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STUDY THE ASSOCIATION OF RETINAL CHANGES WITH BLOOD PRESSURE, PROTEINURIA AND SEVERITY OF PIH

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Abstract

Background: Pregnancy induced hypertension is a clinical syndrome that afflicts 3–5% of all pregnancies and is a leading cause of maternal mortality, especially in developing countries.

Objective: To study the association of retinal changes with blood pressure, proteinuria and severity of PIH

Methodology: Prospective Observational study, A total of patients were included in the study during Nov 2018 to April 2020. Study was conducted at Minto ophthalmic hospital, regional institute of ophthalmology and Vani Vilas hospital attached to Bangalore medical college and research institute.

Results: Most no. of subjects in our study population were primigravida (54%) and the rest were multigravida (46%). Amongst the 43 subjects with retinal changes, 15 had grade I hypertensive retinopathy followed by grade IV retinopathy which were seen in 11 individuals, then grade II and III. In 100 subjects, maximum number of patients were of mild PIH group (n=37), followed by severe PIH (n=34), eclampsia (n=18) and gestational hypertension (n=11). The prevalence of retinopathy changes was more among patients with severe PIH (76.5%) and eclampsia (88.9%). A significant increase in urine albumin was seen with increase in the severity of retinopathy.

Conclusion: The present study demonstrated that there is a greater chance of developing retinopathy with increase in blood pressure, proteinuria and severity of PIH in cases of PIH. Thus fundus examination is of paramount importance in patients with PIH and it can also be considered as an indirect marker for the severity of PIH and its prognosis.

Keywords: Retinal changes, Blood Pressure, Proteinuria, Pregnancy Induced hypertension.

INTRODUCTION

Pregnancy induced hypertension is a clinical syndrome that afflicts 3–5% of all pregnancies and is a leading cause of maternal mortality, especially in developing countries^(1,2). It is a multisystem hypertensive disorder, with the clinical spectrum including preeclampsia; eclampsia; HELLP syndrome; and HELLP syndrome with eclampsia. Hypertension occurs in approximately 10% of first pregnancies and 8% of all pregnancies⁽³⁾. Incidence of eclampsia in the developed countries is about 1 in 2000 deliveries as compared to developing countries where it varies from 1 in 100 to 1 in 1700. The national incidence of PIH is 15.2% in India, while it is four times higher in primipara women than in multipara⁴. The placenta, maternal endocrine glands and the fetal adrenal glands combine their productivity to make a high-powered hormone factory. By some of these mechanisms, pregnancy causes ocular changes which may be physiological or pathological or may be modifications of pre-existing conditions¹. No significant retinal changes occur in most normal pregnancies. However, pregnancy can be associated with the development of new ocular conditions such as serous retinal detachment related to pre eclampsia, or with an exacerbation of pre-existing disease processes such as diabetic retinopathy. These ocular changes are usually transient, but occasionally cause permanent visual disability.

OBJECTIVES

1. To study the retinal manifestation in PIH.
2. To determine the importance of fundus examination in PIH patients to assess the progress of the disease and further management.
3. To study the association of retinal changes with blood pressure, proteinuria and severity of PIH.

MATERIALS AND METHODS

Type of study: Prospective Observational study

Duration of study: 18 months

Period of study: November 2018-april 2020

Subject/source of the patients: Minto ophthalmic hospital, regional institute of ophthalmology and Vani Vilas hospital attached to Bangalore medical college and research institute

Sample size: Total 100

METHODOLOGY

SOURCE OF DATA: Data was collected from patients fulfilling the inclusion and exclusion criteria admitted cases in Vani Vilas Hospital, diagnosed with pregnancy induced hypertension were included in the study. Prior approval for the study protocol was obtained from the institutional ethical committee. After explaining the need for relevant investigations, and their role in the further management, patients were included in the study. Informed written consent was obtained from patient or a responsible attendant before including the patient in the study.

METHOD OF COLLECTION OF DATA:

The study was carried out in 100 patients admitted in the obstetric ward diagnosed with PIH except those under exclusion criteria. Age, race, gravida, gestational period, blood pressure and proteinuria were noted. The fundus examination was done irrespective of visual complaints after dilating the pupils with eyedrops, 1% tropicamide topical agent, with an indirect ophthalmoscope in the ward, bedside. The patients were followed up 2 days after termination of pregnancy and dilated fundoscopy was done in the same fashion. Informed consent was taken from the patient. A pre-structured and pretested proforma was used to collect the data.

Inclusion Criteria

Pregnant women fulfilling the criteria of PIH and willing to participate.

Exclusion Criteria

1. Patients with pre existing diabetes, hypertension or renal disease
2. Patients with pre existing retinal pathologies
3. Patients with hazy media unfavorable for fundus examination

RESULTS

Mean age in our study group was 24.8years, majority of the subjects were in the age group of 20-25years (53%). Gestational age was divided into 4 groups, out of which highest number of PIH patients were from the group of >36wks (60%) and only 2% were from the group of 24-28wks(Table1)Most no. of subjects in our study population were primigravida (54%) and the rest were multigravida (46%).

TABLE 1: Frequency of PIH in various gestational age groups.

Gestational Age	Frequency	Percent
24-28 wks	2	2.0
29-32 wks	11	11.0
33-36 wks	27	27.0
>36 wks	60	60.0
Total	100	100.0

In our study, most of the subjects were of mild and severe pre eclampsia (37% & 34% respectively). Least were of gestational hypertension (11%).

TABLE 2: Distribution of study subjects based on stage of PIH

PIH Type	Frequency	Percent
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Gestational HTN	11	11.0
Mild Pre eclampsia	37	37.0
Severe Pre eclampsia	34	34.0
Eclampsia	18	18.0
Total	100	100.0

Out of the 100 patients with PIH, the prevalence of retinal changes (hypertensive retinopathy changes) was noted in 43 patients (43%). Amongst the 43 subjects with retinal changes, 15 had grade I hypertensive retinopathy followed by grade IV retinopathy which were seen in 11 individuals, then grade II and III. Grade I was the most common type of change seen overall.

TABLE 3: Prevalence of retinal changes based on PIH type

	Total no. of pts.	Pt with retinal changes	Prevalence		OR		P value
			Prevalence	95% CI	OR	95% CI	
Gest HTN	11	00	-	-		-	-
Mild Preeclampsia	37	01	2.7%	0.01%-14.2%	1	-	-
Severe Preclampsia	34	26	76.5%	58.8%-89.3%	117	13.8-993.65	<0.001
Eclampsia	18	16	88.9%	65.3%-98.6%	288	24.32-3410.56	<0.001
Total	100	43	43.0%	33.1%-53.3%	-	-	-

In 100 subjects, maximum number of patients were of mild PIH group (n=37), followed by severe PIH (n=34), eclampsia (n=18) and gestational hypertension (n=11). The prevalence of retinopathy changes was more among patients with severe PIH (76.5%) and eclampsia (88.9%). As the severity of the PIH increased the Odds of women developing retinopathy also increased substantially from OR: 117; 95% CI: 13.8-993.65 in severe PIH to OR: 288; 95% CI: 24.32-3410.56 in eclampsia and this association between the severity of PIH and the development of retinopathy changes was found to be statistically significant (P=<0.001).

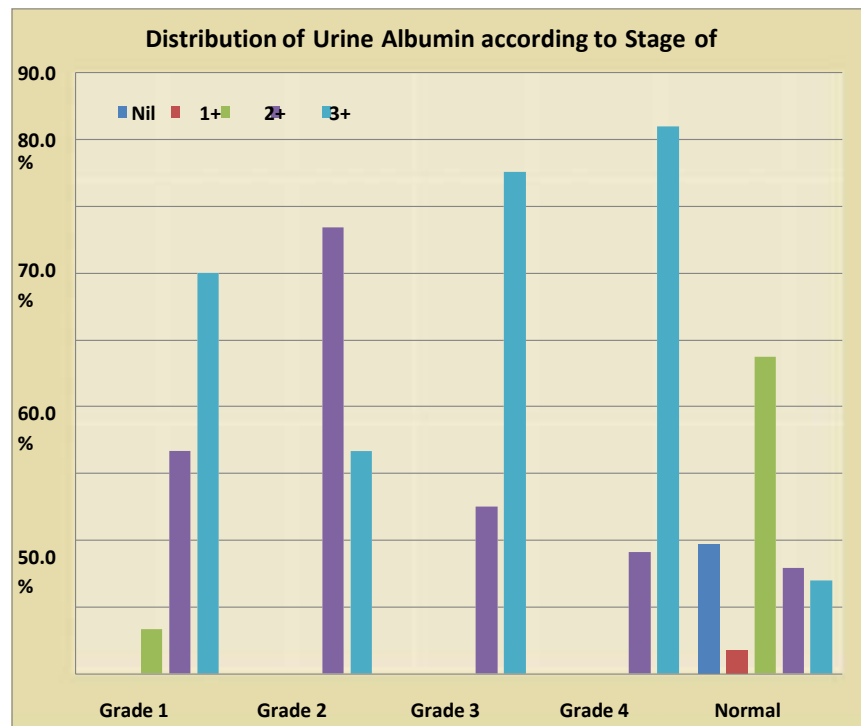
A significant increase in the mean systolic and diastolic blood pressure was seen with increase in severity of retinopathy among the study groups [grade I 164/110.4(SBP/DBP) & grade IV 175.45/115(SBP/DBP)].

TABLE 4: Association of Systolic blood pressure with grades of retinopathy

	N	Mean	SD	Min.	Max.	P value
Grade I	15	164.00	11.212	150	190	<0.001
Grade II	9	168.89	7.817	160	180	
Grade III	8	170.00	13.093	160	200	
Grade IV	11	175.45	10.357	160	190	
Normal	57	153.79	9.178	130	180	
Total	100	160.36	12.634	130	200	

A significant increase in urine albumin was seen with increase in the severity of retinopathy.

Graph 1: Association of Urine Albumin with grades of retinopathy



Grade I retinal changes were the commonest amongst all the groups of PIH. Only grade I retinal changes were seen in mild PIH patients whereas all grades of retinal changes were observed in severe PIH and eclampsia patients. This difference in the distribution of retinal changes among

women with different stages of PIH was found to be statistically significant.

All grades of retinopathy changes were observed more among women in the younger age group between 20-25 years compared to other age groups. Similarly in primigravida women all grades of retinopathy changes were noted compared to multigravida. A significant correlation was also seen with albuminuria and severity of retinopathy.

DISCUSSION

Pregnancy induced hypertension is a multi organ hypertensive disorder which is one of the leading cause of maternal mortality, particularly in the developing countries. An increasing awareness of its complications both amongst the medical fraternity and the general population has helped in reducing both morbidity and mortality. The ocular system is one of the main organs to be affected and the severity of the retinal changes increases with severity of PIH. A detailed indirect ophthalmic examination of the retina will give us an insight about the ischemic changes elsewhere in the body, especially the placenta, as retinal vasculature changes reflect the vascular changes of brain, placenta and other organs.

In the present study, where 100 PIH cases were studied, the mean age of the total study population was 24.8 years, the age of the patients ranging between 18 and 39 years. Amongst these, mean age of the patients with significant fundus changes was 24.16 years and the mean age of the patients with normal fundus findings 24.78 years. In a similar hospital based prospective study conducted by Bhandari et al., the mean age in patients with fundus changes was 23.85 years⁽⁴⁾. In another study conducted by Karki et al., 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⁾

In the present study prevalence of PIH was more in the primigravida (54%) than multigravida (46%). In the present study, 43% of the cases had retinal changes, of them 62.8% were primi. In a similar study conducted by Bhupally et al similar results were found, 56.7% were primi⁽⁶⁾. However in two other studies, by Reddy et al⁽⁷⁾ where 43.6% were primi and Varija et al⁽⁸⁾, where 49.7% were primi, making the prevalence more in multigravida, which contradict the present study.

In our study, the distribution of subjects based on stage of PIH is, gestational hypertension 11 cases, mild pre eclampsia 37 cases, severe pre eclampsia 34 cases and eclampsia 18 cases. Amongst these, the class of gestational hypertension had no significant retinal changes (0%). The class of mild pre eclampsia had 1 case with retinal changes (2.7%), the class of severe pre eclampsia had 26 cases with retinal changes (76.5%) and the class of eclampsia had 16 cases with retinal changes (88.9%). These values clearly show that there is an association between the severity of PIH and the development of retinopathy changes and this association was found to be statistically significant ($P < 0.001$).

TABLE 5: Distribution of the grades of retinal changes in various studies.

Grades of retinal vascular changes	Present study (%)	Bhandari et al. (%)	Bhupally et al. (%)	Varija et al. (%)
Grade I	34.88	65.9	45.2	75.2
Grade II	20.93	11.3	45.2	9.9
Grade III	18.6	6.8	0	4.97
Grade IV(including RD)	25.52	15.9	9.52	9.99

As the increase in blood pressure and proteinuria indicate increase in the severity PIH, a statistically significant association was found between the increase in blood pressure and proteinuria with the occurrence of retinal changes.

A significant increase in the mean systolic and diastolic blood pressure was seen with increase in severity of retinopathy among the study subjects. The mean blood pressure noted in cases with grade I hypertensive retinopathy was 164/110.4 (SBP/DBP) and the mean blood pressure noted in cases with grade IV hypertensive retinopathy was 175.45/115 (SBP/DBP).

A significant increase in urine albumin was noted with increase in severity of PIH. Amongst grade I retinopathy, 33% of cases had urine albumin 3+ and 60% had 4+. Amongst grade IV retinopathy cases, 18% had 3+ and 82% had 4+ urine albumin. Whereas, in cases with normal fundus, 47% had 2+, 15 % had 3+ and 14% had 4+ . Thus, association of proteinuria and severity of PIH is statistically significant ($P < 0.001$).

LIMITATIONS OF THE STUDY

Our study included only 1 follow up visit, i.e., day 2 post termination of pregnancy. Generally, the retinopathy changes take a few weeks to resolve. Hence, the fully resolved state of fundus could not be examined or documented in most patients.

CONCLUSION

The present study demonstrated that there is a greater chance of developing retinopathy with increase in blood pressure, proteinuria and severity of PIH in cases of PIH. Retinal changes were observed more in the primigravida PIH patients compared to multi gravida. Cases of severe pre-eclampsia and of eclampsia showed higher grades of retinal changes. Thus fundus examination is of paramount importance in patients with PIH and it can also be considered as an indirect marker for the severity of PIH and its prognosis.

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