Original Article

Observation of Adverse Neonatal in Relation to Maternal Hypertension

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ABSTRACT

Introduction: *Hypertension (HTN) is the most common medical problem encountered in pregnancy and is a leading cause of perinatal and maternal complication. Maternal hypertension, particularly conditions such as preeclampsia and gestational hypertension, can have a wide range of complications for neonates.* ***Methods and materials:*** *A comparative observational cohort study was conducted, including pregnant women with and without hypertension who received prenatal care at Enam Medical College and Hospital, Dhaka, Bangladesh between July 2022 and June 2023. Clinical data, including maternal age, gestational age at diagnosis, parity, and mode of delivery were collected.* ***Result:*** *Pregnancy outcomes, such as maternal complications, hypertension, neonatal birth weight, and other relevant parameters were also assessed. A total of 968 pregnant women were included in the analysis, 146 were diagnosed with HTN and 822 without HTN. This study sheds light on the critical link between maternal hypertension and adverse neonatal outcomes in the unique context of Bangladesh.* ***Conclusion:*** *The findings underscore the importance of early detection and management of maternal hypertension*

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to mitigate the associated risks for neonates. Implementation of targeted interventions and improved antenatal care protocols may prove instrumental in reducing the incidence of adverse neonatal outcomes in this population.

Keywords**:** *Hypertension, Preeclampsia, neonatal outcome, maternal complication*

INTRODUCTION

A clinical term used to characterize elevated blood pressure is hypertension (HTN) [1]. "Systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg which usually confirmed within four hours apart measurement" is the definition of hypertension in pregnancy [2]. Preeclampsia/eclampsia, gestational hypertension, pre-existing hypertension, and superimposed hypertension are all included in the range of conditions that make up hypertension disorder of pregnancy. These disorders can range in severity from a little rise in blood pressure at term without any further symptoms to serious problems that could seriously injure the mother, fetus, or newborn [3]. Pregnancy complicated by hypertensive disorders can have a variety of outcomes, from a smooth pregnancy in women whose hypertension is chronic but under control to mortality in situations of preeclampsia-eclampsia [4].

Numerous factors influence the feto-maternal outcomes of hypertension diseases during pregnancy. These include gestational age at beginning, disease severity, multifetal gestation, and co-morbid diseases such as diabetes mellitus, renal disease, thrombophilia, or preexisting hypertension, among others [5, 6, 7].

According to WHO estimations, preeclampsia is seven times more common in low- and middle-income countries than in high-income ones, and a woman in a low-income country has a 300-fold increased chance of dying from pre-eclampsia or eclampsia compared to a woman in a high-income country [8]. The bulk of neonatal mortality resulting from hypertension-related problems have happened in low- and middle-income nations [9].

These pregnant women' fears are nonetheless made worse by the typical indicators of developing nations, such as inadequate prenatal care, illiteracy, ignorance, and poverty [10]. The purpose of this study is to draw attention to the finding that maternal hypertension and neonatal relationship exist.

MATERIALS AND METHODS

This was a comparative observational cohort study that included all women with HTN admitted to Enam Medical College and Hospital, Dhaka, Bangladesh between July 2022 and June 2023. Maternal and fetal perinatal outcomes were monitored and registered by a single investigator from the admission to hospital discharge or death.

The study was approved by an independent ethics committee. Data were collected from medical records, including maternal demographics, glycemic control measures, and maternal and neonatal outcomes. The study included 968 pregnant women, all diagnosed selected HTN cases were included in the Case =146, while selected cases without HTN were included in the Control =822.

Dependent variable was Hypertensive disorder of pregnancy and independent variables were age, marital status, gravida, parity multiplicity of pregnancy, pre-existing hypertension, and family history.

RESULTS

Table I: Maternal age, parity, gestation week and antenatal care distribution study population

Variables	Case		Control	
	n	%	n	%
Age				
<20	10	6.85	22	2.67
20-30	52	35.62	774	94.16
>30-32	84	57.52	26	3.16
Parity				
0	130	89.04	106	12.89
1-2	10	6.85	674	81.99
≥3	06	4.10	42	5.10
Gestation week				
<28	14	9.59	22	2.67
29-36	110	75.34	788	95.86
>37	22	15.07	12	1.46
Antenatal care				
Irregular	40	27.39	204	24.82
Regular	106	72.60	618	75.18

Table I shows the baseline characteristics distribution among the participants. The study involved a total of 968 participants, all of whom were married. Among them, (Case=146) were diagnosed with HTN, while the majority, (Control=822) did not have HTN. Maximum patients were found under the age range of 20-30 for control group but >30-32 range for case group. In terms of parity, nulliparity indicated higher chance of HTN (case=130). All patients required antenatal care.

Table II: Hypertension status among the study population

Hypertension type	Frequency	%
Primary	98	10.12
Secondary	48	4.96
Duration of Hypertension	**Frequency**	**%**
<1 year	106	10.95
1-3	22	2.27

4-7	14	1.45
>7	4	0.41
Familial hypertension	**Frequency**	**%**
Yes	110	11.36
No	36	3.72

Table II shows the hypertension distribution among the participants. The study revealed that among participants, 10.12% had primary hypertension, 4.96% had secondary hypertension. In terms of duration, 10.95% had hypertension for <1 year, and 11.36% report familial hypertension.

Table III: Delivery mode of all patients

Mode of Delivery	Frequency	%
LSCS	870	89.87
NVD	86	8.88
Others (peripartum hysterectomy)	12	1.24

Table III shows the distribution of mode of delivery among participants. The study groups included 6 peripartum hysterectomies, 86 NVD cases, and 870 LSCS patients, representing a range of delivery modalities.

Table IV: Outcomes of pregnancies among the study groups

Maternal Outcome	Case	%	Control	%
Live birth	128	87.67	804	97.81
Early neonatal death (END)	02	1.37	04	0.49
Still birth (SB) (fresh+ macerated	14	9.59	10	1.22
Perinatal death (END+SB)	02	1.37	04	0.49

The **Table IV** compared maternal outcomes between cases (hypertensive pregnancies) and controls (non-hypertensive pregnancies), showing live births, early neonatal deaths, still births, and perinatal deaths.

Table V: Pregnancy related complications among case and control groups

Maternal Complications	Case	%	Control	%
Gestational Diabetes	20	13.69	190	23.11
Preeclampsia	44	30.14	146	17.76
Placental abruption	12	8.22	12	1.46

Placental Previa	08	5.48	16	1.95
Intrauterine growth restriction	32	21.92	26	3.16
Oligohydramnios	26	17.80	112	13.62
Anemia	04	2.74	16	1.95
No complication	00	00	304	36.98
	n=146		n=822	

The **Table V** presented maternal complications in a study, comparing cases and controls. Notable differences include higher occurrences of gestational diabetes, preeclampsia, and intrauterine growth restriction in cases.

Table VI: Neonatal birth weight distribution among study population

Neonatal birth weight	Frequency	%
≥ 4001	24	2.48
2501- 4000	892	92.15
1501- 2500	42	4.34
1000- 1500	08	0.83
≤ 1000	02	0.20
NICU required = 32 (3.3%) Congenital Anomalies = 04 (0.41%)		

The **table VI** shows the neonatal birth weight distribution among the participants. The study groups were categorized based on neonatal birth weight. The majority (892) fell within the 2501-4000 gram range, with 24 infants weighing ≥ 4001 grams. Only one baby weighed ≤ 1000 grams. Thirty two infants required NICU admission, and four had congenital anomalies.

Table VII: Observed neonatal complications among study population

Neonatal Complications	Case	%	Control	%
Jaundice	06	4.1	20	2.43
Septicemia	0	0	02	0.24
Respiratory distress	08	5.48	12	1.15
Neonatal convulsion	02	1.37	04	0.49
No complication	130	89.04	784	95.38

The **table VII** showed neonatal complications and hypertension status in a study, comparing cases and controls. Cases exhibit varying complications such as jaundice, septicemia, respiratory distress, and convulsions.

DISCUSSION

Our study compared hypertension cases and non-hypertensive individuals across various demographic factors. In terms of age, the majority of hypertension cases fell within the >30-32 age range, constituting 57.52% of cases. Parity analysis revealed that nulliparous women (parity 0) exhibit a higher prevalence of hypertension at 89.04%. Regarding gestation weeks, most cases occurred between 29 and 36 weeks. Additionally, antenatal care patterns showed a higher incidence of hypertension among individuals with irregular care (27.39%). These findings emphasize the importance of considering age, parity, gestation weeks, and antenatal care in understanding and managing hypertension during pregnancy. This study observed hypertension in 10.12% of cases, with primary hypertension accounting for 98 cases (10.12%) and secondary hypertension in 48 cases (4.96%). The duration of hypertension varied, with 10.95% of patients having hypertension for less than a year, 2.27% for 1-3 years, 1.45% for 4-7 years, and 0.41% for over 7 years. Familial hypertension was present in 11.36% of cases. When comparing delivery modes, 89.87% of patients underwent a cesarean section (LSCS), while 8.88% had a normal vaginal delivery (NVD). Peripartum hysterectomy and other delivery modes accounted for 1.24% of cases. These findings provide a comprehensive overview of LSCS requirements for the mode of delivery for hypertensive conditions.

The presented data compares maternal and neonatal outcomes, as well as maternal complications, between cases with hypertension during pregnancy and a control group without hypertension. In terms of maternal effects, the case group with hypertension had a slightly lower percentage of live births (87.67%) compared to the control group (97.81%). Additionally, the case group showed higher rates of early neonatal death (1.37%), stillbirth (9.59%), and perinatal death (1.37%) compared to the control group.

Regarding maternal complications, the case group with hypertension exhibited higher percentages across various conditions compared to the control group. These included gestational diabetes (13.69% vs. 23.11%), preeclampsia (30.14% vs. 17.76%), placental abruption (8.22% vs. 1.46%), placental previa (5.48% vs. 1.95%), intrauterine growth restriction (21.92% vs. 3.16%), oligohydramnios (17.80% vs. 13.62%), and anemia (2.74% vs. 1.95%). The control group had a notably higher percentage of pregnancies without complications (36.98%) than the hypertensive case group.

These findings suggest that hypertension during pregnancy is associated with increased risks of adverse maternal and neonatal outcomes, as well as a higher likelihood of experiencing various complications during pregnancy, emphasizing the importance of monitoring and managing hypertension in pregnant individuals to improve overall maternal and fetal health.

This study presented a comprehensive overview of neonatal birth weight distribution, associated complications, and the prevalence of hypertension in a given population. Most infants fall within the normal birth weight range, with 92.15% weighing between 2501 and 4000 grams. Notably, there is a low incidence of deficient birth weight infants (≤ 1000 grams) at 0.20%, but these cases warrant

special attention due to their vulnerability. The need for Neonatal Intensive Care Unit (NICU) support is relatively low at 3.3%, indicating that the majority of newborns did not require intensive medical intervention immediately after birth. Additionally, congenital anomalies are reported in 0.41% of cases, underscoring the importance of monitoring and addressing such issues early in infancy.

By turning attention to neonatal complications, jaundice is the most common, affecting 4.1% of cases. Respiratory distress follows at 5.48%, while neonatal convulsions and septicemia are relatively rare. Importantly, the majority of newborns (89.04%) experienced no complications, emphasizing the overall health and resilience of the neonatal population under consideration.

In the context of hypertension, the data indicates that 4.1% of neonates born to mothers with hypertension developed jaundice, compared to 2.43% in the non-hypertensive group. While the incidence of hypertension-related complications in this neonatal population is relatively low, healthcare providers must monitor and manage hypertension during pregnancy to minimize potential risks to both maternal and neonatal health. The overall low occurrence of complications and the high percentage of newborns without complications underscore the effectiveness of prenatal care and medical interventions in ensuring the well-being of mothers and their neonates in this population.

CONCLUSION

In the particular context of Bangladesh, this study clarifies the important relationship between maternal hypertension and newborn outcomes. The results highlight how critical it is to identify and treat maternal hypertension as soon as possible in order to reduce the dangers to newborns. The incidence of unfavorable newborn outcomes in this population may be decreased with the implementation of focused therapies and enhanced prenatal care practices. To better understand the underlying mechanisms influencing these results and to create specialized risk-reduction plans for the local environment, more study is necessary.

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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