDR and 3 had advanced diabetic changes in right eye. Similarly in the left eye these 71 had mild NPDR , 44 had moderate NPDR, 19 had severe NPDR, 15 had PDR and 5 had advanced diabetic changes.(Table 2)

According to NEI guidlance of a score of 3 or more for corneal staining with Fluorescein stain was taken as positive for dry eye. In this study of 382 patients 104 had significant staining patterns with Fluorescein stain. In this study of 382 patients 91 had significant staining patterns with Rose Bengal stain. In our study population 32.7% that is 125 patients had meibomium gland dysfunction In our study population out of 382 patients with type 2 diabetes mellitus 135 patients had dry eye disease having a prevalence of 35.3%. (Table 3)

Out of these 135 patients with dry eye 45(33.%) patients had grade 1 dry eye disease, 62(45.8%) had grade 2 dry eye disease, 25(18.5%) had grade 3 disease and 3(2.2%) had grade 4 disease who were classified according Dry Eye Workshop 1(DEWS I) staging system. Of the 135 patients diagnosed with dry eye 41.4% were females and 58.6% were males. 135 patients diagnosed with dry eye 36 patients were having grade 2 dry in age group of 56–65. Also severe forms of dry was seen in patients aged more than 66 years of age. So there was significant association of age with severity of dye eye was noted.

Of the 135 patients diagnosed with dry eye there was linear relationship noted between duration of the disease and the severity of dry eye. 11 and 3 patients having diabetes for more than 15 years were having grade 3 and 4 dry eye respectively. There was significant association of dry eye severity with the duration of diabetes. (Table 7)

In this study out of the 45 patients with grade 1 dry eye 27 had no diabetic retinopathy changes and rest 18 had mild to moderate NPDR changes in their left eye. In 62 patients with grade 2 dry eye 6 had no changes, 50 had NPDR changes, 5 had PDR changes and 1 patient had advanced diabetic changes in left eye. Out of 16 patients with grade 3 dry eye 14 had NPDR changes, 9 had PDR changes and 2 had advanced diabetic changes in left eye. The rest 3 patients who had grade 4 dry eye had PDR changes in 1 patient and advanced diabetic changes in 2 patients. The diabetic retinopathy stage and dry eye severity in left eye showed statistical significance with chi square value of 366.8 and P value less than 0.001.(Table 4,6)

In this study out of the 45 patients with grade 1 dry eye 26 had no diabetic retinopathy changes and rest 19 had mild to moderate NPDR changes in their right eye. In 62 patients with grade 2 dry eye 7 had no changes, 48 had NPDR changes, 6 had PDR changes and 1 patient had advanced diabetic changes in right eye. Out of 16 patients with grade 3 dry eye 17 had NPDR changes and 8 had PDR changes in right eye.(Table 5) The rest 3 patients who had grade 4 dry eye had PDR changes in 1 patient and advanced diabetic changes in 2 patients. The diabetic retinopathy stage and dry eye severity in right eye showed statistical significance with chi square value of 346.3 and P value less than 0.001.

Table 1: Dry Eye Severity Grading Scheme.

Dry eye severity level	1	2	3	4
Discomfort, severity and frequency	Mild and/or episodic occurs under environment stress	Moderate episodic or chronic, stress or no stress	Severe frequent or constant without stress	Severe and/or disabling and constant
Visual symptoms	None or episodic mild fatigue	Annoying and/ or activity limiting episodic	Annoying, chronic and/ or limiting activity	Constant and/or possibly disabling
Conjunctival injection	None to mild	None to mild	+/-	+/++
Conjunctival staining	None to mild	Variable	Moderate to marked	Marked
Corneal staining	None to mild	Variable	Marked/central	Severe punctuate erosions
Corneal /tear signs	None to mild	Mild debris	Filamentary keratitis, mucus clumping	Filamentary keratitis, mucus clumping, ulcerations
Lid/meibomian gland	MGD variably present	MGD variably present	Frequent	Trichiasis, kertinization, symblepharon.
Tear break-up time (TBUT)	Variable	<10 seconds	<5 seconds	Immediate
Schimmer score	Variable	<10mm/5min	<5mm/5min	<2mm/5min

Table 2: Diabetic Retinopathy grading.

Diabetic Retinopathy grading	Right		Left	
	Frequency	Percent	Frequency	Percent
No Diabetic retinopathy	227	59.4	228	59.7
Mild NPDR	69	18.1	71	18.6
Moderate NPDR	47	12.3	44	11.5
Severe NPDR	21	5.5	19	5.0
PDR	15	3.9	15	3.9
Advanced diabetic eye	3	.8	5	1.3
Total	382	100.0	382	100.0

Table 3: Schirmers test.

Schirmers test in seconds	Frequency	Percent
0–5	25	6.5
6–10	57	14.9
11–15	27	7.1
16 and above	273	71.5
Total	382	100.0

Table 4: TBUT test.

TBUT test in seconds	Frequency	Percent
0–5	26	6.8
6–10	59	15.4
11–15	16	4.2
16–20	75	19.6
20 and above	206	53.9
Total	382	100.0

Table 5: Dry eye grading.

Dry eye grading	Frequency	Percent
Grade 0	247	64.7
Grade 1	45	11.8
Grade 2	62	16.2
Grade 3	25	6.5
Grade 4	3	0.8
Total	382	100.0

Table 6: Dry eye severity association with retinopathy in the left eye.

Dry eye severity		DR in left eye					
		0	1	2	3	4	5
DED	Grade 0	195	40	11	1	0	0
	Grade 1	27	12	6	0	0	0
	Grade 2	6	19	20	11	5	1
	Grade 3	0	0	7	7	9	2
	Grade 4	0	0	0	0	1	2
Total		228	71	44	19	15	5

Table 7: Dry eye severity association with retinopathy in right eye.

Dry eye severity		DR in right eye					
		0	1	2	3	4	5
DED	Grade 0	194	38	14	1	0	0
	Grade 1	26	13	6	0	0	0
	Grade 2	7	18	19	11	6	1
	Grade 3	0	0	8	9	8	0
	Grade 4	0	0	0	0	1	2
Total		227	69	47	21	15	3

Discussion

In this study majority were males 58%, the youngest patient being 38 years and oldest is 90 with most of them 42.7% aged more than 56 to 65 years and about 29% were aged more than 66 years. The duration of diabetes was mostly less than 5 years in 56% of patients, with 26% patients having 6–10 years and 4% had diabetes for more 16 years. Of these patients 40.3% had diabetic retinopathy which was classified according to ETDRS classification. Majority of the patients had mild to moderate non proliferative diabetic retinopathy changes while 5 patients had advanced diabetic retinopathy in one or both eyes who were having diabetes for more than 10 years.

In the present study dry eye was diagnosed based on validated DEQ-5 questionnaire, schirmers test, tear beakup time , meibomium gland disease , corneal and conjunctival staining by fluorescein and Rose Bengal respectively. In our study population dry eye prevalence was 35.3%, 135 patients had some grade of dry eye which was according to prevalence reported in other studies on diabetic patients.

Seifart et al[5] reported a prevalence of 57% in type 1 diabetics and 70% in type 2 diabetics, Study by Manviet et al[7] reported prevalence of 54.3%, Nepp et al[6] reported prevalence of 43%, Maruthi et al of 35%. So it can be noted that the dry eye prevalence varies from 14% to 70% in different studies though these were higher numbers when compared to dry eye prevalence in general population. This disparity may due variation in study group selected or questionnaires used for symptoms assessment which are not universal. Further there is deficiency of proper guidlance of different dry eye diagnostic criteria employed and different cut-off values for the objective dry eye tests .Various age related changes in lacrimal system occur, including tear chemistry of the tear film. Certain aspects of tear physiology change with age, such as reflex secretion by the lacrimal gland, tear volume, and tear film stability, whereas others remain more or less unchanged, such as basal tear production. The reflex secretion of tears, as measured by Schirmer's I method (without anaesthesia), decreases significantly with increasing age as already was observed by Schirmer in 1903 and by many others thereafter. The tear evaporation rate has not been found to be correlated with age. The evaporation is primarily controlled by the lipid layer of the tear film and lipid layer thickness appears to be constant for different age groups.[8] In this study 46.66% patients with dry eye syndrome had age between 56 to 65 years and 33.33% were aged more than 66 years suggesting statistically significant association of increased age as a risk factor for dry eye syndrome. In a cohort study on 3722 subjects were aged 48 to 91 years (65 ± 10 years) and 43% male. The overall prevalence of dry eye was 14.4%. Prevalence varied from 8.4% in subjects younger than 60 years to 19.0% in those older than 80 years.[9] The higher incidence of dry eyes in this age group could be partly attributed to ageing. In the present study population 90% of the patients with duration of diabetes for more than 15 years, 73.9% of patients of duration 11 to 15 years, 55.4% of duration 6 to 10 years and 12.1% of duration less than 5 year had dry eye syndrome. As the duration of the diabetes increased prevalence of dry eye increased and was found to be statistically significant. In a study[7] from Iran prevalence of dry eye syndrome was significantly higher in patients with longer duration of diabetes. In type II diabetic patients, most of the long term complications of diabetes are well known to correlate with duration, dry eyes could also be a part of this. The reason for this being the slow microangiopathy and neuropathy of the diabetic disease process causing lacrimal gland dysfunction and reduced corneal sensitivity. In this study the diabetic retinopathy stage and dry eye severity showed statistical significance with chi square value of 366.8 and P value less than 0.001. Of the 3 cases of advanced diabetic eye one had grade 2 and two had grade 4 dry eye. Earlier study by Saito et al,[10] reported decrease in corneal sensation, but not that in tear secretion, was correlated with the stage of diabetic retinopathy. However, study by Nepp and associates[6] showed correlation between the severity of retinopathy with the severity of dry eyes. Further studies needs to be done to clarify association between these two. In a study[7] from Iran there was significant association between sex and grades of DR. Lower grades of DR was more common in women and higher grades of DR was more common in men, such a relation was found in another study by Rema et al.

Conclusion

In our study the prevalence of dye eye disease among type 2 diabetes mellitus patients was 35.3%. Among these patients with dry eye 79.2% had dry eye severity of grade 1 or 2 according to DEWS I criteria classification.

Dry eye disease in type 2 diabetes mellitus patients

was significantly associated with the diabetic retinopathy changes in our study population with severe forms of dry eye being present in patients having proliferative retinopathy and advanced diabetic eye disease.

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Original Article

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Exploring The Prognostic Value of Conventional Macular Function Tests in Comparison to B Scan Ultrasonography in Mature Cataract in Government Set Up

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Abstract

Aims: To assess the prognosis in eyes having Mature cataract by Conventional Macular Function tests and B- Scan Ultrasonography, to analyses the utility of both in Mature cataract and to compare the post-operative status in relation to results of both.

Design, Methods and Material: A hospital-based Cross-sectional study was conducted on 177 patients with mature cataract from July 2018 to August 2019 in a Tertiary care hospital in South Gujarat. The Conventional macular function tests likePupillary light reaction, Projection of light and Perception of rays, Color vision test, Maddox rod tests, Two-point discrimination test and B Scan were performed.

Statistical analysis used: Data collected and put in excel sheet and were analyzed using Statistical Package for the Social Sciences (SPSS) 16.0 software. For the descriptive analysis, the mean, standard deviation, and percentage were used. The chi-square test applied for the comparative analysis. A p value < 0.05 was considered be statistically significant.

Results: Age range was 25 to 90 years with mean age of 58 years. 75 patients were male and 102 females. Pupillary light response was normal in majority of cases. Color vision was normal in all the patients. Binocular Maddox rod test revealed red spot in 63.3%, polyopia in 28.2%, and white spot in 8.5% patients. Majority of the patients with abnormal B Scan had white spot response on Maddox rod test. In hyper mature cataract, majority of the patients were not able to discriminate or had short discrimination distance.Most of the patients with abnormal B scan findings were not able to discriminate. B Scan ultrasonography was normal in 61.2% patients. 34.4% patients had Vitreous detachment,vitreous haemorrhage seen in 1.7%, posterior staphyloma in 1.7%, 0.50% had retinal detachment and 0.50% had vitreous haemorrhage with Retinal detachment.

Conclusion: Conventional macular function tests were altered when there was an evident posterior segment abnormality seen on B Scan. So, in setup where B Scan Ultrasonography is not available, the conventional macular function tests do help in cases of mature cataract.

Keywords: Mature cataract; Conventional macular function tests; B-Scan Ultrasonography.

Introduction

Cataract has been documented to be the most significant cause of blindness in India. The most recent estimates from WHO reveal that 47.8% of global blindness is due to cataract and in South Asia region which includes India, 51% of blindness is due to cataract.[1]

Cataract is the commonest surgery performed worldwide. In India, being the developing country, patients having mature cataract are much more. It is very important to give prognosis of visual function which will be obtained following the extraction of a mature cataract. In case of immature cataract, the ophthalmoscopic examination of the fundus provides a source of considerable information concerning the function of the retina. In presence of mature cataract however, fundoscopic examination becomes impossible due to the obstruction of the light pathway by the opacity of the media.

Macular function tests available for opaque media are Maddox rod, Two-point discrimination test, Entoptic phenomena, Laser interferometry, Potential visual acuity meter test, Focal Electroretinography, visually evoked potential.[2] Minimum facilities available in government set up. So, options remain with us are pupillary reaction, projection of light and perception of rays, color vision test using red and green torch light, Maddox rod test and Two-point discrimination test.

Ultrasound was first used in ophthalmology in 1956 by American ophthalmologists MUNDT and HUGHES.[3] They used A scan mode to evaluate an intraocular tumor. B-scan was introduced in ophthalmic practice by BAUM and GREENWOOD in 1958.[3] However, it was not until 1972, when Bronson and Turner produced the first contact B scan method, that ultrasonography became a more practical investigation B scan mode is more useful than A scan for a better demonstration of the shape and topographic relationship of lesions in the posterior segment.

The Government hospitals receives huge pool of cataract patients. Routine evaluation of all patients with advanced cataract by ultrasonography is time consuming and of questionable cost-effectiveness. B-scan can provide information regarding the posterior segment pathologies like vitreous hemorrhage, vitreous detachment, retinal detachment, chorioretinal thickening, posterior staphyloma which helps in explaining accurate prognosis post-operatively. Though some disorders such as branch and central retinal vein occlusion, macular hole, diabetic maculopathy, optic nerve affections cannot be identified by B-scan.[4] So the conventional macular function tests performed and compared with B-Scan ultrasonography will give good idea of its utility in comparison to B-scan.

Methods

A hospital-based Cross-sectional study (Descriptive) was conducted on 177 patients with Mature cataract attending the outdoor patient department in The Government Medical college, Surat, Gujarat, India. Informed consent was taken from the patients participating in the study. All the patients enrolled in the study were evaluated during a period from July 2018-August 2019. The patients were examined and investigated thoroughly as per the protocol.

The inclusion criteria were: All adult patients with mature cataract who gave consent for the study and either sex.

The exclusion criteria were patients with: immature cataract, mature cataract having recorded posterior segment abnormalities and traumatic mature cataract.

A detailed history of patients was taken. Diagnosis of mature cataract put if the patient had no glow observed on direct ophthalmoscopy and slit lamp examination.

Ophthalmic examination

Following Conventional macular tests were performed in Dark room:

Pupillary light reaction: Pupillary evaluation was carried out with low background illumination using a bright focused torch light with the patient looking into the distance.

Projection of light and Perception of rays: The perception of light was assessed by throwing light on to the eye to be examined occluding the other eye in the dark room. The patients were asked to identify the direction from which the light was coming by projecting light from various directions (superior, inferior, nasal and temporal). They were classified as PL+ PR+4 when patients correctly identify all 4 directions, and put as? PR when patients' answers were different at different time.

Colour vision test: In case of mature cataract, assessment of color vision cannot be done by using Ishihara and other tests which are used in clear media. So, we have checked color vision by using red and green filters to check the primary colors.

Maddox rod tests: Maddox rod test 1: Patients were made to sit 1 meter away from a bright electric bulb and Maddox rod was placed in front of the eye to be examined, other eye being open, and patients were asked about what they see. Answers were recorded in their language as polyopia when patient saw multiple red line and multiple red spots, red spot

when they saw only one red spot and negative Maddox rod when they saw white spots.

Maddox rod test 2: Patients were made to sit 1 meter away from a bright electric bulb and Maddox rod was placed Infront of the eye to be examined, other eye being occluded, Maddox rod was rotated in three meridians, vertical, horizontal and oblique; and patients were asked about seeing a line, its color, continuity, direction and straightness. Answers were graded as below*:

Grade-1: Correct direction (in all three positions), Continuity, Straightness, Correct color, Grade-2: Correct direction (in all three positions), Straightness but broken line, Correct color, Grade-3: Only correct direction and color (Not definite about straightness and continuity) and Grade-4: Cannot interpret anything correctly but color.

*Dubey A. K. et al[5]

Two-point discrimination test: It was done by putting a card board with two illuminated pin holes of size 2mm, 2 inches apart, placed 2 feet away from the eye to be tested. The patient was then asked to indicate whether he can perceive the two points separately or not, and answer were taken as "yes" or "no". If they can't perceive, the card board then moves towards the patient and distance measured at which they can perceive two points separately.

B-Scan ultrasonography

The patients were made to lie supine on the examination table. They were evaluated using ultrasound machine OTI Scan 3000 equipped with a real- time linear high-frequency probe of 10 MHZ placed in ophthalmology department. Contact method of examination was used. The probe was placed over the closed eyelid after application of coupling gel. B-scan pictures were obtained in axial, transverse, and longitudinal sections. The lowest possible decibel gain consistent with the maintenance of adequate intensity was used to optimize the resolution of images.

Evaluation of fundus on dilated pupil on post cataract surgery day-1 by Heine's Indirect ophthalmoscope with 20 D lens for detailed retinal examination to note posterior segment abnormalities which is not diagnosed by conventional macular function tests and B Scan Ultrasonography and also to corelate positive findings with the condition.

Statistical analysis

Data collected and put in excel sheet and were analyzed using Statistical Package for the Social Sciences (SPSS) 16.0 software. For the descriptive analysis, the mean, standard deviation, and percentage were used. The chi-square test applied for the comparative analysis. A p value < 0.05 was considered be statistically significant.

Observations and Results

A total 177 patients having Mature cataract were included in this study.

Most common age group having mature cataract was 41–60 years and mean age was 58 years (Table 1). Total 75 (42.4%) males and 102(57.6%) females. 168(95%) patients had unilateral mature cataract and 9(5%) patients had bilateral mature cataract. 23(13%) patients had nuclear mature cataract, 122 (69%) patients had cortical mature cataract, and 32 (18%) had hyper mature cataract.

Table 1: Age wise distribution of Study Population.

Age group (years)	No of Patients (n=177)	Percentage
Less than or equal to 40 years	15	8.5
41–60 years	95	53.7
61 – 80 years	62	35
> 80 years	5	2.8
Total	177	100

Mean ± SD: 58.76±12.1 years, Minimum 25 years, Maximum 90 years.

Most of the patient had visual acuity PL+PR+4 (54.2%) and 38.4% had HM+PL+PR+4 (38.4%). All patients were able to follow light and had projection of rays in all four quadrants except 4 cases (3.3%). Pupillary light response was normal in majority of patients. Relative afferent pathway defect seen in 5 cases (2.8%). Color vision was normal in all the patients.

Binocular Maddox rod test revealed red spot in 63.3%, polyopia in 28.2%, and white spot in 8.5% patients. Polyopia seen more commonly in nuclear mature cataract. Red spot was most common Maddox rod test response in Cortical mature cataract. Hyper mature cataract patients saw only White spot. On uniocular Maddox rod test, majority of patients' response was Grade-3 (57%), followed by Grade 4 (36%). 8% patients did not fit in any grades. Majority of the patients with abnormal B Scan had white spot response on Maddox rod test. Association between Maddox rod test and B Scan Findings was statistically significant (Table 2).

Table 2: Association between Maddox rod test and B Scan Findings.

Maddox rod test	B Scan Findings		
	WNL	Abnormal	Total
Polyopia	48	2	50
Red spot	109	3	112
White spot	12	3	15
Total	169	8	177

Chi square- 9.241, dof-2, p value-0.0098.

Majority of Cortical and nuclear mature cataract patients had Two-point discrimination test distance between 26–30 CM (24.9%). In hyper mature cataract, majority of the patients were not able to discriminate or had short discrimination distance. Most of the patients with abnormal B scan findings were not able to discriminate. Association between Two Point Discrimination test and B Scan Finding was statistically significant (Table 3).

Table 3: Association between Two Point Discrimination test and B Scan Finding.

Two Point Discrimination test	B Scan Findings		
	WNL	Abnormal	Total
10–15	22	2	24
16–20	37	1	38
21–25	38	0	38
26–30	44	0	44
Not able to discriminate	28	5	33
Total	169	8	177

Chi square- 13.65, dof-4, p value-0.008.

B Scan ultrasonography showed no abnormality in the posterior segment in 61.2% patients. 34.4% patients had vitreous detachment. vitreous haemorrhage seen in 1.7%, posterior staphyloma in 1.7%, 0.50% had retinal detachment and 0.50% had vitreous haemorrhage with Retinal detachment (Table 4). None of the patient with abnormal B Scan finding had RAPD, p value of chi square test 0.622 which was statistically insignificant. On comparing B Scan ultrasonography with conventional macular function tests, it was observed that B scan could not diagnosed pathologies like diabetic retinopathy, optic atrophy, macular scar, CRVO.

Table 4: Distribution of cases as per B Scan Ultrasonography findings.

Findings of B-Scan	No of Patients	Percentage
VH with RD	1	0.5
RD	1	0.5
Posterior Staphyloma	3	1.7
VH	3	1.7
VD*	61	34.4
WNL	108	61.2
Total	177	100

On post-operative fundus examination, 88.1% of the patients had no abnormalities in the fundus of the eye. The most common fundus finding seen post operatively was Diabetic retinopathy (2.3%), macular scar in 1.7%, optic atrophy in 1.7% and posterior staphyloma in 1.7%. Macular edema seen in 1.1%, CRVO with macular edema in 0.5%, macular hole with BRVO in 0.50%, mild disc pallor in 0.50%, and dry ARMD in 0.5% (Table 5).

Table 5: Distribution according Post OP fundus examination.

Post OP fundus examination	No of Patients	Percentage.
Crvo With Macular Edema	1	0.5
Dry Armd	1	0.5
Macular Edema	2	1.1
Macular Hole With Brvo	1	0.5
Macular Scar	3	1.7
Mild Disc Pallor	1	0.5
PDR	4	2.3
Optic Atrophy	3	1.7
Posterior Staphyloma	3	1.7
WNL	158	88.1
Total	177	100

Discussion

It is very important to give visual prognosis to all the patients of mature cataract preoperatively who undergo cataract surgery. Various tests are available for retinal function. These tests are easy to perform in case of immature cataract in which the media is clear. But in presence of mature cataract it is a real challenge to give the visual prognosis.

Age range of patients in our study was 25 to 90 years. Most of the patients were in the range of 41 to 60 years of age. Similar study conducted by Kanarek I. et al,[6] in their study, age ranged from 11–86 years with majority being in the older age group (65 years and above).

In present study, among the study population, total 75 (42.4%) males and 102(57.6%) females. Female preponderance can be explained as, male population is working group, so they become vigilant with minimal symptoms as well and seek health care facility earlier. Whereas, females are busy with looking after family, so they seek medical care a bit later stage.

Out of 177 patients, 168(95%) patients had unilateral Mature cataract and 9(5%) patients had bilateral Mature cataract. 23(13%) patients had nuclear mature cataract, 122 (69%) patients had cortical mature cataract, and 32 (18%) had hyper mature cataract. In a study done by Salman A. et

al[7], 24 patients had bilateral dense cataract, 310 eyes (74.2%) had mature cataract, which is comparable with our study, and 41 eyes (9.8%) had hyper mature cataract, which was high as compare to our study.

Most of the patient had visual acuity PL+PR+4 (54.2%) followed by HM+PL+PR+4 (38.4%). All patients were able to follow light and had projection of rays except 4 cases (3.3%). A conducted by Kanarek I. et al[6], nine of the ten patients were able to follow light and had fair to good projection. Pupillary light response was normal in majority of patients. Relative afferent pathway defect seen in 5 cases (2.8%). All had normal color vision.

Most common response of binocular Maddox rod test was red spot in 63.3%, polyopia in 28.2% and white spot in 8.5% patients. On uniocular Maddox rod test, majority of patients' response was Grade-3 (57%) and Grade-4 in 36%. 8% patients did not fit in any grades. In the study conducted by Dubey A. K. et al[5], Grade-1 response to Maddox rod test was the most common, which may be due to the sample size being immature cataract. On binocular Maddox rod test, polyopia seen more commonly in nuclear mature cataract. Red spot was most common Maddox rod test response in Cortical mature cataract. Hyper mature cataract patients saw only White spot.

Majority of patients had Two-point discrimination test distance between 26–30 CM (24.9%), followed by 21–25 CM and 16–20 CM (21.5%). 18.6% patients were not able to discriminate and 13.6% had shortest two-point discrimination test distance. Dubey A. K. et al[5] conducted a study, in which only 8 cases answered positively to two-point discrimination test, rest 72 cases gave variable answers at 2 feet distance. In hyper mature cataract, majority of the patients were not able to discriminate or had test distance range of 10–15 cm.

The ultrasonographic examinations revealed that 61.2% of the patients did not show any abnormalities in the posterior segment of the eye, 34.4% patients had vitreous detachment (VD) which was considered as normal finding as it had no effect on visual prognosis and can be a natural occurrence during senescence. Vitreous hemorrhage seen in 1.7%, posterior staphyloma in 1.7%, 0.50% had retinal detachment and 0.50% patients had vitreous hemorrhage with Retinal detachment. Most common B-Scan finding was vitreous detachment. A study conducted by Qureshi et al[8], in non-traumatic cataract patient group observed that b-scan ultrasound detected retinal detachment in 1.47%, vitreous hemorrhage in 1.91%, posterior vitreous detachment in 1.03%, posterior staphyloma in 1.32%, and no pathology in 93% patients. We observed low incidence of retinal detachment in our study i.e. 0.5% as compared to 1.47% in their study. No pathology was observed by us in 61.2% patients as compared to them in 93%. Posterior vitreous detachment incidence was high in our study 34.4% as compared to 1.03%.

On post-operative fundus examination, 88.1% of the patients had no abnormalities in the fundus of the eye. The most common fundus finding seen post operatively was Diabetic retinopathy (2.3%), macular scar in 1.7%, optic atrophy in 1.7% and posterior staphyloma in 1.7% patients. Macular edema seen in 1.1%, CRVO with macular edema in 0.5%, macular hole with BRVO in 0.50%, mild disc pallor in 0.50%, and dry ARMD in 0.5%. On post-operative fundus examination, it was observed that B Scan ultrasonography could not diagnosed pathologies like PDR, optic atrophy, macular scar, CRVO. Association between Maddox rod test and Two point discrimination test with B Scan Findings was statistically significant.

Conclusion

It was observed that, the conventional macular function tests like papillary reaction, maddox rod test and two point discrimination test do indicate the prognosis in patients of mature cataract having severe diabetic retinopathy, optic atrophy or macular scar.

B Scan ultrasonography is a useful investigation to see major posterior segment abnormalities like vitreous haemorrhage, different types of retinal detachment, asteroid hyalosis, choroidal detachment etc. But the optic nerve and macular pathologies were not revealed on B Scan Ultrasonography.

On comparing the conventional macular function tests with B Scan ultrasonography, we found that Conventional macular function tests were altered when there was an evident posterior segment abnormality seen on B Scan. So, in setup where B Scan Ultrasonography is not available, the conventional macular function tests do help in cases of mature cataract.

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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.

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State the background of the study and purpose of the study and summarize the rationale for the study or observation.

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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.

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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.

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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/HSQ 20.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.

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