Original Research Article

Ocular fundus changes in pre-eclampsia and eclampsia in a rural set-up

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Abstract

Background: For fetal and maternal mortality, during pregnancy, pregnancy induced hypertension (PIH) is the most common complication which contributes significantly. **Aim:** This study aimed to evaluate ocular fundus changes in pre-eclampsia in tertiary healthcare center. **Materials and Methods:** This study is a prospective, hospital based, observational study conducted between August 2015 to July 2017 at Osmania general hospital and government maternity hospital, Petlaburj in Telangana state of India. **Results:** 60 cases (50%) showed fundus changes in age group of 18-23 years. More are the possibilities of changes of fundus in the eye in the younger age group. The ocular changes was observed more in severe pre-eclampsia (50%) followed by mild pre-eclampsia (34%) followed by eclampsia (22%). Focal arteriolar attenuation was a common retinal sign and it was most commonly seen in severe pre-eclampsia. 70 cases (58%) have shown normal fundus changes. Grade I ocular vascular changes were observed in 26 cases (22%), Grade II ocular fundal changes were observed in 10 cases (8%), Grade III ocular changes were observed in 8 cases (7%) and Grade IV ocular changes were observed in 6 cases (5%). **Conclusion:** Severity of PIH is increased with changes of retinal progress. Thus the presence of retinal changes can be considered as an indirect marker of the severity of PIH.
Key Words: Pregnancy induced hypertension, ocular changes, pre-eclampsia, eclampsia.

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INTRODUCTION

Along with pregnancy, pregnancy induced hypertension (PIH) is the most common complication which significantly contributes to fetal and maternal morbidity and mortality. PIH is a gravid state result and it is a type of hypertension.[1] PIH results in gestational hypertension, pre-eclampsia and eclampsia according to National high blood pressure education program and American college of obstreticians and gynaecologists[2]. A multi system disorder of etiology of unknown which results in hypertension development of 140/90 mm of Hg or more and after 20th week of pregnancy with proteinuria in a normotensive and non-proteinuric patient. Based on the severity, pre-eclampsia is divided into two groups namely mild and severe. Severe pre-eclampsia means blood pressure of more than 160/110 mm of Hg and proteinuria more than 2 gms/24 hours or greater than +2 [3]. It is termed as eclampsia if convulsions are associated with pre-eclampsia. 5-15% of overall incidence of PIH is observed in hospitals. In the developing world, the incidence in primigravida is 10% and incidence in multigravida is 5%.[4] 99% occur in developing world, of which 10-15% is attributed to pre-eclampsia. This study aims to grade the vascular changes of retina in pre-eclampsia and eclampsis patients at admission. This study aimed to evaluate ocular fundus changes in pre-eclampsia in tertiary healthcare center.

MATERIALS AND METHODS

This study is a prospective, hospital based, observational study conducted between August 2015 to July 2017 at Osmania general hospital and government maternity

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hospital, Petlaburj in Telangana state of India. All patients were selected after ethical clearance was obtained from Institutional Ethical Committee and after written informed consent was obtained. 120 patients were selected in the study who were diagnosed with pre-eclampsia or eclampsia admitted in maternity ward and ICU were included in the study. History of pre-existing hypertension and convulsions, pre-eclampsia and eclampsia superimposed on chronic hypertension, diabetes mellitus, thyroid disorders, haematological disorders, HIV were excluded from the study. Patients fulfilling above inclusion and exclusion criteria were taken into study at admission and follow up was done for 1 week of pregnancy termination. As per severity, the cases were divided into mild and severe pre-eclampsia and eclampsia. Each patients detailed history and ocular examination were recorded. After dilatation of pupil with 1% tropicamide eye drops fully, the fundus was examined with ophthalmoscope. Photographs of fundus were taken. In cases of toxaemia, changes of retina were divided into following grades; Grade I- Spastic narrowing of arterioles of retina, Grade II- Irregular constriction of lumen, Grade III- Narrowing and constriction are more fixed with cotton wool patches and hemorrhages, Grade IV-Diffuse retinitis with papilledema.

RESULTS

Table 1: Association between age group and ocular fundus change

Age group (Years)	Number and percentage of patients who showed fundus changes
18-23	60 (50%)
24-28	42 (35%)
29-33	16 (14%)
34-38	2 (1%)

Table 1 shows that 60 cases (50%) showed fundus changes in age group of 18-23 years, followed by 42 cases (35%) in the age group of 24-28 years, followed by 16 cases (14%) in age group 29-33 years, and 1% in the age group of 34-38 years. This table shows that more are the possibilities of changes of fundus in the eye in the younger age group.

Table 2: Association between eclampsia, pre-eclampsia and ocular fundus change

Based on Severity	Number and percentage of patients
Mild Pre-eclampsia	34 (28%)
Severe Pre-eclampsia	60 (50%)
Eclampsia	26 (22%)

Table 2 shows that out of 120 cases, mild pre-eclampsia was seen in 34 (28%) patients, severe pre-eclampsia was observed in 60 (50%) and eclampsia was seen in 26 (22%) patients, ocular fundus changes were observed more in cases with eclampsia, followed by severe pre-eclampsia followed by mild pre-eclampsia.

Table 3: Retinal signs distribution according to severity of pre-eclampsia and eclampsia.

Retinal Signs	Mild pre-eclampsia	Severe pre-eclampsia	Eclampsia	Total
Focal arteriolar narrowing	8	22	9	39
Generalised arteriolar narrowing	0	6	4	10
Cotton wool spots	0	4	3	7
Hemorrhages	0	5	3	8
Hard exudates	0	3	4	7
Papilloedema	0	2	2	4
Retinal detachment	0	6	3	9
Macular edema	3	8	4	15
Retinal edema	0	5	3	8
Choroidal changes	0	0	0	0
Ischemic optic neuropathy	0	0	0	0

Table 3 shows that 39 cases showed focal arteriolar attenuation and it was a common retinal sign and it was most commonly seen in severe pre-eclampsia. Macular edema was seen in 15 cases and it was most commonly seen in severe pre-eclampsia, Generalised arteriolar narrowing, cotton wool spots, hemorrhages, hard exudates, papilloedema, retinal detachment, retinal edema, choroidal changes and ischemic optic neuropathy was seen in severe pre-eclampsia and eclampsia.

There is a significant association between changes of ocular fundus and severity of eclampsia and pre-eclampsia ($P<0.05$).

Table 4: Association between grades of retinal changes, and number and percentage of patients

Grades	Number and percentage of patients
Normal Fundus	70 (58%)
Grade I	26 (22%)
Grade II	10 (8%)
Grade III	8 (7%)
Grade IV	6 (5%)

Table 4 shows that 70 cases (58%) have shown normal fundus changes. Grade I ocular vascular changes were observed in 26 cases (22%), Grade II ocular fundal changes were observed in 10 cases (8%), Grade III ocular changes were observed in 8 cases (7%) and Grade IV ocular changes were observed in 6 cases (5%).

DISCUSSION

The severity of hypertension is related to retinal vascular changes. The increased severity of PIH is due to progression of retinal vascular changes and it has been proven by many studies. This also has an impact on fetal mortality by affecting the ischemic vascular changes in

the placenta, thus terminating pregnancy. 60 cases showed ocular fundus changes, mean age of the cases in the present study is 24.98 ± 5.89 years. Karki *et al.*, conducted a prospective cohort study and it was found that mean age group of patients with retinal changes was 23.86 ± 5.51 years and without retinal changes was 24.36 ± 5.65 years.[5] Shukla *et al.*, conducted a prospective study and they examined 20 cases of pre-eclampsia and eclampsia and noted incidence of retinal changes in 70% of the cases in different age groups[6]. In their study, 60% cases were aged < 25 years. Mean age-group of patients in the present study matches with the studies by Karki *et al.*, and *Shukla et al*., Tadin *et al.*,[7] in their retrospective study of 40 women with pre-eclampsia, 45% (18 cases) showed retinal changes. The average age of 40 patients was 29.1 ± 7.4 years. In a study by Jaeffe and Schatz, mean age of patients with pre-eclampsia was 28 years. Mean age of patients in studies by Tadin *et al.*,[7] Jaeffe, and Schatz was higher than that of our study.[8] In a study conducted by Duke Elder, the most common retinal change is attenuation of retinal arterioles, occurring in approximately 60% of patients with pre-eclampsia.[9] In our study, 39 cases showed focal arteriolar attenuation and it was a common retinal sign and it was most commonly seen in severe pre-eclampsia. Macular edema was seen in 15 cases and it was most commonly seen in severe pre-eclampsia. It can be clearly observed that arteriolar attenuation is the major retinal change observed in PIH, and it is clearly seen in the above studies that the percentage of occurrence of arteriolar attenuation is more and this correlates with our study. Retinal edema is more predominantly seen adjacent to the constricted vessels in the present study. It was observed in 8 cases in our study. In a study done by Reddy *et al.*, it was found that 46 cases (23%) with retinal edema, of which 8 cases (6.6%) of mild pre-eclampsia and 38 cases (47.5%) were of severe pre-eclampsia.[10] In Naval *et al.*, study, it was found 10% of cases with retinal edema.[11] In Francis study, patients with PIH found 2% of cases with retinal edema.[12] In our study, no cases of retinal edema was seen in mild pre-eclampsia, 6 cases (3%)with retinal hemorrhages and 6 cases (3%) with cotton wool spots in severe pre-eclampsia was observed. In Naval *et al.*,study, it was found that 1.5% of cases with cotton wool spots and retinal hemorrhage.[11] In Francis *et al.*, study, it was found that 5% of cases with cotton wool spots and retinal haemorrhage.[12] In our study, more number of cases were found with retinal hemorrhages and cotton wool spots. In Karki *et al*; study optic nerve head changes were observed in 8 cases, In Shukla *et al*; study, 10% of the cases were found to have papilloedema. In our study, gradual decrease in percentage of papilloedema was observed and this could be because of obstetrical and medical management done in an early manner. In a study done by Fry W, it was observed that the serous retinal detachment occurs in approximately 1% of patients with pre-eclampsia and 10% of those with eclampsia.[13] Fry W study matches with our study observations regarding retinal detachment in eclampsia group where no case was seen in both the studies. In Reddy SC *et al*; study also,no case of retinal detachment was seen.[14] In the present study, 70 cases (58%) have shown normal fundus changes. Grade I ocular vascular changes were observed in 26 cases (22%), Grade II ocular fundal changes were observed in 10 cases (8%), Grade III ocular changes were observed in 8 cases (7%) and Grade IV ocular changes were observed in 6 cases (5%). In Tadin *et al* study; 55% of the cases had shown normal fundus, 25 % had shown Grade I retinal vascular changes, 15 % of the cases had shown Grade II retinal vascular changes, 5% of the cases had shown Grade III retinal vascular changes. In Reddy *et al* study, 41.03% of the cases have shown normal fundus, 52.6% of the cases have shown Grade I retinal vascular changes, 6.4% of the cases have shown Grade II retinal vascular changes. Grade I retinal vascular changes was similar in Tadin *et al* study and our study, In our study, the ocular changes was observed more in severe pre-eclampsia followed by mild pre-eclampsia followed by eclampsia where as in Naval *et al* study; the ocular changes were more in pre-eclampsia (78.6%) followed by eclampsia (90%) followed by mild pre-eclampsia (20%).

CONCLUSION

In the present study, 120 cases were studied of which 60 cases have shown ocular changes in severe pre-eclampsia which is comparable to various other studies. Arteriolar attenuation was the most common and detectable retinal change. Majority of changes of retina was of grade I retinopathy. Severe pre-eclampsial cases have shown higher grades of retinal changes. Severity of PIH is increased with changes of retinal progress. Thus the presence of retinal changes can be considered as an indirect marker of the severity of PIH.

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