Neonatal Outcome in Hypertensive Disorders of Pregnancy in a Tertiary Neonatal Unit in Sudan

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ABSTRACT

Hypertensive disorder in pregnancy remains an important cause of fetal / maternal morbidity and mortality. The aim of this study was to determine the different types of hypertensive disorders in pregnancy and to find out the associated neonatal morbidity and mortality. This was a prospective study, conducted in Soba University Hospital, Sudan. Sixty nine babies were included in the study. Data were analyzed using Statistical Package for Social Sciences (SPSS); Chi square test was used to determine the association between diagnosis and other variables. The prevalence of hypertensive disorder in pregnancy was 2.17%. Thirty six (52%) babies were preterm, the rate of small for gestational age was higher in pre eclampsia (53%) compared to other hypertensive groups. There was significant correlation between the birth weight and type of hypertensive disorder in pregnancy (P= 0.01). Six babies (8.6%) had birth asphyxia. Thrombocytopenia was observed in 14 babies (20%). 26 (38%) babies developed sepsis and the mortality rate was 6%. In conclusion hypertensive disorder of pregnancy remains an important cause of neonatal morbidity and mortality.

Keywords: Hypertension; eclampsia; preeclampsia; mother; neonate

INTRODUCTION

Hypertension is the most common medical problem encountered in pregnancy and remains an important cause of fetal / maternal morbidity and mortality. It has been estimated that 10-15% of pregnancies will be complicated by hypertension (Nelson et al.2006, Allen et al, 2004 ). Approximately up to a quarter of all antenatal admissions will be related to hypertension (Nelson et al.2006). In developed countries, 16.1% of maternal deaths are attributed to hypertensive diseases and they continue to be a major contributor to global maternal mortality. Hypertension complicating pregnancy is a major cause of preterm birth and perinatal death of the fetus. According to WHO the incidence of maternal mortality is estimated at 20-33% (Rosenberg et al.2005).

Pregnancies that are affected by hypertension have been accepted to have higher incidence of neonatal morbidity compared to those pregnancies with normal blood pressure. Pregnancies with hypertensive disorders are complicated by an increased risk of premature births and low birth weight (LBW), as compared to the healthy ones(Ferrazzani et al.2011). Several studies have shown that maternal hypertension has an adverse effect on neonates. Most studies showed that this increased risk mainly occurs among women with severe chronic hypertension and in those who develop superimposed preeclampsia (Martikainen et al. 1989).

One of the largest prospective studies which analysed the neonatal outcome in pregnant women with preeclampsia and hypertension showed that the incidence of foetal 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.
A large univariate analysis 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, pre-existing 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 preterm birth between 32 and 36 weeks gestation (Heard et al.2004). In a retrospective study in Turkey, the majority of foetal distress occurred in preeclamptic patients. Foetal tachycardia (rate >160/min) and a low APGAR score was very common in patients with severe preeclampsia. Foetal deaths during labour were significantly more frequent during labour in severely preeclamptic women when compared to other groups (McCowan et al.1996).

A case control study conducted in India analyzed the hematological profile of infants born to hypertensive mothers in 50 cases compared to a similar number of normotensive mothers. The most significant difference found in this study was the presence of thrombocytopenia in the babies born to mothers with pregnancy induced hypertension (Sivakumar et al.,2007). Neutropenia has also been well documented in the infants of mothers with PIH (Sola et al.,2004).

In Sudan, Hypertension has been estimated to complicate 5% of all pregnancies and 11% of first pregnancies. Half of the pregnant women with hypertension have pre-eclampsia. Hypertensive disorders account is responsible for up to 40 000 maternal deaths annually (Villar et al.,2004).

The aim of this study was to determine the different types of hypertensive disorders in pregnancy and to find out the associated neonatal morbidity and mortality.

MATERIALS AND METHODS

This was a prospective observational hospital based study, conducted in the neonatal intensive care unit (NICU) at Soba University Hospital in Khartoum, Sudan, during the period October 2011 to July 2012. All women with hypertension in pregnancy admitted to the department of obstetrics and gynaecology and their newborns (0-28 days) admitted to NICU at Soba University Hospital during the study period were included in the study. Mothers with associated medical problems other than hypertension and neonates with major congenital anomalies were excluded from the study.

The sample was divided into four groups of hypertensive women according to national high blood pressure education program working group report on high blood pressure in pregnancy (Gifford et al, 2000). Chronic hypertension: hypertension diagnosed before pregnancy and/or diastolic pressure >=90 mm Hg and/or antihypertensive medications each before the 20 weeks of gestation uncomplicated by denovo proteinuria. Gestational hypertension: women with systolic blood pressure above 140 mm Hg and/or diastolic pressure >=90 mmHg for the first time after 20 weeks of gestation and/or hospitalized during pregnancy because of hypertension and/or antihypertensive medications prescribed for the first time after 20 weeks of pregnancy without proteinuria. Preeclampsia women different from GH because of development of de novo proteinuria (>=0.3g/24h). Preeclampsia superimposed on chronic hypertension: the criterion for chronic hypertension is met along with the criteria for preeclampsia.

Blood pressure was taken with a standard mercury sphygmomanometer using phase 1 and 5 of the Korotkoff sounds before delivery for systolic and diastolic pressure respectively.

Gestational age (GA) was defined on the last maternal menstrual date confirmed by early ultrasound examination; patients with uncertain GA were not included.

LBW was defined as a birth weight (BW) below 2500 gm, very low birth weight (VLBW) was defined as BW below 1500g. A small for gestational age (SGA) was defined as a newborn infant with a birth weight below the 10th percentile according to the national standard curve for singleton birth.

A large for gestational age (LGA) infant was defined as a newborn infant with a birth weight above the 90th percentile according to the national standard curve for singleton birth as above.

Perinatal mortality included stillbirths with BW of 500g or more and/or GA of 28 completed weeks or more, and death occurring within 7 days from delivery. Perinatal asphyxia defined as an Apgar score < 7 at 5 min requiring resuscitation. Thrombocytopenia was defined as a platelet count less than 150,000 μmol/L. Neutropenia was defined as Neutrophil count less than 1500 cell / microliter.

For the purpose of data analysis, information was extracted from the patients and records and entered into the personal computer database. Information included aspects of prenatal care, previous medical history, complications, intrapartum care, delivery data, fetal outcome and post partum course. Data entries were then accumulated and organized in tabular form on a spreadsheet database.

Sixty nine babies were included in the study. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 17; to determine the degree of association between diagnosis and other variables Chi square test was used. P value was set on an alpha level at 0.05 and 95% confidence limit. Ethical clearance and approval for conducting this study was obtained from the ethical committee of Soba University Hospital. Prior informed verbal consent was
obtained from the parents of the babies participating in this study after full explanation of the study.

RESULTS

In this prospective study, sixty nine deliveries were found to be complicated by hypertensive disorders of pregnancy out of 3168 deliveries, which gives a prevalence of 2.17%. Of these, 29(42%) were pregnancy induced hypertension while 15(21.7%) and 3(4.3%) had preeclampsia and eclampsia respectively. Chronic hypertension was diagnosed in 14 cases (20.2 %). Patients who had chronic hypertension with superimposed preeclampsia contributed to 8(11.5%) of cases. Figure (1).

Sixty three patients (91 %) had regular Antenatal follow up, 14 patients had abnormal U/S. Over 50% of the abnormal U/S findings were in the preeclampsia group, the majority of the abnormality was intrauterine growth restriction. Most of the women affected by hypertensive disorders of pregnancy were aged 26-30 years (36.2 %) and 31-35 years (28.9%) so the incidence of hypertension was higher in pregnant women in their 3rd and 4th decades. In this study about 58% of the hypertensive women were multiparous. Antihypertensive medications were required in 62 cases, while 7 patients required bed rest without pharmacological treatment. Nearly all cases in this study 68(98.5 %) were delivered by caesarean section. Forty three caesarean sections were carried out as an emergency procedure, and only one case delivered vaginally.

36 (52%) babies were preterm. Most of the preterm deliveries were in the pregnancy induced hypertension group (33.3%) followed by preeclampsia and chronic hypertension with superimposed preeclampsia groups (27.7%, 19.4% respectively) compared to chronic hypertension and eclampsia. Table (1).

Our study showed that the rate of SGA was higher in pre eclampsia (53%) and chronic hypertension with superimposed preeclampsia (CHPE) compared to other hypertensive groups. On the other hand, LGA was just observed in chronic hypertension (CH) (7.14%), six babies (8.6%) had birth asphyxia.

Figure (2) demonstrates the rates of LBW and VLBW among the different hypertensive groups. Most of the babies with LBW were found in the pregnancy induced hypertension group, most of the babies with VLBW were found in the preeclampsia group, and there was significant correlation between the birth weight and type of hypertensive disorder in pregnancy ($P = 0.01$).

38% of the babies in this series developed sepsis during their stay in the neonatal unit. Most of the septic patients
Table 1. Term and preterm deliveries in different study groups

<table>
<thead>
<tr>
<th></th>
<th>Preterm</th>
<th>Term</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIH</td>
<td>12 (17.3%)</td>
<td>17 (24.63%)</td>
<td>29 (42.02%)</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>10 (14.5%)</td>
<td>5 (7.24%)</td>
<td>15 (21.73%)</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>2 (2.89%)</td>
<td>1 (1.44%)</td>
<td>3 (4.34%)</td>
</tr>
<tr>
<td>Cronic HTN</td>
<td>5 (7.24%)</td>
<td>9 (13.04%)</td>
<td>14 (20.28%)</td>
</tr>
<tr>
<td>Ch HTN with superimposed Pre-eclampsia</td>
<td>7 (10.14%)</td>
<td>1 (1.44%)</td>
<td>8 (11.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>36 (52.18%)</td>
<td>33 (47.82%)</td>
<td>69 (100%)</td>
</tr>
</tbody>
</table>

P value = 0.01

Thrombocytopenia was observed in 14 babies (20%), the majority of the babies with thrombocytopenia were in the pre-eclampsia and chronic hypertension with superimposed pre-eclampsia groups, while just one baby was documented to have neutropenia. The baby with neutropenia also had thrombocytopenia. There was no significant correlation between the type of hypertensive disorder in pregnancy and thrombocytopenia (P = 0.3).

In this series only 4 (6%) babies died, all within 7 days of delivery. Perinatal death occurred in two babies in the preeclampsia group; one baby in the chronic hypertension with superimposed preeclampsia and one in the PIH group. The perinatal death was solely in the sepsis group. There was significant correlation between perinatal outcome and sepsis (P = 0.008).

DISCUSSION

Hypertensive disorder of pregnancy is considered to be a major worldwide health problem running an increased risk of perinatal, maternal morbidity and mortality (Nisell et al., 2000). There seems to be confusion about the terminology and classification of these disorders. Not only the etiology and pathophysiology still remain to be unclear, but also effective prevention and treatment modalities are absent (Foy et al., 2004).
There is variation in the prevalence of hypertensive disorders of pregnancy. According to the geographical regions of the world, it ranges from 1.5% in Sweden to 8.49% in Turkey. In Brazil the prevalence is 7.5%. Saudi Arabia reported a prevalence ranging between 2.6% to 3.7%. In USA the prevalence is 3.8%, and in our study it was 2.16%. The variation can be attributed to genetic factors, racial differences, socioeconomic status and some other demographic parameters such as parity and age (Gaio et al., 2001, Al-Ghamdi et al., 1999, Ventura et al., 2000).

Obstetricians vary widely in their use of caesarean section as an indication for pregnant mothers with hypertensive disorders. However, recent studies have reported a caesarean section rate of 84% to 94% (Fenakel et al., 1991, Geary, 1997), which is comparable with the 98% found in our study and also 92% in the study conducted in Australia (Gray et al., 1998). However, other studies such as the one conducted in Iran, reported a very low caesarean section rate (39.4%) (Tavassoli et al., 2010).

The present study showed that most of the cases who suffered hypertensive disorders of pregnancy were multiparous. This finding differs from the patient profile of the present literature, which found primaparous are the most typical cases such as the Turkish study (Yucesoy et al., 2005) This difference cannot be explained.

Hypertensive disorder of pregnancy is responsible for significant maternal / perinatal morbidity and mortality. Maternal deaths associated with preeclampsia/eclampsia assumed further importance since previously more frequently encountered etiologies such as infection and hemorrhage became less common nowadays (Sawhney et al., 2000). In contrast to the published study conducted in Turkey (Yucesoy et al., 2005), which revealed 1.2% of maternal mortality, our study revealed no maternal deaths. This might be due to regular antenatal visits and proper use of anticonvulsive prophylaxis at Soba University Hospital. The maternal mortality in the Turkish study was attributed to intracranial bleeding, septic shock and cardiopulmonary arrest. Irregular or absent antenatal visits, late admission to medical facilities, improper anticonvulsive prophylaxis at primary care units were characteristic of these cases.

Fetal complications associated with preeclampsia/eclampsia are intrauterine growth restriction, oligohydramnios, preterm delivery, non-assuring fetal heart patterns during labour, low APGAR scores at birth and requirement for admission to the neonatal intensive care unit. Obviously intrauterine fetal growth restriction with oligohydramnios and fetal distress and preterm birth of a fetus consequently carry a high risk of early neonatal death due to complications of prematurity in the neonatal intensive care unit (Hernandez et al., 2001, Ray et al., 2001). IUGR, birth asphyxia, low APGAR scores, requirement of neonatal intensive care unit were significantly observed in our study.

According to several published studies, pregnancies complicated by hypertension are characterized by an increase in the rate of preterm delivery, LBW, and VLBW infants, compared with normal pregnancies. This is true in all groups of hypertensive women independent of presence or absence of proteinuria (Xiong et al., 2004, Moutquin et al., 1990). The incidence of small for gestational age (SGA) amongst women with preeclampsia in our study (53.3%) compares favorably to several Italian studies (Tranquilli et al., 2002, Ferrazzani et al., 2011). However, several other studies reported significantly low incidence compared to our study. Claussion et al from Sweden (Claussion et al., 1998), Ananth et al from the USA (Ananth et al., 1995), Ray et al from Canada (Ray et al., 2001), Yucesoy et al (Yucesoy et al., 2005) from Turkey reported an incidence of 14.7%, 15.6%, 25%, 28% respectively. It is evident that the rate of fetus growth restriction in our study is similar to studies from Italy; however the rate is significantly higher compared to other centres in other parts of the world. This finding might be partially explained by a higher rate of preterm delivery in our sample.

Our study demonstrated a very low perinatal mortality (6%). Prematurity and sepsis were the main causes of death in our study group. This finding is similar 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 (Gray et al., 1998).

Neutropenia and thrombocytopenia have been well documented in infants of mothers with PIH. In our study fourteen babies (21%) were found to have thrombocytopenia. This was similar to a study conducted by Brazy et al (1982) who noted thrombocytopenia in 22% of infants of mothers with severe PIH (Brazy et al., 1982). Furthermore, neutropenia was documented in only one baby and this is more or less similar to the study done in India in which significant neutropenia was not documented in any of the babies (Sivakumar et al., 2007).

CONCLUSION

Hypertension in pregnancy remains an important cause of fetal/ maternal morbidity and mortality. Fetal complications like prematurity, SGA, LBW and sepsis were frequently observed in our study, however the perinatal mortality was low, sepsis and prematurity were the main causes of death.

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REFERENCES


Reports, CDC; 48 (No.3) 1-21