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Research Article

A study of prevalence and association of fundus changes in pregnancy induced hypertension

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ABSTRACT

Background: The pathological changes of pregnancy induced hypertension appear to be related to vascular endothelial dysfunction and its consequences. The retinal vascular changes generally, but not always, correlate with the severity of systemic hypertension. To find out the prevalence and association of retinal changes in pregnancy induced hypertension.
Methods: A hospital based cross-sectional study was conducted where all antenatal pregnant women who fulfilled the diagnostic criteria of PIH were included in this study. Patients who had pre-existing diabetes or hypertension or renal disease or hazy media which did not permit fundus visualization were excluded from the study.
Socio-demogrpahic and obstetric data was collected and all the patients were subjected to detailed clinical examination followed by fundoscopic examination.
Results: Out of the total 423 patients of PIH examined, the retinal changes (hypertensive retinopathy changes) were noted in 181 (42.7%) patients. The prevalence of retinopathy changes was more among patients with imminent Eclampsia (76.5%) and eclampsia patients (50%). As the severity of the PIH increased the Odds of women developing retinopathy also increased substantially from OR: 17.6; 95% CI: 3.1-136.3 in severe PIH to OR: 253; 95% CI: 47.2-1935 in Imminent eclampsia and this association between the severity of PIH and the development of retinopathy changes was found to be statistically significant.
Conclusions: Fundus examination in cases of PIH is of paramount importance in monitoring and managing cases as it co-relates with the severity of PIH.

Keywords: Pregnancy induced hypertension, Retinal changes, Fundoscopy

INTRODUCTION

Hypertensive disorders complicating pregnancy are one of the common and significant causes of maternal morbidity and mortality especially in developing countries. They are responsible for 8-9% of maternal deaths in India and 15-20% of maternal deaths in western world. Overall they complicate 5-10% of pregnancies in India.[1]

Pregnancy induced hypertension (PIH) is a hypertensive disorder in pregnancy that occurs in the absence of other causes of elevated blood pressure (140/90 mmHg, or a rise of 30mmHg of systolic pressure, or a rise of 15mmHg of diastolic pressure), taken on two occasions after rest, in combination with generalized edema and/or proteinuria. When there is significant proteinuria it is termed as preeclampsia; seizures or coma as a consequence of PIH is termed as eclampsia.[2] The incidence of pr-eclampsia in nulliparous population ranges from 3 to 10 per cent worldwide.[3] Incidence of

eclampsia in the developed countries is about 1 in 2000 deliveries 4 as compared to developing countries,[5-7] 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 multipara.[8,9]

PIH cannot be attributed to single cause as it is multifactorial as disease process.

The disease process affects almost every organ system of body including cardiovascular, renal, endocrine and central nervous system. The changes in the retinal vasculature generally, but not always, correlate with the severity of systemic hypertension. Vasospastic manifestations are reversible and the retinal vessels rapidly return to normal after delivery.[2] There is paucity of data available in the published literature on the prevalence of retinal changes in PIH from India. Therefore, this study was under taken to determine the prevalence of retinal changes in PIH and association between the retinal changes and severity of PIH.

Objective of the study is to determine the prevalence of retinal changes in pregnancy induced hypertension and to study the association between retinal changes and severity of the PIH.

METHODS

Study design and setting

A hospital based cross-sectional study was conducted in the setting of department of Obstetrics and Gynaecology, JSS Medical College, Mysore, Karnataka, during the year 2004-2006.

Inclusion and exclusion criteria

All antenatal pregnant women who fulfilled the diagnostic criteria of PIH (>24 weeks of pregnancy, high arterial blood pressure and proteinuria) admitted in Obstetric ward, were included in this study. Patients who had pre-existing diabetes or hypertension or renal disease or hazy media which did not permit fundus visualization were excluded from the study.

Sample size and sampling technique

Since it is a time bound study, during the two year study period a total of 423 antenatal pregnant women who fulfilled the diagnostic criteria were included in the study. A convenient sampling technique was adopted to sample the study subjects.

Method of data collection

After taking written consent the data was collected by interview method related to:

1. Socio-demographic data.
2. Obstetric profile of the study subjects.
3. Clinical profile of the study subjects.
4. Clinical examination which included fundoscopic examination.

After taking history for any eye symptoms, anterior segment was examined with torch light on the bed itself. Both pupils were dilated with 1% tropicamide eye drops and fundus examination was done by ophthalmologist with direct ophthalmoscope in a semi dark room in the ward. Hypertensive retinopathy changes seen in right or left or both eyes, was taken as positive findings in that patient. The retinal changes (hypertensive retinopathy) were graded according to Keith Wagener classification into: grade I - mild generalized arterial attenuation, particularly of small branches; grade II - more severe grade I + focal arteriolar attenuation; grade III - grade II + haemorrhages, hard exudates, cotton wool spots; Grade IV - grade III = optic disc swelling (papilloedema).[10] The PIH was graded as preeclamsia (mild and severe), Imminent eclampsia and eclampsia based on the standard diagnostic criteria.[11] All the findings were noted on a data sheet.

Statistical Analysis

All the collected data was entered into an excel sheet and after appropriate data cleaning, the data was transferred and analysed using SPSS software version 22. Appropriate descriptive statistics like percentages and mean, standard deviation are used to describe the socio-demographic, risk factor variables. The difference in the prevalence of retinal changes among various groups of PIH was tested using Chi-square test and p value of less than 0.05 was considered to be significant.

RESULTS

A total of 423 patients of PIH were examined. Majority (79.6%) were in the age group of 20-25 years. The mean age of patients was 22.7 years with a standard deviation of 3.31 years. Nearly two thirds of them were BPL card holders (60.8%) and remaining were APL card holders (39.2%). Two thirds of women were primigravida and one third of them were multigravida. The gestation period ranged from 25 weeks to 40 weeks with mean gestation of 35.9±4.13 weeks (Table 1).

Out of 423 patients, 81 (19.1%) had mild PIH, 99 (23.4%) had severe PIH and 153 (36.2%) had imminent eclampsia with associated symptoms of blurring of vision, severe headache and in the remaining 90 (21.3%) had eclampsia (Table 2).

Out of the 423 patients with PIH, the prevalence of retinal changes (hypertensive retinopathy changes) was noted in 181 (42.7%) patients (Table 3). The prevalence of retinopathy changes was more among patients with imminent eclampsia (76.5%) and eclampsia patients (50%). As the severity of the PIH increased the Odds of

women developing retinopathy also increased substantially from OR: 17.6; 95% CI: 3.1 - 136.3 in severe PIH to OR: 253; 95% CI: 47.2 - 1935 in Imminent eclampsia and this association between the severity of PIH and the development of retinopathy changes was found to be statistically significant (Table 4).

Table 1: Socio-demographic and obstetric profile of the patients (N=423).

Variable	Frequency	Percentage
Age group		
20 - 25 yrs	337	79.6
26 - 30 yrs	78	18.4
> 30 yrs	8	1.9
Mean ± SD	22.77 ± 3.31	
Socio-economic status		
APL	166	39.2
BPL	257	60.8
Gravida		
Primigravida	282	66.7
Multigravida	141	33.3
Gestation period		
24 - 28 wks	18	4.3
28 - 32 wks	45	10.6
33 - 36 wks	107	25.3
> 37 wks	253	59.8
Mean ± SD	35.9 ± 4.13	

Table 2: Distribution of study subjects based PIH type.

PIH type	Frequency	Percentage
Mild PIH	81	19.1
Severe PIH	99	23.4
Imminent eclampsia	153	36.2
Eclampsia	90	21.3
Total	423	100.0

Table 3:Prevalence of retinal changes based on PIH type.

Retinal changes	Frequency	Percentage
Grade I	136	32.1
Grade II	18	4.3
Grade III	9	2.1
Grade IV	18	4.3
Normal	242	57.2
Total	423	100.0

Table 4: Prevalence of retinal changes based on PIH type.

PIH type	Total no. of pts	Pts with retinal changes	Prev rate (95%CI)	OR (95% CI)	P value
Mild PIH	81	1	1.2 (0.2- 6.6)	1	-
Sev PIH*	99	18	18.2 (11.8- 26.9)	17.6 (3.1- 136.3)	<0.001
IE**	153	117	76.5 (69.2- 82.5)	253 (47.2- 1935)	<0.001
Eclampsia	90	45	50.0 (39.8- 60.1)	78.3 (14.4- 600)	<0.001
Total	423	181	42.8 (38.2- 47.5)	-	-

*Severe PIH; **Imminent eclampsia.

Table 5: Association of PIH type, obstetric profile with retinal changes.

Parameter	Retinal changes				
	Grade I	Grade II	Grade III&IV	Normal	P value
PIH type					
Mild PIH (n=81)	1 (1.2)	0 (0.0)	0 (0.0)	80 (98.8)	0.000
Sev PIH (n=99)	18 (18.2)	0 (0.0)	0 (0.0)	81 (81.8)	
*Im Ecl (n=153)	81 (52.9)	9 (5.9)	27 (17.6)	36 (23.5)	
Eclampsia (n=90)	36 (40.0)	9 (10.0)	0 (0.0)	45 (50.0)	
Agegrp					
20-25 yrs (n=337)	118 (34.7)	18 (5.4)	27 (8.0)	175 (51.9)	0.000
26-30 yrs (n=78)	18 (23.1)	0 (0.0)	0 (0.0)	63 (76.9)	
>30 yrs (n=8)	0 (0.0)	0 (0.0)	0 (0.0)	8 (100.0)	
Gravida					
Multi (n=141)	63 (44.6)	8 (5.7)	0 (0.0)	70 (49.6)	0.000
Primi(n=282)	73 (25.5)	9 (3.2)	27 (9.6)	174 (61.7)	
Gestation					
24-28 wks (n=18)	0 (0.0)	9 (50.0)	9 (50.0)	0 (0.0)	0.000
28-32 wks (n=45)	9 (20.0)	0 (0.0)	9 (20.0)	27 (60.0)	
33-36 wks (n=107)	73 (67.3)	0 (0.0)	9 (8.4)	26 (24.3)	
≥ 37 wks (n=253)	54 (21.3)	9 (3.5)	0 (0.0)	190 (75.1)	

*Imminent eclampsia, Numbers within the parenthesis are percentages

Out of the 423 patients with PIH, the prevalence of retinal changes (hypertensive retinopathy changes) was noted in 181 (42.7%) patients (Table 3). The prevalence of retinopathy changes was more among patients with imminent eclampsia (76.5%) and eclampsia patients (50%). As the severity of the PIH increased the Odds of women developing retinopathy also increased substantially from OR: 17.6; 95% CI: 3.1 - 136.3 in severe PIH to OR: 253; 95% CI: 47.2 - 1935 in Imminent eclampsia and this association between the severity of PIH and the development of retinopathy changes was found to be statistically significant (Table 4).

Grade I retinal changes were the commonest among all the groups of PIH. Only grade I retinal changes were noted in mild and severe PIH. However in Imminent eclamptic patients all grades of retinal changes were noted (grade I: 52.9%, grade II: 5.9%, grade III and IV: 17.6%) and this difference in the distribution of retinal changes among women with different types of PIH was found to be statistically significant (Table 5).

All grades of retinopathic changes were observed more among women in the younger age group between 20-25 years compared to other age groups and this difference was found to be statistically significant. Similarly in primigavida women all grades of retinopathy changes were noted compared to multigravida women where only grade I and II changes were observed and this difference was found to be statistically significant (Table 5).

DISCUSSION

Preeclampsia is a multisystem hypertensive disorder which is a clinical syndrome that afflicts 3-5% of pregnancies and is a leading cause of maternal mortality, especially in developing countries.[12,13] In pregnancy induced hypertension, the various pathological changes in different organs of the body can be studied directly visualizing the ocular fundus and may give a true index of changes in vascular system of brain and retina.[14]

In the present study over a period of two years 423 cases of PIH patients were studied among hypertensive retinopathy changes were noted in 181 cases (42.8%; 95% CI: 38.2 - 47.5) (Table 2). Similar studies conducted elsewhere showed that the prevalence of retinopathy in PIH patients ranges from 38.46%, 45%, 58%, 59% to 60%.[15-19]

In the present study the grade I retinopathy (narrowing of retinal arterioles) was the commonest fundoscopic finding, grade III and IV changes were noted in few patients (Table 3). These findings were inconsonance with other studies conducted elsewhere.[15,17-19]

It has been described in the literature that among PIH patients, in 30% to 100% of patients visual system may be affected by and the most common abnormality seen in the fundus is narrowing of retinal arterioles.[2] Among patients with preeclampsia and eclampsia there is a wide spectrum of fundoscopic findings and visual problems reported from different countries ranging from focal/generalized narrowing of retinal arterioles to serious retinal detachment.[20] However with the current methods of early diagnosis and treatment the incidence of such severe retinopathy changes has come down. In the present study we did not find any case of serous retinal detachment. However, Rasdi et al[21] reported a case of serous retinal detachment from Malaysia.

In the present study significant correlation was observed between the severity of PIH and the development of retinopathy changes where in as the severity of the PIH increased the Odds of women developing retinopathy also increased substantially from OR: 17.6; 95%CI: 3.1 - 136.3 in severe PIH to OR: 253; 95% CI: 47.2 - 1935 in Imminent eclampsia (Table no. 04). Similar association between the severity of PIH and retinopathy changes were noted in other studies.[16,18,22]

In the present study younger the age of the women (20-25 years) higher is the prevalence of retinal changes (48.3%) and higher proportion of Grade III and Grade IV changes (8%) compared to rest of the age groups and this difference was found to be statistically significant (Table no. 05). This observation was in accordance with S C Reddy et al[23] and Rajalaxmi Kamath et al.[19]

In our study though the prevalence of retinal changes was more among multigravida women (50.3%) with predominantly grade I changes, primigravida women apart from grade I and II (28.7%), grade III and IV (9.6%) retinal changes were more common compared to multigravida women. Early the onset of PIH (24-28 weeks of gestation) more are the changes of development of grade III and grade IV (50%) retinal changes compared to other groups and was found to be statistically significant. The earlier the development of preeclampsia greater the chances of retinopathy. Similar association was observed by Rajalaxmi Kamath et al[19] and other studies.[22,24-26]

As described in the literature, the wellbeing of the foetus depends on the placental circulation and it is believed that the vascular changes in the placenta can be indicated by the presence of changes in the retinal arterioles and retinal haemorrhages and therefore ophthalmoscopic examination of mother's fundus may give a clue to similar micro-circulation changes in the placenta and indirectly to the foetal wellbeing. Fundus examination in patients with PIH is an important clinical evaluation to predict adverse foetal outcomes.[27]

CONCLUSIONS

Regular fundus examination in all cases of PIH with special emphasis in younger, primigravida women and early onset of PIH patients results in a proper assessment of the clinical status of the patient. Therefore, by repeated

fundus examinations at regular intervals one can assess the severity of the disease and also response to treatment instituted thereby improving the feto-maternal outcome by managing the pregnancy judiciously.

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