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ORIGINAL RESEARCH

Hypertension induced by pregnancy and neonatal outcome in preterm under 34 weeks

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ABSTRACT
Background: To study hypertension induced by pregnancy and neonatal outcomes.
Materials & methods: A total of 200 premature newborns of gestational age (GA) between 20 and 35 weeks and 5 days, born alive were included. In total, 90 infants were born to hypertensive mothers (G1) and 110 to normotensive mothers (G2). The data was recorded. The results were analysed using SPSS software.
Results: The anthropometric measurements of birth weight were significantly lower in G1. Resuscitation in the delivery room and the need to use surfactant and oxygen dependence at 36 weeks of gestational age did not differ between groups.
Conclusion: There was no difference in weight and survival at 18 months of chronological age.

Keywords: Neonates, Hypertension, Pregnancy.

INTRODUCTION

The prevalence of hypertension in reproductive-aged women is estimated to be 7.7%.[1] Hypertensive disorders of pregnancy, an umbrella term that includes preexisting and gestational hypertension, preeclampsia, and eclampsia, complicate up to 10% of pregnancies and represent a significant cause of maternal and perinatal morbidity and mortality. [2]Hypertensive Disorders of Pregnancy (HDP) present a serious complication that affects approximately 2.5 to 3.0 percent of women, increasing the risk of maternal and neonatal complications.[3,4] Worldwide, hypertensive disorders remain the leading cause of maternal mortality related to pregnancy. [3]Hypertensive disorders of pregnancy appear as a hypertensive condition that develops at any time after 20 weeks of pregnancy, accompanied or not by proteinuria. Among the manifestations of these syndromes is eclampsia, which presents with a convulsive component, and HELPP syndrome, which manifests with the presence of hemolysis, elevated liver enzymes and thrombocytopenia; HELLP is a severe form of preeclampsia and not a separate disorder. [5,6]

Preterm birth, a common adverse pregnancy outcome, is one of the leading causes of child death globally, especially in developing countries. [7] It is estimated that, globally, annual preterm live births number 14.84 million, thus 10.6% of all births. Asian countries account for 52.9% of global preterm births; the proportion in China (7.8%) is the second highest worldwide. [8] Preterm birth greatly increases the risks of infant mortality and morbidity, and the risks of long-term effects including respiratory syndrome and infections, which bring heavy medical financial burdens on the families and countries. [9,10] The mechanism of preterm birth is still uncertain, and some studies suggested that elevated blood pressure levels during pregnancy may play an important role in the development of preterm birth. [11]The neonatal complications described here range from prematurity to fetal growth restriction. The latter is the most frequent neonatal complication in newborns (NB) with hypertensive mothers.[12,13] Perinatal mortality rates in growth-restricted neonates are 6 to 10 times that of those with normal growth.[14] Doppler ultrasonography in fetuses of hypertensive mothers is a way of assessing the severity of intrauterine growth restriction and intrauterine monitoring allows the disease progression to be observed non-invasively. [15] Hence, this study was conducted to study hypertension induced by pregnancy and neonatal outcomes.

MATERIALS & METHODS

A total of 200 premature newborns of gestational age (GA) between 20 and 35 weeks and 5 days, born alive were included. In total, 90 infants were born to hypertensive mothers (G1) and 110 to normotensive mothers (G2). Outcomes during hospitalization and outcomes of interest were evaluated: respiratory distress syndrome (RDS), diagnosis of bronchopulmonary dysplasia (BPD), retinopathy of prematurity, survival at discharge and at 18 months of chronological age and relationship between weight and gestational age. The data was recorded. The results were analysed using SPSS software.

RESULTS

The anthropometric measurements of birth weight were significantly lower in G1. Resuscitation in the delivery room and the need to use surfactant and oxygen dependence at 36 weeks of gestational age did not differ between groups. However, the G1 stay more time on mechanical ventilation.

Table 1: Neonates' morbidity considering the presence or absence of Hypertensive disorders of pregnancy

	G1	G2	P- value
Birth weight (grams)	1023.2	1356.3	0.001
Mechanical ventilation (days)	10.5	6.3	0.05
SGA rating%	20.5	9.6	0.001
Neonatal resuscitation%	65.2	60.4	0.2

No difference was observed at 18 months of chronological age, with rates of 94.5% in G1 and 90.8% in G2.

Table 2: Survival at discharge and at 18 months in neonates considering the presence or absence of hypertensive disorders of pregnancy

	G1	G2	P- value
Survival at discharge %	68.2	75.9	0.02
Survival at 18 months %	94.5	90.8	0.2
Weight at 18 months (kg)	8.45	8.40	0.8

DISCUSSION

The onset time of pregnancy-induced hypertension exerted different effects on preterm birth; early-onset subjects seemed to be at greater risk than late-onset cases. [16] One study using population-based data found that an early-onset (<34 weeks) pre-eclampsia group exhibited a higher incidence of gestational age (34–36 weeks) than did a late-onset group (60.1% vs 23.4%). [17] Another retrospective analysis also found that the rate of preterm birth was significantly higher in an early-onset than a late-onset group. [18] One case series explored the maternal and neonatal outcomes of early-onset pre-eclampsia (before 26 weeks of gestation) and found high maternal complication rates and poor neonatal survival.[19] Hence, this study was conducted to study hypertension induced by pregnancy and neonatal outcomes.

In the present study, the anthropometric measurements of birth weight were significantly lower in G1. Resuscitation in the delivery room and the need to use surfactant and oxygen dependence at 36 weeks of gestational age did not differ between groups. However, the G1 stay more time on mechanical ventilation. A study by Rocha de Moura MD et al, newborns with hypertensive mothers had significantly lower measurements of birth weight and head circumference. The G1 group had a higher risk small for gestational age (OR 2.4; CI 95% 1.6–3.6; p <0.00), as well as a greater risk of being born with a weight less than 850 g (OR 2.4; 95% CI 1.2–3.5; p <0.00). Newborns of mothers with hypertension presented more necrotizing enterocolitis (OR 2.0; CI 95% 1.1–3.7); however, resuscitation in the delivery room and the need to use surfactant did not differ between groups, nor did the length of stay on mechanical ventilation, or dependence on oxygen at 36 weeks of gestational age. Survival was better in newborns of normotensive mothers, and this was a protective factor against death (OR 0.7; 95% CI 0.5–0.9; p <0.01). In the follow-up clinic, survival at 18 months of chronological age was similar between groups, with rates of 95.3% and 92.1% among hypertensive and normotensive mothers, respectively. Exclusive breastfeeding at discharge was 73.4% in the group of hypertensive women and 77.3% in the group of normotensive mothers. There were no significant differences between groups.[20]

In the present study, no difference was observed at 18 months of chronological age, with rates of 94.5% in G1 and 90.8% in G2. Another study by An H et al, the incidences of gestational hypertension and pre-eclampsia were 5.47% and 5.44%, respectively, for women who gave birth at full term, and 5.63% and 7.33%, respectively, for those who gave birth preterm. After adjusting for potential confounders, the risk ratios (RRs) of preterm birth in women with gestational hypertension and pre-eclampsia were 1.04 (95% CI 0.98 to 1.11) and 1.39 (95% CI 1.25 to 1.55), respectively. The associations were stronger for early-onset (<28 weeks of gestation) gestational hypertension (adjusted RR=2.13, 95% CI 1.71 to 2.65) and pre-eclampsia (adjusted RR=8.47, 95% CI 5.59 to 12.80). Pre-eclampsia was associated with a higher risk of preterm birth. The early-onset gestational hypertension and pre-eclampsia were associated with more severe risks than late-onset conditions.[21]The prevalence of pregnancy-induced hypertension (PIH) and preeclampsia (PE) are 5–10% and 2–4%, respectively. PIH might affect angiogenesis in preterm neonates, but its association with

bronchopulmonary dysplasia (BPD) remains controversial. They evaluated the association between PIH and BPD in very low-birth weight infants. As a result, 1,624 infants without maternal PIH (gestational age: 27.3 ± 1.8 weeks) and 203 infants with maternal PIH (28.0 ± 1.4 weeks, $p < 0.001$) were included. Birth weight was higher in the non-PIH group, compared with the PIH group (1027.4 ± 250.2 vs. 876.4 ± 261.5 g, $p < 0.001$). Multivariate logistic regression showed that PIH was associated with BPD (adjusted OR 1.474, 95% confidence interval 1.025–2.121), after adjusting for confounders, including small-for-gestation age (SGA). [22]It was observed that most women attended prenatal care; however, normotensive mothers had fewer consultations (5.3 ± 2.4 and 5.0 ± 2.4, $p = 0.63$). Adequate monitoring of the pregnant woman is extremely important in preventing both maternal and fetal morbidity and mortality. Webster et al., in a systematic review with meta-analysis, suggest that antihypertensive treatment reduces the risk of severe hypertension in pregnant women with chronic hypertension and, consequently, fewer maternal and neonatal complications. However, the lack of randomized controlled trials does not clarify which is the best therapeutic option. [23]

Conclusion

Arterial hypertension during pregnancy can increase the risk of low weight, small babies for gestational age (SGA), with no differences in weight and survival at 18 months of chronological age.

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