

Neonatal outcome of pregnancy with hypertensive disorders in Birat Medical College Teaching Hospital, Morang, Nepal

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ABSTRACT

Background: Hypertensive disorders of pregnancy are multi-organ, heterogeneous disorder of pregnancy and seriously endanger the safety of the mother and the fetus during pregnancy with continuous impact on neonatal period. It causes adverse neonatal outcomes like prematurity, low birth weight (LBW), intrauterine fetal demise (IUFD), intrauterine growth restriction (IUGR), respiratory distress, admission at neonatal intensive care unit (NICU) and neonatal death. The main objective of this study is to assess neonatal outcome in pregnancy with hypertensive disorders.

Methods: This was a hospital based cross sectional study carried out in the Department of Paediatrics of Birat Medical College Teaching Hospital, Morang. This study was performed on 175 neonates delivered by pregnant mother with hypertensive disorders who fulfilled the inclusion criteria. Demographic information, detailed clinical and obstetric history, clinical examination, investigations and neonatal outcomes were recorded in the proforma. Data were entered in Microsoft excel and analyzed using SPSS version 16.

Results: Among 175 mothers, majority were suffering from gestational hypertension (54.8%) followed by pre-eclampsia (40.6%), with most (60%) being a term pregnancy. Intrauterine growth retardation (IUGR) was 32% and appropriate for gestational age (AGA) were 68%. Perinatal asphyxia comprising of 19% cases was the most common cause of admission. NICU admission was needed in 53.7% neonates for various complications with neonatal mortality seen in 6% cases.

Conclusion: Hypertensive disorders of pregnancy is associated with the increased risk of adverse neonatal outcome.

Keywords: Neonatal outcome, gestational hypertension, hypertensive disorder of pregnancy

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INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are a multi-organ, heterogeneous disorder of pregnancy that seriously endanger the safety of the mother and fetus during pregnancy and continue its impact on neonatal period. These disorders have remained a significant public threat in both developed and developing countries, contributing globally to maternal and perinatal morbidity and mortality. In

some conditions, delivery is needed to halt its progression for the benefit of the mother, fetus and neonate [1].

HDP are higher in primigravida mothers. In multipara mothers, it is associated with longstanding essential hypertension or chronic renal failure. The most common risk of hypertension is pre-eclampsia [2]. Hypertension in pregnancy is defined as either a systolic blood pressure (BP) of

≥140 mm Hg and/ a diastolic ≥90 mm Hg [3]. The Working Group of the NHBPEP-National High Blood Pressure Education Program (2000) has categorized HDP into 4 types:

- Gestational Hypertension: Hypertension (HTN) 1st diagnosed after 20 weeks gestation not accompanied by proteinuria.
- Pre-eclampsia/pre-eclamptic toxemia (PET) – Eclampsia: HTN accompanied by proteinuria greater than 0.3g in 24 hours urine collection or greater than 1g/L in a random sample;
- Eclampsia: Pre-eclampsia when complicated with convulsion and / coma.
- Chronic Hypertension: Hypertension present before pregnancy or 1st diagnosed before 20 weeks gestation.
- Pre-eclampsia superimposed on chronic hypertension.

The term pregnancy induced hypertension (PIH) is defined as the hypertension that develops as a direct result of the gravid state. It includes (i) Gestational hypertension (ii) Pre-eclampsia (PE) (iii) Eclampsia [4].

Hypertensive disorders of pregnancy (HDP) are more likely to cause adverse neonatal outcomes which includes prematurity, low birth weight (LBW), intrauterine fetal demise (IUFD), intrauterine growth restriction (IUGR), respiratory distress, admission at neonatal intensive care unit (NICU) and neonatal death. Spontaneous preterm labour or iatrogenic preterm induction are the main reasons for perinatal morbidity [5]. The main reasons for NICU admissions and early neonatal death in babies born to mothers with hypertensive disorders of pregnancy are low birth weight (LBW) due to prematurity/ intrauterine growth retardation (IUGR) and fetal hypoxia [6]. An expectant management with temporizing treatment should be performed to lengthen gestation which may be associated with enhanced perinatal survival. The presence of good intensive care, close monitoring during labor, judicious timing of delivery and NICU facilities is required for better fetal and neonatal outcome in this case [7].

Similar study was not conducted before at our institute. Therefore, the present study is undertaken to assess neonatal outcome of pregnancy with hypertensive disorders in order to devise different strategies to reduce fetal and neonatal morbidity and mortality.

MATERIALS AND METHODS

This is a hospital based cross sectional study carried out from 15th January 2023 to 15th September 2023 in the department of Paediatrics, Birat Medical College Teaching Hospital. Ethical clearance was obtained from the Institutional Review Committee (IRC) of the institute to carry out the study. The study was conducted on 175 neonates delivered by pregnant mother with hypertensive disorders. Informed consent was taken from their parents. Neonate delivered by mother with hypertensive disorders during pregnancy (like gestational hypertension, preeclampsia, eclampsia), beyond 20 weeks of gestation, from both inpatient and outpatient department, with regular antenatal check-up (ANC) and good documentation regarding maternal physical condition and blood pressure were included in the study. Similarly, neonate delivered by mother with normal blood pressure, pregnant female with underlying chronic diseases like chronic diabetes mellitus, chronic renal failure, chronic hypertension, heart disease, twin or multiple pregnancy and polyhydramnios were excluded. Data regarding the demographic parameters of the mothers like maternal age, parity, type of maternal hypertensive disorder of pregnancy, and mode of delivery were recorded in a structured questionnaire.

HDP were categorised as gestational hypertension (HTN after 20 wks. of gestation), pre-eclampsia (HTN accompanied by proteinuria greater than 0.3g in 24 hours urine collection or greater than 1g/L in a random sample) and eclampsia (Pre-eclampsia when complicated with convulsion and / coma) [8]. Neonatal parameters were sex, gestational age, birth weight and the neonatal medical problems like perinatal asphyxia, respiratory distress syndrome, neonatal sepsis and

meconium aspiration syndrome were also recorded. Gestational age (GA) were categorized as pre-term (<37 completed weeks) and term (37 to 42 weeks), birth weight were categorized as normal birth weight, (2500 to 4000 gm), low birth weight (from 1500 up to 2499 gm), and Very low birth weight (from 1000 up to 1499gm). IUGR was considered when the birth weight was less than 10th percentile for the gestational weight.[9] During hospital stay neonates with clinical signs of sepsis were observed and Investigation like complete blood count and blood culture were done and Chest X ray findings were recorded. The data was recorded in a predesigned proforma and data analysis was done using statistical package of social science (SPSS) version 16. Categorical variables were reported in terms of numbers and percentages.

RESULTS

Total 175 mothers with their neonates were included in the study. In our study, maximum mothers (56%) were seen in the age group of 20-24 yrs and majority (56%) of them were multiparous. Also, 76% cases needed lower uterine caesarean section (LSCS) for delivery and 24% had spontaneous vaginal delivery (SVD). Among 175 cases of HDP, 54.8% cases were of gestational hypertension followed by 40.6% cases and 4.6% cases of pre-eclampsia and eclampsia respectively. (Table 1)

In this study, 56.6% of neonates were male and 43.4% were female. This study showed that majority 43.4% of neonates had normal birth weight with 41.8% cases and 14.8% cases of LBW and VLBW neonates respectively. IUGR were 32% and appropriate for gestational age (AGA) were 68% neonates. In this study, 60% neonates were delivered term and rest 40% were delivered preterm before 36 weeks of pregnancy. (Table 2)

In the present study, 46.3% of the babies had no adverse perinatal outcome. Neonates need admission for other than intrauterine growth retardation and/or preterm delivery, were due to complications like perinatal asphyxia, respiratory distress, neonatal sepsis and meconium aspiration

syndrome comprising of 19%, 15%, 10% and 9.7% cases respectively (Table 3).

The study showed that NICU admission was required in 53.7% cases. Only 6% neonates expired and 94% cases survived (Table 4).

Table 1: Frequency distribution of maternal demographic and clinical profile (n=175)

Age of mother in years	
20-24	98 (56%)
25-29	54 (31%)
30-34	11 (6.2%)
35-39	12 (6.8%)
Parity	
Primiparous	98 (56%)
Multiparous	77 (44%)
Mode of delivery	
SVD	42 (24%)
LSCS	133 (76%)
Types of HDP	
Gestational hypertension	96 (54.8%)
Pre-eclampsia	71 (40.6%)
Eclampsia	8 (4.6%)
Total	175 (100%)

Table 2: Frequency distribution of the neonates according demographic and clinical profile (n=175)

Sex	
Male	99 (56.6%)
Female	76 (43.4%)
Birth weight (kg)	
VLBW (1-1.499)	26 (14.8%)
LBW (1.5-2.499)	73 (41.8%)
Normal (≥2.5)	76 (43.4%)
Intrauterine Growth	
IUGR	56 (32%)
AGA	119 (68%)
Gestational age (weeks)	
<32	23 (13%)
32-36	47 (27%)
37-42	105 (60%)
Total	175 (100%)

Table 3: Neonatal clinical problems at the time of admission (n=175)

Category	Frequency (%)
Normal	81 (46.3)
Perinatal asphyxia	33 (19)
Meconium aspiration syndrome	17 (9.7)
Neonatal sepsis	18 (10)
Respiratory distress	26 (15)
Total	175 (100)

Table 4: Immediate outcome (n=175)

Outcome	Frequency (%)
NICU admission	
Yes	94 (53.7)
No	81 (46.3)
Neonatal outcome	
Alive	164 (94)
Death	11 (6)

DISCUSSION

Globally hypertensive disorders of pregnancy have been identified as a major health problem associated with increased neonatal morbidity and mortality. HDP predispose women to acute or chronic uteroplacental insufficiency, thereby having an effect on perinatal and neonatal outcome that may result in antenatal or intrapartum anoxia which may lead to foetal death, IUGR and preterm delivery. Various authors have found the frequency of hypertensive disorders of pregnancy between 7-10% [10,11]. Among them gestational hypertension was 46%, pre-eclampsia 45% [12].

In our study, 96(54.8%) cases were of gestational hypertension followed by 71 (40.6%) cases and 8 (4.6%) cases of pre-eclampsia and eclampsia respectively. Similar findings were seen in a study conducted by Gupta et al and Hassan et al where gestational hypertension comprised of 57.7% cases and 60% cases respectively [1,4]. Also, 98(56%) cases of HDP was noted among 20-24 years of age group followed by 54 (31%) cases seen in 25-29 years of age group. This is in accordance with the study conducted by Patel R

where majority of PIH were noted among 18-22 years of age group (51.56%) followed by 23-27 years of age group (28.12%) [8]. Similarly in a study conducted by Gandhi et al, majority of cases were noted among 21-25 years of age group (48.42%) followed by 25.26% cases among greater than 30 years of age group. This can be due to the fact that HDP are more common in the younger age group [9].

Further, 98(56%) cases of pregnancy induced hypertension were seen among primiparous and 77 (44%) cases were seen in multiparous. This is in contrast to a study conducted by Hassan et al and Mohanty et al where 75% cases and 56 % cases of pregnancy induced hypertension were seen in multiparous but 25% and 44% cases of pregnancy induced hypertension were seen in primiparous respectively [4,5]. This could be due to more prevalence of hypertensive disorder of pregnancy in primiparous.

In this study, 133 (76%) neonates were delivered by LSCS and 42(24%) were delivered by SVD. This is in accordance with the study conducted by Gupta et al and Hassan et al where 71.2% and 90% neonates were delivered by LSCS [1,4]. Chronic uteroplacental insufficiency in hypertensive disorders of pregnancy leads to IUGR, preterm delivery and fetal hypoxia. Therefore, high rates of preterm termination of pregnancy by LSCS are performed for feto-maternal sake in hypertensive mothers.

Perinatal outcome is strongly influenced by gestational age and the severity of hypertension as expressed by the need for antihypertensive treatment, irrespective of the underlying syndrome [1]. So, fetal growth is a useful marker for fetal well-being. Pregnancies complicated by intrauterine growth restriction (IUGR), defined as a pathological process of reduced fetal growth, have been associated with increase in perinatal mortality. Intrauterine growth retardation was 56 (32.0%) in our study which is in accordance with the studies conducted by Hassan et al and Mohanty et al where IUGR comprised of 30% and 40.6% cases

respectively [4,5]. This can be due to decreased utero-placental blood flow and ischemia.

In our study maximum number of babies had birth weight ≥ 2.5 kg, accounting for 76 cases (43.4%), followed by 73 cases (41.8%) in the range of 1.5-2.49 kg (low birth weight) and 14.8% cases were in the range of 1-1.49 kg (very low birth weight). Comparable results were obtained in the study conducted by Mohanty et al, Patel et al and Parmar et al where 52%, 53.12% and 53% of babies were low birth weight respectively.[5,8,13] This can be due to the compromise of uteroplacental blood flow leading to early spontaneous labour or therapeutic induction necessitated by severe HDP.

In our study, majority of the babies were born at term, accounting for 105 cases (60%) and 70 babies were preterm (40%). This is in accordance with the study conducted by Mohanty et al, Bangal et al and Yadav et al where 33.3%, 37% and 28.8% of neonates were preterm respectively [4,15]. The reason for majority term neonates in our study could be attributed to the fact that all the mothers were booked cases who attended regular antenatal check-up. On the other hand, higher incidence of prematurity was seen in studies done by Tiwari A et al and Nadkarni et al accounting for 44.2% and 44.3% respectively [16,17]. This difference in prematurity can be attributed to the severity of hypertension in the mothers and also the varying expertise and judgement of the obstetricians from centre to centre.

In this study, 53.7% babies required NICU admission for various complications, which is in accordance with a study conducted by Uwizeyimana et al where 50.4% neonates born to PIH group needed NICU care for various adverse fetal outcome [3]. Among all neonates in the study, 46.3% of the babies, had no adverse perinatal outcome. Neonates needing admission for other than intrauterine growth retardation and/or preterm delivery, were due to complications like perinatal asphyxia, respiratory distress, neonatal sepsis and meconium aspiration syndrome seen in 19%, 15%, 10% and 9.7% cases respectively. This is similar to the study conducted by Gupta et al [1] where

perinatal asphyxia, respiratory distress and neonatal sepsis were seen in 19.2%, 17.7% and 13.5% cases respectively. Perinatal asphyxia was the most important and most common fetal complication occurring at birth in hypertensive disorders of pregnancy [1]. This can be attributed to reduced utero-placental blood flow and ischemia associated with hypertensive disorders of pregnancy, along with higher rates of induction, which increase the risk of fetal distress.

In our study, 94% of neonates were alive and 6% of neonates expired which is similar to the study conducted by Hassan et al where 90% of neonates were alive and 10% of neonates were expired.[4] The lower incidence of neonatal mortality in our study is likely attributed to the fact that all cases involved regular antenatal check-ups, institutional deliveries, and prompt, intensive postnatal care for various neonatal complications. Chronic uteroplacental insufficiency in hypertensive disorders of pregnancy leads to IUGR, preterm delivery and fetal hypoxia. Also high rates of preterm termination of pregnancy for feto-maternal sake in hypertensive mothers results in preterm babies. Thus low birth weight due to prematurity/IUGR and fetal hypoxia are the main reasons for NICU admissions and early neonatal death in babies born to mothers with hypertensive disorders of pregnancy.

Limitations reflect the relatively small group of pregnant women, which limit our ability to draw firm conclusions on the magnitude of adverse events. The setting was urban, so the findings couldn't be generalizable in rural cities and community settings.

CONCLUSION

Hypertensive diseases complicating pregnancy remains a major problem in developing countries. Pregnancy complicated with hypertension are associated with adverse fetal and neonatal outcome in terms of prevalence of intrauterine growth restriction, prematurity, low birth weight, early neonatal death, high rates of admission to NICU and the need for resuscitation. A good intensive care,

close monitoring during labor, judicious timing of delivery and NICU facilities is required for better fetal and neonatal outcome in these cases. In the view of high probability of adverse neonatal outcome in hypertensive disorder of pregnancy, regular monitoring of blood pressure during pregnancy on a regular basis needs to be considered.

Author contributions:

All authors conceptualized and designed the research and reviewed the literature; CBJ and RBS did data collection, analysis and prepare result. CBJ, RBS and SKY drafted the manuscript; and all authors reviewed the manuscript and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the research work.

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Consent and/or assent: Written informed consent was obtained from the parents of all the participants.

Data availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest: There was no any conflict of interest to declare.

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