

Prevalence of Pregnancy-Induced Hypertension and Pregnancy Outcomes

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ABSTRACT

Background: The most frequent medical comorbidity during pregnancy is hypertension, rendering an elevated menace of unfavorable outcomes for equally mother and infant. It is a substantial public health concern, characterized by eclampsia, chronic hypertension, and preeclampsia.

Objectives: The study determined occurrence of pregnancy-induced hypertension (PIH) and pregnancy outcomes, in the locality of Pakistan.

Methods: The cross-sectional research appraised 05 districts of Pakistan in 2021-22. The study comprised 1920 patients affected with PIH. The demographic characteristics, laboratory and clinical values and pregnancy outcomes were recorded on the approved questionnaire.

Results: Prevalence of PIH in pregnant females in study area was recorded as 13.70%. A significant proportion of PIH-affected females had genetic predisposition (51.14%), followed by abortion history (15.52%), history of hormonal imbalance (9.94%), history of Cesarean section (7.50%) and history of stillbirth (0.88%). Pregnancy outcome revealed that 16 (0.833%) women died of the PIH, 31 suffered from renal failure, 36 from pulmonary edema, 4.06% were affected with abruptio placentae and 103 suffered from HELLP syndrome. Similarly, the neonatal complications revealed that 27 fetuses died to mothers' PIH, 111 suffered from asphyxia (5.78%) at the time of birth and 13 infants were abnormal and had different congenital anomalies.

Practical implication: It emphasized the need for improved prenatal care, early detection of pregnancy-induced hypertension, and meticulous management of the condition in order to improve maternal and neonatal outcomes, especially in high prevalence regions such as Pakistan.

Conclusion: The frequency of PIH in Pakistan was high (13.70%) and women had a greater risk of adverse pregnancy outcomes. With good prenatal care and continuous monitoring of the mother and fetus, perinatal outcomes including maternal morbidity and infant mortality can be avoided.

Keywords: Asphyxia; Hypertension; Neonatal mortality; Perinatal outcomes.

INTRODUCTION

Pregnancy-induced hypertension (PIH) is de novo hypertension arising at 20 weeks or more gestational stage of pregnancy that may or may not induce proteinuria¹. The main frequent health comorbidity in pregnancy is hypertension. Such problems during pregnancy are linked to elevated hazard of unconstructive outcomes equally to mother and infant. Hypertension is described as persistent systolic BP over 140 mmHg or diastolic BP 90 mmHg². It is also known as toxemia which develops after 20 weeks of pregnancy. 5–10% of all pregnancies are influenced by PIH, universally, which is a leading causes of death and morbidity. It is extensive communal health concern and is illustrated by eclampsia (2.73%), preeclampsia (2.16%) and chronic hypertension (0.28%). Women with PIH have a five times greater risk of perinatal death compared to those without this ailment³. 2–8% of pregnancies in Western world are intricated by PIH, while in meager developing nations, PIH prevalence is hiked to 16.7%^{1,4}.

Gestational hypertension is a serious pregnancy complication linked with preterm birth, abrupted placentae, intrauterine growth retardation, intrauterine death, maternal morbidity or mortality and stillbirth. Neonatal mortality is rendered leading to preterm birth, neonatal sepsis and birth asphyxia. Preterm delivery problems account for 39% of all newborn fatalities⁵. Primary risk factors for PIH are: family predisposition, primigravida, obesity (BMI > 30), placental anomalies, maternal age, hormonal imbalance, history of hypertension and vascular disorders⁶⁻⁷.

Women with PIH have a greater risk of long-term hypertension, chronic renal failure and coronary artery disease, whereas a fetus born to her is likely to develop hypertension, heart disease, diabetes mellitus and renal anomalies later in life. The predicted probability of PIH recurrence in a subsequent pregnancy is 55% if delivery occurs before 28 weeks of gestation and 25% if it occurs prior to 34 weeks of conception. These long-term effects of hypertension in pregnancy are therefore a significant public health

concern since they can affect the health and well-being of both mother and child for the duration of their lives and impose a substantial healthcare economic burden. The incidence is predicted to grow as mean age of pregnant lady and proportion of obesity inclined⁸⁻¹⁰.

In Pakistan, the frequency of PIH was reported to be 15%, encompassing two relatively benign disorders (chronic and gestational hypertension) leading to intense maternal and fetal complications like stern hypertension, stroke and seizures, that impact vital maternal organs i.e. kidneys and liver, hemorrhages, intrauterine fetal growth retardation, maternal and fetal death¹¹.

So far little data was observed pertaining to PIH prevalence and its clinical outcomes in Pakistan; therefore, this study was carried out to determine the prevalence of PIH and pregnancy outcomes due to it, in the locality of Pakistan.

MATERIAL AND METHODS

Study location and period: We did a descriptive cross-sectional study for determining prevalence of PIH among hospitalized and outpatient pregnant women at tertiary care hospitals and maternity centers in Lahore, Faisalabad, Multan, Rawalpindi and Sargodha, between November 2021 and 2022.

Sample size estimation: The sample size was estimated through equation $n = 1.96^2 P_{exp} (1 - P_{exp}) / d^2$, by maintaining 50% predicted prevalence with 95% Confidence interval limitations and a 5% absolute precision¹². Using this equation, sample size per district was calculated to be 384 and with 1920 total pregnant women with PIH was included in this research.

Study design: Based on hypertension with systolic (140mm of Hg) and diastolic (90mm of Hg) blood pressures and the presence of anemia, edema, sudden weight gain, vertigo, oliguria and insomnia, the data on PIH was retrieved and the patients were classified as per criteria of Ahsan et al. based on PIH without proteinuria with normotensive pre-pregnancy level, or a parallel group of severe hypertensive disorder with eclampsia and pre-

eclampsia ¹¹. On the approved questionnaire form, all pertinent demographic data, laboratory and clinical findings, patient and neonatal outcomes, etc were gathered from the enrolled patients who met the inclusion criteria designed for research.

Inclusion and exclusion criteria: Women with PIH were enrolled in research by assessing their blood pressure levels and proteinuria. Those diagnosed with PIH during data-collecting period in specified prenatal care clinics were registered as exposed participants, while women without PIH during same period were enrolled as non-exposed individuals. At the time of enrollment, pregnant women with chronic hypertension, critically ill, non-willing and those pregnant women planning to abort were excluded from this study.

Ethical approval: Research and Ethics Review Board was granted and clearance for ethical standards was ensured. Pre-informed consent in writing was secured from the participants and Incharge of each health center.

Statistical analysis: Using IBM SPSS (version 24) and JMP (version 9), collected data on the questionnaire were analyzed. Frequencies and descriptive statistics were utilized to demonstrate the prevalence of exposure. We maintained 95% Confidence Intervals to investigate correlations between diagnostic values, risk variables and clinical outcomes. Pearson's Chi-squared test for independence was utilized to analyze proportional differences and multiple treatment groups were analyzed using ANOVA test.

RESULTS

A cross-sectional study was executed for determining PIH prevalence among hospitalized and outpatient pregnant women at tertiary care hospitals and maternity centers in Pakistan and their pregnancy outcomes. A total of 14014 pregnant women were presented at hospitals of different areas, out of which 1920 were diagnosed with PIH, with a prevalence of 13.70% and were enrolled in the study after obtaining their willful consent, who fulfilled the study's inclusion criteria. The demographic characteristics recorded on the approved questionnaire revealed that most of the participating women ($p < 0.05$) belonged to the age group >30 years (69.89%) and 30.10% PIH affected women were below 30 years of age. The height and weight of all the participants were measured to calculate their BMI and it was evident from the findings that the majority of the hypertensive women had abnormal or elevated BMI of >25 (80.26%), which was the significant ($p < 0.05$) and potential risk factor for PIH. Their pregnancy patterns were also evaluated and it was found that a significant proportion of the females ($p < 0.05$) belonged to the class multigravida (73.91%) and 26.09% were pregnant for the first time (primigravida). Only 13.07% of participants were employed professionals and most of the patients were housewives (86.92%). However, the patients had a higher literacy level of 74.58%. A large portion of the study population ($p < 0.05$) was presented at the clinics for their health complications 82.28% (1599/1920), while 16.72% of patients were critically ill and were admitted to the hospitals (Table 1).

The details of the obstetric history of the participating women were also recorded on the questionnaire and it was found that a significant proportion of the PIH females had genetic predisposition (51.14%), followed by abortion history (15.52%), history of hormonal imbalance (9.94%), history of Cesarean section (7.50%) and history of stillbirth (0.88%) (Figure 1). The recorded clinical manifestations of the study group revealed that most of the patients exhibited sudden weight gain (71.7%), experienced cephalalgia (41.7%), blurred vision (19.8%), epistaxis (12.7%), insomnia (11.7%), vertigo (9.4%), etc (Figure 2). The pregnancy outcome of the PIH affected pregnant women were studied pertaining to the distribution frequency of maternal and fetal complications due to PIH and it was found that sixteen out of 1920 (0.833%) women died of PIH, 31 suffered from renal failure, 36 from pulmonary edema, 4.06% were affected with abruptio placentae and 103 suffered from HELLP syndrome. Similarly, the neonatal complications revealed that 27 fetuses died to mothers'

PIH, 111 suffered from asphyxia (5.78%) at the time of birth and 13 infants were abnormal and had different congenital anomalies (Table 2).

Table 1: Demographic features of PIH-affected women enrolled in the study

S. No	Demographic feature	No. of patients (n)	Frequency (%)
1	Age <30 years >30 years	578 1342	30.10 69.89
2	BMI <24.9 >25	379 1541	19.73 80.26
3	Pregnancy Primigravida Multigravida	501 1419	26.09 73.91
4	Occupation Employed Housewife	251 1669	13.07 86.92
5	Education Literate Illiterate	1432 488	74.58 25.41
6	Patient's presentation Hospitalized Outpatient	321 1599	16.72 83.28

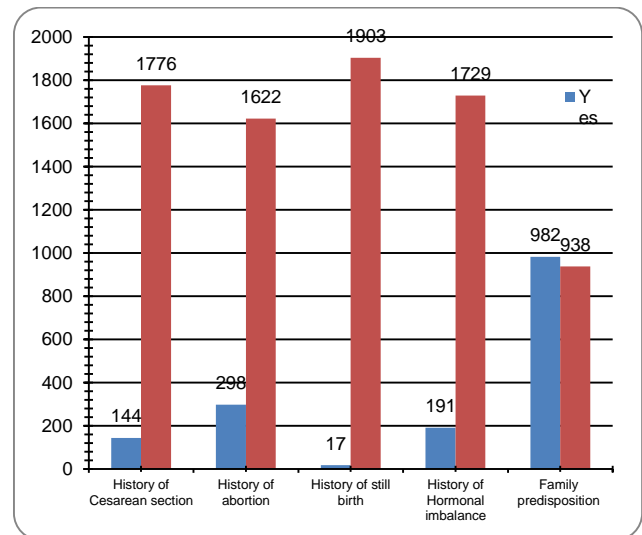


Figure 1: Details of the obstetric history of the participating women

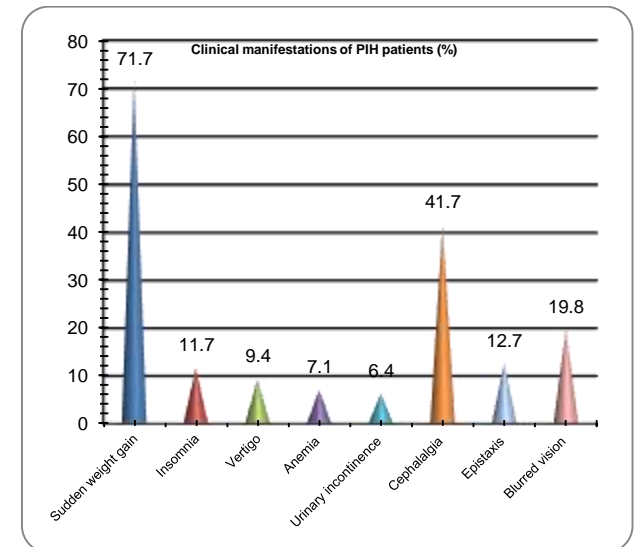


Figure 2: Clinical manifestations of the PIH affected women

Table 2: Distribution frequency of maternal and fetal complications due to PIH

Maternal complications				
S. No	Variable	Number of women (n)	Frequency (%)	p-values
1	Mothers death	16	0.833	0.00001* (significant at p<0.05)
2	Renal failure	31	1.61	
3	Pulmonary edema	36	1.87	
4	Abuptio placentae	78	4.06	
5	HELLP syndrome	103	5.36	
Fetal/neonatal complications				
1	Fetal death	27	1.40	0.00001* (significant at p<0.05)
2	Asphyxia	111	5.78	
3	Congenital anomalies	13	0.67	

DISCUSSION

Our findings revealed a 13.70% prevalence rate of PIH in pregnant women. Our findings were consistent with the studies that reported an 11.5% prevalence rate of PIH in public health facilities in Addis Ababa³. The results were comparable to the research conducted in Dessie, Ethiopia (8.8%), Jimma, Ethiopia (10.3%), Metu, Ethiopia (12.4%) and Tamil Nadu, India (10%). It was slightly higher than global prevalence of PIH (5–8%)¹³⁻¹⁶. The study also supported our findings and further identified a strong correlation between PIH and mother age. Compared to responders aged 30 or younger, individuals aged 31 or older were three times as likely to have PIH³. Our findings supported the study in which 10.75% of the PIH prevalence among pregnant women was discovered⁷. In the studies undertaken in Brazil and South Africa, the prevalence of PIH was found to be 13.9% and 12%, respectively¹⁷. Contrary to our results, a study reported a very low prevalence of PIH of 2.06%¹¹. This might be because a high number of participating women with persistent hypertension and postpartum eclampsias were excluded from our study¹⁸. In Zimbabwe, a prevalence of 19.4% of PIH was recorded in the case of pregnant women⁵.

The significant risk factors for PIH were family predisposition, history of abortion, Cesarean, stillbirth and hormonal imbalance. Sudden weight gain, insomnia, blurred vision, anemia, urinary incontinence, cephalgia, etc were the prominent clinical manifestations of the affected patients. Our results coincided with the study which indicated that those with a family history of chronic hypertension and PIH had a 3-4 times greater risk of developing PIH³. Our findings were justified with the study indicating the need to consider modifiable risk factors, as they are strongly connected with the development of PIH. Research conducted in two Irish maternity clinics revealed that 19 and 25% of women were obese on their initial prenatal visits. One large maternity hospital's annual report attributed the increase in the incidence of women diagnosed with GDM since 2014, in part to the introduction of International Association of Diabetes in Pregnancy Study Group's (IADPSG) new diagnostic thresholds, to the hospital's population's continued increase in obesity rates⁸.

The pregnancy outcomes were studied based on maternal and fetal complications. Compared to normotensive pregnant women, women with PIH had a greater risk of unfavorable perinatal outcomes such as birth asphyxia, preterm delivery, small for gestational age, stillbirth, low birth weight, perinatal mortality, and admission to the NICU. Annually, complications from preterm birth and low birth weight cause about one million child fatalities worldwide. Hence, preventing and managing PIH should become a top focus¹.

CONCLUSION

The frequency of PIH in Pakistan was high (13.70%). Women with PIH had a greater risk of negative pregnancy outcomes than those without the condition. Inadequate knowledge of the management

of PIH and inadequate resources are a threat to the proper management of PIH. With good prenatal care and continuous monitoring of the mother and fetus, perinatal outcomes including maternal morbidity and infant mortality can be avoided. PIH risk factors included maternal age, diabetic history, obstetric history, hormonal imbalance and family history.

Conflict of Interest: None

REFERENCES

- Berhe AK, Ilesanmi AO, Aimakhu CO, Mulugeta A. Effect of pregnancy induced hypertension on adverse perinatal outcomes in Tigray regional state, Ethiopia: A prospective cohort study. *BMC Preg Child Birth*. 2020;20:7.
- Bello NA, Zhuo H, Cheatham TC, Miller E, Getahun D, Fassett MJ, Reynolds K. Prevalence of hypertension among pregnantwomen when using the 2017 American College of Cardiology/American Heart Association Blood Pressure Guidelines and Association With Maternal and Fetal Outcomes. *Cardio*. 2021;4(3):e213808.
- Getahun GK, Benti Y, Woldekidan F, Shitemaw T, Negash Z. Prevalence of pregnancy-induced hypertension and associated factors among women receiving antenatal care in Addis Ababa, Ethiopia, 2022. *Biomed J Sci Tech Res*. 2023;48(1):007587.
- North RA, McCowan LM, Dekker GA, Poston L, Chan EH, Stewart AW. Clinical risk prediction for pre-eclampsia in nulliparous women: development of model in international prospective cohort. *BMJ*. 2011;342:d1875.
- Muti M, Tshimanga M, Notion GT, Bangure D, Chonzi P. Prevalence of pregnancy induced hypertension and pregnancy outcomes among women seeking maternity services in Harare, Zimbabwe. *BMC Cardiovasc Dis*. 2015;15:111.
- Parmer MT, Solanki HM, Gosalia VV. Study of risk factors of perinatal death in pregnancy-induced hypertension. *Natl J Community Med* 2012;3:4.
- John S, Vanitha M, Babu A, Sushma P, Regina AE. Prevalence of Pregnancy-Induced Hypertension and Its High-Risk Factors among the Antenatal Women. *J Heal Allied Sci*. 2021;11:154-157.
- Corrigan L, O'Farrell A, Moran P, Daly D. Hypertension in pregnancy: Prevalence, risk factors and outcomes for women birthing in Ireland. *Int J Women Cardiovasc Heal*. 2021;24:1-6.
- Shen M, Smith GN, Rodger M, White RR, Walker MC, Wen SW. Comparison of risk factors and outcomes of gestational hypertension and pre-eclampsia. *PLoS one*. 2017;12(4):e0175914.
- Ying W, Catov JM, Ouyang P. Hypertensive disorders of pregnancy and future maternal cardiovascular risk. *J Am Heart Assoc*. 2018;7(17):e009382.
- Ahsan N, Naheed F, Shiekh F. Hypertensive Disorders of Pregnancy and Its Associated Fetomaternal Complications. *J Surg Pak*. 2019;24(4):176-180.
- Khan A, Ashfaq K, Din I, Haq R, Jamil M, Ullah B, Ullah S, Rehman H, Ullah F. Bovine Theileriosis: Prevalence, Estimation of Hematological Profile and Chemotherapy in Cattle in Dera Ismail Khan, Khyber Pakhtunkhwa Province, Pakistan. *Am Sci Res J Eng Tech Sci*. 2017;32(1):8-17.
- Wodajo S. Hypertensive disorders of pregnancy and associated factors among admitted pregnant cases in Dessie town referral hospital, northeast Ethiopia, 2015. *Medico Res Chronicles*. 2016; 3(03):297-306.
- Haque MM, Sarkar NC. Risk Factors of Gestational Hypertension-Preeclampsia in Pregnant Women Patients Aged within 20-35 Years with Feto maternal Outcome & Its Perioperative Management: A Study in Shaheed Ziaur Rahman Medical College Hospital, Bogra, Bangladesh. *Glob Acad J Med Sci*. 2021;3.
- Belay AS, Wudad T. Prevalence and associated factors of pre-eclampsia among pregnant women attending anti-natal care at Mettu Karl referral hospital, Ethiopia: cross-sectional study. *Clin Hypertension*. 2019;25(1):1-8.
- Sengodan SS, Sreepathi N. Prevalence of hypertensive disorders of pregnancy and its maternal outcome in a tertiary care hospital, Salem, Tamil Nadu, India. *Int J Reprod Contracep and Gynecol*. 2020;9(1):236-240.
- Randhawa AK, Singh A, Kaboor S. Pregnancy Induced Hypertension: a retrospective study of 200 cases of pregnant women. *J IOSR JDMS*. 2016;15(6):36-43.
- 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 Heal Sci*. 2011;5:12-6