

Fundoscopic Changes in Pre-Eclampsia and Fetal Outcome

Dr.S.V.Mobeen Taj MS OBG.,Assistant professor¹ Dr.S.Sowmya MS OBG.,
Junior Resident²

Department of obstetrics and gynaecology, Sri Venkateswara medical college, Tirupathi, Andhra Pradesh,India

Abstract: Hypertensive disorders complicate 5-10% of all pregnancies. Along with hemorrhage and infection, it forms a deadly triad-that contributes mainly to maternal morbidity and mortality [1]. Visual system may be affected in 30-100% of patients with this disease. Hypertensive disorders of pregnancy are further complicated by coexisting fundoscopic changes.Our study aims to correlate fundoscopic changes in pregnancy induced hypertension and fetal outcome. This prospective observational study was carried out in 302 patients with hypertensive disorders of pregnancy.Study was conducted at OBG department during November 2017 and 2018. Incidence of hypertensive disorders in this institute was 8.91%.Out of 302 subjects with hypertensive disorders of pregnancy, 83(27.4%) had preterm delivery, 128(42.38%) low birth weight babies, 47(15.56%)babies with low APGAR, 75(24.83%) were IUGR babies. There were 14(4.63%) neonatal deaths and 62(20.5%) NICU admissions. 12(3.97%) subjects had placental abruption, 4(1.32%) had HELLP syndrome,1(0.33%) had Postpartum hemorrhage and 2(0.66%) had acute renal failure. There were no cases of pulmonary edema and no maternal deaths. **CONCLUSION:** Early identification of hypertensive disorders of pregnancy, prompt and timely intervention and fetal surveillance are needed to reduce adverse maternal and fetal outcomes.

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I. Introduction

Hypertensive disorders complicate 5-10% of all pregnancies. Along with hemorrhage and infection, it forms a deadly triad- that contributes mainly to maternal morbidity and mortality [1]. Gestational Hypertension(PIH) is the occurrence of hypertension (2 readings of BP with a spacing of 4hrs >140/90mm of Hg)after 20 weeks of gestational age without proteinuria. When there is significant proteinuria it is termed preeclampsia;seizures or coma as a consequence of preeclampsia is termed as Eclampsia [2, 3]. Some potentially serious conditions such as disseminated intravascular coagulation, cerebral hemorrhage, pulmonary edema, hepatic insufficiency and acute renal failure are often associated with Hypertensive disorders of pregnancy, worsening the maternal prognosis. As a consequence of preeclampsia, spasm of the uteroplacental circulation occurs which leads to fetal distress, accidental haemorrhage, IUGR, IUD, low birth weight, low APGAR score, NICU admissions and early neonatal death. Visual system may be affected in 30-100% of patients with this disease. Hypertensive disorders of pregnancy are further complicated by coexisting fundoscopic changes.

Various changes seen are:

- 1) Angiospasm - constriction of retinal arterioles [3][4][5] initially focal on nasal side progressing to generalized narrowing[3][6] . These are reversible in most cases [3].
- 2) Retinal edema - persistent reduction in perfusion results in retinal edema [5].
- 3) Sclerosis – sclerosis, arteriovenous crossing changes, hemorrhages, cotton wool spots.
- 4) Serous detachment – usually bilateral. It is exudation from choroid which elevates retina [7].
- 5) Spontaneous vitreous hemorrhage, retinal neovascularisation.
- 6) Optic neuropathy – vascular change in vessels of optic nerve head can occur in PIH resulting in papilloedema, acute ischemic optic neuropathy, and optic atrophy[4]
- 7) Cortical blindness – rare. Total visual recovery is frequent and parallels the resolution of edema[8]

Progression of retinal changes correlates with progression of hypertensive disorders of pregnancy and fetal mortality due to similar vascular ischemic changes in placenta.

Early detection of toxemic retinopathy in mother, will help the obstetrician to manage both mother and fetus, as status of hypertension , grade of pedal edema & proteinuria , type of delivery, health status of mother and baby before and after delivery, treatment given, response & recovery, and follow up of patients are noted. The fetal outcome will be assessed by birth weight of the baby, APGAR scores, prematurity, any resuscitation needed at birth etc.

II. Material And Methods

The current study aims to correlate fundoscopic changes in pregnancy induced hypertension and fetal outcome. The present study was carried out at the department of Obstetrics and Gynaecology, S.V. Medical college, Government maternity hospital, Tirupati from November 2017 to November 2018.

Study Design : Prospective Observational study
Study Subjects : All diagnosed cases of Pregnancy Induced Hypertension admitted at Government Maternity Hospital, Tirupati
Sample Size : 302

INCLUSION CRITERIA:

- 1) All women in whom hypertension was detected after 20 weeks of pregnancy who are admitted in hospital. Subjects who fulfil the diagnostic criteria of Hypertensive disorders of pregnancy
- 2) With or without eclampsia
- 3) Singleton pregnancies

EXCLUSION CRITERIA:

- 1) Patient having pre existing hypertension, cardiovascular disease, collagen vascular disease, before pregnancy.
- 2) Medical disorders complicating pregnancy, anemia
- 3) Multiple gestation
- 4) Patient having ocular media opacity which will interfere examination of fundus.
- 5) Pre-existing ocular diseases like glaucoma, optic neuritis and uveitis.
- 6) Patients who are not willing to give consent.

STUDY METHODS:

The selected patients are subjected to clinical examination as per the proforma designed for the purpose (enclosed- Annexure-1). History regarding symptoms, preexistence of hypertension and relevant ocular history taken. Age, gravida, gestational period, blood pressure and proteinuria of the patients were documented after taking an informed consent. Routine urine analysis for the presence of protein and sugar was done. Protein was analyzed using urine dipstick method. Systemic examination was done to rule out other co-morbidities. Hb%, bleeding time, clotting time, platelet count; renal function tests and liver function tests were investigated.

Fundoscopy:

- Fundus examination was done under tropicamide mydriasis.
- Tropicamide 0.5% eye drops were instilled into the eyes
- After instillation of eye drops patients were advised punctal occlusion for 3 minutes after closing their eyes to avoid systemic absorption.
- Fundoscopy was done after adequate mydriasis.
- Fundus evaluation is done by indirect ophthalmoscopy.

Statistical analysis

- Data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL). Student's *t*-test was used to ascertain the significance of differences between mean values of two continuous variables and confirmed by nonparametric Mann-Whitney test. In addition, paired *t*-test was used. Chi-square and Fisher exact tests were performed to test for differences in proportions of categorical variables between two or more groups. The level $P < 0.05$ was considered as the cutoff value or significance.

III. Results:

Out of 11242 women admitted in obstetric ward during the study period, 1002 had hypertensive disorder of pregnancy. On the basis of this data, the incidence of hypertensive disorders of pregnancy at study place is 8.91%. The study was conducted among 302 members fulfilling inclusion criteria.

Out of 302 with hypertensive disorder of pregnancy, 30(9.93%) had gestational hypertension, 106(35.10%) had mild preeclampsia, 73(24.17%) had severe preeclampsia, 64(21.19%) had imminent eclampsia and 29(9.60%) had eclampsia.

TABLE 1: DISTRIBUTION OF STUDY SUBJECTS BASED ON SEVERITY OF HYPERTENSIVE DISORDERS OF PREGNANCY

| SEVERITY | NUMBER | PERCENTAGE |
|--------------------------|--------|------------|
| Gestational Hypertension | 30 | 9.93% |
| Mild preeclampsia | 106 | 35.10% |
| Severe preeclampsia | 73 | 24.17% |
| Imminent eclampsia | 64 | 21.19% |
| Eclampsia | 29 | 9.60% |

TABLE 2 : DISTRIBUTION OF STUDY SUBJECTS BASED ON FUNDUS CHANGES

Out of 302 subjects under study 86 (28.52%) had hypertensive fundus changes and 216(71.52%) did not have fundus changes

| RETINAL CHANGES | NO OF PATIENTS(n=302) | PERCENTAGE % |
|-----------------|-----------------------|--------------|
| Normal fundus | 216 | 71.52 |
| Grade I | 72 | 23.89 |
| Grade II | 12 | 3.97 |
| Grade III | 2 | 0.66 |
| Grade IV | 0 | 0 |
| Total | 302 | 100 |

Out of 302 with hypertensive disorder of pregnancy, 30(9.93%) had gestational hypertension, 106(35.10%) had mild preeclampsia, 73(24.17%) had severe preeclampsia, 64(21.19%) had imminent eclampsia and 29(9.60%) had eclampsia

TABLE 3: ASSOCIATION OF RETINOPATHY WITH SEVERITY OF HYPERTENSION:

| SEVERITY OF HYPERTENSION | Total no | FUNDUS CHANGES PRESENT(n=86) | Percentage | FUNDUS CHANGES ABSENT(n=216) | Percentage | P value |
|--------------------------|----------|------------------------------|------------|------------------------------|------------|---------|
| GESTATIONAL HTN | 30 | 0 | 0% | 30 | 13.88% | <0.005 |
| MILD PREECLAMPSIA | 106 | 7 | 8.13% | 102 | 47.22% | |
| SEVERE PREECLAMPSIA | 73 | 20 | 23.25% | 53 | 24.53% | |
| IMMINENT ECLAMPSIA | 64 | 46 | 55.81% | 27 | 12.5% | |
| ECLAMPSIA | 29 | 21 | 24.41% | 9 | 4.16% | |

TABLE 4: ASSOCIATION OF SEVERITY OF HYPERTENSION WITH GRADES OF RETINOPATHY

| Severity of hypertension | Total No.(n) | Normal Fundus | Grade I | Grade II | Grade III | Grade IV |
|--------------------------|--------------|---------------|---------|----------|-----------|----------|
| Gestational Hypertension | 30 | 30 | 0 | 0 | 0 | 0 |
| Mild Preeclampsia | 106 | 100 | 6 | 0 | 0 | 0 |
| Severe Preeclampsia | 73 | 53 | 18 | 2 | 0 | 0 |
| Imminent Eclampsia | 64 | 25 | 34 | 4 | 1 | 0 |
| Eclampsia | 29 | 8 | 14 | 6 | 1 | 0 |

Grade I retinal changes were commonest among all groups of hypertensive disorders of pregnancy. Grade I, II, III fundus changes were seen in imminent eclampsia and eclampsia group of subjects. As severity of PIH increased, subjects developing retinopathy also increased substantially. $P < 0.005$ indicates that there is statistically significant association between severity of PIH and fundus changes.

TABLE 5: ASSOCIATION OF RETINOPATHY WITH PROTEINURIA

In the present study, out of 302 subjects 272(90%) had proteinuria

| Proteinuria | Total | Fundus changes present(n=86) | Percentage (%) | Fundus changes absent(n=216) | Percentage (%) | P value |
|-------------|-------|------------------------------|----------------|------------------------------|----------------|---------|
| Absent | 30 | 0 | 0 | 30 | 13.89% | <0.001 |
| Present | 272 | 86 | 100 | 186 | 86.1% | |

100% of subjects with proteinuria have fundus changes. $p < 0.001$ indicating that there is statistically significant association between proteinuria and retinopathy.

TABLE 6: ASSOCIATION OF GRADES OF RETINOPATHY WITH PROTEINURIA

| Proteinuria | Total | Normal fundus | Grade I | Grade II | Grade III | Grade IV |
|-------------|-------|---------------|---------|----------|-----------|----------|
| Nil | 30 | 30 | 0 | 0 | 0 | 0 |
| Traces | 31 | 31 | 0 | 0 | 0 | 0 |
| 1+ | 65 | 61 | 3 | 1 | 0 | 0 |
| 2+ | 53 | 37 | 14 | 2 | 0 | 0 |
| 3+ | 113 | 56 | 46 | 9 | 2 | 0 |
| 4+ | 10 | 1 | 9 | 0 | 0 | 0 |

Subjects having 3+ proteinuria showed increased incidence of fundus changes

TABLE 7: ASSOCIATION OF MEAN VALUES OF DIFFERENT MATERNAL AND FETAL VARIABLES WITH FUNDUS CHANGES IN PIH:

| VARIABLE | FUNDUS CHANGES PRESENT(n=86) (Mean± SD) | FUNDUS CHANGES ABSENT(n=216) (Mean±SD) | P value |
|----------------------|--|--|---------|
| AGE in years | 24.15±4.5 | 23.35±3.8 | 0.2 |
| SBP (mm of Hg) | 153.72±12.5 | 139.6±16.2 | 0.00 |
| DBP(mm of Hg) | 108.14±9.52 | 96.99±9.8 | 0.00 |
| Birth Weight(Kg) | 1.68±0.7 | 2.68±0.68 | 0.00 |
| APGAR SCORE at 1 min | 4.48±3.08 | 7.33±1.7 | 0.00 |

The mean age of the subjects with fundus changes was 24.15±4.5 and that of those without fundus changes was 23.35±3.8. The means of systolic and diastolic BP of the subjects with hypertensive fundus changes were 153.72±12.5mm of Hg and 108.14±9.52 mm of Hg, whereas those values without fundus changes were 139.6±16.2mm of Hg and 96.99±9.8 mm of Hg. The mean birth weight of babies born to subjects with and without hypertensive fundus changes were 1.68±0.7 kg and 2.68±0.68kg respectively. The mean APGAR score at 1 minute of babies born to subjects with and without fundus changes were 4.48±3.08 and 7.33±1.7 respectively. This showed that there is statistically significant association between mean SBP,DBP,birth weight , 1 minute APGAR score and fundus changes, whereas no association between that of age and fundus changes.

TABLE 8: ASSOCIATION OF AGE WITH FUNDUS CHANGES IN PIH:

| AGE(in years) | TOTAL CASES WITH PIH | CASES WITH POSITIVE FUNDUS CHANGES | P value |
|----------------|----------------------|------------------------------------|---------|
| <20 | 77 | 20(25.97%) | 0.2 |
| 21-30 | 206 | 56(27.18%) | |
| >30 | 19 | 10(52.63%) | |
| TOTAL | 302 | 86 | |

Out of 77 women under 20 years of age,20 (25.97%) had positive fundus findings, out of 206 between 21-30years of age 56(27.18%) had positive fundus findings and out of 19 women above 30 years 10(52.63%) had positive fundus finding. No statistically significant relation found between age and fundus changes.

TABLE 9: ASSOCIATION OF HYPERTENSIVE RETINOPATHY IN PIH WITH GRAVIDA(BIRTH ORDER)

| GRAVIDA | Total cases (n=302) | FUNDUS CHANGES PRESENT | Percentage% | FUNDUS CHANGES ABSENT | Percentage% | P value |
|--------------|---------------------|------------------------|-------------|-----------------------|-------------|---------|
| PRIMIGRAVIDA | 180 | 48 | 26.67% | 132 | 73.33% | 0.4 |
| MULTIGRAVIDA | 122 | 38 | 31.14% | 84 | 68.85% | |

Out of 302 patients with hypertensive disorders of pregnancy, 180 were primigravida,of which 48(59.60 %) had hypertensive retinopathy. Out of 122 multigravida 38(31.14%) had hypertensive retinopathy. There is no statistically significant association between gravid(birth order) and fundus changes.

FETAL OUTCOME

TABLE 10: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH PRETERM DELIVERIES(DELIVERY AT GESTATIONAL AGE < 37 WEEKS)

| Fetal outcome | With fundus changes(n=86) | % | Without fundus changes(n=216) | % | P value |
|----------------------------|---------------------------|-------|-------------------------------|-------|---------|
| Gestational age < 37 weeks | 49 | 56.9% | 34 | 15.7% | <0.05 |

49 subjects with fundus changes delivered before 37 weeks of gestation (preterm) with p value < 0.05 , showing statistically significant association between fundus changes and preterm delivery (< 37 weeks).

TABLE 11: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH LOW BIRTH WEIGHT (LESS THAN 2.5 Kg):

| Variable | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|-------------------------------|----------------------------|-----|--------------------------------|-------|----------|
| Birth weight less than 2.5 Kg | 73 | 84% | 55 | 25.4% | < 0.05 |

Out of 86 women with fundus changes, 73 (84%) gave birth to babies with low birth weight, whereas 55 out of 216 (25.4%) without fundus gave birth to babies with low birth weight. P value < 0.05 shows that there is a statistically significant association between fundus changes and low birth weight of baby.

TABLE 12: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH 1 MIN APGAR LESS THAN 5:

| Fetal outcome | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|-------------------|----------------------------|--------|--------------------------------|-------|----------|
| 1 min APGAR < 5 | 33 | 38.37% | 14 | 6.48% | < 0.05 |

Babies of 33 (38.37%) women out of 86 with fundus changes had 1 minute APGAR less than 5, whereas babies of 14 (6.48%) women out of 216 without fundus changes had 1 minute APGAR less than 5. P value < 0.05 indicates that there is a statistically significant association between fundus changes and 1 minute APGAR < 5 of the baby.

TABLE 13: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH IUGR:

| Fetal outcome | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|---------------|----------------------------|-------|--------------------------------|--------|----------|
| IUGR | 42 | 48.8% | 33 | 15.27% | < 0.05 |

42 women out of 86 (48.8%) with fundus changes and 33 women out of 216 (15.27%) without fundus changes had IUGR babies. $P < 0.05$ suggesting that there is a statistically significant association between fundus changes and IUGR.

TABLE 14: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH INTRAUTERINE DEATHS:

| Fetal outcome | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|---------------|----------------------------|-------|--------------------------------|-------|----------|
| IUD | 23 | 26.7% | 9 | 4.16% | < 0.05 |

23 (26.7%) women among 86 with fundal changes and 9 (4.16%) women among 216 without fundal changes had intrauterine fetal death. $P < 0.05$, showing that there is a statistically significant association between fundus changes and intrauterine fetal death.

TABLE 15: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH NEONATAL DEATHS:

| Fetal outcome | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|-----------------|----------------------------|--------|--------------------------------|------|----------|
| Neonatal deaths | 11 | 12.79% | 3 | 1.3% | < 0.05 |

Babies of 11 women among 86 (12.79%) with fundus changes 3 among 216 (1.3%) died in neonatal period. $P < 0.05$, showing significant association between fundus changes and neonatal deaths.

TABLE 16: ASSOCIATION OF FUNDUS CHANGES IN PIH WITH NICU ADMISSIONS:

| Fetal outcome | With fundus changes (n=86) | % | Without fundus changes (n=216) | % | P value |
|-----------------|----------------------------|--------|--------------------------------|-------|----------|
| NICU admissions | 39 | 45.34% | 23 | 10.6% | < 0.05 |

39 babies out of 86 (45.34%) born to women with fundus changes and 23 babies out of 216 (10.6%) born to women without fundus changes required NICU admission. $p < 0.05$ showing a statistically significant association between fundus changes and NICU admissions.

TABLE 17: ASSOCIATION OF MODE OF TERMINATION OF PREGNANCY WITH FUNDUS CHANGES IN PIH:

| Mode of termination | With fundus changes(n=86) | % | Without fundus changes(n=216) | % | P value |
|---------------------|---------------------------|--------|-------------------------------|--------|---------|
| Spontaneous | 1 | 1.16% | 78 | 36.11% | <0.05 |
| Induced | 59 | 68.6% | 81 | 37.5% | <0.05 |
| LSCS | 26 | 30.23% | 59 | 27.3% | >0.05 |

1 woman out of 86(1.16%) with fundus changes had spontaneous normal vaginal delivery whereas 78 out of 216(36.11%) without fundus changes had spontaneous normal vaginal delivery. P < 0.05 indicating there is statistically significant association between the two.

Labour was induced in 59 out of 86(68.60%) with fundus changes and 81 out of 216(37.50%) without fundus changes. P < 0.05 indicating a statistically significant association between fundus changes and labour induction.

26 out of 86(30.23%) with fundus changes underwent caesarean section and 59 out of 216(27.31%) without fundus changes underwent caesarean section. P> 0.05 indicating that there was no statistically significant association fundus changes and caesarean delivery.

TABLE 18: ASSOCIATION OF MATERNAL COMPLICATIONS WITH FUNDUS CHANGES IN PIH:

| Maternal complication | With Fundus changes | % | Without fundus changes | % | P value |
|-----------------------|---------------------|--------|------------------------|-------|---------|
| Abruption | 11 | 12.79% | 1 | 0.46% | <0.05 |
| HELLP | 4 | 4.65% | 0 | 0% | <0.05 |
| Maternal death | 0 | 0% | 0 | 0% | |
| Pulmonary edema | 0 | 0% | 0 | 0% | |
| PPH | 0 | 0% | 1 | 0.48% | >0.05 |
| Renal | 2 | 2.33 | 0 | 0% | <0.05 |

11 women out of 86(12.7%) with fundus changes and 1 out of 216 (0.46%) without fundus changes had placental abruption. 4 out of 86(4.65%) with fundus changes and none without fundus changes had HELLP syndrome. 2 out of 86(2.33%) with fundus changes and none without fundus changes had renal failure. P < 0.05 indicates that there is statistically significant association between maternal complications like Abruption,HELLP syndrome, renal failure and fundus changes. Whereas, there was no statistically significant association between PPH and fundus changes.

IV. Discussion

Prevalence of hypertensive disorders of pregnancy at the study place is 1224 (2017). This prospective observational study was carried out in 302 patients with hypertensive disorders of pregnancy.

TABLE 19: COMPARISON OF MEAN AGE OF STUDY SUBJECTS WITH AND WITHOUT FUNDUS CHANGES IN PIH BETWEEN PRESENT STUDY AND OTHER STUDIES

| STUDY | MEAN AGE OF WOMEN WITH FUNDUS CHANGES(in years) | MEAN AGE OF WOMEN WITHOUT FUNDUS CHANGES(in years) |
|---------------------|--|---|
| Present study | 24.15±4.5 | 23.35±3.82 |
| Savitha et al | 24.53±4.84 | 24.45±4.29 |
| Dasgupta S et al | 24.06±3.31 | 24.52±2.98 |
| Karki P et al | 23.86±5.51 | 24.36±5.65 |
| Ranjan et al | 22.73±2.01 | 24±1.71 |
| Javadekar S D et al | 21.73±2.01 | 25±1.71 |

In the present study of 302 cases studied, mean age of women with fundus changes was 24.15±4.5 years, which is similar to that of studies conducted by Savitha[61] et al(24.53±4.84), Dasgupta S[66] et al(24.06±3.31), Karki P[54] et al(23.86±5.51), Ranjan[60]et al(22.73±2.01), and Javadekar S D[63] et al(21.73±2.01). Younger patients are more prone to hypertensive disorders of pregnancy .

GRAVIDA:

Primigravida women are particularly vulnerable to developing preeclampsia but there was no correlation between the parity and fundus findings observed.

In the present study (TABLE-2) of 302 patients with hypertensive disorders of pregnancy, 59.60 % were primigravidas. In the study by Shah [68] et al 50.67% were primigravidas, Sagili Chandrasekhara Reddy et al[52], 55.3% were primigravidas and in a study by Rajalaxmi et al[61] 65% were found to be primigravidas. The present study correlates with other studies indicating that primigravidas are more susceptible to hypertensive disorders.

BLOOD PRESSURE:

In the present study, the mean systolic and diastolic BP of the subjects with hypertensive fundus changes are 153.72±12.5 mm of Hg and 108.14±9.52 mm of Hg. In the study by Javadekar et al[63], the mean systolic and diastolic BP of the subjects with hypertensive fundus changes were 178.07 mm of Hg. with standard deviation of 12.10 and 100.63 mm of Hg. with standard deviation of 12.86 respectively.

In the study by Savitha H C et al[61], the mean systolic and diastolic BP in women with fundus changes were 147.65±12.52 and 103.53±11.15 mm of Hg respectively. In Dasgupta et al[66] study mean SBP and DBP in women with fundus changes were 150±10.7 and 112.56±10.2 respectively. In study by Javadekar S D et al[63] mean SBP and DBP were 178.07±12.10 and 100.63±12.86 mm of Hg respectively in women with hypertensive fundus changes. In study by Karki et al[54] mean SBP was 182±33.64 and mean DBP was 125.24±21.36 mm of Hg in women with hypertensive fundus changes. In the study by Ranjan et al[60], mean SBP and DBP were 179.07±12.10 and 100.50±12.86 mm of Hg respectively.

TABLE 19: COMPARISON OF MEAN SBP AND DBP OF STUDY SUBJECTS BETWEEN PRESENT STUDY AND OTHER STUDIES

| STUDY | Mean SBP±SD(mm of Hg) | Mean DBP±SD(mm of Hg) |
|-----------------|-----------------------|-----------------------|
| Present study | 153.72±12.5 | 108.14±9.52 |
| Javadekar et al | 178.07±12.10 | 100.63±12.86 |
| Savitha et al | 147.65±12.52 | 103.53±11.15 |
| Dasgupta et al | 150±10.7 | 112.56±10.2 |
| Javadekar et al | 178.07±12.10 | 100.63±12.86 |
| Karki et al | 182±33.64 | 125.24±21.36 |
| Ranjan et al | 179.07±12.10 | 100.50±12.86 |

FUNDUS CHANGES:

In the present study of 302 (n)patients (Table 1), 86(28.48%) had hypertensive fundus changes. Normal fundus picture was seen in 216 patients (71.52%). Grade I retinopathy changes were seen in 72 patients (23.84%) Grade II in 12 patients (3.97%), Grade III in 2 patients (0.66%), No Grade IV changes were observed.

Rasdi et al[51]., study on hypertensive disorder at pregnancy showed 32.5% fundus changes which is comparable with the present study.

In present study hypertensive retinopathy was higher than Shah et al.[55], (12%) and Karki et al.[54], (13.7%) but was lower than Sagil Chandrasekhar Reddy et al[52].,(59%), Tadin et al.[53],(45%), and Rajalaxmi et al.[61], (60%) studies.

TABLE 20: COMPARISON OF FREQUENCY OF HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | PERCENTAGE WITH HYPERTENSIVE FUNDUS CHANGES |
|-----------------|---|
| Present Study | 28.48% |
| Rasdi et al | 32.5% |
| Shah et al | 12% |
| Karki et al | 13.7% |
| Reddy et al | 59% |
| Tadin et al | 45% |
| Rajalaxmi et al | 60% |

FETAL OUTCOMES**PRETERM DELIVERY (GESTATIONAL AGE < 37 WEEKS):**

In the present study (Table 3) patients with fundus changes, who delivered at Gestational Age < 37 weeks were 49(56.9%) whereas patient without fundus changes delivered before 37 weeks of GA were 34 (15.7%)

The prevalence of delivery before Gestational Age < 37 weeks in women with hypertensive fundus changes is comparable to study done by Savitha et al[61]., (47%), Revathy et al.[65], (54%), Dasgupta et al[66].,

(52.94%) , higher when compared with studies of Karki et al.[54] [(23.8%) ,Javadekar et al[63]., (23%) and lower than the study done by Bakhda et al[67]., (72.46%).

TABLE 21: COMPARISON OF PRETERM DELIVERIES IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | PRETERM DELIVERIES (<37 WEEKS OF GESTATIONAL AGE) |
|------------------|---|
| Present study | 56.9% |
| Savitha et al | 47% |
| Revathy et al | 54% |
| Dasgupta S et al | 52.94% |
| Karki et al | 23.8% |
| Javadekar et at | 23% |
| Bakhda et al | 72.46% |

LOW BIRTH WEIGHT (< 2.5 Kg):

The present study showed that 73 out of 86 (84%) women had babies with birth weight less than 2.5 Kg which is comparable with the study of Rajalaxmi et al[61]., (73.3%), Mithila et al[64]., (78%) Revathy et a[65]l., (70%) and higher than those of Dasgupta S et al[66]., (64%), Javadekar et al[63].,(59.52%), Bakhda et al[67].,(46.56%) and Ranjan et al.[60],(46.6%)

TABLE 22: COMPARISON OF LOW BIRTH WEIGHT BABIES IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | LOW BIRTH WEIGHT (BWt< 2.5kg) |
|-----------------|--------------------------------|
| Present Study | 84% |
| Rajalaxmi et al | 73.3% |
| Mithila et al | 78% |
| Revathy et al | 70% |
| Bakhda et al | 46.56% |
| Dasgupta et al | 64% |
| Javadekar et al | 59.52% |
| Ranjan et al | 46.6% |

1 MINUTE APGAR SCORE < 5:

The present study showed that out of 86 patients, 33 (38.37%) women with hypertensive fundus changes had the babies with 1 min APGAR less than 5 whereas other studies had 1 minute APGAR less than 5 was: Karki [54]et al 23%,Javadekar[63] et al 23% and ,Revathy [65]et al 20%. Mean 1 minute APGAR score in babies born to women with hypertensive fundus changes in this study is 4.48 ± 3.08 , whereas mean 1 minute APGAR was 6.63 ± 2.34 in Mithila et al[64] study and 7.29 ± 2.34 in Savitha et al study[61].

TABLE 23: COMPARISON OF BABIES WITH 1 MINUTE APGAR SCORE<5 IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | 1 minute APGAR <5 |
|-----------------|-------------------|
| Present Study | 38.37% |
| Karki et al | 23% |
| Javadekar et al | 23% |
| Revathy et al | 20% |

TABLE 24: COMPARISON OF MEAN APGAR SCORE OF BABIES IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | Mean 1 minute APGAR |
|---------------|---------------------|
| Present study | 4.48 ± 3.08 |
| Mithila et al | 6.63 ± 2.34 |
| Savitha et al | 7.29 ± 2.34 |

TABLE 25: COMPARISON OF IUGR IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

The present study showed that 42 out of 86 (48.87%) with fundus changes had IUGR babies which was comparable to the study done by Dasgupta [66] et al. (46.94%)

| STUDY | IUGR |
|----------------|--------|
| Present study | 48.87% |
| Dasgupta et al | 46.94% |

TABLE 26: COMPARISON OF IUDs IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

The present study showed 23 IUDs out of 86 women having hypertensive retinopathy (26.7%) which is comparable to the study done by Revathy[65] et al.,(24%) and higher than the results compared with the study done by Bakhda [67]et al., (4.5%) and Karki et al.,[54] (4.76%)

| STUDY | IUD |
|---------------|-------|
| Present study | 26.7% |
| Revathy et al | 24% |
| Karki et al | 4.76% |
| Bakhda et al | 4.5% |

Neonatal Deaths:

The present study showed that 11 Neonatal deaths in babies born to mothers with fundus changes (12.79%) which is far higher when compared with study by Rajalaxmi et al[61](3.3%) and Karki[54] et al (0%)

TABLE 27: COMPARISON OF NEONATAL DEATHS IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | NEONATAL DEATHS |
|-----------------|-----------------|
| Present study | 12.79% |
| Rajalaxmi et al | 3.3% |
| Karki et al | 0% |

NICU Admissions:

39 babies out of 86 born to mothers with fundus changes (45.34%) needed NICU admission which is higher when compared to study done by Dasgupta[66] et al., (24.49%)

TABLE 28: COMPARISON OF NICU ADMISSIONS IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | NICU admission |
|----------------|----------------|
| Present study | 45.34% |
| Dasgupta et al | 24.49% |

MATERNAL OUTCOME**MODE OF DELIVERY:**

In the present study only 1 out of 86 (1.16%) had spontaneous vaginal delivery, which is far less when compared with study done by Revathy et al.[65],(42%) and Javadekhar et[63] al.,(23.8%).

Labour was induced in 59 out of 86 (68.6%) women with fundus changes which is higher when compared with the studies done by Revathy et al.[65], (30%) and Javadekhar[63] et al., (23.8%)

In the present study 26 out of 86(30.23%) underwent emergency caesarean section which is comparable to the study done by Revathy et al[65],(20%) and lower to the study done by Sujoy et al.,(44.9%) and Javadekar et al[63]l., (52.4%)

TABLE 29: COMPARISON OF MODE OF DELIVERY IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | SPONTANEOUS LABOUR | LABOUR INDUCED | CAESAREAN SECTION |
|-----------------|--------------------|----------------|-------------------|
| Present study | 1.16% | 68.6% | 30.23% |
| Revathy et al | 42% | 30% | 20% |
| Javadekar et al | 23.8% | 23.8% | 52.4% |
| Dasgupta et al | - | - | 44.9% |

In the present study 4 out of 86(4.65%) women with fundus changes developed HELLP syndrome comparable to that of study done by Dasgupta[66] et al(2.04%) and Revathy et al [65]study(6%)

TABLE 30: COMPARISON OF HELLP SYNDROME IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | HELLP SYNDROME |
|----------------|----------------|
| Present study | 4.65% |
| Dasgupta et al | 2.04% |
| Revathy et al | 6% |

In the present study abruption was seen in 11 out of 86 (12.79%) when comparable to studies done by Rajalaxmi [61] et al (13.3%) and Dasgupta [66] et al (8.16%)

TABLE 31: COMPARISON OF PLACENTAL ABRUPTION IN SUBJECTS WITH HYPERTENSIVE RETINOPATHY IN DIFFERENT STUDIES

| STUDY | PLACENTAL ABRUPTION |
|-----------------|---------------------|
| Present study | 12.79% |
| Rajalaxmi et al | 13.3% |
| Dasgupta et al | 8.16% |

V. Conclusion

“Retinal changes” is a very good indicator of the severity of hypertension. Grade 1 and 2 hypertensive retinopathy is the most common fundus change observed in the present study. The presence of these changes carries a grave visual and systemic prognosis, until and unless the pregnancy is terminated. Though PIH was more common in primigravidas, no correlation was found between parity and fundus changes. There was no significant association between age and retinal changes. There was a significant association between increasing systolic and diastolic blood pressures and the fundus changes. The present study suggested a positive correlation with the severity of hypertension, fundus changes and fetal outcome like preterm delivery, low birth weight (<2.5kgs), 1 minute APGAR score <5, IUGR, IUD, neonatal death, and NICU admissions. Examination of the retina is mandatory in all cases of pregnancy induced hypertension. It is an indirect indicator of the severity of hypertension.

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