International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Kadam D et al. Int J Reprod Contracept Obstet Gynecol. 2022 May;11(5):1496-1500
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20221283

Original Research Article

Comparative study of fundus changes in hypertensive and normotensive pregnant females in third trimester at tertiary care centre

Dhruvika Kadam[1], Jongpongyangla N. Imti[2]*, Radha Rastogi[2], Anuj Sharma[2], Kanupriya Meena[2]

[1]Department of Ophthalmology, [2]Department of Obstetrics and Gynaecology, RNT Medical College, Jodhpur, Rajasthan, India

Received: 04 March 2022
Revised: 01 April 2022
Accepted: 02 April 2022

***Correspondence:**
Dr. Jongpongyangla N. Imti,
E-mail: ayangimti7@gmail.com

ABSTRACT

Background: According to ACOG, hypertension in pregnancy can be defined as systolic blood pressure of 140mmhg or higher, diastolic blood pressure of 90mmhg or higher confirmed on atleast two occasions 4-6 hours apart but within a maximum of a week period. The retinal vascular changes have been said to correlate with the severity of hypertension. Many studies have considered the progression of retinal vascular changes as a sign of increasing severity of PIH and have correlated them with fetal mortality. The aim of the study was to comparison of fundus changes among hypertensive and normotensive pregnant female in third trimester.
Methods: 50 hypertensive and 50 normotensive pregnant women were included in the study. All patients fulfilling inclusion and exclusion criteria diagnosed with pre-eclampsia, eclampsia, chronic hypertension were studied for ocular fundus changes and retinal changes were graded according to Keith Wagener classification.
Results: Nearly 3/4th of patients in this study group were primigravida. 64% of patients were in the gestational age less than 36weeks. A significant number of PIH changes were noted in the age group 21-25 however significant number of fundal changes were noted in age group 26-30. 58.33% of study group showed fundal changes of grade III.
Conclusions: The vascular changes in the retina correlate with the severity of the systemic and vascular involvement. Fundoscopy should be offered to all hypertensive pregnant females so that if positive findings are noted, active intervention can be done correlating with other radiological and biochemical findings.

Keywords: Fundoscopy, PIH, Normotensive, Fundal changes

INTRODUCTION

Pregnancy-related hypertension is one of the leading causes of maternal and perinatal mortality worldwide. Pre-eclampsia complicates pregnancy in 2-8 percent of women around the world.[1]

According to the American College of Obstetricians and Gynecologists, hypertension in pregnancy is defined as a systolic blood pressure of 140mmhg or higher, and a diastolic blood pressure of 90mmhg or higher, confirmed on at least two occasions 4-6 hours apart but no more than a week apart.[2,3,4] Young and nulliparous women are more susceptible to pre eclampsia, while older women are more likely to develop chronic hypertension on top of pre eclampsia.[5-6]

Endothelial dysfunction with generalised vasoconstriction is thought to be the basic pathology, with symptoms ranging from mild to severe depending on the severity of Vasospasm and capillary leakage.[7] This can affect a variety of multisystem organs, resulting in cardiovascular dysfunction, haematological abnormalities, neurological

manifestations, renal and hepatic involvement, and ocular manifestations, in addition to placental pathology.[8-10]

The severity of hypertension has been linked to changes in the retinal vascular system. The progression of retinal vascular changes has been linked to foetal mortality in numerous studies as a sign of increasing PIH severity.[11]

Retinal changes were graded according to Keith Wagener classification.[12]

Grade I: mild generalised arterial attenuation particularly of small branches. Grade II: More severe grade I plus focal arteriolar attenuation. Grade III: Grade II plus haemorrhages, hard exudates, cotton wool spots. Grade IV: Grade III with papilledema.[14]

One of the most dramatic and potentially serious ocular complications of PIH is retinal detachment.[13]

The severity of hypertension has been found to correlate with ocular vascular changes in PIH, and this has been used as an indicator to predict adverse feto-maternal outcomes and pregnancy termination.[14]

Funduscopy, a non-invasive procedure, is useful in determining the severity of vascular and systemic involvement in pregnant women with hypertension. It should be considered for use during the antenatal period, allowing for timely diagnosis and management to avoid adverse maternal and foetal outcomes.

Aim of study

Comparison of fundus changes among hypertensive and normotensive pregnant female in third trimester.

METHODS

A cross sectional study conducted in RNT Medical College attached to Govt. Hospital, a tertiary care hospital in Udaipur during the period July 2020 to June 2021. 50 hypertensive and 50 normotensive pregnant women were included in the study.

Inclusion criteria

All pregnant females above 28 weeks fulfilling the criteria of hypertension in pregnancy.

Exclusion criteria

All pregnant females with pre existing ocular disease and chronic renal disease.

Method of data collection

Study group were divided into two groups, first group consisting of 50 normotensive pregnant females as control and 50 hypertensive pregnant females fulfilling the inclusion criteria in second group.

After proper informed consent, detailed history, general and systemic as well as obstetric examination was done and then the pregnant females eyes were dilated with eyedrops tropicamide with phenylephrine three times at an internal of ten minutes, until sufficient pupillary dilatation was attained and fundus examination was done using a indirect ophthalmoscope and 20D lens. All patients fulfilling above inclusion and exclusion criteria diagnosed with pre-eclampsia, eclampsia, chronic hypertension were studied for ocular fundus changes and retinal changes were graded according to Keith Wagener classification.

Statistical analysis of the data was done using Graph Pad version 3.0. Data was analysed with proper statistical test as applicable.

RESULTS

Almost 75% of patients of hypertensive group were primigravida.

Table 1: Distribution according to parity.

	Normotensive		Hypertensive	
Parity	**No. of patients**	**%**	**No. of patients**	**%**
Primi	24	48%	36	72%
Multi	26	52%	14	28%
Total	50	100%	50	100%

Table 2: Distribution according to gestational age.

	Normotensive		Hypertensive	
Gestational age (weeks)	**No. of patients**	**%**	**No. of patients**	**%**
30-33	-	-	14	28%
33-36	-	-	18	36%
36-39	30	60%	16	32%
>39	20	40%	2	4%

In the study group 64% of patients were in the gestational age less than 36weeks. A significant number of PIH changes were noted in the age group 21-25 however significant number of fundal changes were noted in age group 26-30.

In this study group nearly 58.33% of study group showed fundal changes of grade III. Most common fundal changes noted were arterial attenuation followed by haemorrhages and exudates in 52% and 26% respectively.

Eight cases with deranged LFT had grade III retinal changes followed by 4 cases had grade IV and 2 cases had grade II. The most common grade was grade III retinopathy with deranged LFT, RFT and platelets. It was observed that of the patients of preeclampsia without

severe features (i.e. mild cases), 48.6% had no retinopathy. Of the changes observed, grade 1 was most common (28.6%). None of the patients had grade 4 changes. In the patients of preeclampsia with severe features, 100% cases had varying degrees of retinopathy, the most common grade still being grade 1, II (41.66%). In the group of eclampsia also, 100% had some degree of retinopathy. Thus, as severity of disease increased, incidence of retinopathy also increased.

Table 3: Relationship between total number of cases of PIH and fundus changes according to age.

Age group (years)	PIH	Fundus changes	%
Up to 20	4	2	50.00%
21-25	26	6	53.85%
26-30	18	14	33.33%
>30	2	2	100.00%
Total	50	24	48.00%

Table 4: Distribution according to retinal grading.

	Normotensive		Hypertensive	
Stages	**No. of patients**	**%**	**No. of patients**	**%**
Normal	50	100%	26	52%
Grade I	-	-	2	8.33%
Grade II	-	-	4	16.67%
Grade III	-	-	14	58.33%
Grade IV	-	-	4	16.67%

Table 5: Distribution according to effect of hypertension on eyes.

Fundal changes	Number	Percentage
Arterial attenuation	100	100%
Haemorrhages	52	52%
Exudates	26	26%
Papilloedema	6	6%

Table 6: Comparison of lab parameters with retinopathy in hypertensive pregnant females.

Variable		Grade 0/ Normal	Grade I	Grade II	Grade III	Grade IV	Total
Proteinuria	1	6	2		4	-	12
	2	10	-	2	10	2	24
	3	10	-	2	-	2	24
	4	-	-	-	-	-	0
Liver function test (LFT)	Normal	10	2	2	6	-	20
	Deranged	16	-	2	8	4	30
Renal function test (RFT)	Normal	20	2	4	10	4	40
	Deranged	6	-	-	4	-	10
Platelets (Per cum)	Normal	18	2	2	8	4	34
	Deranged	8	-	2	6	-	16

Table 7: Relationship of retinal grading with severity Of PIH.

Fundus grading	Pre eclampsia without severe features		Pre eclampsia With severe features		Eclampsia		Total	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Normal	18	51.4	0	0	0	0	18	36
Grade I	10	28.6	5	41.66	0	0	15	30
Grade II	6	17.14	5	41.66	1	33.3	12	24
Grade III	1	2.9	2	16.66	1	33.3	4	8
Grade IV	0	0	0	0	1	33.3	1	2
Total	35	100	12	100	3	100	50	100

DISCUSSION

The incidence of PIH is more common in primipara than multigravida because the young retinal arterioles are more sensitive to high blood pressure. The second high peak was seen in patients having multiple pregnancies. These findings were similar to Bakhda et al.[16]

The incidence of PIH as well as positive fundus findings is more common in age group of 18 to 25 years. Our study correlates with the study of Neutra et al, who reported that

women under 20 years were six to seven times more susceptible than those in age 25-29 years.[15] Retinal detachment and papilloedma are indication for termination of pregnancy. The prevalence of hypertensive fundus changes was found to be 24%. This is little more than reported by Tadin et al.[17] The prevalence of ocular changes in PIH patients as described in literature varies from 30 to 100% (Hayreh et al; Sadowsky et al).[18,19]

Visual symptoms are generally not very frequent in patients of PIH. Out of the visual symptoms blurred vision is most common followed by photopsia, scotomata and diplopia (Davis et al).[20] In our study, we didn't come across any patients complaining of significant visual disturbances. Mild arteriolar spasm involving the bulbar conjunctival vessels has been observed in normal pregnancy. When retinal haemorrhages are present a more severe hypertensive state is suggested. The presence of retinal hemorrhage, transudate or papilledema associated with hypertension, requires prompt interruption of pregnancy regardless of duration of gestation.[16]

The severity of preeclampsia correlated with the occurrence of retinal changes. 100% of patients with preeclampsia without severe features showed no changes on fundoscopy while 88.9% cases of severe preeclampsia and eclampsia had positive findings. The presence of systolic BP of 195 mmHg had 85.7% sensitivity and 93.1% specificity for predicting the presence of retinopathy. The area under curve (AUC) was significant 0.945 with a $p<0.001$. Similar results have been reported by Tadin et al, who reported that the degree of retinopathy was directly proportional to severity of preeclampsia.[17]

The ocular vascular changes in PIH have been found to correlate with the severity of hypertension and this has been used as an indicator to predict adverse feto-maternal outcomes and for termination of pregnancy. There was a significant correlation between the degree of protienuria and retinopathy. Similarly Sharma et al reported a significant association of severity of retinopathy with protienuria which was also in consonance with Tadin et al.[17,21]

CONCLUSION

The retina offers a non-invasive platform to directly observe the pathological changes occurring in the systemic vasculature. Fundoscopy conducted in normotensive pregnant females had normal findings whereas in hypertensive pregnant females fundal changes were noted of varying degree. Retinal changes of grade III is more commonly noted in pregnant females diagnosed with hypertension. The vascular changes in the retina correlate with the severity of the systemic and vascular involvement. Hence, the eyes can truly be considered a mirror to the otherwise elusive vascular changes occurring elsewhere in the body. Hence, we should offer fundoscopy to all hypertensive pregnant females so that if positive findings are noted, active intervention can be done correlating with other radiological and biochemical findings. However, to achieve optimal result in management, synchronisation of obstetrician with ophthalmologist should be considered provided there is adequate resources for conducting fundal examination alongside antenatal care.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. James PR, Nelson-Piercy C. Management of hypertension before, during, and after pregnancy. Heart. 2004;90(12):1499-504.
2. ACOG Committee on Obstetric Practice. ACOG practice bulletin. Diagnosis and management of preeclampsia and eclampsia. Number 33, January 2002. American College of Obstetricians and Gynecologists. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2002;77(1):67-75.
3. Croke LM. Gestational hypertension and preeclampsia: a practice bulletin from ACOG. Am Fam Phy. 2019;100(10):649-50.
4. Staff AC, Sibai BM, Cunningham FG. Prevention of preeclampsia and eclampsia. In: Chesley's Hypertensive Disorders in Pregnancy. Academic Press.2015;253-67.
5. Bartsch E, Medcalf KE, Park AL, Ray JG. Clinical risk factors for pre-eclampsia determined in early pregnancy: systematic review and meta-analysis of large cohort studies. BMJ. 2016;353.
6. Jaskolka D, Retnakaran R, Zinman B, Kramer CK. Fetal sex and maternal risk of pre-eclampsia/eclampsia: a systematic review and meta-analysis. Int J Obst Gyn. 2017;124(4):553-60.
7. Melchiorre K, Sutherland G, Sharma R. Mid-gestational maternal cardiovascular proile in preterm and term pre-eclampsia: a prospective study. BJOG. 2013;120(4):496.
8. Karki P, Malla KP, Das H, Uprety DK. Association between pregnancy induced hypertensive fundus changes and fetal outcome. Nepal J Ophthalmol. 2010;2(1):26-30.
9. Handor H, Daoudi R. Images in clinical medicine. Hypertensive retinopathy associated with preeclampsia. N Engl Med. 2014;370(8):752.
10. Roos N M, Wiegman MJ, Jansonius NM. Visual disturbance in (pre) eclampsia. ObstetGynecolSurv. 2012;67(4):242.
11. Report of the national high blood pressure education programme working group report on high blood pressure in pregnancy. Am J Obstet Gynecol 2000;183:S1-22.
12. ACOG Committee on Obstetric Practice. ACOG practice bulletin. Diagnosis and management of

preeclampsia and eclampsia. Number 33, January 2002. American College of Obstetricians and Gynecologists. Int J Gynaecol Obstet 2002;77:67-75.3. Dutta DC. Textbook of Obstetrics. In: Konar H, editor. Hypertensive disorders in pregnancy. 6th ed. Ch. 17. Calcutta: New central book agency. 2001;(1):221-42.
13. Jaffe G, Schatz H. Ocular manifestations in preeclampsia. Am J Ophthalmol 1987;103:309-15.11. Duke E. System of Ophthalmology. In: Sir Stewart, editor. Diseases of Retina. 2nd ed. Vol. X. St Louis: CV Mosby. 1971;136.
14. Hallum AV. Eye changes in hypertensive toxaemia of pregnancy: A study of three hundred cases. JAMA. 1936;106:1649-51.
15. Neutra RR. A case control study for estimating the risk of eclampsia in California, Colombia. Am J Obstet Gynecol. 1973;117:894.
16. Bakhda RN. Clinical study of fundus findings in pregnancy induced hypertension. J Family Med Prim Care. 2016;5:424-9.
17. Tadin L, Bojic L, Mimica M, Karelovic D, Dogas Z. Hypertensive retinopathy and preeclampsia. Coll Antropol. 2001;25:77-81.
18. Hayreh SS, Servais GE, Virdi PS. Fundus lesions in malignant hypertension. V. Hypertensive optic neuropathy. Ophth. 1986;93:74-87.
19. Sadowsky A, Serr DM, Landa J. Retinal changes and fetal prognosis in the toxemias of pregnancy. Obstet Gynecol. 1956;8:426-31.
20. Davis EA, Dana MR. Pregnancy and the eye. In: Albert & Jakobeik, Azar, Gragoudas. Principles and practice of ophthalmology. 2nd ed. (Philadelphia): W.B. Saunders Company. 2000;4768-69.
21. Sharma JC, Choudhary B, Maru L, Mathur P. The retina in hypertensive disorders of pregnancy: a study of the prevalence and association with severity of disease in a tertiary referral centre in India. Int J Reprod Contracept Obstet Gynecol. 2020;9:375-82.

Cite this article as: Kadam D, Imti JN, Rastogi R, Sharma A, Meena K. Comparative study of fundus changes in hypertensive and normotensive pregnant females in third trimester at tertiary care centre. Int J Reprod Contracept Obstet Gynecol 2022;11:1496-500.