



NEONATAL OUTCOME IN HYPERTENSIVE DISORDERS OF PREGNANCY IN A TERTIARY NEONATAL UNIT IN CENTRAL INDIA

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ABSTRACT

Introduction: Hypertensive disorders of pregnancy are an important cause of maternal and neonatal morbidity and mortality. The objective of this study was to evaluate clinical outcomes in babies born to hypertensive mothers as compared to normotensive mothers.

Materials and methods: This was a prospective case-control study, conducted in a tertiary neonatal unit in central India over a period of one year. Eighty-two singleton babies of hypertensive pregnancies as cases and 164 singleton babies of normotensive pregnancies as controls were recruited. Baseline clinical and sociodemographic profile of mother was recorded. Clinical outcomes including anthropometric profile of neonates were noted and compared between hypertensive and normotensive pregnancies.

Results: Most common hypertensive disorder was preeclampsia (52.44%). Total stillborn among hypertensive mothers were 9 (10.98%) as compared to 2 (1.22%) in normotensive mothers. Neonatal complications like intrauterine growth retardation (44.83% vs 16.67%), respiratory distress syndrome (23.17% vs 3.70%) and meconium aspiration syndrome (13.42% vs 4.42%) are significantly more common in hypertensive pregnancies. Significant correlation was found between maternal B.P and birth weight, head circumference, chest circumference & ponderal index (P.I), but not with length.

Conclusion: Hypertensive disorder of pregnancy remains an important cause of neonatal mortality, morbidities and reduced anthropometric parameters in central India.

KEYWORDS : Hypertension, Pregnancy-induced, Neonatal Outcome

Introduction

Hypertensive disorders of pregnancy are major cause of maternal and neonatal morbidity and mortality especially in developing countries and it complicates around 10 percent of all pregnancies globally (1,2). Hypertensive disorders in pregnancy are classified into five categories: chronic hypertension, chronic hypertension with superimposed preeclampsia, pregnancy induced hypertension, preeclampsia and eclampsia (3). Preeclampsia, a pregnancy-specific disorder characterized by hypertension ($\geq 140/90$ mm Hg) and proteinuria (≥ 300 mg in a 24-hour urine), affects 3% to 4% of all pregnancies worldwide (4). Risk factors include primiparity, previous preeclampsia, high maternal body mass index (BMI) before pregnancy, ethnicity (black women are more at risk), multiple gestations, and underlying medical conditions such as renal disease and diabetes mellitus (4). In low-income and middle-income countries, preeclampsia and its convulsive form, eclampsia, are associated with 10% to 15% of direct maternal deaths (1). Risks to the fetus include premature delivery, growth retardation, and death. The only definitive treatment of preeclampsia is delivery.

One of the largest prospective studies that analyzed the pregnancy outcome in women with chronic hypertension with or without superimposed preeclampsia showed that the incidence of fetal growth restriction was 48% and 21%, preterm birth was 51% and 15%, caesarean section was 70% and 44%, and neonatal intensive care admission was 35% and 12% respectively (5). Another large study from Australia revealed that women with hypertension, when compared with normotensive women, had increased risks for preterm birth, low birth weight and small for gestational age (SGA) birth as well as for low APGAR scores. However chronic hypertension not complicated by superimposed pre-eclampsia is not shown to be a risk factor for having an SGA infant, but still has a relatively high risk of for preterm birth between 32 and 36 weeks' gestation (6).

There is paucity of studies, which had evaluated neonatal outcome in babies born to hypertensive mothers in central India. Hence we had conducted this study to assess the clinical outcomes in neonates born to hypertensive pregnancy as compared to normotensive pregnancy.

Materials and methods:

This is a prospective case-control study conducted in a tertiary neonatal unit in central India over a period of 1 year. Eighty-two

singleton babies of hypertensive mothers born after 28 weeks of gestation were recruited as cases and 164 babies born to normotensive mothers were taken as controls. All babies born before 28 weeks of gestation, non-singleton babies, babies born to mothers with other comorbidities, babies born outside our hospital and mothers who refused to participate in the study were excluded. Written informed consent was taken from all study participants. The institutional ethical committee approved our study protocol. The study followed the Helsinki Declaration of 1975, as revised in 2000 and 2008, concerning human and animal rights.

Maternal particulars like age, parity, antenatal care and modified Kuppaswamy's socio economic status was recorded in pre designed and pretested proforma. Maternal blood pressure was recorded at the time of admission; 6 hours later to confirm hypertension case as per definition and then these cases were followed for urine protein level to label as preeclampsia as per definition (7). These enrolled cases were followed till the time of delivery and any complications in mother like convulsion or in newborn were recorded in proforma. Diagnosis of underlying condition was made using standard clinical, laboratory and / or radiological criteria. Gestational age was assessed by New Ballard Score system (8). Anthropometric parameters of the neonates like weight, length, head circumference and chest circumference were measured according to standard guidelines (9). Ponderal index (P.I) of all newborns was calculated by standard formula (10).

All neonates fulfilling inclusion criteria were followed till completed 7th postnatal day and their course of illness, complications and outcomes were recorded. All the observations were entered in excel sheet for data analysis. Appropriate statistical tests were applied on observations e.g. student t-test, Chi-square test, Fischer exact test and Pearson correlation. The critical values for significance of the results were considered at 0.05 levels (95% confidence limits).

Results:

During one-year study period, total 5712 deliveries were conducted in our hospital and out of those 284 women were hypertensive (4.97%). Out of these 284 women only 82 followed our inclusion and exclusion criteria. Mean systolic blood pressure among cases was 170.2 ± 16.2 mmHg and mean diastolic blood pressure was 105 ± 8.1 mmHg at the time of recruitment. Hypertensive pregnancies are significantly more common in lower socioeconomic mothers compared to middle and

upper class (P value<0.05). Among various maternal variables younger age, primigravida, unbooked status, less than 3 antenatal check (ANC) ups had significantly more risk of hypertension in pregnancy (Table 1). Pre eclampsia is the most common hypertensive disorder of pregnancy (52.44%) followed by pregnancy induced hypertension (21.95%) then eclampsia (14.63%) then chronic hypertension superimposed with pre eclampsia (6.1%) and chronic hypertension (4.87%), (Table 2). Number of still born, lower gestational age, requirement of NICU admission, occurrence of intrauterine growth retardation (IUGR), respiratory distress syndrome (RDS), meconium aspiration syndrome (MAS), necrotizing enterocolitis (NEC) and birth asphyxia were significantly more common in babies born to hypertensive mothers (Table 3). Pearson correlation found significant relationship between maternal B.P and birth weight, gestation, head circumference, chest circumference & ponderal index, but not with length (Table 4).

Discussion:

In this 1-year prospective study we found prevalence of hypertensive disorder in pregnancy 4.9 %. This observation is in correspondence with other studies from developing nations, which reported the incidence of hypertensive disorder in pregnancy ranges from 4-18% (11,12).

Hypertensive pregnancy is more common in younger females in our study, which is in contrast to study by Mehta et al where the prevalence of hypertension in pregnancy was found significantly higher in the age group ≥ 25 years (9.9%) as compared to <25 years age group (5.9%) (12). It may be explained due to more females in pre eclampsia and eclampsia group in our study. The present study showed that most of the cases that suffered hypertensive disorders of pregnancy were primiparous. This finding is same as found in a Turkish study (13) that primiparous are mostly complicated by hypertension. In contrast Kheir et al. from Sudan found that multiparous have higher risk of hypertension in pregnancy (14).

In our study preeclampsia is the most common type of hypertension in pregnancy (52.44%), which is in accordance with findings of another study from India by Prakash et al (11). Hypertensive disorder of pregnancy is responsible for significant maternal morbidity and mortality. Published study conducted in Turkey (13) revealed 1.2% maternal mortality in hypertensive pregnancy; our study revealed almost similar observation with maternal mortality 1.22%. The maternal mortality in our study can be attributed to irregular or absent antenatal visits, late admission to medical facilities and improper anticonvulsive prophylaxis at primary care units.

Neonatal complications like IUGR, RDS, MAS, birth asphyxia and NEC were observed to be significantly more common in hypertensive pregnancies in our study. According to several published studies, pregnancies complicated by hypertension are characterized by an increase rate of preterm delivery and SGA compared with normal pregnancies. This is true in all groups of hypertensive women independent of presence or absence of proteinuria (15,16). The incidence of SGA among pregnant women with hypertension in our study was 24.45% which is comparable to several studies e.g. Claussion et al from Sweden (17), Ananth et al from the USA (18), Ray et al from Canada (19), Yucesoy et al (13) from Turkey reported an incidence of 14.7%, 15.6%, 25% and 28% respectively.

Our study demonstrated still birth rate (10.98% vs 1.22%), perinatal mortality rate (17.07% vs 2.44%) and early neonatal mortality rate (6.1% vs 1.22%) in hypertensive pregnancy group and normotensive pregnancy group respectively. Prematurity and RDS were the main causes of death in neonates in our study. Yadav et al also observed significantly higher still birth rate of 4.8% vs 0.25%, perinatal mortality rate of 14.8% vs 3.5% in hypertensive pregnancies as compared to normotensive pregnancies (20). This finding is in contrast to an Australian study in which the survival rate to hospital discharge of preterm infants born to hypertensive mothers was high 96.3%, and only one intrauterine fetal death was reported (21), this contrasting observation is probably due to better maternal and neonatal care and less patient burden in developed countries as compared to developing countries.

We found a statistically significant correlation between maternal blood pressure and fetal birth weight, gestational age, head circumference, chest circumference and ponderal index, stating that with rise in

maternal blood pressure all above mentioned fetal anthropometric parameters are significantly affected in an inversely proportional manner. Lower growth parameters in the study group can be attributed to increased utero placental insufficiency leading to poor nutrition in utero to fetus. Xiong et al also found statistically significant difference in mean birth weight of babies between hypertensive and normotensive mother from 547.5 gm to 239.5 gm (22). Raman et al and Siromani et al also found significantly lower birth weight in babies born to hypertensive mothers in their studies (23,24). In a similar way Obed and Patience also found that preeclamptic mother's babies have significantly lower ponderal index (P.I) along with lower birth weight at all gestational age as compared to normotensive mothers (25).

In summary hypertension in pregnancy remains an important cause of maternal and neonatal morbidity and mortality. Fetal complications like stillbirth, prematurity, IUGR, RDS, early neonatal death rate and reduced anthropometric parameters are significantly high in hypertensive mothers as compared to normotensive mothers. IUGR, prematurity and RDS are the main causes of early neonatal death.

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Table 1. Maternal variables associated with hypertensive pregnancy

Maternal variables	Cases (N=82)	Controls (N=164)	P - value
Mean age	23.8 \pm 5.3	25.3 \pm 4.8	0.025
Primigravida	59 (71.95%)	89 (54.27%)	0.015
Unbooked	59 (71.95%)	93 (56.70%)	0.029
< 3 ANC visits	71 (86.59%)	108 (65.85%)	< 0.001

ANC – antenatal care, p–value < 0.05 significant*

Table 2. Types of hypertensive disorders of pregnancy

Type of hypertensive disorder	N (%)
Preeclampsia	43 (52.44%)
PIH	18 (21.95%)
Eclampsia	12 (14.63%)
Chronic HTN with preeclampsia	5 (6.1%)
Chronic HTN	4 (4.87%)

PIH – pregnancy induced hypertension, HTN - hypertension

Table 3. Differences in neonatal clinical outcomes between hypertensive and normotensive pregnancies

Neonatal outcomes	Cases, n (%)	Controls, n (%)	P - value
Still birth	9 (10.98%)	2 (1.22%)	0.001
Gestational age < 37 weeks	28 (38.35%)	25 (15.43%)	<0.0001
Requirement of NICU admission	34 (46.57%)	21 (12.96%)	<0.0001
IUGR	32 (44.83%)	27 (16.67%)	0.001
RDS	19 (23.17%)	6 (3.70%)	0.001
MAS	11 (13.42%)	7 (4.32%)	0.001
NEC	6 (7.31%)	2 (1.22%)	0.001

NICU – neonatal intensive care unit, IUGR – intrauterine growth retardation, RDS – respiratory distress syndrome, MAS – meconium aspiration syndrome, NEC – necrotizing enterocolitis
P - value < 0.05 significant*

Table 4. Correlation between blood pressure of hypertensive mothers and anthropometric measurements of their babies

Anthropometric measurements	Pearson correlation coefficient	P - value
Weight	- 0.611	< 0.0001
Length	- 0.163	0.284
H.C	- 0.686	< 0.0001
C.C	- 0.331	< 0.0001
P.I	- 0.608	< 0.0001

H.C – head circumference, C.C – chest circumference, P.I – Ponderal index, P - value < 0.05 significant*

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