Original Research Article

Assessment of prevalence and risk factors of pre-eclampsia and eclampsia in tertiary care hospital

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ABSTRACT

Background: Pre-eclampsia and eclampsia are two conditions in which high blood pressure essentially complicates pregnancy by causing oedema and/or albuminuria. The present study was undertaken among pregnant women to determine the prevalence of pre-eclampsia and eclampsia as well as to assess the association between risk factors and pre-eclampsia, risk factors and eclampsia and to determine the complications of pre-eclampsia and eclampsia.
Method: A prospective observational study was conducted over a period of six months at obstetrics inpatient department of Basaveshwara Medical college and hospital, Chitradurga.
Results: Total of 583 pregnant women who visited the inpatient department were enrolled, out of which study showed that the prevalence of pre-eclampsia was 91 (15.67%) and eclampsia was 54 (9.26%). A statistically varied significance level of p=0.00001 to 0.05 for risk factors such as age, primigravida, birth interval, pre-existing disease, placental abnormalities, multiple pregnancy, past history, proteinuria were found to be associated with pre-eclampsia and eclampsia. The complications such as pre-term birth, neonatal death HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets), Foetal growth restriction were found. Out of which pre-term birth was the most observed complication in both pre-eclampsia and eclampsia.
Conclusions: Considering the significant association between the risk factors and pre-eclampsia, eclampsia from the study we conclude that early diagnosis is essential. Lack of antenatal care, limited access to medical facility and lack of resources have influenced in late diagnosis in our set up. As evidenced by study proper awareness should be provided to the pregnant women.

Keywords: Pre-eclampsia, Eclampsia, Chi-square test, Prevalence, Risk factors and complications

INTRODUCTION

Pregnancy is regarded as a special, biologically normal stage in a woman's life. Normal pregnancy, which generally lasts for 40 weeks (280 days), is just a usual physiological process which can happen one or more times during a woman's childbearing years.[1] Pre exitsing illness or an unanticipated illness in the mother or foetus, however, can make pregnancy complications more likely.[2] The pregnancies which are complicated by hypertension in 10% to 15% of pregnancies are pregnancy-related hypertension diseases. Pregnancy-induced hypertension (PIH) is the term used to describe hypertension that develops during pregnancy or that worsens if it already existed. Pre-eclampsia and eclampsia are two conditions in which high blood pressure essentially complicates pregnancy by causing ooedema and/or albuminuria. Eclampsia is the occurrence of a coma or convulsion in pre-eclampsia.[1]

Classification of hypertensive disorder in pregnancy:[1]

PIH

Pre-eclampsia: Mild and severe

Eclampsia: Chronic hypertension preceding pregnancy, chronic hypertension with (Superimposed gestational hypertension, Superimposed pre-eclampsia, Superimposed eclampsia).

Pre-eclampsia is a serious condition that can affect pregnant women, marked by high blood pressure and potential harm to organs. It usually arises after the 20th week of pregnancy and can lead to complications for both the mother and baby.[2] In cases of hydatidiform mole and acute polyhydramnios preeclamptic features may appear even before the 20th week of pregnancy.[1] According to WHO, the prevalence of preeclampsia is seven times higher in developing countries than in developed countries.[4] When pre-eclampsia is worsened by grand mal seizures and/or a coma, it is known to as eclampsia.[1] Thus, it may occur in patients with pre-eclampsia or in patients who have pre-eclampsia superimposed on essential hypertension.

Eclampsia is still a major source of maternal, neonatal morbidity and mortality in many parts of the world. It is thought to be responsible for more than 50,000 maternal mortalities worldwide and occur in low income nations where the maternal care is poor. Despite the fact that it affects only 1-2% of pregnant women, it accounts for about 10% of maternal morbidity in India.[3]

Preeclampsia and eclampsia, are influenced by various risk factors. These include factors like primigravida (first-time pregnancy), maternal age extremes, previous history of preeclampsia, pre-existing conditions (hypertension, anemia, electrolyte imbalance, proteinuria), placental abnormalities, family history of preeclampsia, obesity, short birth intervals, and low calcium levels.[1-2] One of the most significant risk factors for pre-eclampsia is a woman's previous pregnancy history of pre-eclampsia and eclampsia.[6]

Preeclampsia and eclampsia, can cause complications such as preterm birth, neonatal death, HELLP syndrome, seizures (eclampsia), and fetal growth issues.[19] Early detection and care are vital for reducing risks to both mothers and babies. The difference between Pre-eclampsia and Eclampsia are given in Table 1.

Considering all the above facts, the objective of the study is to investigate the prevalence of pre-eclampsia and eclampsia, to examine the association between different risk factors and the occurrences of these conditions and to evaluate the complication of them.

METHODS

A prospective observational study was conducted in Basaveshwara medical college hospital and research center (BMCH and RC) Chitradurga, from May 2022-Oct 2022. The study was carried out after receiving the approval from the institutional ethical committee (IEC) 628/2022-23. Informed consent was obtained from all participants prior to enrolment in the study. All the patients who were presented to the obstetrics Inpatient departments of the hospital were reviewed daily to identify the patients having pre-eclampsia and eclampsia. Pre-Eclampsia and Eclampsia patients were identified and collected their demographic details, medical history, clinical data using medical records laboratory reports and by interviewing the patients and/or care givers. Obtained patient information was documented in a suitably predesigned and validated individual data collection forms.

Statistical analysis

The acquired data was entered in Microsoft excel-2010 version and the results were analyzed using statistical package for social services (SPSS 25). The frequency and percentage of prevalence and risk factors were calculated by using chi square test respectively.

RESULTS

The pregnant cases were identified, the demographic details of the patient which includes age, height, weight, date of admission (D.O.A) and Inpatient number was collected. The various risk factors which include age, obesity, previous pre-eclampsia and eclampsia history, family history of (H/O) pre-eclampsia and eclampsia, pregnant women who didn't have a regular ante natal check-ups and socio-economic status were identified and collected. The above-mentioned details were collected in a suitably designed data collection form by interviewing the patients.

Prevalence of pre-eclampsia

A total of 583 pregnant women of age 18-45 were identified and was enrolled into the study. Among them 91 pregnant women were found to have pre-eclampsia. Therefore, the prevalence of pre-eclampsia was found to be 15.61%. The prevalence of pre-eclampsia are given in Table 2.

Distribution of risk factors of pre-eclampsia (single and multiple risk factors)

Pre-eclamptic women was found to have both single and multiple risk factors that were associated to pre-eclampsia. Single risk factors were found in 43 cases (47.25%) and multiple risk factors were found in 48 cases (52.75%). Therefore, we can say that there were more pre-eclamptic women with multiple risk factors. The distribution of risk factors of pre-eclampsia is given in Table 3.

Association between pre-eclampsia and risk factors

Out of 91 patients associated.

Age

The association of pre-eclampsia and age as a risk factor was found to be 7.5% in pregnant women with age ($\leq$18), 21.23% in pregnant women with age (19-25), 13.04% in pregnant women with age (26-34), 19.05% in pregnant women with age (35-45). P=0.0035 and so it's evident that there exists significant association between pregnant women with age 18 to 45 and pre-eclampsia.

Primigravida

The association of pre-eclampsia and primigravida as a risk factor was found to be 12.34% in pregnant women. P=0.02127 and hence it's clear that there exist significant association between pregnant women with first pregnancy and pre-eclampsia.

Birth interval

The association of the pre-eclampsia and the birth interval less than the 1.5 years as a risk factor was found to be 4.76% in the pregnant women. P=0.00001 and so it's evident that there exist significant association between pregnant women with the birth interval less than 1.5 years and the pre-eclampsia.

Pre-existing disease

The association of pre-eclampsia and pre-existing disease as a risk factor was found to be 10.44% in pregnant women. P=0.012751 and therefore we can say that there exist significant association between pregnant women with pre-existing disease and pre-eclampsia.

Placental abnormalities

The association of pre-eclampsia and placental abnormalities as a risk factor was found to be 2.97% in pregnant women. P=0.000119 and so it's clear that there exist significant association between pregnant women with the placental abnormalities and the pre-eclampsia.

Multiple pregnancy

The association of pre-eclampsia and multiple pregnancies as a risk factor was found to be 4.35% in pregnant women. P=0.028332 and hence it's clear that there exist significant association between pregnant women with multiple pregnancy and pre-eclampsia.

Past history

The association of pre-eclampsia and past history as a risk factor was found to be 38.9% in pregnant women.

P=0.00001 and so it's clear that there exist significant association between pregnant women with past history and pre-eclampsia.

Proteinuria

The association of pre-eclampsia and proteinuria as a risk factor was found to be 10.15% in pregnant women. P=0.000568 and so it's clear that there exist significant association between pregnant women with proteinuria and pre-eclampsia.

The association between pre-eclampsia and its risk factors are given in Table 4.

Complications of pre-eclampsia

The complications that were found in pregnant women with pre-eclampsia were pre-term birth 35.16%, neonatal death 12.08%, HELLP syndrome 9.90%, eclampsia 6.60%, foetal growth restriction 4.40% and 36.86% of pregnant women were not found to have any complications. The complications of pre-eclampsia are given in Table 5.

Prevalence of eclampsia

A total of 583 pregnant women of age between 18 and 45 were identified and was enrolled into the study. Among them 54 pregnant women were found to have eclampsia. So, the prevalence of eclampsia was found to be 9.26%. of the prevalence pre-eclampsia are given in Table 6.

Distribution of risk factors of pre-eclampsia (single and multiple risk factors)

Eclamptic women were found to have both single and multiple risk factors that were associated to eclampsia. Single risk factors were found in 5 cases (9.26%) and multiple risk factors were found in 49 cases (90.74%). Therefore, we can say that there were more eclamptic women with multiple risk factors. The distribution of risk factors of pre-eclampsia is given in Table 7.

Association between eclampsia and risk factors

Out of 54 patients were associated.

Age

The association of eclampsia and age as a risk factor was found to be 3.43% in pregnant women with age ($\leq$18), 10.21% in pregnant women with age (19-25), 12.29% in pregnant women with age (26-34), 14.29% in pregnant women with age (35-45).

P value is 0.034129 and so it's evident that there exist significant association between pregnant women with age 18 to 45 and eclampsia.

Primigravida

The association of eclampsia and primigravida as a risk factor was found to be 13.67% in pregnant women. P=

0.00116 and so it's clear that there exist significant association between pregnant women with first pregnancy and eclampsia.

Birth interval

The association of eclampsia and birth interval less than 1.5 years as a risk factor was found to be 13.54% in pregnant women. P=0.00001 and so it's clear that there exist significant association between pregnant women with birth interval less than 1.5 years and eclampsia.

Pre-existing disease

The association of eclampsia and pre-existing disease as a risk factor was found to be 16.91% in pregnant women. P=0.00001 and so it's clear that there exist significant association between pregnant women with pre-existing disease and eclampsia.

Placental abnormalities

The association of eclampsia and placental abnormalities as a risk factor was found to be 24.76% in pregnant women.

P=0.00001 and so it's clear that there exist significant association between pregnant women with placental abnormalities and eclampsia.

Multiple pregnancy

The association of eclampsia and multiple pregnancies as a risk factor was found to be 19.57% in pregnant women. P=0.012024 and so it's clear that there exist significant association between pregnant women with multiple pregnancy and eclampsia.

Past history

The association of eclampsia and past history as a risk factor was found to be 40.67% in pregnant women. P=0.00001 and so it's clear that there exist significant association between pregnant women with past history and eclampsia.

Proteinuria

The association of eclampsia and proteinuria as a risk factor was found to be 11.60% in pregnant women. P=0.00053 and so it's clear that there exist significant association between pregnant women with proteinuria and eclampsia. The association between pre-eclampsia and its risk factors are given in Table 8.

Complications of eclampsia

The complications that were found in pregnant women with eclampsia were pre-term birth 35.19%, neonatal death 3.70%, HELLP syndrome 16.67%, foetal growth restriction 11.11% and 33.33% of pregnant women were not found to have any complications. The complications of pre-eclampsia are given in Table 9.

Table 1: Difference between pre-eclampsia and eclampsia.

Pre-eclampsia (after 20 weeks of pregnancy)	Eclampsia (after 20 weeks of pregnancy)
Hypertension+	Hypertension+
Albuminuria or	Albuminuria or
Oedema or both	Oedema or both+
	Convulsions and/ or coma

Table 2: Prevalence of pre-eclampsia.

Prevalence	N	Percentage (%)
Pre-eclampsia	91	15.61
Not affected	492	84.39
Total patients	583	100

Table 3: Distribution of risk factors of pre-eclampsia (single and multiple risk factors).

Distribution	N	Percentage (%)
Single risk factors	43	47.25
Multiple risk factors	48	52.75
Total	91	100

Table 4: Association between pre-eclampsia and risk factors.

Risk factors	Normal, n (%)	Eclampsia, n (%)	Total, n (%)	X^2 value	P value
Age (In years)					
≤18	135 (92.5)	11 (7.5)	146 (100)		
19-25	193 (78.77)	52 (21.23)	245 (100)	13.6019	0.0035
26-34	147 (85.96)	24 (14.04)	171 (100)		
35-45	17 (80.95)	4 (19.05)	21 (100)		
Primigravida					
No	222 (80.70)	53 (19.30)	275 (100)	5.30455	0.02127
Yes	270 (87.66)	38 (12.34)	308 (100)		
Birth interval					
Less than 1.5 year	220 (95.238)	11 (4.76)	231 (100)	34.1735	0.00001
More than 1.5 year	272 (77.27)	80 (22.72)	352 (100)		

Continued.

Risk factors	Normal, n (%)	Eclampsia, n (%)	Total, n (%)	X^2 value	P value
Pre-existing disease					
Absent	312 (81.67)	70 (18.32)	382 (100)	6.2033	0.012751
Present	180 (89.55)	21 (10.44)	201 (100)		
Placental abnormalities					
Absent	394 (81.76)	88 (18.25)	482 (100)	14.8114	0.000119
Present	98 (97.02)	3 (2.97)	101 (100)		
Multiple pregnancy					
Absent	448 (83.42)	89 (16.57)	537 (100)	4.8078	0.028332
Present	44 (95.65)	2 (4.35)	46 (100)		
Past history					
Absent	456 (87.02)	68 (12.98)	524 (100)	27.2264	0.00001
Present	36 (61.01)	23 (38.9)	59 (100)		
Proteinuria					
Absent	244 (79.47)	63 (20.53)	307 (100)	11.8793	0.000568
Present	248 (89.85)	28 (10.15)	276 (100)		

Table 5: Complications of pre-eclampsia.

Complications	N	Percentage (%)
No complications	29	31.86
Pre-term birth	32	35.16
Neonatal death	11	12.08
HELLP syndrome	09	9.90
Eclampsia	06	6.60
Foetal growth restriction	04	4.40
Total	91	100

Table 6: Prevalence of eclampsia.

Prevalence	N	Percentage (%)
Eclampsia	54	9.26
Not affected	529	90.74
Total patients	583	100

Table 7: Distribution of risk factors of eclampsia (single and multiple risk factors).

Distribution	N	Percentage (%)
Single risk factors	05	9.26
Multiple risk factors	49	90.74
Total	54	100

Table 8: Association between eclampsia and risk factors.

Risk factors	Normal, n (%)	Eclampsia, n (%)	Total, n (%)	X^2 value	P value
Age (In years)					
≤18	141 (96.57)	5 (3.43)	146 (100)	8.6627	0.034129
19-25	220 (89.79)	25 (10.21)	245 (100)		
26-34	150 (87.71)	21 (12.29)	171 (100)		
35-45	18 (85.71)	3 (14.29)	21 (100)		
Primigravida					
No	263 (95.63)	12 (4.37)	275 (100)	14.8634	0.00116
Yes	266 (86.36)	42 (13.67)	308 (100)		
Birth interval					
Less than 1.5 year	198 (86.46)	31 (13.54)	229 (100)	8.0709	0.00001
More than 1.5 year	329 (93.46)	23 (6.54)	352 (100)		
Pre-existing disease					
Absent	362 (94.76)	20 (5.24)	382 (100)	21.3772	0.00001
Present	167 (83.08)	34 (16.91)	201 (100)		

Risk factors	Normal, n (%)	Eclampsia, n (%)	Total, n (%)	X^2 value	P value
Placental abnormalities					
Absent	453 (93.98)	29 (6.01)	482 (100)	34.8767	
Present	76 (75.24)	25 (24.76)	101 (100)		0.00001
Multiple pregnancy					
Absent	492 (91.62)	45 (8.38)	537 (100)	6.307	
Present	37 (80.43)	9 (19.57)	46 (100)		0.012024
Past history					
Absent	494 (94.27)	30 (5.73)	524 (100)	77.084	
Present	35 (59.32)	24 (40.67)	59 (100)		0.00001
Proteinuria					
Absent	295 (96.09)	12 (3.91)	307 (100)	12.303	
Present	244 (88.40)	32 (11.60)	276 (100)		0.00053

Table 9: Complications of eclampsia.

Complications	N	Percentage (%)
No complications	18	33.33
Pre-term birth	19	35.19
Neonatal death	02	3.70
HELLP syndrome	09	16.67
Foetal growth restriction	06	11.11
Total	54	100

DISCUSSION

Pre-eclapmsia/eclampsia has remained a leading cause of maternal mortality throughout the world, incidence being higher in developing countries due to illiteracy, poor antenatal care and poverty. Incidence of eclampsia and associated maternal mortality and morbidity remain high in developing countries.[7]

The prevalence of pre-eclampsia in present study was 15.61%, which is higher compared with the global average by approximately 7.61%.[40] Were the study conducted by Machno et al showed prevalence of 35.1% in Mnazi Mmoja hospital, 18.5% in Kivunge hospital, 9.8% in Abdulla Mzee hospital in Tanzania.[5]

The prevalence of eclampsia in our study was 9.26% which were more than the study conducted by Wassie A which showed 6.27% and less than studies conducted in departments across Haiti which showed 23.3%, Mpilo central hospital, Bulawayo, Zimbabwe 21.5%, Albert Schweitzer (HAS) in Deschapelles, Haiti 30.7%, in Mettu Karl referral hospital, Ethiopia 19%, in Addis Ababa 17.3% and in Amhara region referral hospitals, North West Ethiopia 46.7%.[32,34-39] This might be due to the large sample size difference, study setting, time gap difference/ data collection time used in the former studies.

According to the conducted study, some patients were found to have multiple risk factors (like primigravida with age, age with proteinuria and placental abnormality). Specifically, in pre-eclampsia (n=91), 43 patients were found to have single risk factor and 48 patients were found to have multiple risk factors. Whereas, in eclampsia (n=54)

49 patients had multiple risk factors and 5 patients had single risk. The various risk factors that were identified in the current study were associated to both pre-eclampsia and eclampsia with p≤0.05.

Study conducted by Nisell et al identified HELLP, pre-term birth and fetal growth restriction as few of the complications which was closely similar to complications recognised by our study that identified complications associated with pre-eclampsia and eclampsia like, neonatal death, HELLP syndrome, fetal growth restriction.[33]

Limitations

Sample size was low due to duration of the study and outpatients were not included who could have had eclampsia or pre-eclampsia diagnosed previously and were on medication.

CONCLUSION

The study concludes that there is a significant association between risk factor and pre-eclampsia, eclampsia so early diagnosis is essential. Or else the consequences of delayed diagnosis could include complications like foetal development restriction, HELLP syndrome, and neonatal mortality. Pre-eclampsia and eclampsia continue to be a significant cause of maternal mortality around the country, with a higher prevalence in developing nations because of lack of antenatal care, limited access to medical facility and lack of resources have influenced in late diagnosis in our set up and hence proper awareness should be provided to patients. The study suggests the need for larger-scale research involving multiple hospitals.

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