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INCIDENCE OF FUNDUS CHANGES IN WOMEN WITH PREGNANCY INDUCED HYPERTENSION IN RURAL POPULATION OF EASTERN UTTAR PRADESH, INDIA

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ABSTRACT:-

AIM: Incidence of ocular manifestations and demographic changes in women with pregnancy induced hypertension.

SETTING AND DESIGN: Cross-sectional study.

STATISTICAL ANALYSIS USED: Chi-square test and fisher exact test

MATERIALS AND METHODS: We conducted a study on 203 womens with PIH over a period of 2.5 years in awadh region of Uttar Pradesh. We recorded the baseline data from the patient files and conducted a fundoscopic examination of all patients included in the study and findings classified on the basis of Keith Wegner and Barker classification.

RESULT: Out of 203 patients 60% were primigravidas of average age 36 years. 57% patients had no fundus changes. Most common grade-1 retinopathy changes (29.60%) are seen followed by grade-2 (9.9%), grade -3(2.5%) and grade- 4(1%). Most common fundus finding is arterial attenuation and most common symptom was headache.

CONCLUSION: The examination of ocular fundus proved to be a valuable and necessary diagnostic procedure in determining the cause and appropriate treatment for mothers with pre-eclampsia.

KEYWORD: Pregnancy induced hypertension, Fundoscopy, Preeclampsia,Eclampsia.

INTRODUCTION:

Pregnancy induced hypertension(PIH) is defined as hypertension (blood pressure ≥140/90 mmHg) with or without proteinuria (≥300 mg/24 hours) emerging after 20 weeks gestation, but resolving up to 12 weeks postpartum.[1-10)] PIH is also defined as new onset proteinuria

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(≥300 mg/24 hours) in hypertensive women who exhibit no proteinuria before 20 weeks gestation.

PIH includes gestational hypertension, preeclampsia and eclampsia occurs in approximately 5% of pregnancies usually after 20 th week of pregnancy.[11]When preeclampsia progresses rapidly and convulsions develop, the condition is then termed as eclampsia.[12-14]

The incidence of PIH is 8%, preeclampsia is reported to be 8-10% and eclampsia affects 5% of total pregnancies. The condition is responsible for 17.2% of maternal mortality and 22% of fetal mortality. Early detection and treatment are therefore of important step .[15]

There is paucity of data available in the published literatures on the incidence of retinal changes in preeclampsia from other parts of the world especially from India[16,17,18]. Fundoscopic findings in PIH include a reduced arteriole to vein ratio, A-V crossing changes has been noted previously, hemorrhages, exudates in retina, exudative retinal detachments and choroidal infarcts.[17]

By detecting disc and retinal changes the ophthalmologist might advice whether immediate delivery of the baby is required to revert the pre-eclampsic state and prevent an adverse maternal outcome.[19]

For the assessment of fundus changes, retinal examination is primarily required investigative procedure in all women with PIH .Retinal examination is OPD procedure, which is simple, non-invasive and cost effective.

Therefore, this study was under taken to determine the incidence of retinal changes in Preeclampsia / Eclampsia and association between the retinal changes and severity of the disease.

MATERIALS AND METHODS

A cross-sectional observational study carried out jointly in the department of obstetrics and gynecology and department of ophthalmology of RDASMC, Ayodhya (U.P.) between May 2019- December 2021. Study period was 2.5 years. All women with PIH during this period, who were willing to participate are considered as the sample size. Results are presented in the form of percentage and proportions and the relationship between various factors are analysed by chi-square test and fisher exact test.

Patients who have pre-existing -Diabetes, Hypertension, Renal disease, Hazy ocular media, any other ocular disease causing retinopathy were excluded from the study.

An informed consent was taken and baseline data of all pregnant patients was recorded .All patients were initially evaluated by an obstetrician. Pregnant womens age, para, gravida, blood pressure were noted from the case record. Detailed history, general, physical and systemic examination were done by obstetrician, and reffered to ophthalmology department for ocular evaluation which included visual acuity with Snellen's chart and best- corrected visual acuity (BCVA) (in possible cases after refraction). Detailed ocular examination was done with slit-lamp (whenever possible). Fundus evaluation was done after instilling 0.8% tropicamide eye drops with direct and indirect ophthalmoscope and imaging of any significant finding was done using fundus camera from elsewhere because fundus camera facility is not available at our institute.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Retinal changes in one or both eyes were considered as the positive finding in the patient.
The retinal changes of our patients were graded according to **KEITH WAGENER**

CLASSIFICATION:
Grade1: Slight narrowing, broadening of light reflex, sclerosis, and tortuosity of the retinal arterioles; mild, asymptomatic hypertension

Grade2: Definite narrowing, focal constriction, sclerosis and AV nicking; blood pressure is higher and sustained; few if any, symptoms referable to blood pressure
Grade3: Retinopathy (cotton-wool patches, arteriolosclerosis, hemorrhages), copper wire appearance; blood pressure is higher and more sustained; headache, vertigo, and nervousness; mild impairment of cardiac, cerebral, and renal function

Grade4: Silver wire appearance, Neuroretinal edema, including papilledema; Siegrist streaks, Elschnig spots; blood pressure persistently elevated; headache, asthenia, loss of weight, dyspnea, and visual disturbances; impairment of cardiac , cerebral, and renal function

The PIH was graded as preeclamsia (mild and severe) and eclampsia.

All the findings were noted on a data sheet. The severity of PIH was classified into preeclampsia (mild and severe) and eclampsia, based on the following findings:

Mild preeclampsia --- BP >140/90mmHg, with or without proteinuria

Severe preeclampsia --- BP >160/110mmHg, proteinuria ++ or +++, headache, cerebral or visual disturbances, epigastric pain, impaired liver function tests, and increased serum creatinine

Eclampsia --- preeclampsia + convulsions.
Proteinuria was tested using dipstix method and was graded as + = 0.3gm/L, ++ =1gm/L, and +++ = 3gm/L.

Data were entered on “Excel” master sheet.
The results were analyzed using NCSS11 and SPSS program. Results are calculated in the form of percentage and proportions. Relationship between the variables calculated by using chi-square and fisher exact test. A p- value <0.05 was taken as significant

RESULTS
In the present study, we have registered 403 eyes of 203 patients. Of these 3, one eye had leucomatous corneal opacity, two had artificial eye, so were excluded from the study.
The mean age of the women with PIH were 25.71yrs with standard deviation of 4.46. Minimum age of the patient was 19 years and maximum age was 45 years.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Mean duration of the pregnancy among all women with PIH was 36.30 weeks ± 3.23. Minimum duration of pregnancy was 22 weeks and maximum duration was 40 weeks (Table 1). Among all women with PIH, mean values of systolic BP was 159.54mmHg with ± 11.59 and standard error of 0.81 and mean diastolic BP was 101.64mmHg ± 9.03 and standard error of 0.63. The maximum systolic BP observed among patients was 200mmHg and minimum was 140mmHg. The maximum diastolic BP observed was 130mmHg and minimum was 84mmHg. (Table 2)

Most of the women with PIH i.e. 123(60.6%) were primigravidas, only few i.e. 80(39.4%) were multigravidas. (Table 3)

Table 1:- DURATION OF PREGNANCY AT PRESENTATION OF WOMEN WITH PIH

MEAN DURATION	STANDARD DEVIATION	MAXIMUM DURATION	MINIMUM DURATION
36.30 weeks	3.23	40 weeks	22 weeks

Table 2:- MEAN VALUES OF DIFFERENT VARIABLES OF BLOOD PRESSURE IN WOMENS WITH PIH

VARIABLES	MEAN	STANDARD DEVIATION	STANDARD ERROR	MAXIMUM BP	MINIMUM BP
SYSTOLIC BP	159.54mmHg	11.59	0.81	200mmHg	140 mmHg
DIASTOIC BP	101.16mmHg	9.03	0.63	130mmHg	84mmHg

BP – Blood pressure

Table 3:- DISTRIBUTION OF PRIMIGRAVIDA AND MULTIGRAVIDA IN WOMENS WITH PIH

GRAVIDA	NUMBER	FREQUENCY(PERCENTAGE)
PRIMI	123	60.6%
MULTI	80	39.4%

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

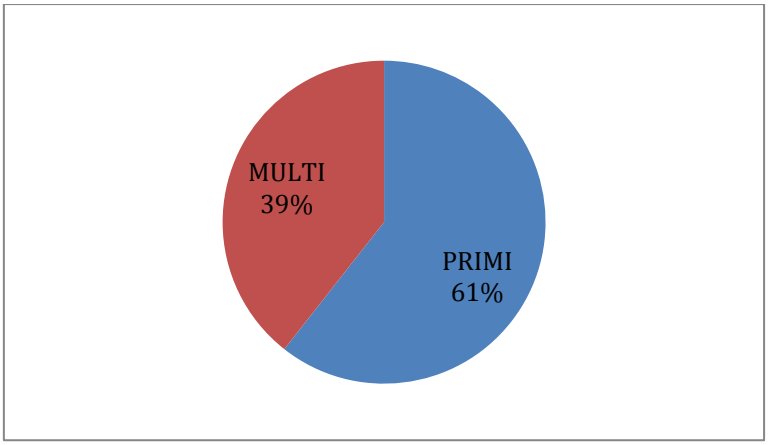


Chart 1- Distribution of primigravidas and multigravidas in womens in PIH

Out of all patients only 44(21.7%) had eclampsia while majority 159(78.3%) were non eclamptic. (Table 4)

Table 4:- NUMBER OF WOMENS WITH ECLAMPSIA

ECLAMPSIA	NUMBER	FREQUENCY(PERCENTAGE)
YES	44	21.7%
NO	159	78.3%

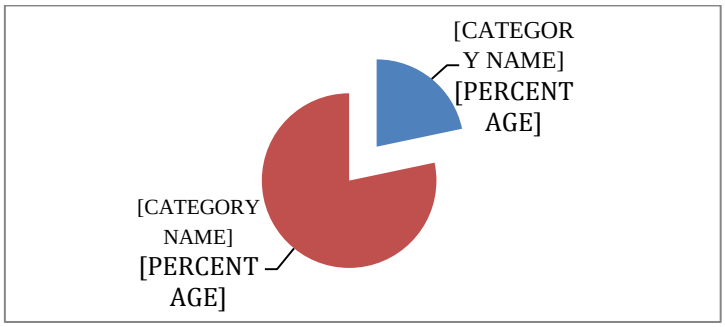


Chart 2- Distribution of womens with and without eclampsia

Fundus changes were observed only in 87 patients. Most common grade of hypertensive retinopathy observed in women with PIH in this population was grade 1 followed by grade 2 and grade 3 and least common was grade 4 hypertensive retinopathy in only 2 patients. In 116 patients no fundus changes were observed. (Table 5)

Table 5:-- DISTRIBUTION OF GRADES OF HYPERTENSIVE RETINOPATHY IN WOMENS WITH PIH

GRADES OF HYPERTENSIVE RETINOPATHY	NUMBER	FREQUENCY(PERCENTAGE)
NO RETINOPATHY	116	57.10%
GRADE 1	60	29.60%
GRADE 2	20	9.9%
GRADE 3	5	2.5%
GRADE 4	2	1.0%

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

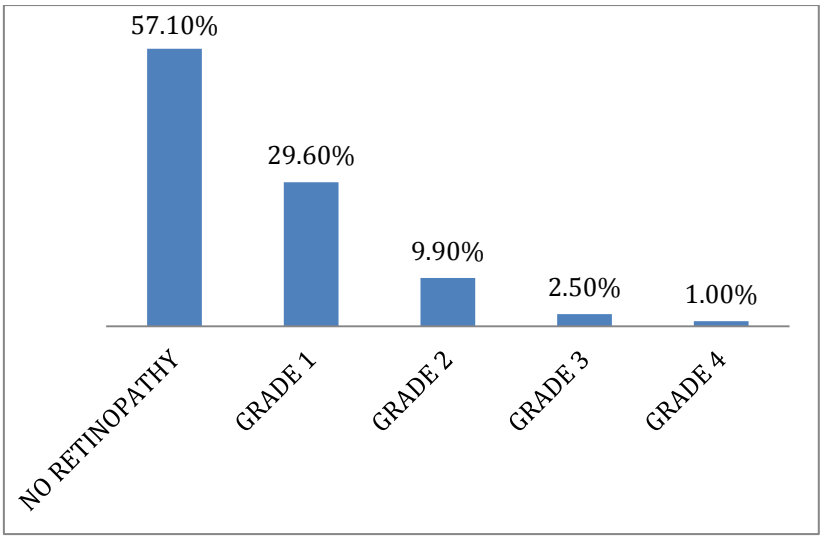


Chart 3-Distribution of grades of hypertensive retinopathy in women with PIH

Among various retinal findings observed in fundus of women with PIH most common finding was arterial attenuation of the nasal mid-peripheral blood vessels (figure 1) followed by copper wiring. Flame shaped haemorrhages(figure 2) are seen in 07 patients while cotton wool spots, hard exudates and papilloedema with macular edema(figure 3) is seen in only 02 patients.(Table 6)

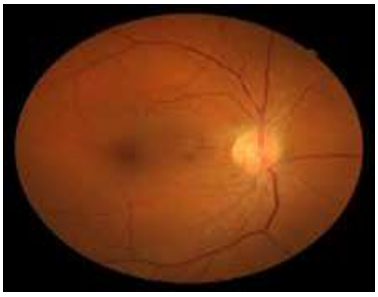


Figure -1 –fundus image of the women with PIH showing diffuse arteriolar attenuation

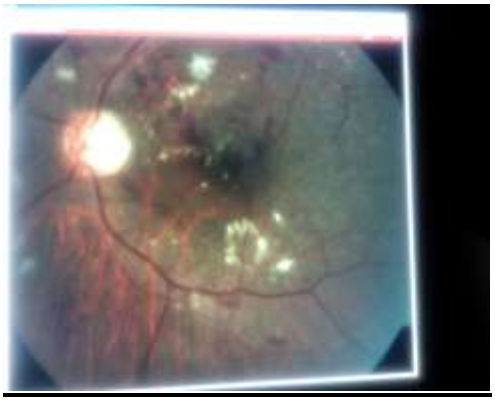


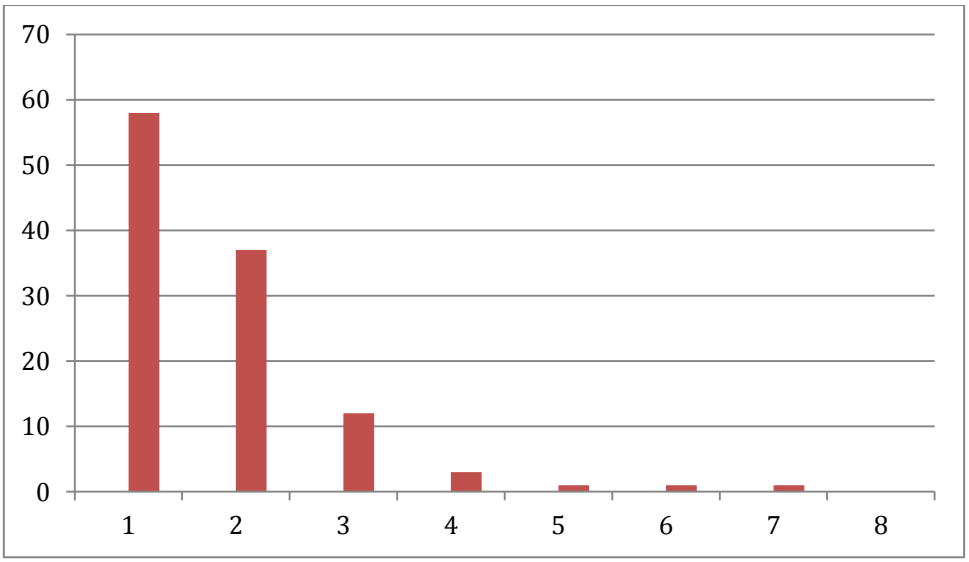
Figure 2- fundus changes in a women with PIH showing diffuse arteriolar attenuation, cotton wool spots with flame shaped haemorrhages.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Figure
3- showing cotton wool spots, hard exudates and papilloedema with macular edema found in women with PIH

Table 6:-DISTRIBUTION OF VARIOUS RETINAL FINDINGS OBSERVED WOMENS WITH PIH

RETINAL FINDINGS	FREQUENCY	PERCENTAGE
1. NO FINDINGS	**116**	57.7%
2.ARTERIAL ATTENUATION	**87**	35.8%
3.COPPER WIRING	27	11.1%
4. FLAME SHAPED HEMORRHAGES	**07**	2.9%
5. COTTON WOOL SPOTS	02	0.8%
6. HARD EXUDATES	02	0.8%
7.PAPILLOEDEMA WITH MACULAR EDEMA	02	0.8%



ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Chart 4- Frequency of various retinal findings observed in womens with PIH

Most common symptom that is observed in women with PIH is headache followed by blurred vision and sudden diminution of vision obscured in only 02 patients. Rest of the patients did not had any symptom (Table 7).

Table 7- VARIOUS SYMPTOMS OBSERVED IN WOMENS WITH PIH

SYMPTOMS	NUMBER	FREQUENCY
HEADACHE	133	56.60%
SUDDEN MARKED DOV	2	0.85%
BLURRED VISION	**28**	11.91%
NO SYMPTOMS	67	28.51%

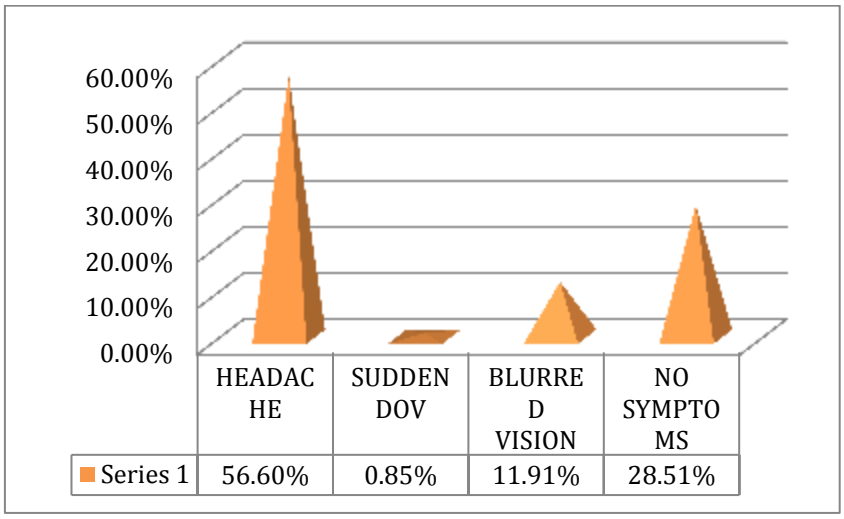


Chart 5- Various symptoms observed in womens with PIH

DISCUSSION

Pregnancy induced hypertension causes numerous ocular abnormalities and can have a potential impact on ocular fundus[20]. It can also rapidly progress to life threatening events, which include convulsions (eclampsia) and syndromes characterized by disseminated clotting abnormalities, thrombocytopenia and liver failure. It is of great importance to determine the degree of fundus changes in women with PIH [21].

In this study, we tried to determine incidence of demographic factors, retinal changes and ocular manifestations in women with PIH of pregnancy induced hypertension. We found a statistically significant correlation between the severity of pre-eclampsia and the degree of hypertensive retinopathy. Our findings are in agreement with the results obtained from several other studies[21-24]

It is essential that these women are followed up closely and receive the right treatment and deliver when it is appropriate for both the mother and the foetus.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

DEMOGRAPHIC CHARACTERSTICS

In our study the mean age of patients was 25.71±4.46years (range 19-45years). The gestation period ranged between 22 and 40 weeks which is in accordance with the criteria of PIH which is seen after 20 weeks of pregnancy and that also more common in the third trimester. This was similar to study by **Rasdi et al**[17] where the mean age of patients was 30.2±6.2 years (range 21-45years).The retinal changes were seen in 42.9% of preeclampsia/eclampsia. There was also a similar study conducted by **Reddy et al**[25] in Malays and found that the mean age of patients was found to be 21-45 years and the gestation period ranged from 25-41 weeks.

PREECLAMPSIA AND ECLAMPSIA

Total 203 women with PIH were included in this study, which included 159(78.3%) pre-eclamptic patients and 44(21.7%) eclamptic patients. This was similar to a study by **karki et al**[26] who included a total of 153 patients of pregnancy-induced hypertension (PIH) which consisted of 110 (i.e.71.9%) pre-eclamptic patients and 43 (28.1 %) eclamptic patients. **Javadekar et al**[27] included a total 100 patients of pregnancy-induced hypertension (PIH) of which 88 were pre-eclamptic patients and 12 were eclamptic patients. In a study by **S .C .Reddy et.al**[25], thirty (38.5%) had mild preeclampsia, 46 (59%) had severe preeclampsia and 2 (2.5%) had eclampsia.

A study by **Rajlaxmi andNayak**[28] 38 (38%) had mild preeclampsia, 50 (50%) had moderate to severe preeclampsia and 12 (12%) had Eclampsia.

PRIMI AND MULTI GRAVIDAS

Primigravidas are at more risk for pre-eclampsia as compared to the multigravidas.

Our present study observed the retinal changes were found in primigravida to an extent of 60.6 % where as **S.C.Reddy.et.al**[25], observed a proportional statistics of only 55.3 % in the similar group. The multigravida exhibited retinal changes to an extent of 39.4% in our study, which was similar to the findings of S.C.Reddy et.al[25] where retinal changes are seen in 34.6% of multigravidas. A study conducted in southern India by **Rajlaxmi and Nayak**[28] observed the retinal changes were found in primigravida to an extent of 63.7 % similar to our study, where as multigravida exhibited retinal changes to an extent of 55%.

As mentioned previously in this study, primigravida is a predisposing factor for developing pre-eclampsia. In a case-control study done in rural northern Tanzania, they observed that primigravidae and women with parities of higher order were at increased risk of maternal death[29].

GRADES OF HYPERTENSIVE RETINOPATHY

In the present study, hypertensive retinopathy changes (Grade I and II) were seen in 40% of patients and grade III and grade IV in 3.5% patients with preeclampsia / Eclampsia, these findings were similar as in the study by **Tadin et.al**.[30]

Javadekar et al[27] included a total 100 patients of pregnancy-induced hypertension (PIH) of which 88 were preeclamptic patients and 12 were eclamptic patients. Hypertensive fundus changes were observed in 42%.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

In a study by **Rajlaxmi andNayak**[28] 54.5% with preeclampsia and 100% with Eclampsia had fundal changes. **Hallum** made similar observations, among the 38 cases of mild preeclampsia.

FUNDUS FINDINGS

In this study we observed fundus changes in 87 women with PIH and the most common finding was arteriolar attenuation of the nasal retinal blood vessels. However, **Rasdi**[17] reported a case of serous retinal detachment from Malaysia.

These findings are almost similar to a study of 275 cases of preeclampsia and 125 cases of eclampsia, by **Reddy**[25] from India has reported retinal changes in 53.4% preeclampsia and in 71.2% in eclampsia patients .

Cheney[31] found narrowing of the retinal arterioles in most of those who had marked hypertension, and the constriction was dependent only on the hypertension and not whether the cases were acute toxemia or nephritis.

Gibson[32] reported 39 cases of hypertensive toxemia of pregnancy; the eye grounds of five were normal, 20 showed pre-organic arteriole constriction, and 11 showed organic changes.

Wagener[11] found spastic constrictions of the arterioles in skeletal muscles taken by biopsy from patients with toxemia of pregnancy who at the same time showed spastic constrictions of the retinal arterioles. **Hinselmann**[33], observed with the miscroscope recurring spasmodic constrictions of the arterioles in the nailfold of eclamptics.

VISUAL SYMPTOMS

In the present study, headache is most common symptom, followed by blurred vision . In our study, we didn't come across any patients complaining of photopsia or scotoma.

Cortical blindness is one of the important causes of blindness in toxemia of pregnancy. One study concluded that cortical blindness associated with toxemia resulted from petechial hemorrhages and focal edema in the occipital cortex.[34]

These findings were in accordance with the study by **Jaffe and Schatz**[19], who found a significant relationship between reduced arteriole to vein ratio and preeclampsia.

In our study, we didn't come across any patients complaining of significant visual disturbances. Nearly 90% of the patients in our study had visual acuity between 6/6 and 6/9.

SUMMARY

In present study, a statistically significant correlation between the degree of hypertensive retinopathy and the severity of pre-eclampsia was found. Our findings like arteriolar attenuation, cotton wool spots, flame shaped haemorrhages, hard exudates, papilloedema with macular edema suggest that the degree of hypertensive retinopathy in women with pre-eclampsia is a valid and reliable prognostic factor that gives a valid prognostic information on assessment of the severity of pre-eclampsia and also helped in decision making for termination of pregnancy. Therefore, the examination of ocular fundus proved to be a valuable and necessary diagnostic procedure in determining the cause and appropriate management for women with pre-eclampsia.

ISSN:0975 -3583,0976-2833 VOL 15, ISSUE 01, 2024

Visual disturbances are very common among pregnant women with preeclampsia/eclampsia. Physicians should have a firm understanding of the various ocular conditions associated with these disturbances. In addition, it is very important to be vigilant about the rare and serious conditions that may occur in pregnant women with visual complaints. Prompt evaluation may be required and the immediate transfer of care of the patient may help saving the lives of both the mother and the baby.

In rural areas with limited resources, this is one of the easiest things to look at and to do something with. In this institution, I found the standard of health care very satisfying, and there are very few maternal and perinatal/neonatal deaths

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