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Evaluation of Fundus Findings in Pregnancy Induced Hypertension

Dr.Aruja Baid[1], Dr. N. Lakshmi[2], Dr. G. Sirisha[3], Dr. T. Divya[4]
[1](Department of Ophthalmology, NRI medical college and General Hospital, India)
[2](Department of Ophthalmology, NRI medical college and General Hospital, India)
[3](Department of Ophthalmology, NRI medical college and General Hospital, India)
[4](Department of Ophthalmology, NRI medical college and General Hospital, India)

Abstract
Aim:*To evaluate the fundus findings in pregnancy induced hypertension.*
Materials and Methods :*100 cases admitted with pregnancy induced hypertension were included in this study. Pupils were dilated with tropicamide eyedrops and fundus examination was done using slit lamp biomicroscopy with 90D lens or direct ophthalmoscope. Age, gravida, para and gestational age of the patient were noted. Complete urine analysis was done. Patients were evaluated for blood urea, serum creatinine, serum uric acid and total proteins.*
Results:*Most number of PIH cases were found in the age groups 21-25 years. 58% were primigravida, 42% were multigravida. 43% of the patients had normal fundus and 57% of the patients had abnormal fundus changes. 59.6% of the patients had grade I, 28% of the patients had grade II, 0% had grade III and 12.2% had grade IV hypertensive retinopathy.42.3% patients having 1+ grade of proteinuria, 69.4% patients having 2+ grade of proteinuria and 83.3% of the patients having 3+ grade of proteinuria had abnormal fundus findings. 46.5% patients having mild preeclampsia, 62% patients having severe preeclampsia and 85.7% of the patients having eclampsia had abnormal fundus findings.*
Conclusion: *Patients with severe hypertension and high degrees of proteinuria had abnormal fundus findings. Hence, correlation was found between the degree of proteinuria and severity of hypertension. Presence of papilloedema, macular edema and serous retinal detachment is an indicator for termination of pregnancy. Hence, examination of the fundus, creating awareness regarding fundus examination and regular follow up in all PIH cases is very important.*
Key Words: *Pregnancy Induced Hypertension(PIH), Hypertensive Retinopathy(HTR), proteinuria, blood urea, serum creatinine, serous retinal detachment, macular edema.*

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I. Introduction

Pregnancy induced hypertension (PIH) is a challenging situation in the field of obstetrics and it is one of the major contributors to maternal and perinatal mortality and morbidity. In pregnancy, there are changes in anatomical, physiological and biochemical parameters. Astonishing fact is that the woman returns to her pre pregnancy state after her delivery[1].

PIH is a hypertensive disorder in pregnancy which occurs in >20 weeks of pregnancy and in the absence of other causes of elevated blood pressure (BP). i.e>140/90 mmHg measured 2 times with atleast 6 hour interval. Preeclampsia is defined as new-onset hypertension after 20 weeks of gestation and significant proteinuria (>300mg/24 hour) and/or evidence of end-organ damage, including CNS symptoms (headache and/or visual changes), pulmonary oedema, thrombocytopenia, renal insufficiency, or liver dysfunction. HELLP syndrome is on the severe spectrum of preeclampsia with severe systemic signs and is not specifically characterized as a separate entity by the American College of Obstetrics and Gynaecologists (ACOG). Eclampsia is diagnosed with new-onset of generalized tonic clonic seizures in a woman with preeclampsia[2].

Of all pregnancies, 5 to 10 percent are complicated by hypertensive disorders. It forms one member of the triad—along with infection and haemorrhage—which contributes to maternal mortality and morbidity. Among them, preeclampsia syndrome is very dangerous[3]. Microvasculature of the retina and the brain have morphological and physiological similarities. Assessment of the cerebral microvasculature needs highly specialised and expensive methods. Hence, clinical assessment of the retinal microvasculature in an non invasive manner serves as a marker of the state of the cerebral microvasculature[4].

Symptoms associated with severe preeclampsia and eclampsia are amaurosis, scotomata, diplopia, photopsia, achromatopsia and hemianopia. The abnormalities in the retina and the retinal vasculature are more common. Though the conjunctiva, choroid, optic nerve and the visual cortex may also be affected.

Most common ocular finding in pre eclampsia is focal or generalised arteriolar narrowing. It is presumed to be due to increased central retinal artery blood flow velocity. Further progression of retinopathy occurs rapidly and leads to hypertensive optic neuropathy and choroidopathy. Retinal edema and exudation is severe and it may be seen as 'macular star and flat macular detachment'. Choroidal dysfunction is one of the common ocular complications seen in preeclampsia/eclampsia and it is seen clinically as serous retinal detachments or yellow RPE lesions. Along with the retinal vascular changes, optic nerve can also be involved and the end stage is optic atrophy. It is also one of the reasons for decrease in visual acuity. In preeclampsia, selective optic nerve involvement is rare.

Visual loss occurring because of vascular causes is common. The conditions which are vision threatening involve central retinal artery occlusion, central serous retinopathy ,secondary optic atrophy, serous retinal detachment, central retinal vein occlusion, choroidal ischaemia and haemorrhage. Spontaneous vitreous haemorrhage may occur in HELLP syndrome. Defective vision due to eclampsia may improve after delivery but if it has occurred due to retinal artery occlusion, permanent impairment of vision may occur[5]. Hence, in all cases of pregnancy induced hypertension, retinal assessment is crucial. It is an indicator of the severity of hypertension and fundus finding and also plays an important role in determining the termination of pregnancy[6].

II. Materials And Methods

100 cases admitted with pregnancy induced hypertension in obstetric ward, NRI Medical College and General Hospital, Chinakakani, Guntur, between the study period of April 2021 – August 2022 in 100 pregnant females with equal to or more than 28 weeks of gestation having BP >140/90 mmHg were included in this study.

Study Design : Prospective Observational study.

Study Location : Tertiary care teaching hospital based study done in NRI Medical College and General Hospital, Chinakakani, Guntur.

Sample Duration : April 2021 – August 2022

Sample Size : 100 patients

This study was approved by the Institutional Ethics Committee (IEC).

Inclusion Criteria

1. Pregnant females with new onset hypertension with proteinuria.
2. Equal to or more than 28 weeks of gestation.
3. Patients willing to give informed consent admitted in NRI Medical College and General Hospital.

Exclusion Criteria

1. Patients with pre-existing hypertension, diabetes mellitus, cardiovascular and renal conditions.
2. Patients with anaemia, connective tissue disorders, vasculitis, malignancy, leukemia or any other systemic disease.
3. Patients with other ocular pathologies like glaucoma, cataract, corneal opacities, chorioretinal inflammations and vascular occlusions.
4. History of ocular trauma, ocular surgery or previous laser treatment and having hazy media which hinders the fundus examination.

III. Methodology :

Nature and purpose of the study were explained to the patient and an informed consent was taken. Baseline data for all the patients was recorded. All the patients were initially evaluated by an obstetrician. Detailed history, general physical examination and systemic examination were done and noted down in the case sheet.

History of eye symptoms and visual acuity was noted using Snellen's charts and the patients who could not be shifted to OPD, bedside vision was recorded and counting fingers at more than 3 metres was considered as normal. Anterior segment examination was done using slit lamp wherever possible. For patients who could not be shifted, bedside ocular examination was done using torch light to exclude gross anterior segment pathology.

Pupils were dilated with tropicamide eyedrops and fundus examination was done using slit lamp biomicroscopy with 90D lens and for patients who cannot be shifted it was done using direct ophthalmoscope. Hypertensive retinopathy grading was done using Keith and Wagner classification. Wherever possible, fundus image was taken.

Age, gravida, para and gestational age of the patient were noted. Any relevant ocular history was noted. Other systemic conditions were ruled out through systemic examination. Complete urine analysis was done for the presence of proteins. It was analysed through Dipstick method. Blood urea, serum creatinine, serum uric acid and total proteins were done and it was recorded. The patients were followed up after delivery and were reassessed for persistence of fundus changes.

IV. Results

This study was done on 100 pregnant females diagnosed with pregnancy induced hypertension in obstetric ward in NRI Medical College and General Hospital, Chinakakani.

Table no 1 shows most number of PIH cases were found in the age groups 21-25 years followed by 26-30 years but no correlation between patient's age and fundus findings was found.

Table no 1 : Distribution according to age

Age (years)	Number of patients (no)	Percentage (%)
<=20	14	14
21-25	37	37
26-30	36	36
31-35	8	8
>35	5	5
Total	100	100

Table no 2 shows 58% were primigravida, 42% were multigravida but no correlation between fundus findings and gravida of the patient was found.

Table no2 : Incidence of PIH related to gravida

Gravida (Primi or Multi)	Number of patients (no)	Percentage(%)
Primi	58	58
Multi	42	42
Total	100	100

Table 3 shows 43% of the patients had normal fundus and 57% of the patients had abnormal fundus changes.

Table no3 : Distribution according to fundus changes in PIH

Fundus findings	Number of patients (no)	Percentage (%)
Normal	43	43
Abnormal	57	57
Total	100	100

Table 4 shows 59.6% of the patients had grade I, 28% of the patients had grade II, 0% had grade III and 12.2% had grade IV hypertensive retinopathy.

Table no4 : Distribution according to grades of hypertensive retinopathy

Grade of hypertensive retinopathy	Number of patients (no)	Percentage (%)
Grade I	34	59.6
Grade II	16	28
Grade III	0	0
Grade IV	7	12.3
Total	57	100

Figure no 1 shows 42.3% patients having 1+ grade of proteinuria, 69.4% patients having 2+ grade of proteinuria and 83.3% of the patients having 3+ grade of proteinuria had abnormal fundus findings. Hence, correlation was found between the degree of proteinuria and fundus findings.

Figure no 1 : Comparison of abnormalities in the fundus with the grade of proteinuria using simple logistic regression analysis

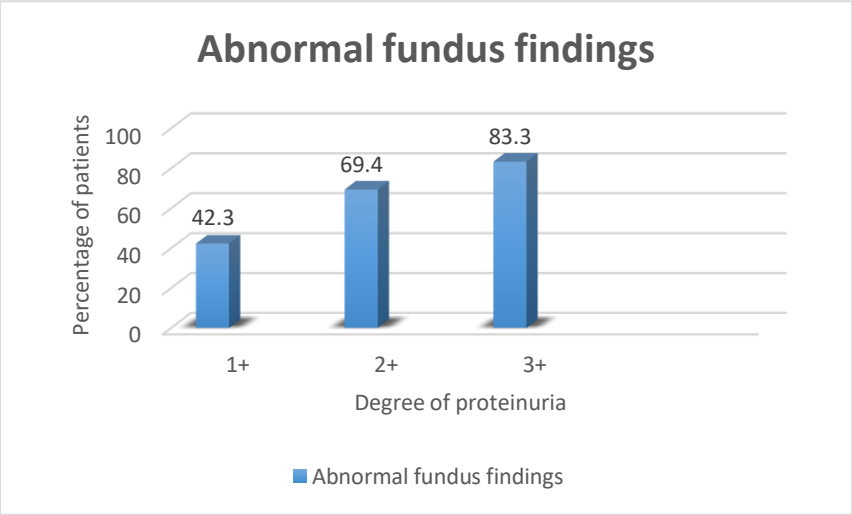
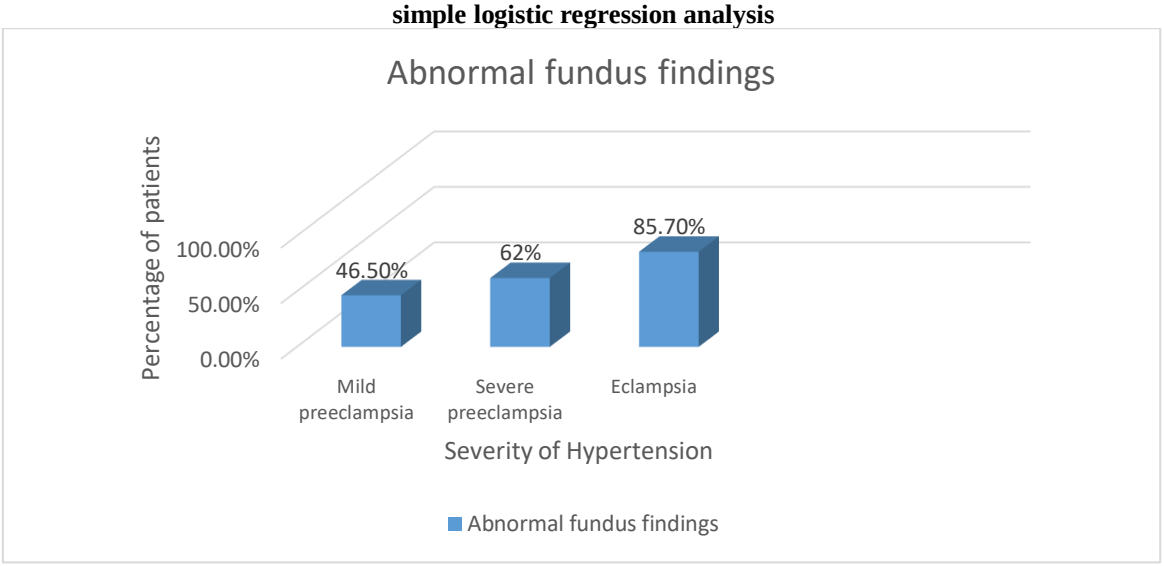


Figure no 2 shows 46.5% patients having mild preeclampsia, 62% patients having severe preeclampsia and 85.7% of the patients having eclampsia had abnormal fundus findings. Hence, correlation was found between the abnormalities in the fundus and the severity of hypertension.

Figure no2 : Abnormalities in fundus findings percentage with increase in severity of hypertension using simple logistic regression analysis



V. Discussion

In the present study of 100 patients, most number of PIH cases were found in the age group 21-30 years (73%) which is comparable to Pandu Rangaiah et al[7] study (21-30 years).In the study done by Shivangini Kumari Shekhawat[8] et al, maximum number of patients belonged to the age of 21-25 years.

In the present study among 100 patients, 58% were primigravida, 42% were multigravida. Even though PIH was more in primigravidas than multigravidas, there was no correlation found between fundus findings and gravida of the patient. It is comparable to the study done by Nalini[9] et al where more number of cases (70%) were also primigravida. In the study done by Reddy et al[10], out of 78 patients, 34 patients(43.5%) were pimigravida and the remaining were multigravida.

In the present study, 43% of the patients had mild preeclampsia, 50% of the patients had severe preeclampsia and 7% had eclampsia. In the study done by Bakhda[11] et al, out of 300 patients studied,182 patients (60.7%) had mild preeclampsia, 76 patients(25.3%)had severe preeclampsia and 42 patients(14%) had eclampsia. The present study is comparable to the study done by Reddy et al[10], where out of 78 patients studied, 30 cases (38.4%) had mild, 46 cases (59%) had severe preeclampsia and 2 cases (2.5%) had eclampsia.

All the 100 patients included in the present study had proteinuria. 52% of the cases had grade 1+, 36% of the cases had grade 2+ and 12% of the cases studied had 3+ proteinuria.

In the present study 57% of the patients had abnormal fundus changes. This is comparable to the study done by Bakhda[11] et al where 51% of the cases studied had abnormal fundus changes. In a study done by Chandranet al[12], 48.7% of the patients had abnormal fundus and in a study done by Varija et al[13], 42.7% of the patients had fundus changes. In the present study, among the patients who had Grade IV HTR, 3 patients had exudative retinal detachment and 2 patients had macular edema. These patients were started on topical anti inflammatory agents. No cases of central serous chorioretinopathy were found.

In the present study, among the 100 patients, 34% of the patients had Grade I, 16% of the patients had Grade II, 0% had Grade III and 7% had Grade IV hypertensive retinopathy changes. In the study done by Pandu Rangaiah et al[7], 24% had Grade I, 22% had Grade II, 6% had Grade III and 2% had Grade IV hypertensive retinopathy changes. In a study done by Tharihalli et al[14], out of the 432 patients studied, 41.7% had hypertensive retinopathy changes. Out of them, 31.3% had Grade I, 4.2% had Grade II, 2.1% had Grade III and 4.2% had Grade IV hypertensive retinopathy changes.

In the present study of 100 cases, there was a positive association between fundus findings, severity of hypertension and severity in grades of proteinuria. This is comparable to the study done by Tadin[15] et al, where he had reported that the severity of hypertensive retinopathy was directly proportional to preeclampsia severity and proteinuria. Hence, hypertensive retinopathy was considered as a valid and reliable prognostic factor in the determination of severity of preeclampsia. In another study done by Reddy et al[10], there was also significant association observed between retinal changes and severity of blood pressure, proteinuria and severity of preeclampsia.

In the present study, the mean blood urea level in patients with mild preeclampsia was 23.77, in patients with severe preeclampsia was 25.49 and in the patients with eclampsia it was 28.67.In a study done by Kishore and Tandon[16], the mean blood urea level in patients with mild preeclampsia was 24.6, in patients with severe preeclampsia was 30.3 and in the patients with eclampsia it was 43.5.

In the present study, the levels of serum uric acid in patients having mild preeclampsia had a mean value of 5.3, in the patients having severe preeclampsia it was 5.6 and in the patients having eclampsia it was observed to be 6.5.Hence, a definite association is seen between the levels of serum uric acid and hypertension severity in the present study. This is comparable to a study done by Kishore and Tandon[16], the mean serum uric acid levels in patients with mild preeclampsia was 5.2, in patients with severe preeclampsia was 5.6 and in the patients with eclampsia it was 7.2.

VI. Conclusion

Patients with severe hypertension and high degrees of proteinuria had abnormal fundus findings. Hence, correlation was found between the abnormalities in the fundus, degree of proteinuria and severity of hypertension. Presence of papilloedema, macular edema and serous retinal detachment is an indicator for termination of pregnancy. Hence, examination of the fundus, creating awareness regarding fundus examination and regular follow up in all PIH cases is very important.If there is any persistence of fundus changes even after the termination of pregnancy, we need to rule out any chronic persisting hypertension or any renal complications occurring in hypertension.

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