ORIGINAL ARTICLE

# Maternal and Perinatal Outcome of Hypertensive Disorders of Pregnancy at a Tertiary Care Hospital

Nazli Hossain,[1] Nusrat Shah,[1] Nazeer Khan,[2] Sunita Lata[1] and Nusrat H. Khan[1]

## ABSTRACT

**Objective:** To study the frequency of various hypertensive disorders of pregnancy and to determine their maternal and perinatal outcome.
**Study Design:** Retrospective descriptive study.
**Place and Duration of Study:** Department of Obstetrics & Gynecology Unit III, Civil Hospital Karachi, from January 2002 to December 2007.
**Patients and Methods:** A total of 626 cases were reviewed for age, parity, gestational age, diagnosis, antenatal and intra partum complications, mode of delivery and neonatal outcome. Data was analyzed using SPSS software (version 16).
**Results:** Total number of deliveries during the study period was 11,718 and there were 626 cases of hypertensive disorders of pregnancy giving a frequency of 5.34%. Pre-eclampsia was seen in 308 (49%), severe pre-eclampsia in 85 (13%), eclampsia in 121 (19.2%), chronic hypertension in 41(6%) and postpartum eclampsia in 21 (3.3%) patients. There were 39 maternal deaths (case fatality rate: 6.23%). The mean ages for pre-eclampsia, severe pre-eclampsia, eclampsia and chronic hypertension were 28, 27, 24 and 29 (27 years) years respectively. The commonest maternal complication of hypertensive disorders was postpartum hemorrhage in 24 women (4.2%). This was followed by placental abruption in 9 women (1.6%) and pulmonary edema in 8 women (1.4). The prevalence of prematurity in pre-eclampsia, severe pre-eclampsia and eclampsia in study population was 14%, 5% and 8.6% respectively. Cesarean section was required for pre-eclampsia, severe pre-eclampsia and eclampsia in 46%, 51% and 61% of patients respectively. The main fetal complications were found to be still birth (14% in pre-eclampsia, 18% in severe pre-eclampsia and 15% in eclampsia) and low birth weight (31% in pre-eclampsia, 49% in severe pre-eclampsia and 52% in eclampsia). Conclusion: Hypertensive disorders in pregnancy are an important cause of maternal and perinatal mortality and morbidity.

**Key words:** Pre eclampsia, eclampsia, maternal mortality.

## INTRODUCTION

Hypertensive disorders of pregnancy are reported in 6-8% of pregnancies.[1] Globally it is a major cause of maternal mortality.[2-3] Studies from Pakistan rank it among the top three most common causes of maternal deaths.[4-5] The frequency of hypertensive disorders of pregnancy was reported as 15% in one study from Pakistan.[5] Hypertension during pregnancy also affects the fetal outcome. It is associated with Prematurity, intrauterine demise, low birth weight and increased risk of admission to neonatal intensive care unit. In a hospital based study from Karachi, it was found to be the leading cause of stillbirth.[6] The case fatality from hypertension during pregnancy is far higher in developing world, when compared to the developed world.[7]

The etiology of hypertensive disorders of pregnancy is still elusive. A number of risk factors have been identified including maternal age, obesity, increased inter-pregnancy interval, family history of hypertension in mother, twin gestation, underlying vascular disorders like diabetes mellitus, bacterial and viral infections and antiphospholipid syndrome.

Both maternal and perinatal morbidity is also increased in hypertensive disease of pregnancy. Maternal complications include placental abruption, postpartum hemorrhage, intracranial hemorrhage and pulmonary edema. Perinatal morbidity is mainly attributed to low birth weight, prematurity and intrauterine growth restriction.

The recurrence of disease in subsequent pregnancy calls for prophylaxis. The role of low dose aspirin in subsequent pregnancy in women with past history of eclampsia is well established.[8] Researchers are now

1 Department of Obstetrics and Gynaecology, Unit III, Dow University of Health Sciences, Karachi, Pakistan.

2 Director Research and Professor of Biostatistics, Dow University of Health Sciences Karachi, Pakistan.

**Correspondence:** Dr. Nusrat Shah, Department of Gynaecology Unit III, Civil Hospital Karachi.

**Email:** nusrat61@gmail.com

investigating the role of low molecular weight heparin in women with history of severe preeclampsia without any thrombophilia.[9-10] Non invasive methods include use of uterine artery Doppler in first and second trimester to predict pre-eclampsia at earlier stages.[11]

We conducted this study to determine the frequency of various hypertensive disorders of pregnancy and their maternal and perinatal outcome, since, hypertensive disorders are among the first three most common causes of maternal mortality in Pakistan.

## PATIENTS & METHODS

A retrospective cross-sectional study was conducted by reviewing the medical records of all women admitted with hypertensive disorders of pregnancy in the department of Obstetrics & Gynecology Unit 3, Civil Hospital Karachi & Dow University of Health Sciences, from January 2002 to December 2007. During the study period a total of 11,718 deliveries were conducted and 626 women were identified as having hypertensive disorders of pregnancy. Of these, complete medical records were available for 576 women whose data were entered into SPSS computer software program and was analyzed.

Hypertensive disorders of pregnancy were classified as Pre-eclampsia (PE), Severe Pre-eclampsia (SPE), Eclampsia and Chronic Hypertension. This classification was done, according to National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy.[1] Pre-eclampsia is defined as new onset hypertension (systolic = 140mm Hg, and diastolic blood pressure of = 90mm hg) after 20 weeks of gestation along with proteinuria (> 300mg/dl in 24 hours). Severe Pre eclampsia is defined as blood pressure = 160/110 mm Hg with proteinuria of 2gm/dl, along with clinical features of severe headache, blurring of vision, epigastric pain and oligura.

Eclampsia is defined as generalized convulsions, in a woman with SPE in the absence of any other cause. Women who were known to be hypertensive, before pregnancy, were grouped as having chronic hypertension. In final analysis, we also included women who were brought to the unit after delivery with fits. Care was taken to exclude other causes of fits like hypoglycemia, malaria and hypocalcaemia. Thus in total we had five groups: Pre-eclampsia, severe pre-eclampsia, eclampsia, chronic hypertension and postpartum eclampsia. Majority of these women were not booked at the hospital. The departmental protocol consists of routine use of magnesium sulphate for women with eclamptic seizures, which is continued for 24 hours after the last fit. For acute control of blood pressure, hydralazine and oral nifedipine are used. Blood samples are collected for complete blood picture, random blood sugar and liver and renal function test. Urine for albumin and 24 hour urinary protein are done routinely. Coagulation profile is carried out in event of low platelet count. Maternal complications like HELLP syndrome (hemolysis, elevated liver enzymes and low platelet count), renal failure, placental abruption, postpartum hemorrhage, neurological complications and pulmonary edema were noted.

Fetal outcome included gestational age, birth weight, Apgar score, intrauterine demise or early neonatal death. Intrapartum details were also recorded. Demographic data included age, parity, history of hypertension in previous pregnancies and recurrent disease.

## STATISTICAL ANALYSIS

The data were analyzed using SPSS (Version 16.0). Mean values of hemoglobin, total leukocyte count (TLC), platelet (PLT), Serum Creatinine, maternal age, gestational age and fetal weight of the five groups were compared using one- way ANOVA. Turkey HSD post HOC test was employed for significant value obtained by ANOVA for multiple comparisons. Frequency of maternal complications with hypertensive disorders was also computed.

## RESULTS

A total of 11,718 deliveries were conducted during the study period and 626 women were admitted with the diagnosis of hypertensive disorders of pregnancy, giving a frequency of 5.34%. Pre-eclampsia was diagnosed in 309 women, SPE in 85, eclampsia in 122, post-partum eclampsia in 20 and CH in 41 women. Thirty-nine mothers died (case fatality rate: 6.23%). Table 1 shows the demographic and clinical data of these women, who have been divided into five groups. Maternal age was highest in women with chronic hypertension, and lowest in women with eclampsia. Serum urea was also highest in women with chronic hypertension. Women with eclampsia also had higher total leukocyte counts where as platelet count did not show any association with disease severity. Gestational age was also low in women with eclampsia and chronic hypertension. Women with eclampsia had lower gestational ages and fetal birth weights (p-value < 0.001).

Cesarean section was required for PE, SPE and eclampsia in 46%, 51% and 61% of patients respectively. Uncontrolled blood pressure was the main indication for Cesarean section in all the three groups of women.

The commonest maternal complication was postpartum hemorrhage in 24 women (4.2%). This was followed by placental abruption in 9 women (1.6%) and pulmonary edema in 8 women (1.4%). These

Table 1 showing demographic and clinical variables of women with hypertensive disorder of pregnancy

| | Pre eclampsia N= 308 X ±SD [significance] | Severe Preeclampsia N =85 X ±SD [significance] | Eclampsia N = 122 X ±SD [significance] | Postpartum eclampsia N = 20 X ±SD [significance] | Chronic hypertension N=41 X ±SD [significance] | P value |
|---|---|---|---|---|---|---|
| Haemoglobin | 9.32±1.56 [A] | 9.74±1.80 [A] | 9.43 ±2.07 [A] | 9.79 ±1.68 [A] | 9.63± 1.60 [A] | 0.251 |
| TLC | 8894±7226 [A] | 8840±4245 [A] | 11926±9821 [B] | 10794±4807 [A] | 9269±5062 [A] | 0.004 |
| PLT | 282±1525 [A] | 574±3118 [A] | 189±97.41 [A] | 194±106 [A] | 204±113 [A] | 0.681 |
| Serum Urea | 21.80±10.57 [A] | 25.34±17.57 [AB] | 24.01±12.85 [BC] | 30.39±16.27 [C] | 35.85±5.44 [BC] | <0.0001 |
| Serum Creatinine | .769 ± .483 [A] | .787±.493 [AB] | 1.016±.737 [B] | 1.200±1.691 [B] | 1.021±.937 [AB] | 0.001 |
| Maternal age | 27±5.37 [A] | 28±5.07 [A] | 24±5.05 [B] | 26±7.29 [AB] | 29±6.34 [A] | <0.0001 |
| Gestational age | 36±2.84 [A] | 35±2.60 [AB] | 34±3.67 [CD] | 36±2.012 [AD] | 34±3.66 [BD] | <0.0001 |
| Fetal weight in grams | 2774±837 [A] | 2476±957 [B] | 2345±852 [B] | 2790±242 [AB] | 2634±900 [AB] | <0.0001 |

* Different alphabets indicate statistical significance

Table 2 showing maternal complications in women with hypertensive disorders of pregnancy

| | |
|---|---|
| Abruptio placentae | 9 (1.6%) |
| HELLP syndrome | 4 (0.7%) |
| Renal failure | 5 (0.9%) |
| DIC | 7 (1.2%) |
| Pulmonary edema | 8 (1.4%) |
| Intracranial hemorrhage | 4 (0.7%) |
| PPH | 24 (4.2%) |
| Maternal death | 5 (0.9%) |

complications were more commonly seen in eclamptic women. Among eclamptic women, 39% had had more than three fits before admission to hospital. The complication of intracranial hemorrhage was seen only in women with eclampsia. The maternal complication of intracranial hemorrhage was most frequent in women who had > 3 fits before admission.

Still birth was the main fetal complication in all the groups, PE: 14%, SPE: 18%, eclampsia: 15%. There were a total of 110 perinatal deaths among the study population, giving a perinatal mortality rate of 175 per 1000 Total births. Low birth weight (<2.5 kg) was also a significant finding in our study and was most frequently seen in women with eclampsia (52%).

## DISCUSSION

Hypertensive disorders occur in 6-8% of the pregnancies.[1] This rate varies among different populations. Pre eclampsia is seen in 3-14% of all pregnancies.[12] Prevalence of eclampsia was found to be 3.2% in a hospital based study from Pakistan.[13]

The prevalence of chronic hypertensive diseases complicating pregnancy is 3%.[14] In our study, the frequency of hypertensive disease during pregnancy was around 5.34%. The difference in prevalence of disease in different populations has been attributed to race, ethnicity, geographical location, parity and to numerous other factors.

Severe pre-eclampsia and eclampsia are commonly seen in young, nulliparous women, belonging to low socio economic class, with little or no access to antenatal facility. This picture was also seen in our study. Women, who were classified as having eclampsia, had a mean age of 24 ± 5.05 years ($p < 0.001$). Similarly women with chronic hypertension had a mean age of 29 years, which was also found significant. Laboratory data also showed significant association of eclampsia with a higher leukocyte count ($P = 0.004$). Infection has been associated with increased risk of PE. Both bacterial and viral infections have been shown to increase the

risk of PE two folds.[15-16] Platelet counts were not found to have a significant association with disease severity in this study.

Hypertensive disease in pregnancy has been associated with increased risk of maternal mortality. Moodley reported 18% of maternal deaths in South-Africa in the year 2002-04, due to hypertensive diseases of pregnancy.[2] Similarly 19% of maternal deaths in USA in the year were attributed to hypertension during pregnancy.[3] A national survey, looking at direct causes of maternal mortality, found eclampsia as the third leading cause of maternal death, preceded by hemorrhage and sepsis.[4] In our own hospital based study of maternal deaths over a period of 3 years, hypertensive disorders were responsible for 15% of maternal deaths, second commonest cause of maternal death.[5] Intracranial hemorrhage is the leading cause of death in hypertensive disease of pregnancy.

We had 39 maternal deaths in our study majority of which occurred in eclamptic women. Rigorous control of blood pressure along with magnesium sulphate has been recommended to decrease the incidence of maternal death due to eclampsia. The frequency of eclampsia in the above study was 21%. The prevalence of postpartum eclampsia in our study was 3.6%. The reported prevalence of eclampsia in antepartum period is 38-55% where as in intrapartum period it is 13-36%. Late postpartum convulsions, after 48 hours but within 6 weeks may be seen in 5-17%.[17] The prevalence of eclampsia has been found to be much greater in developing countries as compared to developed countries (6-100 cases versus 4-6 cases /10,000 live births).[17]

Perinatal complications of hypertensive diseases in pregnancy include premature delivery, oligohydramnios, intrauterine death due to asphyxia, low birth weight and poor Apgar scores at birth. The cumulative stillbirth rate in our study was 175 /1000 live births. Stillbirths were highest in women with SPE (18%). Similarly hypertension during pregnancy was identified as a leading cause of stillbirths in a hospital based audit of stillbirth from a large tertiary referral center.[16] Increased perinatal mortality rate is also attributed to preterm gestation. In our study, women who were diagnosed with eclampsia had a mean gestational age of 34 weeks, which was found significant when compared to other subgroups.

The rate of obstetric intervention has been found to be high in hypertensive disorders of pregnancy.[18] In our study, Cesarean section was the main mode of delivery, with highest rate observed for eclampsia (52%). The main indications for operative intervention were uncontrolled blood pressure and fetal distress.

There is a risk of recurrent eclampsia in subsequent pregnancy. The reported risk in literature is around 25-65%.[19] Recurrence risk is dependant upon the severity of disease and gestational age. Women having severe preeclampsia at an earlier gestational age are more prone to recurrent disease. The recurrence risk persists even after normal deliveries in between. In our study population, recurrent hypertensive disease was seen in 19%. This emphasizes the role of prophylactic low dose anti-platelet therapy in subsequent pregnancies. The role of anticoagulant therapy in this group of women is also being explored. Rey et al, in a pilot study of women with a past history of severe pre eclampsia, intrauterine demise and other placental mediated complications without thrombophilia, randomized women in two groups. (Low molecular weight heparin versus no treatment). Among the 110 women included in the final analysis, dalteparin was associated with a lower rate of the primary outcome [5.5% (3/55) vs. 23.6% (13/55), adjusted odds ratio (OR) = 0.15, 95% confidence interval (CI) 0.03-0.70][9]

Recently, the cardiovascular risk in women having hypertensive disease of pregnancy has been highlighted in the literature. Women with PE in pregnancy were found to have higher incidence of dyslipidemia, hypertension and increased insulin resistance in later life.[20] The risk has been found to be greater in those women who develop both maternal (hypertension and proteinuria) and fetal complications (intrauterine growth restriction).[21] At the time of discharge from hospital, these women should be counseled for a change in life style and the importance of medical follow up in later years of life.

## CONCLUSION

We can conclude from this study that hypertensive disorders of pregnancy are a significant cause of maternal and perinatal mortality and morbidity in our institution.

## REFERENCES

1 Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol 2000; 183:1-22.

2 Moodley J. Maternal deaths due to hypertensive disorders in pregnancy. Best Pract Res Clin Obstet Gynaecol 2008; 22:559-67.

3 Rochat RW, Koonin LM, Atrash HK, Jewett JF. Maternal mortality in the United States: report from the Maternal Mortality Collaborative. Obstet Gynecol 1988; 72:91-7.

4 Jafarey SN. Maternal mortality in Pakistan--compilation of available data. J Pak Med Assoc 2002; 52:539-44.

5 Shah N, Hossain N, Shoaib R, Hussain A, Gillani R, Khan NH. Socio-demographic Characteristics and the Three Delays of Maternal Mortality. J Coll Physicians Surg Pak 2009; 19:95-8.

6 Korejo R, Bhutta S, Noorani KJ, Bhutta ZA. An audit and trends of perinatal mortality at the Jinnah Postgraduate Medical Centre, Karachi. J Pak Med Assoc 2007; 57:168-72.

7 Geographic variation in the incidence of hypertension in pregnancy. World Health Organization International Collaborative Study of Hypertensive Disorders of Pregnancy. Am J Obstet Gynecol 1988; 158:80-3.

8 CLASP: a randomised trial of low-dose aspirin for the prevention and treatment of pre-eclampsia among 9364 pregnant women. CLASP (Collaborative Low-dose Aspirin Study in Pregnancy) Collaborative Group. Lancet 1994; 343:619-29.

9 Rey E, Garneau P, David M, Gauthier R, Leduc L, Michon N, et al. Dalteparin for the prevention of recurrence of placental-mediated complications of pregnancy in women without thrombophilia: a pilot randomized controlled trial. J Thromb Haemost 2009; 7:58-64.

10 Urban G, Vergani P, Tironi R, Ceruti P, Vertemati E, Sala F, et al. Antithrombotic prophylaxis in multiparous women with preeclampsia or intrauterine growth retardation in an antecedent pregnancy. Int J Fertil Womens Med 2007; 52:59-67.

11 Papageorghiou AT, Leslie K. Uterine artery Doppler in the prediction of adverse pregnancy outcome. Curr Opin Obstet Gynecol 2007; 19:103-9.

12 ACOG practice bulletin. Diagnosis and management of preeclampsia and eclampsia. Number 33, January 2002. Obstet Gynecol. 2002; 99:159-67.

13 Sultana R, Bashir R. Khan B. Presentation and management outcome of Eclampsia at Ayub Teaching Hospital, Abbottabad. J Ayub Med Coll Abottabad 2005; 17:59-62.

14 Lain KY, Roberts JM. Contemporary concepts of the pathogenesis and management of preeclampsia. JAMA 2002; 287:3183-6.

15 Rustveld LO, Kelsey SF, Sharma R. Association between maternal infections and preeclampsia: a systematic review of epidemiologic studies. Matern Child Health J 2008; 12:223-42.

16 Conde-Agudelo A, Villar J, Lindheimer M. Maternal infection and risk of preeclampsia: systematic review and metaanalysis. Am J Obstet Gynecol 2008; 198:7-22.

17 Matthys LA, Coppage KH, Lambers DS, Barton JR, Sibai BM. Delayed postpartum preeclampsia: an experience of 151 cases. Am J Obstet Gynecol 2004; 190:1464-6.

18 Gofton EN, Capewell V, Natale R, Gratton RJ. Obstetrical intervention rates and maternal and neonatal outcomes of women with gestational hypertension. Am J Obstet Gynecol 2001; 185:798-803.

19 Sibai BM, el-Nazer A, Gonzalez-Ruiz A. Severe preeclampsia-eclampsia in young primigravid women: subsequent pregnancy outcome and remote prognosis. Am J Obstet Gynecol 1986; 155:1011-6.

20 Manten GT, Sikkema MJ, Voorbij HA, Visser GH, Bruinse HW, Franx A. Risk factors for cardiovascular disease in women with a history of pregnancy complicated by preeclampsia or intrauterine growth restriction. Hypertens Pregnancy 2007; 26:39-50.

21 Newstead J, von Dadelszen P, Magee LA. Preeclampsia and future cardiovascular risk. Expert Rev Cardiovasc Ther 2007; 5:283-94.