

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

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### 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 hypertension 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 analyzed and 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 to causes 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 is moving above 90mmHg. It can also be classified as mild, 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

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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<sup>5</sup> it was reported that the 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 earlier studies, 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

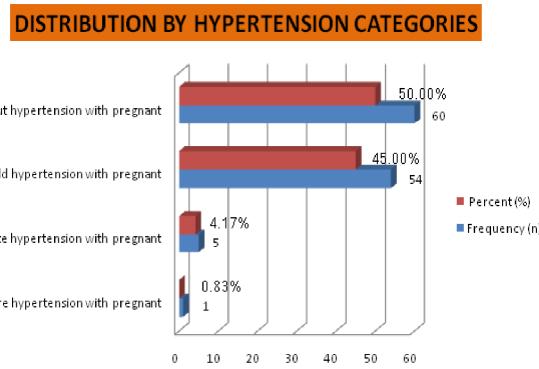
Our study population include two groups New onset hypertension of pregnancy and normal pregnant women

**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) Mean±SD	Grade III (n=1)	Grade IV (n=2)			
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 analyzed 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 is definitely required for a better prognosis.

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