

Preeclampsia: A Risk Factor For Dismal Neonatal Outcome

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ABSTRACT

Objective To determine the neonatal outcome in pregnant women with preeclampsia.

Study design Observational cohort study.

Place & Duration of study Department of Obstetrics & Gynaecology, Jinnah Postgraduate Medical Center (JPMC) Karachi, from July 2019 to January 2020.

Methodology Pregnant women with preeclampsia were enrolled in this study. Similar number of pregnant women without preeclampsia during the study period were also observed longitudinally through the period of gestation. Newborns were followed up to seven days in postnatal period. Informed consent was obtained prior to the study. Detailed history was taken followed by general physical examination and per abdominal examination for assessing maternal and fetal status. Maternal monitoring included blood pressure measurement four-times a day, and clinical evaluation of symptoms twice daily, as well as according to the patient's condition, till delivery. Newborns were followed up to seven days post-delivery. Data entered in to the predesigned form. The data were analyzed by using SPSS version 20. Mean and standard deviation were calculated for quantities variables. Frequencies and percentages were computed for qualitative variables. Chi square and relative risk (RR) were calculated, and $RR > 1$ was considered as significant.

Results A total 156 pregnant women, 78 in each group (preeclampsia and non-preeclampsia) fulfilling the criteria were enrolled. Relative risk of fetal distress was 1.3 times more likely in women with preeclampsia as compared to those without it, with significant association ($p=0.004$), while in small for gestational age and neonatal deaths groups the relative risk were 1.2 and 1.7 times more in exposed as compared to non-exposed women but with non-significant associations ($p=0.395$ and 0.090) respectively.

Conclusion The relative risk of fetal distress was found significant in pregnant women with preeclampsia, however the incidence of small for gestational age and neonatal death were high in preeclampsia group but was no statistically significant.

Key words Neonatal outcome, Preeclampsia, Morbidity, Mortality, Pregnancy, Risk factors.

INTRODUCTION:

Preeclampsia complicates 2-8% of pregnancies.¹ Women with preeclampsia are at high risk for

abruption placenta, acute renal failure, cerebral hemorrhage, disseminated intravascular coagulation, pulmonary edema and circulatory collapse.² Family history of hypertension, extremes of reproductive age, first pregnancy, diabetes mellitus, renal diseases, hypertension prior to pregnancy, black race and obesity are some of the predisposing factors for preeclampsia.^{3,4}

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Women 40-years of age and above are more than five times likely to die of preeclampsia than those between 20-24 years of age.⁵ Preeclampsia occurs

only in the presence of the placenta and resolution begins with its removal. Even though the mechanism behind these features are unknown, shallow endovascular cytotrophoblast invasion in the spiral arteries, an exaggerated inflammatory response and inappropriate endothelial cell activity are key features in the pathogenesis of preeclampsia. This leads to maladaptation of spiral vessels, which interfere with normal villous development. In some cases, compensation can occur but in other poor villous development results in placental insufficiency.⁶ It is also proposed that preeclampsia is a disorder secondary to decreased placental perfusion interacting with maternal constitutional factors that results in oxidative stress.⁷ However, the current knowledge does not adequately explain the occurrence of preeclampsia so it is difficult to determine which of the women will progress.

Preeclampsia accounts for more than 40% of premature deliveries and substantially increases the risk of low birth weight and small for gestational age births.⁸ The rate of fetal complications depends mainly on gestational age at the time of delivery. Fetal morbidity is caused by intrauterine growth restriction (IUGR), small for gestational age (SGA) fetuses, placental abruption and preterm births. The incidence of perinatal and neonatal deaths is increased as well.⁸⁻¹⁰ This study was conducted to determine the effect of preeclampsia on neonatal outcome among pregnant women at a tertiary care hospital.

METHODOLOGY:

This observational cohort study was conducted in the Department of Obstetrics & Gynaecology, Jinnah Postgraduate Medical Centre Karachi, from July 2019 to January 2020. A total of Total 156 pregnant women, 78 in each group as exposed (with risk factor preeclampsia) and non-exposed (without risk factor) were enrolled by non probability consecutive sampling after informed consent. Women between 20 - 40 years of age of 34 -39 weeks of gestation, irrespective of parity were included. Women with chronic hypertension without proteinuria, gestational or transient hypertension without proteinuria, connective tissue / auto immune disorders, diabetes mellitus, cardiac disease, respiratory diseases, epilepsy, renal diseases, obstetric complications like bad obstetric history, multiple gestation, preterm premature rupture of membranes (PPROM), placenta previa and fetuses with congenital anomalies, were excluded.

Preeclampsia was defined by systolic blood pressure >160 or diastolic blood pressure > 110 and

proteinuria > 5g on two occasion at least 6 hours apart in a 24-hours period. Neonatal outcome such as fetal distress was defined as abnormal heart rate for example fetal tachycardia > 160 bpm or fetal bradycardia < 110 bpm or reduced / absent beat to beat variability or recurrent late deceleration or variable deceleration (assessed on auscultation with stethoscope). Presence of all of the above signs was considered as fetal distress. Small for gestational age was defined as baby's weight was < 10th percentile at birth or < 2500 gm measured by weighing machine. Neonatal death was considered when the baby died within 7-days of life. After detailed history, complete general physical examination and per abdominal examination were done for maternal and fetal status. Gestational age was determined by means of the last menstrual period, obstetrical ultrasonography or both.

In pregnant women with preeclampsia betamethasone was given to enhance fetal lung maturity. The dose was 12 mg intramuscular, two doses 24-hours apart. Antihypertensive drugs were administered to keep the systolic blood pressure at 130-150 mmHg and the diastolic blood pressure at 80-100mmHg. The oral antihypertensive agents were given in a stepwise manner (methyldopa 500mg QID, nifedipine 20 mg TID and atenolol 50mg BD). In resistant cases of hypertension nitroglycerine drip (20 ug/kg/h) was used to control severe hypertension. A full blood count, renal function tests, liver function tests, urine routine examination, fundoscopy and coagulation profile were obtained. Fetal condition at admission was assessed by means of ultrasonography. Maternal monitoring, including blood pressure measurements every four hours was done and clinical evaluation of symptoms twice daily or according to the patient's condition till delivery. Women were observed and followed till seven days post-delivery to observe the neonatal deaths and the information was entered on predesigned form.

Data were entered into SPSS version 20. Mean and standard deviation were calculated for quantitative variables like age, parity, weight and gestational age. Frequency and percentage were calculated for mode of delivery, residence and neonatal outcomes i.e. small for gestational age, fetal distress and neonatal death. Chi square test result and relative risk were determined to assess the association between neonatal outcomes and preeclampsia among exposed and non-exposed group. Relative risk (RR) of > 1 was considered as significant. Confounders were controlled through stratification of age, parity, gestational age, followed by Chi-

square test using $p < 0.05$ as significant.

RESULTS:

The mean of age of the women with preeclampsia and without it was 29.2 ± 6.2 year with Confidence Interval (CI) 28.21 - 30.18 and 29.6 ± 6.5 year with CI 28.57 - 30.62 respectively. Similarly, the mean gestational age in same groups was 36.5 ± 1.6 weeks with C1 36.24 - 36.75 and 36.5 ± 1.6 weeks with C1 36.24 - 36.75 respectively. Mean weight of women in preeclampsia group and that without the risk factor was 66.5 ± 12.0 kg with C1 64.60 - 68.39 and 65.2 ± 9.6 kg with C1 63.68 - 66.71 respectively. Mean parity in women with preeclampsia group was 2.2 ± 1.1 with C1 2.02 - 2.37 and in other group 2.1 ± 1.2 with C1 1.91 - 2.28. In group wise distribution of modes of delivery, 33 (42.3%) cesarean sections and 45 (57.7%) vaginal deliveries were done in women with preeclampsia while 36 (46.1%) cesarean sections and 42 (53.9%) vaginal deliveries in other group.

Relative risk of fetal distress was 1.3 times more likely in women with preeclampsia as compared to those without it ($p=0.004$), while in small for gestational age and neonatal deaths groups the relative risks were 1.2 and 1.7 times more in preeclampsia group as compared to women without it. However, the association was non-significant ($p=0.395$ and 0.090 respectively). Details are given in table I. Neonatal outcome in different age groups in women with preeclampsia is given in table II.

DISCUSSION:

Hypertension is an important cause of both maternal and fetal morbidity and mortality in pregnant women. In this study, the frequency of cesarean section was lower in women with preeclampsia. However, in a study by Al Mulhim et al vaginal deliveries were less frequent in women with preeclampsia (69.2%) as compared with healthy controls (86.2%).¹¹ In Bozhinova et al study, normal

delivery was attained with 48.8% and cesarean section in 47.6% of the pregnancies.¹² In our study the mean age in exposed and non exposed groups were noted as 29.2 ± 6.2 years and 29.6 ± 6.5 years respectively. Bridwell M et al,¹³ reported the mean age as 27.7 ± 6.7 year which is almost similar to ours. However, in another study done by Habli M, et al,¹⁴ the mean age was quite less than ours, 21.5 ± 4.7 years. Others studies reported variable age groups.¹⁵⁻¹⁷ In this study the mean gestational age in exposed and non-exposed group was 36.5 ± 1.6 weeks and 36.5 ± 1.6 weeks respectively. In the study of Saadat M et al,¹⁸ the mean gestational was 39 ± 2 weeks and 37 ± 2 weeks in patients and control groups respectively.

Perez-Cuevas R et al in their study found that eclampsia substantially increased the risk of delivery of very low birth weight infants (risk difference $RD=6.7\%$), moderate low birth weight infants ($RD=14.6\%$) and preterm gestational age less than 33 weeks ($RD=7.1\%$) compared with women without hypertension.⁸ Retrospective cohort study performed by Xiong et al showed that preeclampsia increased the risk of intrauterine growth restriction and low birth weight babies.¹⁹ Another study reported that preeclampsia was associated with 3.8 fold increased risk for low birth weight babies and women with preeclampsia were 3.6 times more likely to deliver small for gestational age new born as compared with normotensive women.²⁰ These findings are consistent with our study.

This study had few limitation. Firstly, we did not adjust for confounding variables to assess the influence of preeclampsia on neonatal mortality and complications. Secondly the severity of preeclampsia was not considered as variable. Management of infants should be performed at tertiary centers with ICU facility. A team approach with obstetrician and specialized pediatrician is essential to improve

Table I: Comparison of Neonatal Outcome between Groups (n=156)

Neonatal Outcome	Group	Group		Relative Risk	p value
		With Preeclampsia	Without Preeclampsia		
Fetal Distress	Yes	38 (24.4%)	29 (18.6%)	1.310	0.149
	No	40 (25.6%)	49 (31.4%)		
Small Gestational Age	Yes	28 (17.9%)	23 (14.7%)	1.217	0.395
	No	50 (32.1%)	55 (35.3%)		
Neonatal Deaths	Yes	22 (14.1%)	13 (8.3%)	1.692	0.090
	No	56 (35.9%)	65 (41.7%)		

Table II: Neonatal Outcome In Different Age Groups In Women With Preeclampsia

Age Group	20 – 30 Years	>30 Years
Fetal Distress (n %)	23 (27.4%)	15 (20.8%)
Small For Gestational Age (n %)	16 (19%)	12 (16.7%)
Neonatal Deaths (n %)	13 (15.5%)	9 (12.5%)

neonatal outcome.

CONCLUSION:

A variable relative risk and statistical association were found between preeclampsia and neonatal outcome.

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