

Research Article

## The impact of hypertensive disorders during pregnancy on maternal and fetal outcomes: A retrospective study in South Asian region of Pakistan

Dr. Zulfiqar Ali Khan<sup>1\*</sup>, Dr. Shumaila Khawaja Khail<sup>1</sup>, Sohail Ahmad<sup>2</sup>, Faryal Jahan<sup>3</sup>,  
Ammara Ayub<sup>3</sup>, Mehak Nimra<sup>4</sup>

<sup>1</sup>Swat Medical College & Allied Teaching Hospitals Saidu Sharif Swat

<sup>2</sup>Margalla Institute of Health Sciences, Islamabad

<sup>3</sup>Shifa College of Pharmaceutical Sciences, Shifa Tameer-e-Millat University

<sup>4</sup>Senior Scientific Officer, Biological Production Division, NIH

\*Corresponding author's email: womenhospitalmardan@gmail.com

### Abstract

The current study was conducted to check the effect of high blood pressure on the health of mother and child living in south Asian region of Pakistan during all trimesters of pregnancy. For this retrospective research, 720 females during their deliveries were analyzed at Swat Medical College and Women's Hospital Mardan between June 2022 and June 2023. This current study found almost one fourth of the population suffer hypertensive disorders during any stage of pregnancy which leads to mild to severe pre-eclampsia and ultimately premature births. The observations indicated statistically high significance between hypertensive disorders and associated adverse symptoms like fetus with preterm delivery, c-sections, low birth weight, acute to chronic but reversible renal disorders, neonatal intensive care admissions and sometime central nervous system related disorders. So, this study concludes that more comprehensive parenteral care at the time of pregnancy and especially at the last trimesters. Keen attention towards symptoms and early diagnosis can help to reduce the severity of disease. The maternal and fetal health initiative schemes are required for public awareness.

**Keywords:** Hypertensive disorders in pregnancy, Preeclampsia, Maternal outcomes, Fetal outcomes, Pregnancy-induced hypertension (PIH), HELLP syndrome, Obstetric complications.

**Article History:** Received: 12 August 2024, Revised: 04 September 2024, Accepted: 05 September 2024, Published: 23 September 2024

**Creative Commons License:** NUST Journal of Natural Sciences (NJNS) is licensed under Creative Commons Attribution 4.0 International License.



### Introduction

In Pakistan, difficulties associated with pregnancy and childbirth claim the lives of three women every sixty minutes. In 6% to 8% of pregnancies, hypertension problems

connected to pregnancy are common [1]. They are regarded as a major global contributor to poor maternal and fetal outcomes, with this effect being particularly pronounced in underdeveloped nations. Preeclampsia's precise occurrence

is unknown, while reports place it at 5-8 percent. Preeclampsia is a major cause of maternal and perinatal mortality and morbidity globally, and it can have an impact on both the mother and the fetus [2]. Pregnancy-related hypertensive disorders encompass a range of conditions from slightly increased blood pressure to multiple organ failure [3]. The National High Blood Pressure Education Working Group (2000) described a new classification system that identified five hypertensive disorders: preeclampsia, eclampsia, transient hypertension of pregnancy, chronic hypertension, and preeclampsia superimposed on chronic hypertension [4]. Preeclampsia or prenatal hypertension was detected in 70% of instances of hypertensive disorders of pregnancy, with persistent hypertension accounting for around 30% of cases [5]. Preeclampsia is a pregnancy-specific multisystem illness with an unclear etiology. Preeclampsia can manifest as either eclampsia, which is the occurrence of convulsions that cannot be linked to any other etiologic factor, or HELLP syndrome, which is characterized by hemolysis, increased liver enzymes, and low platelet counts. According to reports, eclampsia is linked to a maternal mortality rate of 0.5–10%, typically necessitating outstanding critical care [6, 7]. Furthermore, placental ablation, disseminated intravascular coagulation, cerebral hemorrhage, hepatic failure, acute renal failure, and cardiovascular collapse are among the potentially fatal consequences associated with preeclampsia. Prematurity, intrauterine fetal death, and intrauterine fetal growth restriction (IUGR) seem to be the other associated obstetric issues [8-10]. All these clinical scenarios require aggressive therapy and a fast diagnosis to improve the unfavorable mother-perinatal outcome. Numerous risk factors for hypertensive disorders in pregnancy have been found in international literature. These risks include obesity, alcohol consumption, smoking,

heart failure, stroke, and left ventricular hypertrophy [11, 12]. Up to 22% of these high-risk pregnancies resulted in difficulties for the mother and fetus when they were monitored until delivery [13, 14]. The severity of hypertension disorders during pregnancy affects the risk of adverse outcomes in the fetus. For instance, mothers with normotensive disorders had the lowest risk of preterm delivery (7.2%), PIH moms had the highest risk (12.5%), and preeclamptic mothers had the highest risk (39.2%) [15-17].

Even though this topic has been extensively researched worldwide, Pakistan does not have enough data, particularly in rural areas. In this study, we evaluate the results for mothers and fetuses' health in Swat Medical College along with women's hospital Mardan who had hypertension disorders during pregnancy. The article's conclusion enabled us to emphasize the importance of a well-planned awareness campaign on hypertensive disorders during pregnancy.

## Methodology

### Study design and setting

From June 2022 to June 2023, a prospective observational study was carried out at the Swat Medical College and Women's Hospital Mardan [12]. The institutional review board approved the trial, and each patient provided written informed permission. Patients who were admitted to the department for birth or expulsion and who had been diagnosed with at least one pregnancy-related hypertensive illness (chronic hypertension, chronic hypertension superimposed, PIH, preeclampsia, eclampsia, and HELLP syndrome) were eligible. Excluded from the study were patients who did not volunteer to participate, had no pregnancy-related hypertension, or were treated in such an emergency that they were

delirious and unable to speak [15]. All participants' blood pressure, type of pregnancy-related hypertension disease, gestational age as confirmed by ultrasound, and patient age were documented. Every patient was closely monitored for the emergence of any complications before, during, and following delivery or discharge from the hospital. Both the mother's result and the frequency of any neonatal complications were noted.

The purpose of this research was to evaluate the incidence of hypertensive disorders during pregnancy and ascertain the impact of these conditions on the outcomes for the fetus and mother. Descriptive, cross-sectional, retrospective research was conducted on randomly chosen women who gave birth at the hospital. Software called SPSS version 20 was used to analyze data. To determine rates, descriptive statistics were employed. The estimates of the connections between the chosen predictor variables were made using chi-square statistics. P-values less than 0.05 were deemed statistically significant.

## Results

The observations were collected from 720 participants from all kinds of deliveries attended from June 2022 to June 2023 in Swat Medical College and Women University, Mardan, Pakistan. The mean of participated mothers age was 17 to 45.5 years. The maximum participants' age was between 25 to 32 years, and very few were after 42 years. More than half of the females of current study was in primiparity and very few was in grand multiparity.

The prevalence of twin pregnancy in this study was only 2% according to the observations collected from the mothers of South Asian region of Pakistan. 64% females were having preterm delivery at the month of 8<sup>th</sup> with 3 or 4 weeks due to

hypertensive disorders. These kinds of disorders led to spontaneous delivery through vagina after painkiller or spinal injections which was accounted to 20% and in 17% deliveries instruments were used like vacuum and/or with forceps (cups) to facilitate the female during intense procedure and to lessen the pain. Our observations showed that 63% females were having cesarean delivery due to emergency state of maternal and fetal health.

The state of mild to severe preeclampsia, mode of delivery was 100% in case of severity whereas previous deep scar at uterine area during delivery was also associated with 29% deliveries by cesarean mode. When the mothers were diagnosed with high blood pressure but no severe complication like kidney disorder or heart diseases, then 87% neonates were normal without complication or post-delivery disorders, but 40% intrauterine growth restriction (IUGR) was seen in case of eclampsia and 44% was reported in case of severe preeclampsia. When the mothers were suffering preeclampsia and eclampsia then the 9% and 40% neonates were admitted in emergency for intensive care and resuscitation for survival according to the observations collected during this study. Mostly neonates were born with less than 1500 g birth weight in case of mild to severe preeclampsia. But mostly birth weight was in between 1500 to 2499 g which leads to 69% preeclampsia and 60% to eclampsia in the mothers. More than 2500 g weight of fetus also led to hypertensive disorders in the mothers. When the scores calculated for APGAR at the first minute was less than 7, it accounted for 65% in severe pre-eclampsia while 40% in eclampsia and in case of first 5 minutes, the rates were 50% and 60% respectively. When the scores for APGAR at the first minute and after 5 minutes were more than 7, it accounted for 31% and 88% in hypertensive disorders, respectively as shown in Table 01.

Table 1: Perinatal and maternal and outcomes of the hypertensive disorders of pregnancy.

Perinatal outcomes	Types of hypertensions (242 (34%))					
	Gestational Hypertension 114 (16%)	Mild Pre-eclampsia 91 (13%)	Severe Pre-eclampsia	Eclampsia 5(0.6%)	Normotensive 478 (66%)	P-value
<b>Gestational age</b>						
< 34 weeks	2 (2%)	10 (11%)	3 (9%)	1 (20%)	271	
34-36 weeks	20 (17%)	21 (23%)	11 (35%)	2 (40%)	59	< 0.001*
≥ 37 weeks	92 (81%)	60 (66%)	18 (56%)	2 (40%)	148	
<b>Birth weight</b>						
< 1500 g	15 (13%)	11 (12%)	3 (9%)	0	15 (3%)	
1500-2499 g	40 (35%)	37 (41%)	22 (69%)	3 (60%)	210 (44%)	< 0.001*
≥ 2500 g	59 (52%)	43 (47%)	7 (22%)	2 (40%)	253 (53%)	
<b>APGAR at 1st minute</b>						
< 7	79 (69%)	32 (35%)	21 (65%)	2 (40%)	112 (24%)	0.001*
≥ 7	35 (31%)	59 (65%)	11 (35%)	3 (60%)	366 (76%)	
<b>APGAR at 5th minute</b>						
< 7	14 (12%)	41 (45%)	16 (50%)	3 (60%)	67 (14%)	< 0.001*
≥ 7	100 (88%)	50 (55%)	16 (50%)	2 (40%)	411 (86%)	
<b>Birth outcome</b>						
Stillbirth	3 (3%)	9 (9%)	2 (6%)	0	9 (2%)	0.65
Alive	111 (97%)	82 (91%)	30 (94%)	5 (100%)	469 (98%)	
<b>Neonatal complication</b>						
No complication	99 (87%)	18 (21%)	7 (22%)	0	378 (79%)	
IUGR	1 (1%)	34 (37%)	14 (44%)	2 (40%)	25 (5%)	
Resuscitation	11 (10%)	5 (5%)	8 (25%)	1 (20%)	44 (10%)	< 0.001*
NICU	3 (2%)	34 (37%)	3 (9%)	2 (40%)	31 (6%)	
<b>Maternal outcome, Maternal age</b>						
≤ 24 yrs.	18 (16%)	30 (33%)	3 (9%)	0	119 (25%)	
25-34 yrs.	50 (44%)	21 (23%)	16 (50%)	0	178 (37%)	0.157
≥ 35 yrs.	46 (40%)	40 (44%)	13 (41%)	5 (100%)	181 (38%)	
<b>Mode of delivery</b>						
Vaginal	23 (20%)	20 (23%)	3 (9%)	0	198 (42%)	
Instrumental	19 (17%)	12 (13%)	1 (3%)	0	226 (47%)	0.009*
Cesarean	72 (63%)	58 (64%)	28 (88%)	5 (100%)	54 (11%)	

\*P-value&lt; 0.05

We have collected data from 720 females and found that the prevalence of hypertensive disorders during pregnancy was 88% in this population. 31 out of 37 (84%) females suffered severe preeclampsia and eclampsia. Among all clinical manifestation, headache is the most common symptoms in both mothers group suffering with eclampsia and hypertensive disorders. The 51% females suffered blurred vision while 92% complained about epigastric pain in state of Severe preeclampsia and Eclampsia during pregnancy. The gastrointestinal complains were having less prevalence in the females suffering only hypertensive disorder due to high blood pressure. Abruption placenta was reported as more prevalent in HDP mothers as compared to eclampsia mothers in our current research work. Central nervous system disorders like seizures, loss of consciousness was reported in a very less percentage in pregnant females with high blood pressure. But acute kidney infection (AKI) was also one of the more prevalent symptoms reported with mild to severe preeclampsia and in eclampsia state as well.

Table 2: Maternal effects of HDP: clinical conditions of severity features

Clinical Manifestations	Mothers with Severe preeclampsia and Eclampsia (n=37)	All Mothers with HDP (n=242)
Headache	31 (84%)	211 (88%)
Blurring of vision	19 (51%)	128 (54%)
Epigastric pain	34 (92%)	209 (87%)
Abruption placentae	20 (54%)	156 (65%)
Seizure and Loss of consciousness	3 (8%)	8 (3%)
AKI (cr $\geq$ 1.2 mg/dl)	32 (86%)	224 (94%)
Thrombocytopenia (plat $<$ $100 \times 10^3/\mu\text{L}$ )	31 (84%)	221 (92%)

AKI indicated high creatinine levels from 1.2 mg/dl in the last trimester of pregnancy. Higher values showed infections in the glomerulus tubules with less filtration efficiency in the loop of Henle. Thrombocytopenia (platelets level  $< 100 \times 10^3/\mu\text{L}$ ) was also reported very high in females suffering with hypertensive crisis.

## Discussion

The current research work is aimed to investigate the prevalence of hypertensive disorders and their impact on the health of maternal and fetus after pregnancy among 720 females participated from Swat Medical College and Women University Mardan, Pakistan. These observations highlight the maternal and perinatal outcomes with HDP and especially with preeclampsia and eclampsia during delivery of fetus.

In terms of the burden of maternal, fetal, and child mortality, Pakistan is now ranked third. A 2007 study found that among women admitted to a Pakistani tertiary care hospital for delivery, one-third of the deaths were due to eclampsia, a pregnancy-related condition [12-14]. Preeclampsia and eclampsia were the main causes of pregnancy-related hypertension disorders. According to a study in the American Journal of Obstetrics & Gynecology, hypertension diseases complicate between 4% and 6% of pregnancies [15]. Particularly in underdeveloped nations, these are the main causes of significant morbidity and mortality for both mother and child health.

Most of the females who participated in study were in the age between 25 to 32 years and the prevalence of HDP in this population was 88% with the high rate of preeclampsia and eclampsia accounting for significant portion of cases. There was a certain clinical manifestation which was associated with high blood pressure.

Headache was one of them and affecting more than 80% of the females during pregnancy. In, 2003 a study was reported as around 85% females suffered headache due to high blood pressure in all trimesters of pregnancy [17, 18]. Changes in eyesight blurred vision and epigastric pains were also reported in the previous studies and these results were aligned with the current work [19]. 65% females suffered abruption placenta and these placental complications also due to hypertensive crises and previously reported by the researchers in literature [20]. So, 64% of preterm deliveries were reported which were a leading cause of neonatal morbidity and mortality. These results were consistent with the reported data showing adverse fetal outcomes after delivery [21].

APGAR scores were also less in the first 5 minutes and cases reported were 65% with severe pre-eclampsia. So, these results showed that those neonates critically need resuscitation or neonatal intensive care right after birth according to the previously reported data [22, 23]. As the prevalence of heart related disorders was high in pregnancy, proper screening and timely diagnosis can reduce the risk of complications in regards of maternal and fetus health. Because the data was collected in specific regions, that's why the study lacks the generalization of findings. Also, the study was retrospective, so biasness also can play its role during observations. Furthermore, the study emphasizes the importance of public health initiatives to raise awareness about hypertensive disorders in pregnancy, particularly in rural and underdeveloped regions. Addressing these conditions through enhanced healthcare services and targeted educational campaigns can lead to better management and outcomes for both mothers and their babies [24, 25].

### Conclusions

The current study showed high frequency

of hypertension and heart related disorders during pregnancy, which can worsen pregnancy outcomes for both the mother and the fetus, especially when suffering with pre-eclampsia and eclampsia. The data indicated the higher incidence of maternal factors like cesarean deliveries, high clinical complications such as thrombocytopenia, acute kidney infections, epigastric pain and frequent complaints of headache. While in fetal adverse outcomes include premature births, low birth weight and dire need of neonatal intensive care or resuscitation.

An expansion of antenatal surveillance is necessary to enable early detection, strict follow-up, and prompt management in cases of seriously afflicted pregnancies, to prevent its deleterious consequences on both fetus and mother outcomes of pregnancy. This study emphasis the importance of public health initiatives to raise the awareness about high blood pressure before and during pregnancy particularly in rural and underdeveloped areas.

### References

1. Organization WH. Maternal mortality. 2019. Available from: <https://www.who.int/newsroom/factsheets/detail/maternal-mortality>
2. Sibai BM. Diagnosis and management of gestational hypertension and preeclampsia. *Obstet Gynecol.* 2003;102(1):181–192.
3. Duley L. The global impact of pre-eclampsia and eclampsia. *Semin Perinatol.* 2009;33(3):130–137.
4. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. *The lancet.* 2006 Apr 1;367(9516):1066-1074.
5. Program NH. Report of the national high blood pressure education program working group on high blood pressure in pregnancy. *American journal of*

- obstetrics and gynecology. 2000 Jul 1;183(1): s1-22.
6. Magee LA, Helewa M, Moutquin JM, von Dadelszen P, Hypertension Guideline Committee. Diagnosis, evaluation, and management of hypertensive disorders of pregnancy. *Journal of Obstetrics and Gynaecology Canada*. 2008;30(3 S 1): S1-48.
  7. Mou AD, Barman Z, Hasan M, Miah R, Hafsa JM, Das Trisha A, Ali N. Prevalence of preeclampsia and the associated risk factors among pregnant women in Bangladesh. *Sci Rep*. 2021 Oct 29;11(1):21339.
  8. Obstetricians ACo G. Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' task force on hypertension in pregnancy. *Obstet gynecol*. 2013;122(5):1122.
  9. Buchbinder A, Sibai BM, Caritis S, MacPherson C, Hauth J, Lindheimer MD, Klebanoff M, VanDorsten P, Landon M, Paul R, Miodovnik M. Adverse perinatal outcomes are significantly higher in severe gestational hypertension than in mild preeclampsia. *American journal of obstetrics and gynecology*. 2002 Jan 1;186(1):66-71.
  10. von Dadelszen P, Magee LA. Preeclampsia: an update. *Current hypertension reports*. 2014 Aug;16(8):454.
  11. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *The lancet*. 2008 Jan 5;371(9606):75-84.
  12. Hauth JC, Ewell MG, Levine RJ, Esterlitz JR, Sibai B, Curet LB, Catalano PM, Morris CD, Calcium for Preeclampsia Prevention Study Group. Pregnancy outcomes in healthy nulliparas who developed hypertension. *Obstetrics & Gynecology*. 2000 Jan 1;95(1):24-28.
  13. Lain KY, Roberts JM. Contemporary concepts of the pathogenesis and management of preeclampsia. *Jama*. 2002 Jun 26;287(24):3183-3186.
  14. Villar J, Betran AP, Gulmezoglu M. Epidemiological basis for the planning of maternal health services. *WHO/RHR*. 2001; 111:298-302.
  15. Malhan A, Hyder M, Baloch S, Roshan S, Dembra G, Arshad M. Frequency of Preeclampsia in Pregnant Women Presenting in A Tertiary Hospital: Frequency of Preeclampsia in Pregnant Women. *Pakistan Journal of Health Sciences*. 2023 Apr 30;04(4):30-33.
  16. Henderson JT, Thompson JH, Burda BU, Cantor A, Beil T, Whitlock EP. Evidence Tables and Additional Figures (Key Questions 1a, 3, 4a, and 5). In: *Screening for Preeclampsia: A Systematic Evidence Review for the US Preventive Services Task Force*. Apr. Agency for Healthcare Research and Quality (US). 2017.
  17. Lowe SA, Bowyer L, Lust K, McMahon LP, Morton M, North RA, Paech M, Said JM. SOMANZ guidelines for the management of hypertensive disorders of pregnancy 2014. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2015 Oct;55(5): e1-29.
  18. Steegers EA, Von Dadelszen P, Duvekot JJ, Pijnenborg R. Preeclampsia. *The lancet*. 2010 Aug 21;376(9741):631-644.
  19. Pakistan Demographic and Health Survey 2017-18. National Institute of Population Studies. 2019.
  20. Roberts JM, Redman CW. Preeclampsia: more than pregnancy-induced hypertension. *The Lancet*. 1993;341(8858):1447-1451.
  21. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. *The Lancet global health*. 2014;2(6): e323-333.
  22. Dekker G, Sibai B. Primary, secondary, and tertiary prevention of

- pre-eclampsia. *The lancet*. 2001 Jan 20;357(9251):209-215.
23. Caritis S, Sibai B, Hauth J, Lindheimer M, VanDorsten P, Klebanoff M, Thom E, Landon M, Paul R, Miodovnik M, Meis P. Predictors of pre-eclampsia in women at high risk. *American journal of obstetrics and gynecology*. 1998; 179(4):946-951.
24. World Health Organization. WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia. World Health Organization; 2011.
25. MacKay AP, Berg CJ, Liu X, Duran C, Hoyert DL. Changes in pregnancy mortality ascertainment: United States, 1999–2005. *Obstetrics & Gynecology*. 2011 Jul 1;118(1):104-110.