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MATERNAL CHARACTERISTICS, FETO-MATERNAL OUTCOME AND SEASONAL VARIATION IN PRE-ECLAMPSIA WITH SEVERE FEATURES AND ECLAMPSIA

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ABSTRACT **Aims&objectives:-** To study prevalence of pre-eclampsia, co-relation of severe pre-eclampsia and eclampsia with maternal characteristics,feto-maternal outcome,seasonal variation and sex of the fetus, if any.

Materials&Methoods- It was prospective observational study, carried out in obstetrics and gynecology department, MMIMSR, Mullana, Ambala, a tertiary care rural hospital in North India, from 1st June,2020 to 31st December,2020. Maternal characteristics, risk factors, sex of fetus, adverse maternal and fetal outcomes were recorded and data analyzed. Retrospective analysis of patients with severe pre-eclampsia and eclampsia, for a period of 3 years from January,2018 to December,2020 was done to see seasonal variation.

Results:- A total of 1275 births were recorded from 1st June,2020 to 31st Dec,2020. 114 women were diagnosed with Hypertensive disorders of pregnancy with a prevalence of 8.94%. An increased incidence(75%) of severe pre-eclampsia/eclampsia in unbooked patients was seen. 87.5% patients were less than 30 years. 55% patients were primigravida. Severe preeclampsia-eclampsia was more in rural population(80%) with low literacy level(45%) and low socio-economic status(70%). Significantly increased incidence(72.5%) of pre-eclampsia in women with dark complexion. 52.5% cases were seen in BMI range of 30.0-34.9. 42.5% patients presented before 34 weeks, 47.5% beyond 34 weeks and 10% within 48 hours post-partum. Singleton pregnancy was seen in 92.5% cases. Anemia was contributing factor in 42.5% and. 12.5% had APS. Caesarean rate was very high. Increased risk of severe pre-eclampsia has been observed while carrying a male fetus(67.5%). Patients with severe pre-eclampsia had increased risk of eclampsia(27.5%) and placental abruption(17.5%). FGR seen in 20%, with oligohydramnios in 15% cases. ICU admission with ventilator support needed by 10% while 5% had maternal deaths. Fetal complications, like pre-maturity seen in 50%, NICU admission required in 57.5% and intra-uterine death in 27.5%. Peak incidence recorded in summers(June-July).

Conclusion-Unbooked/referred-in pregnancy, illiteracy, low socio-economic status, undiagnosed maternal risk factors, anemia pose a challenge for early diagnosis and management of severe pre-eclampsia&eclampsia. Severe disease is usually early onset, more in dark complexion with male fetus in-utero with peak incidence in summer. Regular antenatal check-up with diagnosis of high-risk factors in first trimester, to implement preventive measures should be universal guideline.

KEYWORDS : Maternal Characteristics, Maternal Complicatons, Perinatal Outcome, Pre-eclampsia, Sex Of The Fetus, Seasonal Variation.

INTRODUCTION:-

Early onset pre-eclampsia occurs before 34 weeks of pregnancy, is catastrophic and associated with severe maternal and fetal outcome.[1] Pre-eclampsia complicates 2–8% of pregnancies globally.[1] Maternal death rate is 0-1.8% in developed countries and as high as 14% in developing countries.[2] In Latin America and the Caribbean, hypertensive disorders are responsible for almost 26% of maternal deaths, whereas in Africa and Asia they contribute to 9% of maternal deaths.[1]

The perinatal mortality rate from eclampsia in the United States and Great Britain ranges from 5.6% to 11.8%, while fetal mortality is as high as 13-30% due to premature delivery and its complications.[3]

Early evaluation of high risk factors and maternal characteristics at the time of registration can help us implement preventive measures i.e. ecospirin75-150mg bedtime & high dose calcium before 16 weeks of pregnancy.[4,5]

Recent studies show that sex of the fetus[6,7] and seasonal variation also have impact on prevalence of pre-eclampsia and eclampsia[8,9,10].

AIMS &OBJECTIVES:-

The study aims at evaluating:-

1) Prevalence of pre-eclampsia in rural tertiary care hospital.
2) Co-relation of maternal characteristics with severe pre-eclampsia and eclampsia.
3) Adverse maternal and fetal outcome in severe pre-eclampsia and eclampsia.
4) Seasonal variations in severe pre-eclampsia and eclampsia.

MATERIALS & METHODS:-

It was a prospective observational study, carried out in obstetrics and gynecology department, MMIMSR, Deemed to be university, Mullana, Ambala, Haryana, a tertiary care rural hospital in North India, from 1st June,2020 to 31st December,2020.

Retrospective analysis of patients with severe pre-eclampsia and eclampsia, for a period of 3 years from January,2018 to December,2020 was done to see seasonal variation.

Maternal characteristics and risk factors like- registration status, age, parity, occupation, residence, socio-economic status, BMI, complexion, polyhydramnios, multiple gestation, associated medical disorders (Pre-existing Hypertension, GDM, Anemia, APS, Thyroid dysfunction, Renal dysfunction, Cardiac diseases) if any were noted. Pre-eclampsia or eclampsia in previous pregnancy or in mother/sister was noted. Sex of the baby, apgar at 1& 5 minute and need for NICU admission was also recorded.

Maternal complications in terms of oliguria, abruption placenta, thrombocytopenia, DIC, HELLP syndrome, pulmonary edema, PRES, need for ventilator support and maternal death was noted.

Fetal complications in terms of pre-maturity, fetal growth restriction, respiratory distress syndrome, hyperbilirubinemia, assisted respiratory support, NICU admission, still birth, intra-uterine death and neonatal deaths were evaluated.

Maternal characteristics and adverse materno-fetal outcomes in patients with non-severe pre-eclampsia versus pre-eclampsia with severe features and eclampsia were compared using a chi-square test. A p-value of <0.05 was considered statistically significant.

Approval from ethics committee of our institute was taken for conducting this study.

RESULTS:-

A total of 1275 births were recorded from 1st June, 2020 to 31st Dec, 2020. 114 women were diagnosed with Hypertensive disorders of pregnancy with a prevalence of 8.94%. 27(2.12%) cases presented as gestational hypertension, 35(2.74%) cases had non-severe pre-eclampsia, 29 (2.27%) as pre-eclampsia with severe features and 11 (0.86%) cases of eclampsia (including post-partum eclampsia) were recorded. Chronic hypertension was seen in 12 (0.94%)cases out of which 9 (0.71%) cases had Chronic hypertension with super-imposed pre-eclampsia.

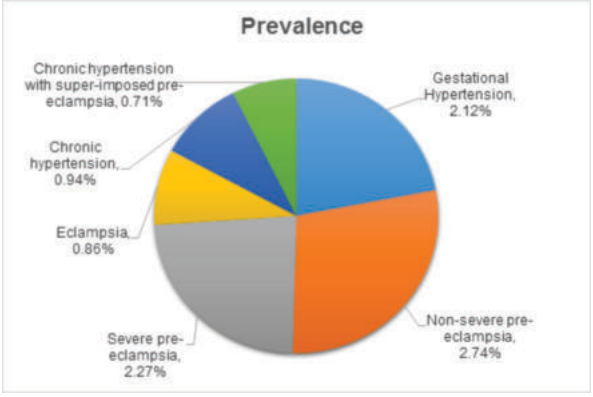

Fig 1:- Prevalence Of Hypertensive Disorders (8.94%).

Table1:- Socio-demographic And Maternal Characteristics In Severe Pre-eclampsia And Eclampsia.

Characteristics studied	No. of cases (non-severe P.E.) (n=35)	No. of cases (severe P.E. & eclampsia) (n=40)	P-value
Booked-n (%)	20(57.1)	6(15)	0.00013
Unbooked/ REFERRED-n (%)	15 (42.9)	34(85)	0.00013
AGE (yrs.): <20-n (%)	2(5.7)	3(7.5)	0.7571
21-25-n (%)	14(40)	17(42.5)	0.8263
26-30-n (%)	14(40)	15(37.5)	0.8244
31-35-n (%)	3(8.6)	4(10)	0.8319
>35-n (%)	2(5.7)	1(2.5)	0.4785
PARITY: Primigravida-n (%)	20(57.2)	22(55)	0.8520
multigravida-n (%)	15(42.8)	18(45)	0.8520
RESIDENCE: Rural-n (%)	28(80)	32(80)	0.7723
Urban-n (%)	7(20)	8(20)	0.7723
EDUCATION: graduate-n (%)	4(11.4)	0(0)	-
high school-n (%)	6(17.1)	0(0)	-
middle school-n (%)	13(37.1)	5(12.5)	0.0126
primary school-n (%)	8(22.9)	12(30)	0.4852
illiterate-n (%)	4(11.4)	18(45)	0.0014
Characteristics studied	**No. Of cases (non-severe P.E.) (N=35)**	**No. Of cases (severe P.E.& eclampsia) (N=40)**	**p-value**
MONTHLY INCOME IN RUPEES: more than 5000-n (%)	6 (17.1)	2(5)	0.0892
1000-5000-n (%)	16 (45.7)	8(20)	0.1204
Less than 1000-n (%)	13(37.1)	30(75)	0.0009
COMPLEXION: Fair-n (%)	4(11.4)	5(12.5)	0.8867
Wheatish-n (%)	14(40)	6(15)	0.0145
Dark-n (%)	17(48.6)	29(72.5)	0.0337
BMI: 18.5-24.9-n (%)	10(28.6)	13(32.5)	0.7128
25.0-29.9-n (%)	15(42.8)	6(15)	0.0073
30.0-34.9-n (%)	10(28.6)	21(52.5)	0.0357
TIME OF PRESENTATION:-(1)ANTENATAL			
(i)VERY EARLY ONSET (20-28 weeks) -n (%)	3(8.6)	6(15)	0.0161
(ii)EARLY ONSET (>28-34 weeks) -n (%)	9(25.7)	11(27.5)	0.3717
(iii)LATE ONSET (>34 weeks and beyond) -n (%)	18(51.4)	19(47.5)	0.0722
2)INTRA-NATAL-n (%)	5(14.3)	0(0)	-
3)POST-PARTUM (within 48 hrs) -n (%)	0(0)	4(10)	-
Characteristics studied	**No. Of cases (non-severe P.E.) (N=35)**	**No. Of cases (severe P.E.& eclampsia) (N=40)**	**p-value**
SINGLETON/ MULTIPLE: Single-n (%)	33(94.3)	37(92.5)	0.7570
Multiple (twins) -n (%)	2(5.7)	3(7.5)	0.7570
ASSOCIATED CO-MORBIDITIES: Anaemia-n (%)	11(31.4)	17(42.5)	0.3226
Pre-existing HTN-n (%)	14(40)	12(30)	0.3639
GDM-n (%)	5(14.3)	6(15)	0.9304
APS-n (%)	0(0)	5(12.5)	-
H/O pre-eclampsia/eclampsia in previous pregnancy-n (%)	3(8.6)	5(12.5)	0.5824
H/O pre-eclampsia/eclampsia in mother/sister-n (%)	2(5.7)	3(7.5)	0.7570
Hypothyroidsim-N (%)	0(0)	2(5)	-
Cardiac disease-n (%)	0(0)	1(2.5)	-

Table 2A:- Mode Of Delivery And Sex Of Fetus In Severe Pre-eclampsia And Eclampsia.

Mode of delivery	No. Of cases (non-severe P.E.) (N=35)	No. Of cases(severe P.E.& eclampsia) (N=40)	p-value
Normal Vaginal-n(%)	27(77.1)	13(32.5)	0.0001
Caesarean-n (%)	8(22.9)	25(62.5)	0.0005
VBAC-n (%)	0(0)	1(2.5)	-
InstrumenTAL-n (%)	0(0)	1(2.5)	-
2(B)SEX OF FETUS			
	Male-n (%)	Female-n (%)	
Non- severe pre-eclampsia	18(51.4)	17(48.6)	
Severe pre-eclampsia and eclampsia	27(67.5)	16(0.4)	

Table 3A:- Maternal And Fetal Complications In Severe Pre-eclampsia And Eclampsia.

Complication	No. Of cases (non-severe P.E.) (N=35)	No. Of cases (severe P.E.& eclampsia) (N=40)	P-VALUE
ECLAMPSIA-n (%)	2(5.7)	11(27.5)	0.0128
FGR-N (%)	4(11.4)	10(25)	0.132
PRES-n (%)	0(0)	8(20)	-
Abruptio placenta-n (%)	6(17.1)	7(17.5)	0.9674
HELLP-n (%)	0(0)	6(15)	-
OLIGOHYDRAMNIOS-n (%)	13(37.1)	6(15)	0.2780

ICU ADMISSION WITH VENTILATOR SUPPORT-n (%)	0(0)	4(10)	-
RENAL DYSFUNCTION-n (%)	0(0)	3(7.5)	-
SEPSIS-n (%)	2(5.7)	3(7.5)	0.7570
MODS-n (%)	0(0)	3(7.5)	-
MATERNAL DEATH-n (%)	0(0)	2(5)	-
PULMONARY EDEEMA-n (%)	0(0)	1(2.5)	-
EBSTEIN ANOMALY-n (%)	0(0)	1(2.5)	-
3(B) FETAL COMPLICATIONS			
COMPLICATION	**NO. OF CASES (non-severe P.E.) (N=35)**	**NO. OF CASES (severe P.E.& eclampsia) (N=40)**	**P-VALUE**
Pre-maturity-n (%)	9(25.7)	20(50)	0.0311
NICU admission-n (%)	18(51.4)	19(47.5)	0.7342
IUD-n (%)	2(5.7)	11(27.5)	0.0128
Hyperbilirubinemia-n (%)	12(34.3)	7(17.5)	0.0954
Meconium Aspiration-n (%)	8(22.9)	5(12.5)	0.2371
Respiratory distress-n (%)	6(17.1)	5(12.5)	0.5707
Ventilatory support-n (%)	0(0)	2(5)	-
Neonatal deaths-n (%)	0(0)	2(5)	-

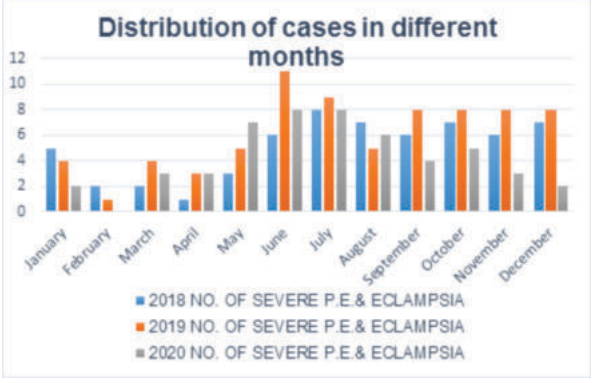

Fig 2:- Seasonal Variation In Severe Pre-eclampsia And Eclampsia.

DISCUSSION:-

Hypertensive disorders of pregnancy form a deadly triad along with hemorrhage and sepsis as a direct cause of maternal morbidity and mortality.[1] Of these, Pre eclampsia-eclampsia syndrome, especially pre-eclampsia with severe features and eclampsia is most catastrophic. The incidence of severe pre-eclampsia and eclampsia found in our study is 8.94%.

There is an increased incidence (75%) of severe pre-eclampsia/ eclampsia in unbooked patients as compared to 28.6% in non-severe pre-eclampsia and the result has been proven significant with p value <0.05. Shaikh S et al also observed that more than half of the patients are unbooked/transferred.[11] Thus, regular antenatal check-up in registered pregnancy helps in early diagnosis and management.
Advanced maternal age is an independent risk factor for pre-eclampsia, however, in our study 87.5% patients were of less than 30 years, which is probably because the study has been done in rural population of India, where early marriage is more common. Some studies have also recorded the same incidence, like Saxena N et al,[12] where 69%patients with severe pre-eclampsia and eclampsia were in the age group between 20-30 years.[12] Singhal SR et al observed that 90% patients were less than 30 years of age.[13,14]

In our study, 55% patients were primigravida. 46.6% patients were primigravida, in a study done by Saxena N et al.[12] SR Singhal et al showed that 73% patients were Primigravida.[13] Ketz et al reported 70% of their patients with pre-eclampsia as primigravida.[15] Hernandez et al in his study found that the risk of pre-eclampsia was 4.1% in the first pregnancy and 1.7% in later pregnancies overall. The risk for multiparous women without a history of pre-eclampsia was around 1%.[16]

We observed that severe pre-eclampsia/eclampsia was more in population belonging to rural area(80%) with low literacy level (45%) and low socio-economic stauts(70%).

We observed significantly increased incidence (72.5%) of pre-eclampsia in women with dark complexion. Black woman have twice the risk that white women have for mortality associated with preeclampsia/eclampsia.[3]

52.5% cases in our study with BMI range of 30.0-34.9 had severe pre-eclampsia and eclampsia and the result has been proven significant with p-value<0.05.

In our study, 42.5% patients presented before 34 weeks, 47.5% beyond 34 weeks and 10% within 48 hrs of post-partum period. The result has been proven significant. Saxena N et al[12] studied that only 35% of patients had term pregnancy.

In our study singleton pregnancy was seen in 92.5% cases of severe pre-eclampsia and eclampsia.

Anemia was contributing factor in majority of patients(42.5%) with severe pre-eclampsia and eclampsia. Similar study conducted in Sudan where women with severe anemia had 3.6 times higher risk of pre-eclampsia. The high susceptibility to pre-eclampsia could be explained by deficiency of micronutrients and antioxidants. Recent results indicate that reduced levels of calcium, magnesium and zinc during pregnancy are possible contributors to the development of pre-eclampsia.[5]

12.5%(5 cases) of severe pre-eclampsia had APS. They had early onset severe pre-eclampsia but none of them had eclampsia due to early intervention. It has been proven that elevated antiphospholipid plasma levels are associated with higher incidence of preeclampsia and eclampsia.[3]

Other factors like renal dysfunction, previous history of pre-eclampsia and history of pre-eclampsia in mother/sister poses greater risk in present pregnancy. Women who have pre-eclampsia in a first pregnancy have seven times the risk of pre-eclampsia in second pregnancy.[17]

Increased caesarean section rate(62.5%) seen in patients with severe preeclampsia and eclampsia. Shaikh S et al also noted high caesarean rate(73%) in pre-eclampsia than vaginal delivery(26.7%) and most common indication was fetal distress.[11]

An increased risk of pre-eclampsia has been observed while carrying a male fetus(67.5%), and it was described over 40 years ago, and has persisted in clinical lore in some quarters, with multiple supporting studies.[6,7]

Severe pre-eclampsia was associated with increased risk of eclampsia(27.5%) and placental abruption(17.5%). FGR was seen in 20% with oligohydramnios in 15%. Yildirim G et al also concluded that women with severe pre-eclampsia had increased risk of fetal growth restriction (50%–53%).[18] Other conditions include disseminated intravascular coagulation, hepatic failure, acute renal failure, cerebrovascular and cardiovascular complications, pulmonary edema, HELLP syndrome, retinal detachment, aspiration pneumonia and maternal death. ICU admission with ventilator support was needed by 10% (4 cases) while 5% (2 cases) had maternal deaths.

Fetal complications in our study, like pre-maturity was seen in 50% cases and NICU admission was required in 57.5% cases. These findings are consistent with studies of Yildirim G et al also.[18] Most common being pre-maturity leading to NICU admission. The neonatal outcomes in our study have been found more severe with intrauterine fetal death in 27.5%. Yildirim G et al reported 11% cases of IUD.[18] The incidence is significantly higher in severe preeclampsia (27.5%) as compared to non-severe pre-eclampsia (5.7% cases).

We observed a higher frequency of preeclampsia in the summer (June-July) when the weather is warmer, and the humidity is too low. Ali *et al* also observed highest incidence of preeclampsia in summer especially June when the temperature is high and humidity levels are low.[8]

Morikawa *et al*[9] found different results, as the prevalence rate of PIH was higher for delivery in winter and early spring and lowest for summer delivery. The environmental factors and climate may affect disease and this might be the main cause of difference between findings of various studies.[10]

CONCLUSION:-

Pre-eclampsia syndrome is most catastrophic and forms a deadly triad with hemorrhage and sepsis, as a direct cause of maternal and fetal morbidity and mortality.

Unbooked/referred-in pregnancy, illiteracy, low socio-economic status, undiagnosed maternal risk factors, anemia pose a challenge for early diagnosis and management of severe pre-eclampsia and eclampsia. Diagnosis of high risk factors in first trimester to implement preventive measures should be universal guideline. Counselling regarding signs and symptoms of severe pre-eclampsia for timely referral, with multi-disciplinary approach shall go a long way to reduce maternal and fetal morbidity & mortality.

Statement Of Ethics

Informed consent was obtained from the patients.

Conflict Of Interest Statement

The authors of this article do not have any conflict of interest to declare.

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