Original Article

Retinopathy in Pregnancy Induced Hypertension

Muhammad Imran Janjua, Saira Bano, Ali Raza

Pak J Ophthalmol 2015, Vol. 31 No. 4

See end of article for authors affiliations

Correspondence to:
Muhammad Imran Janjua
Postgraduate Trainee
Ophthalmology
Holy Family Hospital,
Rawalpindi
janjua.doc@gmail.com

Purpose: The purpose of this study was to observe the prevalence of Hypertensive Retinopathy in patients with Pregnancy Induced Hypertension.

Materials and Methods: This cross-sectional study was carried out at Holy Family Hospital, Rawalpindi from July 2013 to July 2015. 168 patients with Pregnancy Induced Hypertension were examined for any fundus changes. Patient's age, number of pregnancies, gestation period, blood pressure and proteinuria were noted. Pupils were dilated and fundus examination was done by direct ophthalmoscope. The data was analyzed by SPSS program.

Results: A total of 168 patients were examined, 42 (25%) were primi-gravida, 91 (54.2%) were multi-gravida and 35 (20.8%) were grand multi-gravida. The mean age was 27.66 (± 5.20) years. The average gestation period was 33.36 (±3.91) weeks. 126 (75%) patients had gestational hypertension, 37 (22%) had pre-eclampsia and 5 (3%) patients had eclampsia. Hypertensive retinopathy was observed in 87 (51.78%) patients. Central serous chorioretinopathy (CSCR) was seen in 3 (1.8%) patients. A statistically significant positive correlation was seen between the severity of retinal hypertensive changes and blood pressure ($p = 0.005$), the grade of proteinurea ($p = 0.000$), severity of disease ($p = 0.000$) and no of pregnancies ($p = 0.001$).

Conclusion: The level of blood pressure, severity of disease and proteinuria are significantly related with severity of hypertensive retinopathy in cases of PIH. Retinal examination can greatly help in predicting the severity of PIH and also in timely diagnosis and management of such cases.

Key Words: Retinopathy, hypertension, pregnancy.

Pregnancy Induced Hypertension (PIH) is defined as an elevated blood pressure of ≥ 140/90 mm Hg recorded at rest on two different occasions and emerging after 20 weeks of gestation in a pregnant woman. It is classified into three types according to associated features: Gestational Hypertension: BP of ≥ 140/90 mm Hg without associated proteinurea. Pre-Eclampsia: BP of ≥ 140/90 mm Hg with associated proteinurea of ≥ 300 mg / 24 hours. Eclampsia: The onset of convulsions in a woman with pre-eclampsia that cannot be attributed to other causes.[2]

Hypertensive disorders in pregnancy are a major cause of maternal and fetal morbidity and mortality. PIH is the most common cause of maternal mortality in Europe. It is also amongst the leading causes of maternal deaths in developing countries like India and Pakistan.[5] PIH, in its different forms, is responsible for 10 – 15% maternal deaths worldwide.[3] It is also associated with an increased risk of fetal and neonatal mortality.[6] Nearly 5–11% of pregnant women develop hypertensive disorders and fundus changes are seen in 40 – 100% of these patients.[4,11] The most common finding in such patients is attenuation of small retinal

blood vessels especially arterioles. These vascular changes are reversible and the resultant signs and symptoms resolve after delivery.[1] The potential complications of hypertensive retinopathy in pregnancy are development of central serous chorioretinopathy (CSCR) and serous retinal detachment.[8,9]

Retina is the only site in human body where blood vessels can be visualized directly with the help of an Ophthalmoscope. As hypertension has its effects on all the vessels of human body, retinal examination and assessment of vascular changes in pregnant women can provide valuable information about the status of placental circulation and fetal well being [12]. Hypertensive retinopathy is a well known predictor of increased cardiovascular risk.[10] Women affected with pre-eclampsia or eclampsia are twice at risk of cardiovascular and cerebrovascular accidents as compared with unaffected women.[3]

This study was undertaken to determine the prevalence of retinal changes in PIH and association between the retinal changes and blood pressure, proteinuria and severity of the disease.

MATERIALS AND METHODS

This cross – sectional study was carried out at Holy Family Hospital, Rawalpindi from July 2013 to July 2015. A total of 168 patients diagnosed with Pregnancy Induced Hypertension were included in this study. The patients with known diabetes or hypertension or any other ocular pathology which hindered posterior segment examination were excluded from the study. Similarly patients who had any renal disease were also excluded.

Patient's age, number of pregnancies, gestation period in weeks, blood pressure and proteinuria were noted from their clinical records. The pupils were dilated with Tropicamide 1% eye drops and retina was examined with a direct ophthalmoscope. The examination was carried out by two senior residents of ophthalmology department to minimize the observer's bias. Any pathological findings were noted and the Keith – Wagener classification[7] was used to grade the hypertensive retinopathy as shown below:

Grade 1: Mild generalized arterial attenuation, particularly of small branches;

Grade 2: More severe Grade 1 + focal arteriolar attenuation;

Grade 3: Grade 2 + hemorrhages, hard exudates, cotton wool spots;

Grade 4: Grade 3 + optic disc swelling

The dipstick method was used to test proteinurea and it was graded as nil = not detectable, + = ≥ 0.3 gm/L, ++ = ≥ 1 gm/L and +++ = ≥ 3 gm/L. The severity of PIH was classified as gestational hypertension, pre-eclampsia and eclampsia according to clinical and laboratory findings as described above.

The data was analyzed by Statistical Package for Social Sciences (SPSS) version 20.0 and values were expressed in terms of frequencies, percentages and means. Bi-variate correlation was used to determine the association between retinal changes and blood pressure, proteinuria, and severity of the disease. P-value < 0.05 was considered statistically significant.

RESULTS

A total of 168 patients were examined, of which 42 (25%) were primi-gravida (first time pregnant), 91 (54.2%) were multi-gravida (2 to 4 pregnancies) and 35 (20.8%) were grand multi-gravida (5 or more pregnancies). The age ranged from 18 to 42 years with a mean of 27.66 (±5.20) years. The gestation period was between 25 and 41 weeks with an average of 33.36 (±3.91) weeks. 126 (75%) patients were diagnosed with gestational hypertension, 37 (22%) had pre-eclampsia and 5 (3%) patients had eclampsia. 94 (56%) patients had a BP < 150/100 mm Hg while 74 (44%) patients had > 150/100 mm Hg. 126 (75%) patients did not have any detectable proteinurea, 13 (7.7%) had a proteinurea of +, 24 (14.3%) had ++ and 5 (3%) patients had +++. 81 (48.2%) patients did not show any retinal changes. Hypertensive retinopathy was observed in 87 (51.78%) patients. Grade 1 changes were seen in 51 (30.4%) patients, grade 2 in 28 (16.7%), grade 3 in 5 (3%) and grade 4 in 3 (1.8%) patients. Central serous chorioretinopathy (CSCR) was seen in 3 (1.8%) patients (table 1).

A statistically significant positive correlation was seen between the severity of retinal hypertensive changes and blood pressure (p=0.005). Similarly, a highly positive correlation was observed between the severity of retinopathy and the grade of proteinurea (p = 0.000), severity of disease (p = 0.000) and no of pregnancies (p = 0.001) (table 1).

Table 1: Distribution of cases (n =168)

Parameters	No. of Patients n (%)
NO. OF PREGNANCIES	
Primigravida	42 (25.0)
Multigravida	91 (54.2)
Grand multigravida	35 (20.8)
BLOOD PRESSURE	
<150/100 mmHg	94 (56.0)
>150/100 mmHg	74 (44.0)
SEVERITY OF DISEASE	
Gestational hypertension	126 (75.0)
Pre eclampsia	37 (22.0)
Eclampsia	5 (3.0)
PROTEINUREA	
Nil	126 (75.0)
+	13 (7.7)
++	24 (14.3)
+++	5 (3.0)
GRADE OF RETINOPATHY	
Nil	81 (48.2)
Grade 1	51 (30.4)
Grade 2	28 (16.7)
Grade 3	5 (3.0)
Grade 4	3 (1.8)
CSCR	
Present	3 (1.8)
Absent	165 (98.2)

DISCUSSION

Hypertensive disorders are a common cause of morbidity and mortality in pregnant women. In Pakistan 10 – 12% women suffer from pregnancy induced hypertension.[3] In the developed countries like US the reported incidence is much less and only 4% of pregnant women suffer from PIH[6]. This study included 168 women who were diagnosed with pregnancy induced hypertension. The mean age was about 27 years. It is similar to the average age of women as shown in previous studies from Malaysia[1] (30 years) and India[12] (25 years). However, in the US, most of the women who suffered from PIH were either younger than 20 years or older than 35 years of age.[6]

Out of the 168 patients examined, 87 (51.78%) showed signs of hypertensive retinopathy. Previous literature shows a prevalence of retinal changes from 13% to 59%[1]. Most of the previous studies showed only grade 1 and grade 2 hypertensive changes in pregnant women[1, 12], while this study showed grade 3 changes in 5 (3%) and grade 4 changes in 3 (1.8%) patients. 3 (1.8%) patients also showed CSCR. This is very high as compared to a study by Said – Ahmed, et al[9] which showed a rate of only 0.008%. This may be due to delayed presentation of patients for medical care in our setup.

42 (25%) out of 168 patients were primi-gravida, of which 18 (42.8%) showed retinal changes. 91 (54.2%) were multi-gravida and 41 (45%) had retinopathy. 35 (20.8%) patients were grand multi-gravida and retinal hypertensive changes were seen in 28 (80%). This shows that grand multi-gravida had almost twice the incidence of retinal hypertensive changes as compared to primi and multi-gravida. There was a significant correlation between number of pregnancies and severity of retinopathy ($p = 0.001$). This correlation was not seen in previous literature.[1,12]

126 (75%) patients had gestational hypertension, 37 (22%) had pre-eclampsia and 5 (3%) patients had eclampsia. A statistically significant positive correlation was seen between the severity of disease and the grade of retinopathy in this study ($p = 0.000$). This positive correlation was also observed in previous studies.[1,12] 94 (56%) patients had a blood pressure of < 150/100 mm Hg and 74 (44%) had a BP of > 150/100 mm Hg. Of these, retinopathy was seen in 41 (43.6%) and 46 (62.1%) patients respectively. A positive correlation was seen between blood pressure and grade of retinopathy ($p = 0.005$) as described by previous literature.[1,12]

In this study, statistically significant positive correlation was observed between the grade of proteinurea and the grade of retinopathy ($p=0.000$). 126 (75%) patients had no proteinurea and out of these 58 (46%) showed retinopathy. 13 (7.7%) patients had a proteinurea of "+", 24 (14.3%) had "++" and 5 (3%) had "+++". Out of these 6 (46.1%), 18 (75%) and 5

Table 2: Correlation of retinopathy with different variables (n = 168)

		GRADE OF RETINOPATHY						
		NIL (n = 81)	Grade 1 (n = 51)	Grade 2 (n = 28)	Grade 3 (n = 5)	Grade 4 (n = 3)	Total (n = 168)	P value
BLOOD PRESSURE	< 150/100	53	29	12	0	0	94	0.005
	> 150/100	28	22	16	5	3	74	
PROTEINURER	NIL	68	34	24	0	0	126	0.000
	+	7	6	0	0	0	13	
	++	6	11	4	3	0	24	
	+++	0	0	0	2	3	5	
SEVERITY OF DISEASE	Gestational Hypertension	68	34	24	0	0	126	0.000
	Pre-eclampsia	13	17	4	3	0	37	
	Eclampsia	0	0	0	2	3	5	
NO. OF PREGNANCIES	Primigravida	24	9	7	2	0	42	0.001
	Multigravida	50	29	11	1	0	91	
	Grand Multigravida	7	13	10	2	3	35	

(100%) patients had hypertensive changes. Previous studies also showed similar positive correlation between grade of proteinurea and grade of retinopathy in patients of PIH.[1,12]

Many physiological cardiovascular and hemodynamic changes occur in pregnant women to provide for the well being of the developing fetus.[5] If a woman suffers from hypertension during pregnancy, it affects all the blood vessels in the body including placental vasculature[1]. If not properly managed, it results in significant maternal and fetal morbidity and can even lead to maternal or fetal mortality[6]. Presence of hypertensive retinopathy in pregnant women is a strong indicator of similar vascular changes in placental circulation and can be used as a predictor of fetal well – being.[11]

CONCLUSION

In conclusion, the level of blood pressure, grade of proteinurea and severity of PIH are all correlated with the severity of vascular changes in pregnant women. Routine ophthalmoscopy should be performed in women suffering from PIH so that the status of retinal vasculature in particular and placental vasculature in general can be assessed. With timely diagnosis and management of such patients significant loss in terms of maternal and fetal morbidity and mortality can be prevented.

Author's Affiliation

Dr. Muhammad Imran Janjua
Postgraduate Trainee Ophthalmology
Holy Family Hospital, Rawalpindi

Dr. Saira Bano
Postgraduate Trainee Ophthalmology
Holy Family Hospital, Rawalpindi

Prof. Dr. Ali Raza
Head of Ophthalmology Department
Rawalpindi Medical College and Allied Hospitals

Role of Authors

Dr. Muhammad Imran Janjua
Study conception, data collection, analysis and drafting.

Dr. Saira Bano
Study conception, data collection and analysis.

Prof. Dr. Ali Raza
Critical Review, analysis and overall supervision.

REFERENCES

1. **Reddy SC, Sivalingam N, Sheila Rani KG, Tham SW.** Fundus changes in pregnancy induced hypertension. Int J Ophthalmol. 2012; 5: 694-7.
2. **Watanabe K, Naruse K, Tanaka K, Metoki H, Suzuki Y.** Outline of Definition and Classification of "Pregnancy induced Hypertension (PIH)" Hypertens Res Pregnancy 2013; 1: 3–4.
3. **Khan A, Fahim A, Qureshi A, Nizamani GS, Azmi MA.** Pregnancy induced hypertension; assessment of prognostic value of platelet count in women with varying degree. Professional Med J. 2014; 21: 436-440.
4. **Mackensen F, Paulus WE, Max R, Ness T.** Ocular changes during pregnancy. Dtsch Arztebl Int. 2014; 111: 567–76.
5. **Kintiraki E, Papakatsika S, Kotronis G, Dimitrios G. Goulis,[1] Kotsis V.** Pregnancy – Induced hypertension. Hormones. 2015, 14: 211-23.
6. **Ananth CV, Basso O.** Impact of Pregnancy-Induced Hypertension on Stillbirth and Neonatal Mortality in First and Higher Order Births: A Population-Based Study. Epidemiology 2010; 21: 118–23.
7. **Kanski JJ.** Clinical ophthalmology-a systematic approach, 2nd ed, Oxford, Butterworth Heinmann, 1989; p 329.
8. **Omoti AE, Erameh JMW, Okeigbemen VW.** A Review of the Changes in the Ophthalmic and Visual System in Pregnancy. Afr J Reprod Health. 2008; 12: 185-96.
9. **Said-Ahmed K, Moustafa G, Fawzy M.** Incidence and natural course of symptomatic central serous chorioretinopathy in pregnant women in a maternity hospital in Kuwait. Middle East Afr J Ophthalmol 2012; 19: 273-6.
10. **van den Born BH, Hulsman CAA, Hoekstra JBL, Schlingemann RO, van Montfrans GA.** Value of routine funduscopy in patients with hypertension: systematic review. bmj.com. 2005; 331: 73.
11. **Ranjan R, Sinha S, Seth S.** Fundus Changes and Fetal Outcomes in Pregnancy Induced Hypertension: An Observational Study. Int J Sci Stud. 2014; 2: 6-9.
12. **Shah AP, Lune AA, Magdum RM, Deshpande H, Shah AP, Bhavsar D.** Retinal changes in pregnancy induced hypertension. Med J DY Patil Univ. 2015; 8: 304-7.