

ORIGINAL ARTICLE

**PREGNANCY INDUCED HYPERTENSION IN WOMEN WITH TWIN
PREGNANCY**

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ABSTRACT

Objective: To determine the frequency of Pregnancy-Induced Hypertension (PIH) and identify associated risk factors in women presenting with twin pregnancies. **Methodology:** A descriptive, cross-sectional study was conducted at the Dept. of Obstetrics & Gynecology (OBGYN), Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro/Hyderabad. Data were collected from eligible participants using a structured proforma. Recorded variables included maternal demographics, booking status, obstetric history, mode of conception, chorionicity, and pre-existing maternal risk factors (such as obesity, anemia, and diabetes). Blood pressure was monitored to establish the presence and severity of PIH. Statistical analysis included descriptive statistics, bivariate analysis (Pearson Chi-square), and multivariate logistic regression to control for confounders. **Results:** The overall frequency of PIH among women with twin pregnancies was 26.0% (95% CI: 19.5% – 33.6%). Among the affected patients, gestational hypertension was the most common presentation (46.1%), followed by preeclampsia (35.9%), severe preeclampsia (12.8%), and eclampsia (5.1%). Multivariate logistic regression identified maternal obesity (aOR 2.45, 95% CI: 1.21 – 4.96, $p = 0.011$) and an unbooked antenatal care status (aOR 2.10, 95% CI: 1.05 – 4.20, $p = 0.036$) as significant independent predictors for the development of PIH in this cohort. While monochorionic diamniotic (MCDA) chorionicity showed a significant association in bivariate analysis, it did not remain an independent predictor in the adjusted model ($p = 0.085$). **Conclusion:** PIH is a frequent complication in twin pregnancies managed at this tertiary care center, predominantly presenting as gestational hypertension and preeclampsia. Maternal obesity and a lack of booked antenatal care are major, modifiable risk factors. These findings highlight the critical need for intensive, early antenatal surveillance protocols and improved community-based healthcare access to mitigate maternal morbidity. **Keywords:** Pregnancy-Induced Hypertension, Twin Pregnancy, Preeclampsia, Maternal Obesity, Antenatal Care, Chronicity.

INTRODUCTION

Twin pregnancies are associated with a greater amount of risks related to both mothers and babies when compared to those who carry singletons. [1] The most dangerous complications related to twin pregnancies are related to the hypertensive disorder of pregnancy (HDP) — particularly pregnancy-induced hypertension (PIH). These complications lead to significant amounts of maternal and newborn morbidity and mortality world-wide. [2] Published evidence suggests that the incidence of PIH is about twice or thrice in multifetal gestations than it is in singletons; this may be due to the fact that multifetal gestations tend to have larger placentas and therefore contain higher levels of circulating anti-vascular endothelial growth factor (VEGF) proteins. [3]

There are many ways that maternal factors, including chorionicity (whether the pregnancy is dichorionic or monochorionic) and preexisting maternal risk factors (e.g., advanced maternal age, obesity, anemia, and/or the use of assisted reproductive technology) can affect the timing and severity of PIH in twin pregnancies. [4] It has also been determined that the presence of preexisting maternal risk factors increases the likelihood of experiencing a hypertensive disorder during pregnancy in addition to increasing the severity of said disorders. [5]

The effects of PIH on pregnant women living in developing countries are exacerbated by other socioeconomic and health-related issues including limited access to prenatal care, poor nutrition, and variable antenatal booking status [6]. As a result, tertiary care hospitals like the Department of OBGYN at Liaquat University Hospital in Hyderabad often become the first point-of-contact for high-risk patients. Women

from all geographic regions (urban to rural) present themselves at these institutions, which affects their overall clinical picture, and subsequently, the degree to which they develop complications such as preeclampsia or eclampsia [7].

Although researchers have documented many risks associated with having a multiple gestation pregnancy, additional studies are necessary in order to assess how changes in demographics will continue to affect the prevalence of hypertensive disorders in our area. Understanding the frequency and contributing risk factors involved in PIH among twin pregnancies will help to create better early detection methods, improve resource utilization, and provide improved specialized maternal-fetal care to individuals in our community [8].

OBJECTIVES

- **Primary Objective:** To determine the frequency of Pregnancy-Induced Hypertension (PIH) in women presenting with twin pregnancies at a tertiary care hospital.

- **Secondary Objectives:**

- To categorize the severity of hypertensive disorders (Gestational hypertension, Preeclampsia, Severe preeclampsia, and Eclampsia) among the affected study population .

- To assess the distribution of maternal risk factors, obstetric history, and chorionicity (e.g., monochorionic vs. dichorionic) in relation to the development of PIH .

MATERIALS AND METHODS

Study Design and Setting: This descriptive, cross-sectional study is conducted at the Dept. of OBGYN at LUMHS.

Study Variables and Clinical Assessment:

- **Demographic Details:** Maternal age (in years), gestational age at presentation (in weeks), residential background (Urban or Rural), and booking status at the facility (Booked or Unbooked) .
- **Obstetric History:** Gravidity, parity, and the mode of conception, categorized as either spontaneous or assisted .
- **Twin Pregnancy Details:** A critical variable is chorionicity, which is documented via ultrasound findings and classified into three distinct categories: Dichorionic diamniotic, Monochorionic diamniotic, or Monochorionic monoamniotic .
- **Maternal Risk Factors:** The presence or absence of co-morbidities and historical risk factors are recorded, including Diabetes mellitus, Obesity, Anemia, maternal smoking status (Yes/No/Ex-smoker), and any family history of twin pregnancies .
- **Outcome Measures (Blood Pressure and PIH Status):** Blood pressure records are maintained by documenting the systolic and

diastolic BP in mmHg . Based on these readings and clinical evaluation, the presence of Pregnancy-Induced Hypertension (PIH) is established (Yes/No). If PIH is confirmed, it is further sub-classified into specific types:

- Gestational hypertension.
- Preeclampsia.
- Severe preeclampsia.
- Eclampsia.

Data Collection Procedure: Data is collected from eligible patients using a pre-designed, structured proforma. Written informed consent was obtained from all participants prior to their enrollment in the study, as mandated by the REC approval.

Data Analysis: Data were entered and analyzed using the SPSS v.26.0. The analysis was conducted in three phases:

- **Descriptive Statistics:** Continuous variables, such as maternal age , gestational age , and systolic/diastolic blood pressure, were assessed for normality using the Shapiro-Wilk test. Normally distributed data were expressed as Mean $\pm$ Standard Deviation (SD), while skewed data were reported as Median with Interquartile Range (IQR).
 - Categorical variables were summarized using frequencies and percentages. The primary outcomes were calculated as a percentage with a 95% Confidence Interval (CI).

- **Inferential Statistics (Bivariate Analysis):** To determine the association between categorical risk factors (e.g., chorionicity, obesity, diabetes, mode of conception) and the development of PIH, the **Pearson Chi-square test** were utilized.

- To compare continuous variables between patients who developed PIH and those who did not (e.g., comparing mean maternal age between the two groups), an **Independent samples t-test**.

- **Multivariate Analysis (Regression Modeling):** Variables demonstrating a statistically significant association with PIH in the bivariate analysis were included in a **Multivariate Logistic Regression model**. Thereby controlling potential confounders (like maternal age and parity) and identifying independent predictors of PIH in twin pregnancies. Results were presented as adjusted Odds Ratios (aOR) with 95% CIs.

A two-tailed p-value of < 0.05 was considered statistically significant for all analyses.

Ethical Approvals Strict ethical guidelines were followed prior to the commencement of data collection:

- The research protocol and consent forms were reviewed and officially approved by the Research Ethics Committee (REC) at LUMHS (Approval No. LUMHS/REC/-864, dated July 3, 2025).
- The study synopsis was concurrently evaluated and approved by the Research Evaluation Unit of the College of Physicians and Surgeons Pakistan (CPSP Ref No:

CPSP/REU/OBG-2024-164-13233, dated February 22, 2025).

RESULTS

Descriptive Statistics: Baseline and Clinical Characteristics

A cohort of women with twin pregnancies was included in the study. The continuous variables were assessed for normality; maternal age and gestational age at presentation demonstrated normal distribution and were recorded as a mean of 28.4 ± 4.2 years and 34.1 ± 2.8 weeks, respectively. Gravidity and parity data were skewed and reported as a median of 2 (IQR: 1–3) and 1 (IQR: 0–2).

The majority of the study population resided in urban areas (68.0%) and presented as booked cases (76.0%). Spontaneous conception was recorded in 82.0% of the cohort, while 18.0% conceived via assisted reproductive technologies. Ultrasound evaluation of chorionicity revealed that 65.3% of pregnancies were dichorionic diamniotic, 28.0% were monochorionic diamniotic, and 6.7% were monochorionic monoamniotic. Pre-existing maternal risk factors included anemia (42.0%), obesity (24.0%), a family history of twins (14.6%), and diabetes mellitus (12.0%). Maternal smoking (current or ex-smoker) was present in 4.0% of the participants.

Table 1: Baseline Demographics, Obstetric History, and Risk Factors

Variable		Descriptive Statistic
Maternal Age (years)		28.4 ± 4.2 (<i>Mean ± SD</i>)
Gestational Age (weeks)		34.1 ± 2.8 (<i>Mean ± SD</i>)
Gravidity		2 (1–3) (<i>Median, IQR</i>)
Parity		1 (0–2) (<i>Median, IQR</i>)
Residence	Urban	68.0%
	Rural	32.0%
Booking Status	Booked	76.0%
	Unbooked	24.0%
Mode of Conception	Spontaneous	82.0%
	Assisted	18.0%
Chorionicity	Dichorionic diamniotic	65.3%
	Monochorionic diamniotic	28.0%
	Monochorionic monoamniotic	6.7%
Maternal Risk Factors	Anemia	42.0%
	Obesity	24.0%
	Diabetes Mellitus	12.0%

Primary and Secondary Objectives

Frequency and Severity of PIH: The primary outcome, the overall frequency of PIH among women with twin pregnancies, was 26.0% (95% CI: 19.5% – 33.6%). Among those who

developed PIH, the mean systolic blood pressure was 152.4 ± 14.2 mmHg, and the mean diastolic blood pressure was 98.6 ± 10.1 mmHg. Categorization of the hypertensive disorders (Secondary Objective) revealed that the most frequent presentation was Gestational hypertension (46.1%), followed by Preeclampsia

(35.9%), Severe preeclampsia (12.8%), and Eclampsia (5.1%) .

predictor in the adjusted model (aOR 1.85, 95% CI: 0.92 – 3.75, $p = 0.085$).

Inferential Statistics: Bivariate Analysis

An Independent samples t-test revealed no significant difference in mean maternal age between patients who developed PIH (29.1 ± 4.5 years) and those who did not (28.1 ± 4.0 years) ($p = 0.184$). Pearson Chi-square analysis demonstrated that the development of PIH was significantly associated with an unbooked status ($p = 0.012$), the presence of maternal obesity ($p = 0.008$), and monochorionic diamniotic (MCDA) chorionicity ($p = 0.024$). Mode of conception and diabetes mellitus did not show a statistically significant association in this cohort ($p = 0.215$ and $p = 0.142$, respectively).

Table 2: Frequency and Stratification of Pregnancy-Induced Hypertension

Outcome Measure	Percentage (%)
Overall PIH Frequency	26.0%
Severity of PIH	(% within PIH)
Gestational Hypertension	46.1%
Preeclampsia	35.9%
Severe Preeclampsia	12.8%
Eclampsia	5.1%

DISCUSSION

This study was undertaken to assess how frequently Pregnancy-Induced Hypertension (PIH) occurs in women who have a twin pregnancy, and what risk factors contribute to it in relation to a large number of women who present to a tertiary-level hospital in Sindh, Pakistan. It is evident from the findings that there is a very high incidence of hypertensive disorders in these women, therefore, a necessity exists for such women to be placed under close supervision at their antenatal appointments.

We found the frequency of PIH in the total sample population we studied to be 26.0%, i.e., almost

Multivariate Analysis (Regression Modeling)

Variables demonstrating a statistically significant association ($p < 0.05$) in the bivariate analysis (booking status, obesity, and chorionicity) were included in a Multivariate Logistic Regression model to control for potential confounders. The model identified maternal obesity (aOR 2.45, 95% CI: 1.21 – 4.96, $p = 0.011$) and unbooked status (aOR 2.10, 95% CI: 1.05 – 4.20, $p = 0.036$) as independent predictors for the development of PIH in twin pregnancies. Monochorionic diamniotic chorionicity showed a trend toward significance but did not remain an independent

one-quarter of all pregnant women having a multiple birth will develop some degree of hypertension. These findings support previous reports from numerous sources internationally indicating that multiple births are substantially more susceptible to developing preeclampsia than singleton pregnancies [9-11] because of larger placenta masses; greater degrees of relative placental ischemia and a heightened state of inflammation within the mother's circulation system [4, 9]. Our reported frequencies are also consistent with earlier hospital-based studies conducted in other high-volume tertiary care hospitals in Pakistan and across the wider South Asia region [12-14], where these figures are typically reported as being between 20% and 30% due to the fact that many high-risk cases are referred to these centers from more rural locations surrounding Hyderabad and Jamshoro [7, 15].

In terms of the types of hypertensive complications experienced by our patients, Gestational Hypertension and Preeclampsia were identified as the two most prevalent forms. Severe features (Severe Preeclampsia or Eclampsia) were found to exist in almost 18.0% of hypertensive patients. We believe that this somewhat higher percentage of severe disease reflects the tertiary level nature of the hospital at which we carried out this investigation since it attracts a large volume of complicated cases and late referrals from more remote areas surrounding Hyderabad and Jamshoro [7, 15].

One of our most important findings derived from the statistical analyses that we used to evaluate multiple risk factors was the existence of an independent relationship between an individual's 'unbooked' status and their likelihood of experiencing PIH. At LUH, individuals who do

not present themselves until they are booked-in for delivery usually represent individuals who are less able to afford health-care; individuals from lower socio-economic backgrounds; or those whose first contact with health services occur late in pregnancy – after the onset of symptoms. Thus, such individuals inevitably miss the opportunity to undergo baseline assessments of blood pressure throughout pregnancy; thus missing-out on the opportunity for early detection of increasing trends; and potentially missing-out on preventive measures like low dose aspirin, which is widely-recommended by international bodies such as FIGO and ACOG for high-risk multifetal pregnancies [16-20]. Therefore, we consider that this represents a serious systemic barrier to effective antenatal care within our region.

Obesity was also identified as an additional independent predictor of PIH in agreement with an overwhelming amount of evidence from various countries that links an elevated Body Mass Index with impaired function of endothelium and metabolic syndrome in pregnancy [5, 11]; thus, suggesting that pre-pregnancy counseling and aggressive nutritional/weight management through early antenatal clinic attendance are essential elements of managing pregnant women carrying twins within our population [8].

Our bivariate analysis suggested a slightly higher incidence of PIH in monochorionic diamniotic (MCDA) pregnancies compared to dichorionic pregnancies, supporting theories of different vascular pathologies associated with monochorionic placentas [3, 20]. Nevertheless, this association failed to achieve statistical significance in our multivariate model while adjusting for possible confounding variables

including obesity and booking status. Although some studies identify monochorionicity as an independent risk factor for preeclampsia [4], whereas others produce conflicting evidence that may indicate that this association could be influenced by intervening variables [4, 12]; therefore, further research may be necessary to define this relationship clearly within our regional population.

Although we view the principal strengths of this investigation as reflecting the tertiary care environment of LUH that provides a representative picture of the burdens faced by complicated twin pregnancies within our region; additionally, utilizing standardized diagnostic criteria combined with thorough data collection using well-established clinical protocols enhance internal validity. Nevertheless, we acknowledge several limitations in this investigation. Due to its cross-sectional design, this investigation can demonstrate associations rather than cause-effect relationships. Because this is a single-site investigation, our findings may not represent the full spectrum of twin pregnancies within our community where fewer high-risk twin pregnancies may receive medical attention.

CONCLUSION

Pregnancy-Induced Hypertension is a highly frequent complication, affecting more than a quarter of women with twin pregnancies managed at this tertiary care facility. Gestational hypertension and preeclampsia are the predominant clinical presentations. This study identifies a lack of booked antenatal care and maternal obesity as significant, independent, and

modifiable risk factors contributing to this burden in our local setting.

These findings dictate the necessity for mandatory, intensive surveillance protocols for all twin pregnancies, characterized by early booking, more frequent blood pressure monitoring, and proteinuria checks. Furthermore, there is an urgent need to strengthen community-based antenatal care networks around Hyderabad to encourage early referral, allowing for timely risk stratification and the initiation of prophylactic interventions to mitigate the maternal morbidity associated with hypertensive disorders.

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