A clinical study of neonatal outcome in pregnancy-induced hypertension

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ABSTRACT

Background: Pregnancy-induced hypertension (PIH) includes hypertensive disorders peculiar to pregnancy that have their onset during pregnancy and subsides completely following delivery. In India, perinatal mortality rate (PNMR) in PIH is high as the emphasis is still on maternal salvage, and there is lack of tertiary care centers dealing with premature and low-birth-weight infants. **Objective:** The objective of the study was to determine the extent of perinatal problems and to evaluate the prognostic significance of various factors associated with PIH on perinatal outcome and determine its effects. **Materials and Methods:** The study included 200 consecutive births which took place from March 2018 to February 2019 on mothers admitted with PIH in District Hospital, Tumkur, Karnataka. **Results:** The incidence of PIH was 8.6% in this study. The incidence of preterm was 31% which was high in eclampsia (63). PNMR in the study is 345/1000 which is higher than in general PNMR of the hospital. **Conclusion:** PIH is a multisystem disease and threat to the well-being of the mother and her unborn child. Characterization of the neonatal consequences of maternal hypertension is complicated by the administration of antihypertensive and anticonvulsant medications to the mother; thus, the fetal outcome might be influenced by both maternal disease and pharmacological intervention.

Key words: *Blood pressure, Perinatal outcome, Pregnancy-induced hypertension*

Pregnancy is a physiological event for utmost women [1]. Almost 20–30% of the adult population and more than 5–8% of all pregnancies in the world suffer from hypertension (HTN) and 5–22% of all pregnancies develop some kinds of medical problems due to HTN [2-6]. Pregnancy-induced hypertension (PIH) includes hypertensive disorders peculiar to pregnancy that have their onset during pregnancy and subsides completely following delivery. This includes pre-eclampsia, eclampsia, and gestational HTN. The overall incidence of PIH is 7% [4]. PIH is known to be associated with increased perinatal morbidity and mortality due to various prenatal and natal factors in addition to the adverse effects of drugs used in the management of it. PIH is also associated with an increased incidence of prematurity and small for date babies, which also affects the incidence of perinatal mortality and morbidity [5].

In India, perinatal mortality rate (PNMR) in PIH is high as the emphasis is still on maternal salvage, and there is lack of tertiary care centers dealing with premature and low-birth-weight infants [7-9]. Hence, the present study was undertaken to determine the extent of perinatal problems in our district hospital and to evaluate the prognostic significance of various factors associated with PIH on perinatal outcome and determine its effects.

MATERIALS AND METHODS

It was a hospital-based study, and convenient sampling technique was used. All births to mothers with PIH, which took place from March 2018 to February 2019 in District Hospital Tumkur, Karnataka, were included. Mothers who were diagnosed to have PIH as per the criteria laid down by the American College of Obstetricians and Gynecologists were included in the study after taking their consent.

A detailed maternal history was taken regarding age, parity, antenatal care, HTN in previous pregnancy, and history suggestive of severity of HTN such as blurring of vision, headache, and epigastric pain. Mothers with other major illness such as diabetes, heart disease, and renal disease were excluded from the study. Details of labor with reference to the mode of delivery, indications, and mode of termination were included. Details of treatment used to control HTN and convulsion including cumulative dose, route of administration, and time of delivery were noted. Ocular fundus was examined in all cases to grade hypertensive changes in all cases. The investigations carried out in mother were the estimation of hemoglobin, urine for albumin, sugar and microscopy, blood urea, and serum creatinine.

In all cases, the placenta was examined soon after the delivery. Both fetal and maternal surfaces were examined. The number and extent of placental infarcts was recorded. All live babies were examined in the delivery room for Appearance, Pulse, Grimace, Activity, and Respiration (APGAR) score, and details of resuscitation if needed were recorded meticulously. After a few hours of delivery, a detailed examination of a newborn was

carried out for anthropometric measurement in terms of weight, height, and head circumference. Gestational age was determined by maternal dates and by Dubowitz criteria 12–24 h after birth. If a discrepancy of more than 2 weeks existed, the gestational age was assigned from the Dubowitz maturity score. According to the scoring system, infants were classified as pre-term or full term. Infants were also classified as appropriate or small for gestational age (SGA) according to the Lubchenco intrauterine growth curves.

Data were entered in Excel sheet, and the analysis was done in Epi Info. Percentages and figures were calculated. Mean and standard deviation were calculated for quantitative data. Chi square was calculated for proportions. $p<0.05$ was considered significant.

RESULTS

Among the 2325 deliveries which took place, 200 mothers had PIH (8.6%), of which 6.8% (157) had pre-eclampsia and rest (1.8%) suffered from eclampsia**.** The most common reason for morbidity because of PIH was thrombocytopenia (34.28%) and other minor conditions affecting were respiratory depression (11, 7%), hypotonia (10, 6.3%), hypoglycemia (5, 3.2%), intraventricular hemorrhage (13, 1.9%), Disseminated intravascular coagulation (DIC) (6, 3.8%), and transient tachypnea of the newborn (3, 2.5%). The details of relationship of neonatal morbidity to severity of HTN are discussed in Table 1.

There was statistically significant difference regarding grades of PIH and perinatal outcomes. The neonatal deaths and intrauterine deaths were significantly increased as the degree of HTN became more severe. The details are given in Table 2.

The details of the relationship of perinatal outcome with systolic and diastolic blood pressure are mentioned in Table 3.

Neonatal morbidity increased as the dosage of magnesium sulfate increased Table 4. Hypotonia, ileus, lethargy, and respiratory depression increased with the increasing dose of magnesium sulfate.

DISCUSSION

In the present study, the incidence of preterm was 31% which was high in eclampsia (63). This was significantly higher than the hospital incidence of prematurity as compared to 23% noted by Githa and Gopal [5,7] and 58.1% by Sibai (54%) [10,11]. The

Table 1: Neonatal morbidity in relation to severity of HTN

Pregnancy-induced HTN grading	Cases	Live births	Pre-term	Small for gestational age	HMD	MAS	Patent ductus arteriosus of prematurity	Birth asphyxia	Septicemia	Thrombo cytopenia
Gest HTN	27	27	0	0	0	1	0	1	1	0
Mild	42	40	5	0	3	0	1	4	2	4
Severe	88	64	27	23	15	11	5	11	14	30
Eclampsia	43	27	17	5	4	6	5	14	8	20
Total	200	158	49 (31%)	28 (17.7%)	22 (13.9%)	18 (11.4%)	11 (22.4%)	30 (19%)	25 (15.8%)	54 (34.28%)

HTN: Hypertension

Table 2: Perinatal outcome in relation to severity of HTN

Pregnancy-induced HTN grading	Cases (%)	Live births	Pre-term (%)	Term	Small for gestational age (%)	IUD/SB (%)	Neonatal deaths (%)
Gestational HTN	27 (13.5)	27	0	27	0	0	0
Mild	42 (21.0)	40	5 (21.5)	35	0	2 (4.8)	3 (7.5)
Severe	88 (44.0)	64	37 (42.2)	37	23 (26.1)	24 (27.3)	13 (20.3)
Eclampsia	43 (21.5)	27	17 (62.8)	10	5 (11.6)	16 (37.2)	11 (40.7)
Total	200	158	49 (31.0)	109	28 (14.0)	42 (21.0)	27 (17.1)
			p<0.05			p<0.001	p<0.001

HTN: Hypertension

Table 3: Perinatal outcome in relation to maternal BP

Perinatal outcome	Systolic BP in mmHg (%)				Diastolic BP in mmHg (%)					p Value
	140–165	166–190	191–215	215–240	90–100	101–110	111–120	121–130	131–140	
Number	118 (59)	68 (34)	11 (5.5)	3 (1.5)	67 (33.5)	59 (29.5)	40 (20.0)	23 (11.5)	12 (6.0)	
Pre-term	26 (24)	26 (24)	26 (24)	26 (24)	6 (9.2)	18 (38.3)	16 (57.1)	6 (50.0)	3 (50.0)	p<0.001
Term	70 (75.2)	70 (75.2)	70 (75.2)	70 (75.2)	59 (90.8)	29 (61.7)	12 (42.9)	6 (50.0)	3 (50.0)	
Small for gestational age	14 (13.3)	14 (13.3)	14 (13.3)	14 (13.3)	1 (1.5)	14 (29.8)	4 (14.3)	7 (58.3)	2 (33.3)	
IUD	13 (11)	13 (11.0)	13 (11.0)	13 (11.0)	2 (3.0)	12 (20.3)	12 (30.0)	10 (45.5)	6 (50.0)	p<0.001
Neonatal deaths	14 (13.3)	14 (13.3)	14 (13.3)	14 (13.3)	4 (6.2)	6 (12.8)	7 (25.0)	3 (30.0)	6 (100.0)	p<0.001

BP: Blood pressure

Table 4: Maternal administration of magnesium sulfate and associated neonatal morbidity

Cumulative dose grams	No. of patients	Hypotonia	Ileus	Delayed stooling >48 h	lethargy	Respiratory depression
<20	16	0	0	0	0	0
21–40	21	2	1	9	4	2
41–60	8	8	7	7	6	5

incidence of SGA was 17% as compared to be 29% by chesley *et al*. [6] and 20% by Sibai (54%) [10,11]. Patent ductus arteriosus of prematurity was 22.5% which was higher in eclampsia. In PIH, severe constriction leads to ischemic changes in various organs, endothelial damage, and deposition of platelet anti-fibrin thrombi; the incidence may be related to maternal disease.

Hypotonia was seen in 6.3% of cases and ileus in 5.06% because of treatment with magnesium sulfate sand when cumulative doses exceeded 40 g, it leaded to hypermagnesemia with neonatal complications (56) [12,13]. PNMR in the study is 345/1000 which is higher than in general PNMR of the hospital (77.4%) [14], it was significantly higher when compared to other studies. The reason for such a high perinatal mortality may be due to delayed referral. Increase in perinatal morbidity and mortality was observed with rise in systolic and diastolic blood pressure with systolic pressure more than 220 mmHg; there was 100% incidence of prematurity [15].

The time of delivery in women who develop severe PIH in earlier part of pregnancy is difficult. The potential benefit of increased fetal maturity from delaying delivery must be balanced against the risk of hypoxia and sudden intrauterine death and severe growth restriction [16]. Hence, high-risk patients of PIH should be appropriately counseled and must be managed with adequate neonatal intensive care facilities to improve the outcome. The study had certain limitations as it was a hospital-based study; hence, the results of the study could not be generalized. Hence, further community-based study should be done using larger sample size.

CONCLUSION

PIH is a multisystem disease and threat to the well-being of the mother and her unborn child. Characterization of the neonatal consequences of maternal HTN is complicated by the administration of antihypertensive and anticonvulsant medications to the mother. Thus, the fetal outcome might be influenced by both maternal disease and pharmacological intervention.

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