ORIGINAL ARTICLE

# FREQUENCY AND IMPACT OF HYPERTENSIVE DISORDERS OF PREGNANCY

**Shakira Perveen**
**Department of Gynaecology and Obstetrics, Dow University of Health Sciences, Karachi, Pakistan**

**Background:** Hypertensive disorders are one of a major cause of maternal mortality and morbidity especially in developing countries. This cross sectional descriptive study was carried out to determine frequency of hypertensive disorders of pregnancy and its impact on maternal and perinatal outcome. **Methods:** Records of 150 pregnant hypertensive ladies presenting at gynaecology Unit-1 of Civil Hospital Karachi from January to December 2010 was reviewed for demographic profile, mode of delivery, maternal and perinatal outcome. Statistical analysis was performed by SPSS-15. **Results:** Total deliveries during study period were 2702. Out of 2702 deliveries 150 (5.5%) mothers were hypertensive. Out of 150 hypertensive cases 30% were cases of gestational hypertension, 58% were cases of toxaemia of pregnancy and 12% were cases of chronic hypertension. Maternal age, gravida, parity was lowest in toxaemia of pregnancy group. Commonest maternal complication was eclampsia (32%). There were 6 (4%) maternal deaths. Caesarean section was mode of delivery in 54% cases. **Conclusion:** Hypertensive disorders of pregnancy are an important cause of maternal and perinatal mortality and morbidity.

**Keywords:** Preeclampsia, eclampsia, maternal mortality, perinatal mortality rate.
**J Ayub Med Coll Abbottabad 2014;26(4):518–21**

## INTRODUCTION

Three women die every hour in Pakistan from causes related to pregnancy and child birth. Hypertensive disorders of pregnancy (HDP) are reported in 6–8% of pregnancies.[1] Globally its a major cause of maternal mortality and morbidity especially in the developing areas of the world.[2] The spectrum of disease ranges from mildly elevated blood pressure (BP) measurements with minimal clinical significance to severe hypertension (HTN) and multi-organ dysfunction.[3] HTN accompanied by proteinurea (pre-eclampsia PE) usually occurs in 2nd half of pregnancy and complicates 2–8% of pregnancies.[4] It can present as HELLP syndrome (haemolysis, elevated liver enzymes, low platelet) or eclampsia, i.e., occurrence of convulsions that cannot be attributed to other etiological functions.[3] After haemorrhage PE and eclampsia is significant cause of maternal and perinatal mortality and morbidity.[3,5] Eclampsia is reported to be associated with a maternal mortality rate (MMR) of 0.5–10% usually requiring high quality intensive care.[6] Severe maternal morbidities associated with PE and eclampsia are adult respiratory distress syndrome, renal failure, cardiac arrest, coagulopathy and liver failure.[7,8] In developing countries one quarter of still births (SB) and neonatal deaths (NND) are associated with PE and eclampsia.[9] One out of 7 preterm births (PTB) and intrauterine growth restriction (IUGR) are seen in PE.[10]

Possible risk factors of HDP are maternal age, obesity, family history of HTN in mother, increased inter-pregnancy interval, twin gestation, underlying vascular disorders like diabetes mellitus, bacterial and viral infections and anti-phosopholipid syndrome.[11] Role of low dose aspirin in subsequent pregnancy in women with history of eclampsia is well established.[12] Recent researchers are also in favour for use of calcium supplement and co-enzyme Q10 (co Q10) during pregnancy. Calcium supplementation before 20–32 weeks of gestation till delivery is associated with a reduction in risk of gestational HTN, PE, neonatal mortality and PTB in developing countries.[13] co-Q10 is potent antioxidant, its supplementation from 16–20 weeks of gestation till delivery reduces risk of developing PE in women at risk for the condition.[14]

The aim to reduce the maternal mortality remains a challenging target, in low income countries, primarily in Africa and Asia. HDP are associated with high maternal and perinatal mortality (PNM) and morbidity. It mandates prompt diagnosis and aggressive management in order to reverse maternal and perinatal outcome.

The objective of the study was to evaluate frequency, demographic parameters, maternal and foetal complications of this potentially lethal disorder of pregnancy in tertiary care centre.

## MATERIAL AND METHODS

This cross-sectional descriptive study was carried out at gynaecology department Unit-1 civil Hospital Karachi from January to December 2010. The study subjects were 150 pregnant hypertensive women admitted in the department for the treatment and delivery. HDP are classified as gestational HTN {pregnancy induced HTN (PIH)+mild PE}, toxaemia of pregnancy (TOP) {PE+E}, and chronic HTN. This 5 groups classification (PIH, mild PE, severe PE, E, chronic HTN) is according

to National high blood pressure Education program working Group on high blood pressure (BP) in pregnancy.[1]PE was defined as a BP ≥140/90 mmHg together with albumin urea of at least 300 mg/24 hrs after 20 weeks of gestation. Severe PE was defined as one or more of the following criteria. BP ≥160/110, protein urea of at least 5 gm/24 hrs, oligurea (<600 ml/24 hrs or <30–50 ml/hr) along with clinical features of severe headache, blurring of vision, epigastric pain. Generalized seizure in a pre-eclamptic pregnant women not associated with other etiological factors are considered to be eclampsia. Pregnant women with previous HTN or hypertensive women without protein urea early in pregnancy before 20 weeks of gestation are suggested to be chronically hypertensive.

On admission blood samples were collected for laboratory evaluation (Complete blood count, liver enzymes, urea, creatinine, uric acid, coagulation profile). Blood samples were repeated according to severity of disease from 12 hourly to 3 days. Demographic parameters like gestational age, mode of delivery and indications of caesarean section were determined.

The primary outcome was a composite measure of poor maternal and perinatal outcome. Poor maternal outcome was defined as maternal mortality (MM), maternal morbidity (HELLP Syndrome, abruption, disseminated intra vascular coagulation DIC, renal failure, admission to intensive care unit ICU). Platelet count $<100\times10^9$/L with elevated liver enzymes (AST >70U/L, ALT 70U/L) is HELLP syndrome. Poor perinatal outcome was defined as still birth, neonatal death, intrauterine growth restriction, i.e., below 10$^{th}$ centile birth weight (SB, NND, IUGR).

Sampling was done by non-probability convenience technique. Sample size calculated by using open epi sample size calculator with prevalence 38.40 (incidence 6.4%)[15] d=8% and CI=95%, n=142. Statistical analysis was performed by SPSS program 15. Data was presented as mean±SD or as N (%). Test used was kruskalwallis non parametric test, ANOVA (analysis of variance) and pearson chi square test with $p<0.05$ was significant.

## RESULTS

Out of 2702 maternities 150 (5.5%) mothers were hypertensive. Out of it 45 (30%) were cases of gestational HTN, 87 {(58%), PE 26%+ E32%} were cases of TOP and 18 (12%) were cases of chronic HTN. majority 77.2% were non-booked. Demographic and clinical data of these groups are presented in Table-1. Maternal age, gravida and parity are highest in chronic HTN group and lowest in TOP group. Maximum number of nulliparous was {(32%), PE15.3%+ E16.6%} in TOP group. Gestational age and neonatal birth weight was statistically insignificant in 3 groups. Lab data analysis demonstrated high values of AST and ALT in TOP group.

Maternal complications are presented in Table-2. eclampsia was commonest maternal complication (32%). Characteristics of cases of eclampsia are presented in table-3. All maternal deaths 6 (4%) were in TOP group. Clinical characteristic soft maternal mortalities are presented in Table-4. Perinatal deaths were 46 giving PNMR 295/1000 births. Early NNDs were 5, SBs were 17. Perinatal complications are presented in table-5.

**Table-1: Demographic and clinical data of women with HDP: N=150**

| Data | Gestational HTN | Toxemia of pregnancy | Chronic HTN | *P* |
|---|---|---|---|---|
| **Age (yrs)** | 26.89±4.28 | 26.22±5.17 | 32.39±4.48 | 0.000 |
| **Gravida** | 2.00±1.26 | 2.15±1.60 | 6.56±1.38 | 0.000 |
| **Parity** | 0.80±0.99 | 1.05±1.50 | 5.50±1.42 | 0.000 |
| **Gestational Age( wks)** | 36.11±3.31 | 35.64±3.77 | 35.89±2.98 | 0.913 |
| **Birth weight (Kg)** | 1.73±0.61 | 2.01±0.63 | 2.05±0.72 | 0.220 |
| **Platelet count** | 223479±84710 | 149544±66465 | 192111±77754 | 0.046 |
| **AST (U/L)** | 36.16±45.32 | 159.21±164.23 | 38.56±24.97 | 0,000 |
| **ALT (U/L)** | 59.76±63.85 | 155.53±145.01 | 59.44±85.76 | 0.000 |

Data are expressed as mean ±Standard Deviation

**Table-2: Maternal complication in cases of HDP N=150**

| Maternal complication | Gestational HTN | | TOP | | Chronic HTN | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| **Mortality** | 0 | 0 | 6 | 4 | 0 | 0 |
| **Eclampsia** | 0 | 0 | 48 | 32 | 0 | 0 |
| **Abruption** | 2 | 1.3 | 5 | 3.3 | 3 | 2 |
| **HELLP** | 3 | 2 | 4 | 2.6 | 2 | 1.3 |
| **Anemia** | 0 | 0 | 6 | 4 | 0 | 0 |
| **DIC** | 0 | 0 | 4 | 2.6 | 0 | 0 |
| **Renal failure** | 0 | 0 | 4 | 2.6 | 0 | 0 |
| **ICU admission** | 0 | 0 | 15 | 10 | 0 | 0 |
| **Intra cranial Hemorrhage** | 0 | 0 | 2 | 1.3 | 0 | 0 |
| **Cardiomyopathy** | 0 | 0 | 1 | 0.6 | 0 | 0 |

**Table-3: Characteristics of Eclampsia cases: N=48**

| Age (years) | % | Parity | % | Type | % | Gestational Age (wks) | % | MOD | % | Mat outcome | % | Foetal outcome | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **<20** | 14.5 | Primi | 52 | Antepartum | 18.7 | 25–29 | 4.1 | SVD | 37.5 | Alive | 46 | alive | 37 |
| **20–30** | 79 | 1–3 | 43.7 | Intrapartum | 66.6 | 30–35 | 20.8 | Instrument | 6.25 | Dead | 2 | NND | 3 |
| **31–40** | 6.5 | 4–6 | 4.1 | Post partum | 14.5 | 36–40 | 75 | LSCS | 52 | - | - | SBs | 8 |

MOD=mode of delivery, SVD=spontaneous vaginal delivery, Mat outcome=maternal outcome, LSCS=lower segment caesarean section

**Table-4: Clinical Characteristics of maternal mortalities (N=6)**

| Characteristics | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Age (yrs) | 25 | 22 | 40 | 25 | 22 | 20 |
| Gestatational age (weeks) | 38 | 34 | 37 | 37 | 30 | 35 |
| Gravida/para | Primi | $1^{+0}$ | $7^{+0}$ | $7^{+0}$ | Primi | Primi |
| Booking status | Referred | Non booked | Non booked | Non booked | booked | Booked |
| Associated pathology | Severe PE | Severe PE | Post partum E | Severe PE | Intra partum E | Severe PE |
| MOD | SVD | LSCS | SVD | Undelivered | LSCS | SVD |
| Delivery-death interval | 5 hrs | 3 days | 2 days | - | 3 days | 4 days |
| Foetal outcome | Alive | NND | IUD | - | IUD | IUD |
| Cause of death | Intra cranial haemorrhage | HELLP syndrome | HELLP syndrome | Cardiomyo Pathy | Intra cranial haemorrhage | Pulmonary embolism |

LSCS=lower segment caesarean section, IUD=intra uterine death, NND=neonatal death

**Table-5: Foetal and neonatal complications (N=150)**

| Complications | Gestational HTN (N=45) | | TOP (N=87) | | Chronic HTN (N=18) | | Chi square |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | no | % | *p*-value |
| Still birth | 6 | 13.3 | 11 | 12.6 | 5 | 27.7 | 0.244 |
| NND | 5 | 11.1 | 16 | 18.3 | 3 | 16.6 | 0.555 |
| IUGR | 4 | 8.8 | 3 | 4 | - | - | 0.226 |
| Preterm delivery | 11 | 24.4 | 28 | 32 | 7 | 38.8 | 0.476 |
| Oligohyderamnios | 1 | 2.2 | 6 | 6.8 | - | - | 0.293 |
| NICU admission | 6 | 13.3 | 16 | 18.3 | 2 | 11.1 | 0.629 |

## DISCUSSION

Every maternal death is a tragedy for the women and for her family, and a loss to the community and society in which she lives. HDP is the 2nd most common cause of maternal deaths worldwide.[17] In this study frequency of HDP, chronic HTN, gestational HTN, and severe PE and eclampsia is 5.5%, 0.66%, 3.5%, 1.6% and 1.7% respectively. Frequency in 2 local studies is 5.34%, 0.56%, 3.3%, and 1.04% for HDP, chronic HTN, and PE and eclampsia respectively in one study and 8.9%, 1.97% 0.85% for HDP, and PE and eclampsia in 2nd study respectively.[11,17] Prevalence of HDP varies according to geographic region of the world. It ranges between 1.5% in Sweden to 7.5% in Brazil and India.[4,18] Prevalence of chronic HTN, PE and eclampsia in Turkey is 0.56%, 4.34% and 0.54%.[3] In India prevalence of PE and eclampsia is 3.7% and0.79%.[18] Difference in rates of HDP could be genetic, diet or management of mild PE.

Young, nulliparous, non-booked women are typical demographic characteristics. Literature also revealed similar demographic data.[3,11,18,19] Our study is in confirmatory with the view that HDP is essentially a disease of primigravida.

HDP are associated with high MM. WHO estimates that at least 1 mother dies every 7 minutes from complications of HDP.[16] It accounts for 16% of maternal deaths in developed countries, 25% in Latin America and 9% in each Africa and Asia.[16] A national survey found eclampsia is 3rd leading cause of maternal deaths, preceded by haemorrhage and sepsis.[20] Even morbidities associated with severe PE and eclampsia may need intensive care or specialist medical facilities or treatment such as ventilator or renal dialysis. Access to these facilities is often limited particularly in primary care units. Early referral to tertiary care centre is mandatory.

Frequency of post-partum eclampsia (PPE) is high (14.5%) like one local (21%) and one study from Turkey (11.33%).[3,11] This high frequency of PPE requires attention that health providers do not only focused on ante and intra-partum cases of eclampsia but also on cases with severe preeclampsia especially within 48 hrs of delivery for prevention of development of PPE.

HDP are also associated with high PNM and perinatal morbidity. The cumulative SBR is 141/1000 live births. In one local study SBR is 175/1000 live births.[11] PNMR is 295/1000 births while 230/1000 births in one local study.[16] Chronic placental insufficiency is responsible for foetal death, IUGR/ or preterm birth.

Abdominal delivery was performed in 54% cases. This high rate of caesarean delivery further increases the risk associated with PE and eclampsia.[21,22] Magnesium sulphate (Mg $SO_4$) is drug of choice in all cases of PE and E. Pregnancy was terminated in all cases of TOP after clinical stabilization.

Cochrain review identified 5 effective interventions: routine calcium supplementation in pregnancy, antiplatelet agent during pregnancy in women at risk of PE, $MgSO_4$for the treatment of eclampsia, $MgSO_4$for the treatment of PE and hypertensive drugs for the treatment of mild to moderate HTN in pregnancy.[22] WHO estimates that 88-98% of maternal deaths are avoidable with moderate level of health care.[23]

## CONCLUSION

Hypertensive disorders of pregnancy are an important cause of maternal and perinatal mortality and morbidity. Concrete steps should be taken so as to diagnose and manage hypertensive disorders during pregnancy to avoid the lethal morbidities.

## 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. Vigil-De Gracia P, Montufar-Rueda C, Ruiz J. Expectant management of severe preeclampsia and preeclampsia superimposed on chronic hypertension between 24–34 weeks gestation. Eur J Obstet Gynecol Reprod Biol 2003;107:24–7.
3. Yucesoy G, Ozkan S, BodurH, Tan T, Cahskan E, Vural B, *et al*. Maternal and perinatal outcome in pregnancies complicated with hypertensive disorder of pregnancy: A seven year experience of a tertiary care centre. Arch Gynecol Obstet 2005;273:43–9.
4. Sibai BM. Diagnosis and management of gestational hypertension and preeclampsia. Obstet Gynecol 2003;102:181–92.
5. Zhang WH, Alexender S, Bouvier-Colle MH, Macfarlane A, MOMS-BGroup. Incidence of severe preeclampsia, post partum haemorrhage and sepsis MOMS-B survey. BJOG 2005;112(1):89–96.
6. Aali BS, Ghafoorian J, Mohamed-Alizadeh S. Severe preeclampsia and eclampsia in Kerman, Iran: complications and outcomes. Med Sci Monit 2004;10(4):163–7.
7. Matter F, Sibai BM. Eclampsia V111. Risk factors for maternal morbidity. Am J Obstet Gynecol 2000;182:307–12.
8. Altman D, Carroli G, Duley L, Farrell B, Moodley J, Neilson J. Do women with preeclampsia and their babies , benefit from magnesium sulphate? The Magpie trial a randomized placebo-controlled trial. Lancet 2002; 359:1877–90.
9. Knight M: Eclampsia in the United Kingdom 2005. Br J Obstet Gynecol 2007;114:1072–8.
10. Iams JD, Romero R, Culhane JF, Goldenberg RL. Primary, secondary, and tertiary interventions to reduce the morbidity and mortality of preterm birth. Lancet 2008;371:164–75.
11. Hossain N, Shah N, Khan N, Lata S, Khan NH. Maternal and Perinatal outcome of Hypertensive Disorders of Pregnancy at a Tertiary care Hospital. J Dow Uni Health Sc 2011;5(1):12–6.
12. CLASP; a randomized trial of lowdose aspirin for the prevention and treatment of pre eclampsia among 9364 pregnant women. CLASP (Collaborative Low dose Aspirin in Pregnancy. Collaborative Group. Lancet 1994; 343:619–29.
13. Imdad A, Jabeen A, Bhutta ZA. Role of calcium supplementation during pregnancy in reducing risk of developing gestational hypertensive disorders: a meta-analysis of studies from developing countries. Bio Med Central 2011;11(3):1471–2458.
14. Teran E, Hernandez I, Nieto B, Tavara R, Ocampo JE, Calle A. Coenzyme Q10 supplementation during pregnancy reduces the risk of pre eclampsia. Int J Gynecol Obstet 2009;105:43–5.
15. Samadi AR, Mayberry RM, Zaidi AA, Pleasant JC, McGhee N Jr, Rice RJ. Maternal hypertension and associated pregnancy complications among African-American and other women in the United States. Obstet Gynecol 1996; 87: 557–63.
16. Khan KS, Wodyla D, Say L, Gulmezole AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. Lancet 2006;367:1066–74.
17. Nisar N, Memon A, Sohoo NA, Ahmed M. Hypertensive disorders of pregnancy: frequency, maternal and fetal outcomes. Pak Armed Forces Med J 2010:60:113
18. Nadkarni J, Bahl J, Parekh P. perinatal outcome in pregnancy associated hypertension. Indian Paediatr 2001;38:174–8.
19. Ananth CV, Basso O. Impact of pregnancy induced hypertension on still birth and neonatal mortality. Epidemiology 2010;21(1):118–23.
20. Jafarey SN. Maternal mortality in Pakistan-compilation of available data. J Pak Med Assoc 2002;52:539–44.
21. Duley L. The global Impact of Pre eclampsia and eclampsia. Semin Perinatol 2009;33:130–7.
22. Ronsmans C, Campbell O. Quantifying the fall in mortality associated with interventions related to hypertensive diseases of pregnancy. BMC 2011;11:1471–2458.
23. Maternal mortality: helping women off the road to death, WHO Chron 1986;40(5):175–83.



## Address for Correspondence:

**Dr. Shakira Perveen,** Assistant Professor DUHS, CHK B-7 Ruknuddin Flats, F.B Area Block-1, Karachi, Pakistan
**Cell:** +92-300- 2483551
**Email:** drshakiraperveen@live.com