

Retinal Changes with Clinical Observations in Patients of Hypertensive Disorders of Pregnancy

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Abstract

Background: Hypertension is one of the common complications encountered in pregnancy and contributes significantly to maternal and perinatal morbidity and mortality. Identification of hypertension and its effective management plays a significant role in the outcome of pregnancy, both for the mother and the baby. The finding of retinopathy may be an indication for a termination of pregnancy, since its continuance may lead to serious complications like loss of vision or the life of the mother as well as a stillbirth. The eyes serve as windows for studying the pattern of the cerebral circulation. The retina acts as an indicator of the state of the renal parenchyma. Since there is a close correlation among retinal, cerebral and renal vessels, funduscopy gives opportunity of observing the changes in the vascular pattern and drawing inferences about the general condition of the vascular system of the body.

Method: The fundi of 150 patients admitted in the Department of Obstetrics and Gynaecology in Agartala Government Medical College, Agartala, were examined and the findings were documented according to Keith, Wagner and Barkers classification of hypertensive retinopathy, along with documentation of biochemical and haematological parameters. The neonatal parameters were also noted. Indirect ophthalmoscopy was done to look for retinopathy of prematurity in the babies delivered by mothers included in the study. The data was analysed by descriptive statistics, chi-square test and estimation of p value using SPSS software.

Results: Retinal changes were found in 49.33% of the patients and the rest showed normal retina. Focal constriction of the arterioles was the commonest finding in the fundus of those who had retinopathy. Grade 1 hypertensive retinopathy was the commonest grade of retinopathy. Retinopathy was commoner in patients with severe hypertension. Presence of retinopathy in the mother significantly affected neonatal parameters like mode of delivery, sex and birth weight of the baby.

Conclusion: Retinal changes were found in about half of the patients. The commonest grade of retinopathy was Grade 1 hypertensive retinopathy and the least common grade was Grade 4 retinopathy. Focal constriction of retinal arterioles was the commonest finding. Arterio-venous ratio was 2:3 in most of the cases. Nicking at the arterio-venous crossings was found in 10% of the cases. Macular edema was found in 12% of the cases. Hypertensive disorders of pregnancy were associated with low APGAR scores in some of the babies.

Keywords: Hypertension, Hypertensive retinopathy, APGAR score, Pregnancy

I. Introduction

Hypertension is a multisystem disorder and affects many organs of the body, one of which is retina.^[1] Hypertension is one of the common complications encountered in pregnancy and contributes significantly to maternal and perinatal morbidity and mortality. Identification of hypertension and its effective management plays a significant role in the outcome of pregnancy, both for the mother and the baby.^[2]

Retinopathy in Pregnancy induced hypertension (PIH) occurs late in pregnancy, rarely before the sixth month and practically always in the ninth month. It is the responsibility of the ophthalmologist to diagnose retinopathy in pregnant ladies with hypertension and any visual symptoms occurring in the later stages of pregnancy must be thoroughly investigated. The finding of retinopathy may be an indication for a termination of pregnancy, since its continuance may lead to serious complications like loss of vision or the life of the mother as well as a stillbirth.^[3]

The eyes serve as windows for studying the pattern of the cerebral circulation. The retina acts as an indicator of the state of the renal parenchyma. Since there is a close correlation among retinal, cerebral and renal vessels, funduscopy gives opportunity of observing the changes in the vascular pattern and drawing inferences about the general condition of the vascular system of the body. Fundoscopic findings in Hypertensive disorders

of pregnancy include a reduced arteriole to vein ratio, A-V crossing changes, haemorrhages, exudates in the retina, exudative retinal detachments and choroidal infarcts.^[4] By detecting retinal arteriolar spasm, the ophthalmologist might determine when immediate delivery of the baby is required to reverse the pre-eclamptic state and prevent an adverse maternal outcome. Eye grounds are probably the best single indicator of the progress of the toxemia. In general retinal changes run parallel with severity of the hypertension and therefore, of the toxemia.^[5] Hypertension in pregnancy can be classified as Gestational Hypertension, Preeclampsia, Eclampsia, Chronic Hypertension and Superimposed preeclampsia on chronic Hypertension.^[6]

II. Materials And Methods

The study was a cross sectional study done with 150 patients diagnosed as having hypertensive disorders of pregnancy presenting to the Department of Obstetrics and Gynaecology of AGMC and GBP Hospital for a period of two years, from October 2013 to October 2015. Patients with more than 20 weeks of gestational period with persistent systolic blood pressure of more than 140 mmHg who gave consent for study were included in this study. However, patients with history of cardiovascular disease, chronic kidney disease prior to pregnancy, bleeding disorders or antepartum haemorrhage were excluded.

All patients and their relatives were counselled and informed in detail about the procedure and informed consent was taken. After obtaining history and presenting complaints, patient was examined for blood pressure at admission and at the time of fundus examination. Visual acuity was checked clinically at bed side and slit lamp examination was done to rule out any gross anterior segment pathology. One to two drops of a combination of 0.8% Tropicamide (w/v) and 5% (w/v) Phenylephrine Hydrochloride was instilled into the cul-de-sac. The patient was instructed to apply digital pressure on lacrimal sac for 2 to 3 min after drug instillation to avoid systemic absorption. This procedure was repeated for three to four times and when the pupils were fully dilated (after 30 to 40 minutes), fundoscopy was done with indirect ophthalmoscope. Patients who were stable were mobilized to the Department of Ophthalmology and fundus photographs were taken with the help of fundus camera. The biochemical and haematological parameters were also noted. Neonatal parameters were also noted after the deliveries.

The ophthalmoscopic findings were documented and staging and grading was done according to Keith, Wagner and Barker's classification of Hypertensive retinopathy. After that diagnosis was made and further obstetric management was decided based on fundoscopic findings.

III. Results

In this study of 150 patients, 76 % were in age group of 20 to 29 years followed by 17 % in age group of 30 years or more, while 7% of patients were aged 19 years or less. The mean age was 25 years.

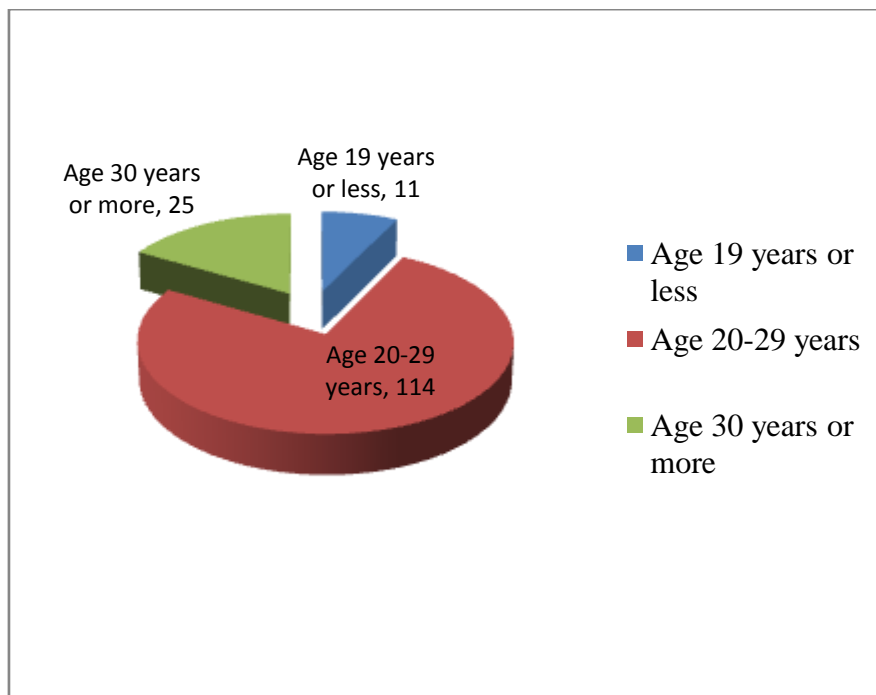


fig 1: pie chart showing age distribution

58.6% were primigravidas followed by 31.3% who were second gravida and 10% were third gravida.

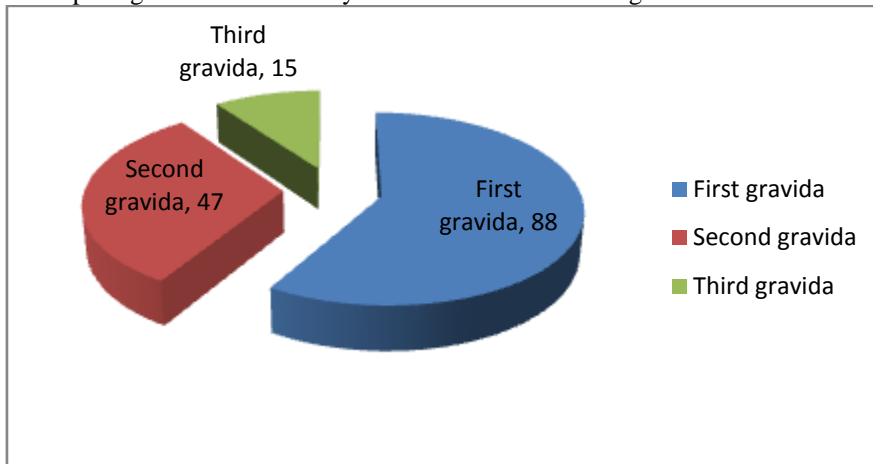


fig 2: pie chart showing distribution of gravida

73 % were term pregnancies (37 to 42 completed weeks calculating from the first day of last menstrual period), followed by 27 % who were preterm (less than 37 completed weeks). The mean gestational age was 37 weeks.

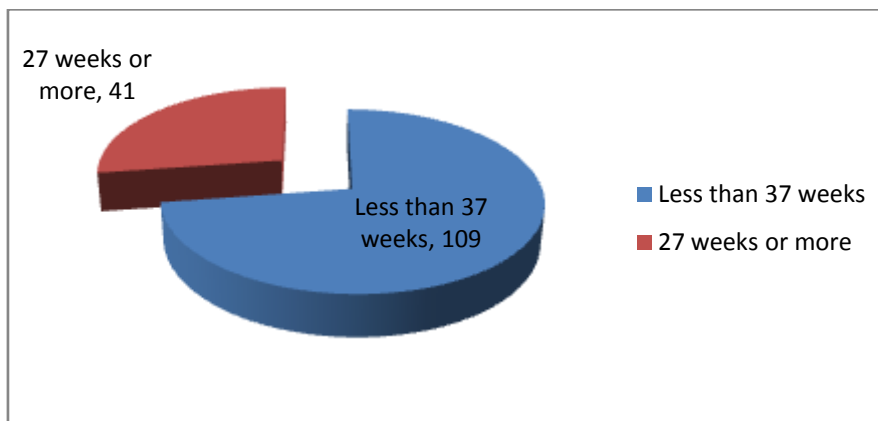


fig 3: showing distribution of duration of pregnancy

Headache was the most frequent complain, which was present in 110 out of 150 patients (73.33% of the patients). 64.66 % of the patients complained of leg swelling and 33.33 % of patients had blurring of vision as initial symptoms. 2% patients had presented with convulsion.

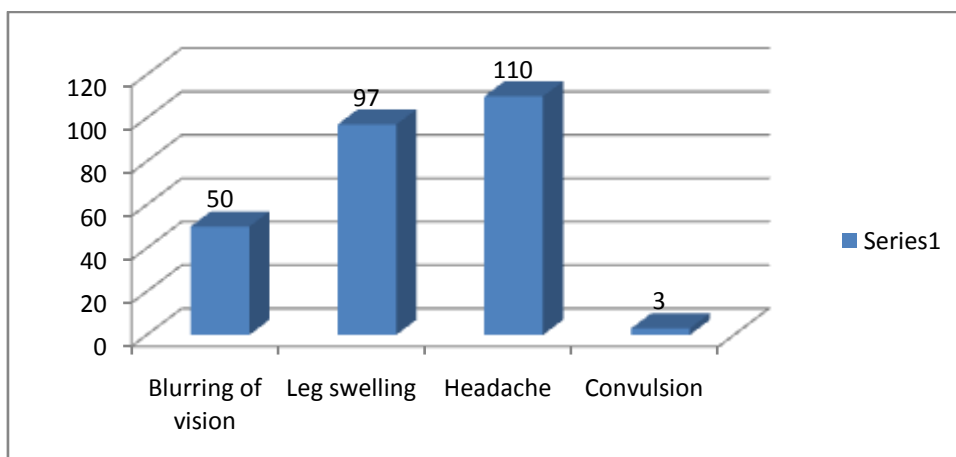


fig 4: bar graph showing distribution of symptoms

In this study of 150 patients, 74 patients (49%) showed presence of retinopathy while 76 patients (51%) showed no retinopathy.

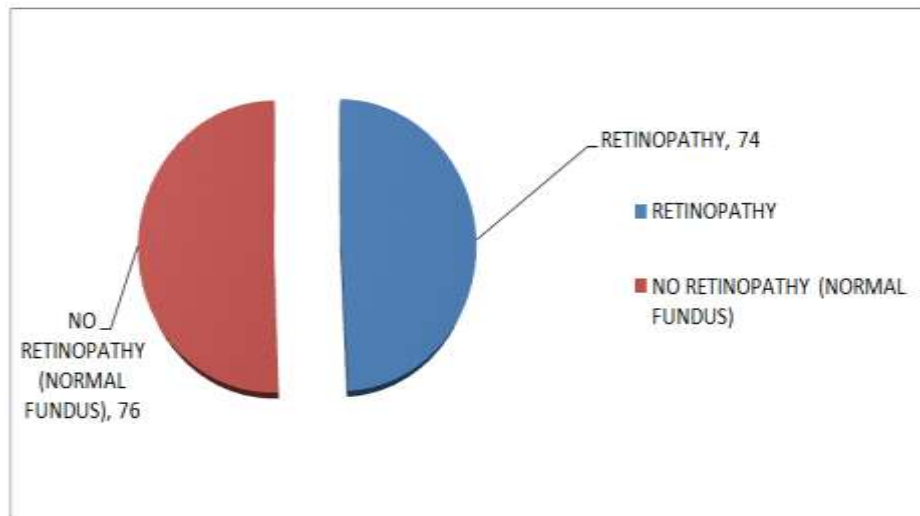


fig 5: pie chart showing distribution of retinopathy

In this study of 150 patients, 41 patients (27.33%) had Grade 1 retinopathy, 12 patients (8%) had Grade 2 retinopathy, 12 patients (8%) had Grade 3 retinopathy and 9 patients (6%) had Grade 4 retinopathy. 76 patients (50.66%) did not have any retinopathy.

Grade 1 retinopathy was the commonest grade of retinopathy, while Grade 4 was the least common.

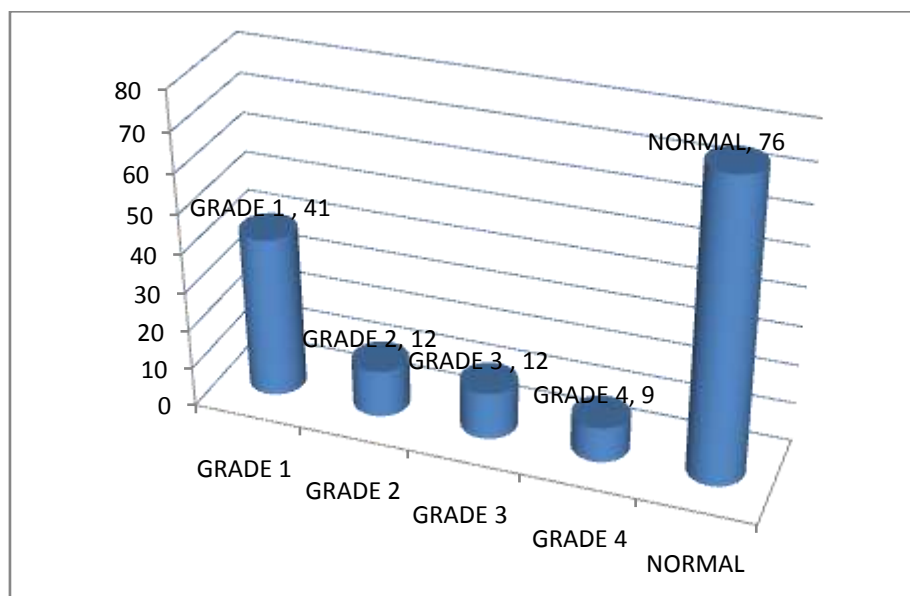


fig 6: showing distribution of various grades of retinopathy

In this study of 150 patients, 76 patients (50.66%) had normal retinal blood vessels. Focal constriction of blood vessels (arterioles) was present in 61 patients (40.66%) and generalised constriction was present in 13 patients (8.66%). 74 patients (49.34%) in total had some constriction of retinal blood vessels (either focal or generalised constriction). Focal constriction of the arterioles was the commonest finding as far as the appearance of the blood vessels was concerned.

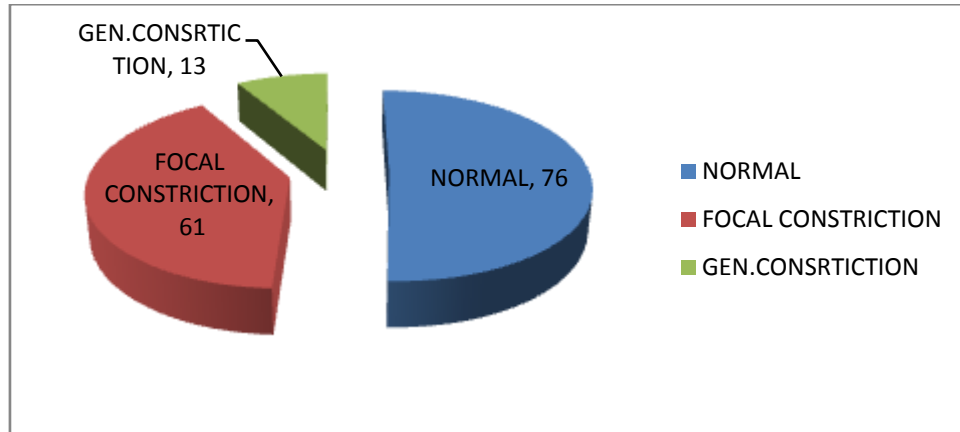


fig 7: pie chart showing distribution of changes in retinal vessels

In this study of 150 patients, 15 patients (10%) showed arteriovenous nicking at the arteriovenous crossings. All of them had either Grade 3 or Grade 4 retinopathy. The remaining 135 patients (90%) showed normal arteriovenous crossings.

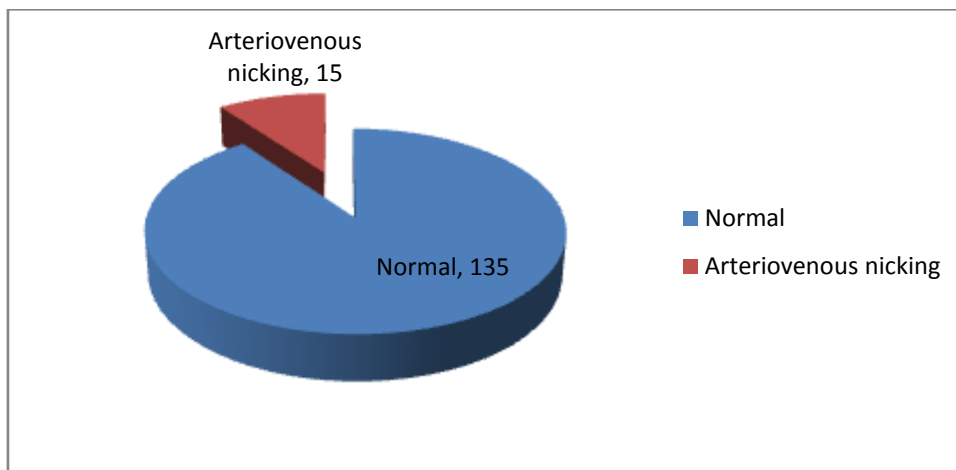


fig 8: pie chart showing distribution of arteriovenous nicking

In this study of 150 patients of hypertensive disorders of pregnancy, an Arterio-venous ratio of 1:2 was found in 60 patients (40%). A ratio of 2:3 was found in 72 patients (48%). An Arterio-venous ratio of 3:5 was present in 18 patients (12%). An Arterio-venous ratio of 2:3 was the commonest ratio as it was found in 48% of the patients.

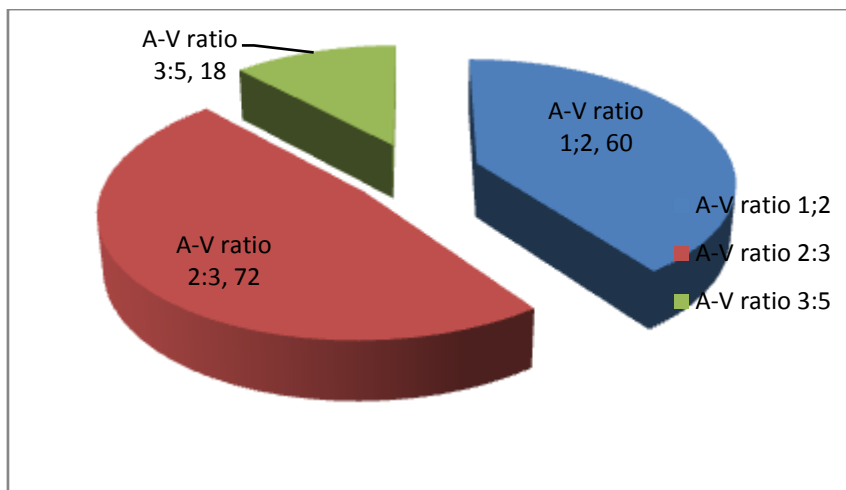


fig 9: pie chart showing distribution of a-v ratio

In this study of 150 patients, retinal backgrounds were normal in patients of Grade 1 and Grade 2 retinopathy and also in those who showed normal fundus. Abnormal findings in the retinal background were present in patients of Grade 3 and Grade 4 retinopathy. Out of 150 patients, haemorrhages were found in 17 patients (11.33%), edema was found in 12 patients (8%), and exudates were found in 4 patients (2.66%). Cotton wool spots were not found in any patient.

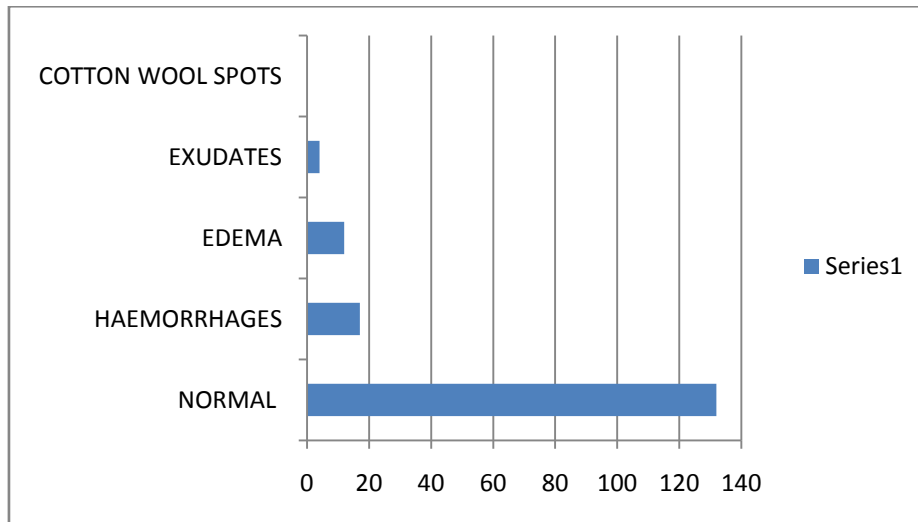


fig 10: bar graph showing distribution of various findings in the retinal background

In this study of 150 patients, normal macula was found in 132 patients (88%) whereas macular edema was found in 18 patients (12%). All the cases of macular edema were in Grades 2, 3 or 4 retinopathy. Macular edema was not found in patients having normal fundus or Grade 1 retinopathy.

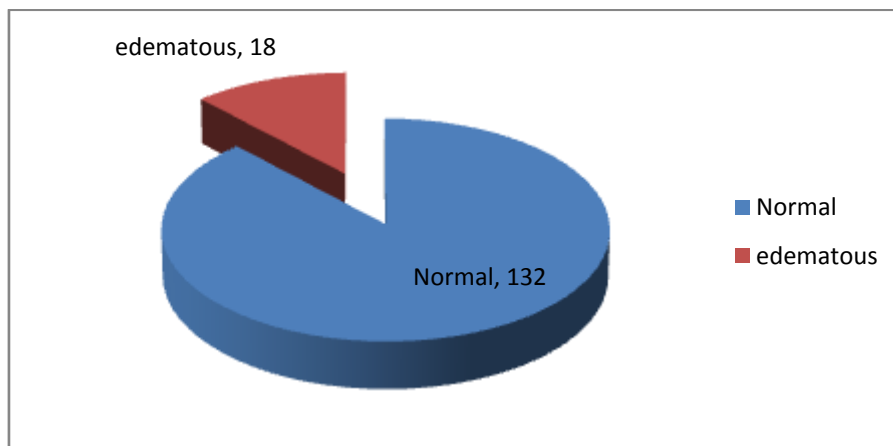


fig 11: pie chart showing distribution of macular edema

In this study , out of 76 patients in the non-retinopathy group, 46.05 % patients delivered by Caesarean section, whereas out of 74 patients in the retinopathy group, 89.18% delivered by Caesarean section. This was statistically significant (p value less than 0.05). In the non-retinopathy group, all delivered live born babies, whereas in the retinopathy group, most of the babies were live born but 3 babies out of 74(4.10%) were delivered as still born.

In the non-retinopathy group, 44.73% delivered male babies, whereas in the retinopathy group, 74.32% delivered male babies. This was statistically significant (p value less than 0.05). In the non-retinopathy group, only 7.90% and in retinopathy group, 41.89% of delivered babies had low birth weight. 19.74% and 9.73% of delivered babies had gestational age was less than 37 weeks (preterm) in non-retinopathy and retinopathy groups respectively. This was not statistically significant (p = 0.218). In the non-retinopathy group, all the patients delivered babies with an APGAR score (at Birth and 1 minute) equal to or more than 7, in comparison with 32.43% with an APGAR score (at Birth) less than 7 and , 95.9% with an APGAR score (at 1 minute) equal to

or more than 7 in retinopathy group. Retinopathy of prematurity or congenital anomalies was not found in any groups.

Table 1: showing neonatal parameters in retinopathy and non-retinopathy group

Neonatal parameters		Retinopathy		Significance
		Absent(76) Number	Present (n = 74) Number	
Mode of delivery	Caesarian	35	66	$\chi^2 = 29.787$ p = 0.000
	Vaginal	41	08	
Fate of delivery	live born	76	71	
	Still born	00	03	
Sex of baby	Male	34	55	$\chi^2 = 12.404$ p = 0.000
	Female	42	19	
Birth weight	2.5 kg or more	70	43	$\chi^2 = 21.527$ p = 0.000
	Less than 2.5 kg	06	31	
Assessed gestational age	Term	61	52	$\chi^2 = 1.513$ p = 0.218
	Preterm	15	22	
APGAR score (birth)	less than 7	00	24	
	7 or more	76	50	
APGAR score (1min)	less than 7	00	03	
	APGAR score (1 min) 7 or more	76	71	
Others	Retinopathy of prematurity	00	00	
	Congenital anomaly	00	00	

Table 2 : showing grades of hypertension in retinopathy and non-retinopathy group

Grades of hypertension	Retinopathy group	Non retinopathy group	Total
Mild	27	55	82
Moderate	21	26	47
Severe	21	00	21

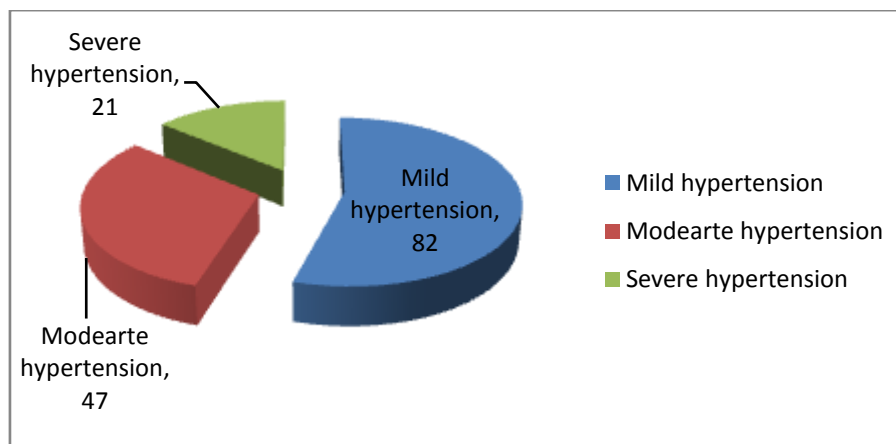


fig 12: showing distribution of hypertension

IV. DISCUSSION

In a study by Tadin et al, out of 40 women with pre-eclampsia, 45% (18) showed abnormalities of the fundus. The average age of 40 patients was 29.1 years. Many studies showed that younger and older age group are associated with risk factors.^[7,8] In another study by Jaeffe and Schatz, mean age of patients with pre-eclampsia was 28 years.^[5] Mean age of the patients in this study was 25 years, which is close to the age as found in the above studies.

Pre-eclampsia and other hypertensive disorders in an otherwise healthy woman are diseases of first pregnancy.^[8] In the present study of 150 patients with hypertensive disorders of pregnancy, 59% of patients were primi gravidas. This result of present study is comparable to previous studies, which have concluded that hypertensive disorders are more common in primigravidas.

As reported by Cunningham et al, in a study of patients with pre-eclampsia and eclampsia, the gestational age when pre-eclampsia and eclampsia developed ranged from 18-40 weeks with average gestational age of 34 weeks.^[9] This result of present study is comparable with the earlier study.

Visual disturbances such as scotoma, diplopia and dimness of vision are seen in 30-50% of patients with eclampsia and 20-25% of patients with preeclampsia. Headache has long been known to be harbinger of eclamptic convulsions. Headache is most common symptom among patients with preeclampsia.^[10, 8, 11] These results are comparable to the earlier studies cited above.

Tadin et al. in 2001 found 45% prevalence of retinopathy in patients of hypertensive disorders of pregnancy, while Reddy et al. in 2012 found 53.4% prevalence of retinopathy in such patients.^[7,12] This result is comparable to the two studies described above.

Retinal changes have been observed in 40-100% patients of preeclampsia. The most common ocular finding is constriction of arterioles occurring in approximately 60% of patients with pre-eclampsia in one study. The hallmark of abnormal ocular findings is terminal arteriolar vasospasm. Wagner reported spastic lesions of retinal arterioles in 70% cases of PIH. In a study by Bhandari et al, the percentage of Grade 1 retinopathy was shown to be 29%. Presence of Grade 3 retinopathy was found to be 4%. In that study, Grade 4 retinopathy was shown to be least common.^[13] Reddy et al in their study, found the percentage of Grade 2 retinopathy to be 10.87%.^[14] These results are comparable to the studies mentioned above.

The most common ocular finding is constriction of retinal arterioles, occurring in approximately 60% of patients with preeclampsia. The most prominent finding is terminal arteriolar vasospasm, associated with development of systemic hypertension. At first, focal areas of spasm may be observed which progress to more generalise narrowing as preeclampsia worsens.^[3, 5, 15] This result in the present study is comparable to the results of earlier studies.

In a study by Klein R. et al, in 1994, the prevalence of nicking at the arteriovenous crossings was found to be 2.2%.^[16]

Here, in the present study, 10% of the Patients showed nicking at the arteriovenous crossings, which is high compared to the mentioned study.

Amanda D Henderson et al. in 2012 found that the arteriovenous ratio in most of the patients in hypertensive retinopathy is 2:3.^[17] In the present study, most of the patients (48%) showed an arteriovenous ratio of 2:3 which is consistent with the above study.

Bhandari et al in their study, found retinal haemorrhage in 6% of the patients, hard exudates in 5% of the patients and retinal edema in 6% of the patients.^[13] In the present study, retinal haemorrhage was found in 11.33% of the patients, hard exudates were found in 2.66% of the patients and retinal edema was found in 8% of the patients. These results are comparable to the above study. However absence of cotton wool spots in the present study is supported by the study of Jaffe and Schats done in 1987.^[5]

Bhandari et al in their study, found macular edema in 12% of the patients.^[16] In the present study, macular edema was found in 12% of the patients (18 patients out of 150). These results are in accordance with the previous study.

Xu Xiong et al in 2002 concluded that infants born at term to mothers with pre-eclampsia have similar birth weights, on average, to those of infants born to women who do not experience this condition; however, preterm infants born to mothers with preeclampsia weigh significantly less than those born to women with normal blood pressure maintained during pregnancy.^[18] This view was also supported by S.A. Obed and Aniteye Patience in 2006.^[19]

Out of 76 patients in the non-retinopathy group, only 7.90% delivered babies with a birth weight of less than 2.5 kg (Low birth weight), whereas in the retinopathy group, 41.89% of the patients delivered babies with a birth weight of less than 2.5 kg (Low birth weight). This was statistically significant (p value less than 0.05). In this study, not all infants born to mothers with hypertensive disorders had low birth weight. Significantly low birth weight was especially found in the retinopathy group only. Therefore, it is in accordance with above mentioned studies.

Elsmén Eet al in their study in 2006 concluded that male fetal gender is associated with an overall increased risk of pre-eclampsia.^[20] In the present study, 74% of the patients in retinopathy group delivered male babies which are consistent with the above study.

5% of the patients with preeclampsia are known to deliver stillborn babies.^[21] In our study, out of 76 patients in the non-retinopathy group, all delivered live born babies, whereas in the retinopathy group, most of the babies were live born but 3 babies out of 74 (4.10%) were delivered as still born. However, this was not statistically significant. Our results are consistent with the findings of the above mentioned article.

Ayaz A et al. in 2009 found 31 out of 73 cases of preeclampsia that delivered babies with low APGAR score.^[22] In the non-retinopathy group, all the patients delivered babies with an APGAR score (at birth) equal to or more than 7, whereas in the retinopathy group, 32.43% of the patients delivered babies with an APGAR score (at birth) less than 7. In the non-retinopathy group, all the patients delivered babies with an

APGAR score (at 1 minute) equal to or more than 7, whereas in the retinopathy group, 95.9% of the patients delivered babies with an APGAR score(at 1 minute) equal to or more than 7. This is in accordance with the study cited above.

OV Ajuzieogu in his study in 2011 concluded that women with pre-eclampsia have an increased rate of caesarean section as a result of several factors like the high incidence of intrauterine growth restriction, fetal distress and prematurity.^[52]In the present study, 66 out of 74 patients (89%) in the retinopathy group had delivered by caesarean section.This result is consistent with the study mentioned above.

A study undertaken by Shah A P, for evaluating 150 cases of pregnancy induced hypertension, showed that retinal changes were present in 5.56% cases of those who had a systolic blood pressure less than 160 mmHg and in 17.95% of those who had a systolic blood pressure more than 160 mmHg.^[23]In the present study, 129 patients had systolic blood pressure below 160 mmHg (mild and moderate hypertension) and retinopathy was present in 48 (58.53%) of them.

21 patients had systolic blood pressure more than 160 mmHg and retinopathy was present in all of them.The results in the present study show higher values in comparison with the study mentioned here.

V. Conclusion

Hypertensive disorders of pregnancy were found to be more common in the age group of 20-29 years. Primigravidas were more at risk for Hypertensive disorders of pregnancy. Hypertensive disorders were more common with increased gestational age. Headache was the commonest symptom, followed by swelling of legs. Retinal changes were found in about half of the patients. The commonest grade of retinopathy was Grade 1 hypertensive retinopathy and the least common grade was Grade 4 retinopathy. Focal constriction of retinal arterioles was the commonest finding. Arterio-venous ratio was 2:3 in most of the cases. Nicking at the arterio-venous crossings was found in 10% of the cases. Macular edema was found in 12% of the cases. Not all babies born to mothers with hypertensive disorders were of low birth weight. Most of the babies born to mothers with hypertensive disorders were male. Hypertensive disorders of pregnancy were associated with low APGAR scores in some of the babies. Caesarean section was the commoner mode of delivery in Hypertensive disorders of pregnancy. Preterm deliveries were more common in the patients having retinopathy. Hypertensive disorders of pregnancy were not associated with congenital anomalies or retinopathy of prematurity.

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