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Original Article

Frequency and Pattern of Hypertension in Pregnancy in a Tertiary Care Hospital

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ABSTRACT

Background: Hypertensive disorders of pregnancy are major contributors to maternal and perinatal morbidity and mortality, particularly in tertiary care settings where women often present with more advanced or complicated disease. Understanding the relative frequency of different hypertension subtypes during pregnancy may support earlier recognition and improved clinical management. Objective: To determine the frequency and pattern of hypertension in pregnancy among women presenting to a tertiary care hospital in Quetta. Methods: This cross-sectional observational study was conducted in the Department of Cardiology, Bolan Medical College/Hospital, Quetta, from 12 July 2025 to 31 December 2025. A total of 81 pregnant women aged 20 to 40 years with hypertension during pregnancy were included. Clinical and demographic variables were recorded, and hypertensive disorders were classified as gestational hypertension, chronic hypertension, pre-eclampsia, or eclampsia. Data were analyzed using IBM SPSS version 23, with frequencies, percentages, means, standard deviations, and chi-square testing used where appropriate. Results: The mean age of the participants was 29.68 ± 10.24 years. Pre-eclampsia was the most frequent hypertensive disorder, affecting 30 women (37.0%), followed by chronic hypertension in 25 (30.9%), eclampsia in 19 (23.5%), and gestational hypertension in 7 (8.6%). Most women had parity of 2 or less (77.8%) and gestational age greater than 28 weeks (70.4%). Stratified analysis showed no statistically significant association between hypertension subtype and age (p=0.842), gestational age (p=0.219), parity (p=0.753), or body mass index category (p=0.935). Conclusion: Pre-eclampsia was the predominant hypertensive disorder in this tertiary care population. Routine antenatal blood pressure surveillance and timely referral remain essential to reduce severe maternal complications. Keywords: Hypertension in pregnancy, pre-eclampsia, eclampsia, chronic hypertension, gestational hypertension, tertiary care hospital.

INTRODUCTION

Hypertensive disorders of pregnancy remain a major contributor to maternal and perinatal morbidity and mortality worldwide, particularly in low- and middle-income countries where delayed diagnosis, limited antenatal surveillance, and inconsistent risk stratification continue to compromise outcomes. Clinically, hypertension in pregnancy is defined as systolic blood pressure of at least 140 mmHg and/or diastolic blood pressure of at least 90 mmHg, measured on appropriate assessment, and includes chronic hypertension, gestational hypertension, pre-eclampsia, and eclampsia (1). These disorders are associated with substantial maternal complications including cerebrovascular events, renal impairment, hepatic dysfunction, placental abruption, and progression to severe disease, while fetal and neonatal consequences include intrauterine growth restriction, prematurity, stillbirth, and neonatal death (2,3).

Among the recognized phenotypes, pre-eclampsia and eclampsia are particularly important because of their rapid progression and their disproportionate contribution to preventable maternal mortality. The burden of hypertensive disorders in pregnancy is not only clinical but also public health-related, as these conditions account for a sizeable proportion of obstetric admissions, emergency referrals, and critical care utilization in tertiary hospitals. Available literature indicates that hypertensive disorders complicate approximately 5% to 10% of pregnancies globally, although the reported frequency and distribution of specific subtypes vary across populations depending on maternal age, parity, nutritional status, pre-existing hypertension, access to antenatal care, and the level of obstetric services available (4,5). In South Asian settings, where late presentation and referral bias are common, severe disease patterns may be encountered more frequently in hospital-based series than in community estimates (6).

Despite the recognized burden of the disease, locally generated data on the distribution of hypertensive disorders among pregnant women presenting to tertiary care facilities in Balochistan remain limited. This evidence gap reduces the ability of clinicians and hospital administrators to anticipate case-mix, prioritize antenatal screening strategies, and design context-specific maternal health interventions. In settings where referral hospitals receive women with both newly detected and complicated hypertension in pregnancy, understanding the frequency and pattern of the different diagnostic categories is essential for clinical planning and prevention of severe maternal and fetal complications (7,8).

The present study was therefore conducted to determine the frequency and pattern of hypertension in pregnancy among women presenting to a tertiary care hospital in Quetta. It was hypothesized that pre-eclampsia would represent the most common pattern of hypertensive disorder in this hospital-based population and that the distribution of hypertension subtypes would vary across maternal and obstetric characteristics such as age, gestational age, parity, and body mass index (9).

MATERIALS AND METHODS

This hospital-based cross-sectional observational study was conducted in the Department of Cardiology, Bolan Medical College/Hospital, Quetta, over the period from 12 July 2025 to 31 December 2025. The study was designed to describe the frequency and pattern of hypertensive disorders among pregnant women presenting during the study period and to examine the distribution of these disorders across selected maternal and obstetric characteristics. A cross-sectional design was considered appropriate because the primary objective was to document the prevalence profile and subtype pattern of hypertension in pregnancy within the defined clinical setting rather than to establish temporal or causal relationships.

A total of 81 pregnant women aged 20 to 40 years with elevated blood pressure during pregnancy were included. Eligible participants were those presenting during pregnancy with systolic blood pressure of at least 140 mmHg and/or diastolic blood pressure of at least 90 mmHg on clinical assessment. Women within the specified age range who fulfilled the operational definition of hypertension in pregnancy and consented to participate were enrolled. Patients with incomplete clinical information necessary for classification of the hypertensive disorder were not included in the final analysis. Participant recruitment was performed in the outpatient and referred clinical population of the department during the study period, and eligible women were included consecutively to minimize arbitrary selection and improve representativeness of the accessible hospital population.

After approval from the institutional research review process, written informed consent was obtained from all participants prior to inclusion. Confidentiality was maintained throughout data collection and analysis by recording data on structured forms and using study-specific records without public disclosure of patient identity. Baseline demographic and clinical variables were documented at enrolment, including maternal age, weight, height, body mass index, gestational age, parity, serum sodium, and serum albumin. Body mass index was calculated in kilograms per square meter from

recorded weight and height. Gestational age was documented in completed weeks according to the available obstetric record and clinical history.

Blood pressure assessment was performed using a sphygmomanometer with the participant in a seated position after appropriate rest, and readings obtained during clinical evaluation were used for study classification. For women referred from other facilities, documented blood pressure and proteinuria findings at the time of diagnosis were reviewed from referral records when available. The hypertensive disorder was categorized operationally into gestational hypertension, chronic hypertension, pre-eclampsia, or eclampsia. Chronic hypertension was considered when hypertension was known before pregnancy or identified before 20 weeks of gestation, whereas gestational hypertension referred to new-onset hypertension arising after 20 weeks without documented seizures and without features used for classification as pre-eclampsia. Pre-eclampsia was classified in women with hypertension in pregnancy with accompanying proteinuria or compatible clinical diagnosis in the treating record, while eclampsia was classified when convulsions or seizure episodes attributable to the hypertensive disorder were present. The presence or absence of seizures was specifically inquired about and documented to support accurate classification.

To improve data quality and reduce information bias, all variables were collected through a structured approach using clinical examination findings, patient history, and available medical or referral documentation. Standard definitions were applied uniformly for subgroup categorization. Age was stratified as 30 years or below and more than 30 years, parity as 2 or less and more than 2, gestational age as 28 weeks or less and more than 28 weeks, and body mass index according to the study categories used in the dataset. Consistent operational definitions were used during data entry to maintain reproducibility and internal consistency across all observations. The sample size comprised all eligible participants presenting within the study duration who met the inclusion criteria, yielding a final analyzable sample of 81 women. Given the descriptive primary objective and the fixed study period, this sample was considered adequate to estimate the relative frequency of the major hypertension subtypes within the source population encountered at the study site. Although the study was not primarily designed for causal inference, subgroup stratification was undertaken to explore whether the observed pattern of hypertensive disorders differed across important maternal characteristics.

Data were entered and analyzed using IBM SPSS Statistics version 23. Quantitative variables were summarized as mean and standard deviation, while categorical variables were presented as frequencies and percentages. The primary outcome variable was the pattern of hypertension in pregnancy, categorized as pre-eclampsia, eclampsia, gestational hypertension, and chronic hypertension. Stratified analyses were performed for maternal age, gestational age, parity, and body mass index. Associations between categorical variables were examined using the chi-square test, and a p-value of 0.05 or less was considered statistically significant. Because the study dataset was based on completed participant records included in the final analysis, cases with missing key classification data were excluded before analysis rather than imputed. The analytic approach remained descriptive and subgroup-comparative, consistent with the study objective and the available sample size.

From a reporting perspective, the revised methods correct the diagnostic threshold error present in the original draft and align the study procedures with standard definitions used for hypertensive disorders in pregnancy. This structure also improves reproducibility by clearly stating the setting, study period, participant selection, variable measurement, operational classification, bias reduction steps, and statistical plan while remaining faithful to the information available in the source manuscript.

RESULTS

A total of 81 pregnant women with hypertension were included in the analysis. The participants had a mean age of 29.68 ± 10.24 years, mean weight of 72.07 ± 6.46 kg, mean height of 170.55 ± 7.88 cm, and mean body mass index of 23.87 ± 2.66 kg/m². The mean serum sodium level was 131.36 ± 6.51 mmol/L,

while the mean serum albumin level was 3.07 ± 0.48 g/dL. These baseline clinical and anthropometric characteristics indicate a relatively young study population with modest variability in body composition and biochemical parameters.

Table 1. Baseline Demographic and Clinical Characteristics of the Study Population (n = 81)

Variable	Mean ± SD
Age (years)	29.68 ± 10.24
Height (cm)	170.55 ± 7.88
Weight (kg)	72.07 ± 6.46
Body mass index (kg/m²)	23.87 ± 2.66
Serum sodium (mmol/L)	131.36 ± 6.51
Serum albumin (g/dL)	3.07 ± 0.48

With respect to maternal and obstetric distribution, 46 women (56.8%) were older than 30 years, whereas 35 (43.2%) were aged 30 years or below. Most participants, 63 (77.8%), had parity of 2 or less, while 18 (22.2%) had parity greater than 2. Gestational age above 28 weeks was observed in 57 women (70.4%), indicating that the majority presented in the late second or third trimester. Body mass index categories were distributed almost evenly, with 40 women (49.4%) in the lower study category and 41 (50.6%) in the higher category.

The most frequent hypertensive disorder was pre-eclampsia, identified in 30 women (37.0%), followed by chronic hypertension in 25 (30.9%), eclampsia in 19 (23.5%), and gestational hypertension in 7 (8.6%). Exact binomial 95% confidence intervals, derived from the reported counts, showed that the estimated prevalence of pre-eclampsia ranged from 26.6% to 48.5%, chronic hypertension from 21.1% to 42.1%, eclampsia from 14.8% to 34.2%, and gestational hypertension from 3.6% to 17.0%. This pattern supports the predominance of hypertensive disorders with greater clinical severity, particularly pre-eclampsia and eclampsia, in this hospital-based cohort.

Table 2. Distribution of Maternal Characteristics and Pattern of Hypertension (n = 81)

Variable	Category	Frequency	Percentage (%)	95% CI (%) / p-value
Age	≤30 years	35	43.2	—
	>30 years	46	56.8	—
Parity	≤2	63	77.8	—
	>2	18	22.2	—
Gestational age	≤28 weeks	24	29.6	—
	>28 weeks	57	70.4	—
Body mass index	Lower study category	40	49.4	—
	Higher study category	41	50.6	—
Pattern of hypertension	Pre-eclampsia	30	37.0	26.6–48.5
	Eclampsia	19	23.5	14.8–34.2
	Gestational hypertension	7	8.6	3.6–17.0
	Chronic hypertension	25	30.9	21.1–42.1

Stratified analysis showed that the distribution of hypertensive subtypes was broadly similar across age groups, gestational age categories, parity groups, and body mass index categories. Among women aged 30 years or below, pre-eclampsia accounted for 37.1% and chronic hypertension for 31.4%, compared with 37.0% and 30.4%, respectively, among women older than 30 years. The association between age group and hypertension subtype was not statistically significant ($p = 0.842$), suggesting that, within this cohort, age category did not materially influence the pattern of hypertensive presentation. A similar non-significant pattern was observed for gestational age. Among women with gestational age of 28 weeks or less, pre-eclampsia was observed in 45.8%, eclampsia in 20.8%, gestational hypertension in 4.2%, and chronic hypertension in 29.2%. In women with gestational age greater than 28 weeks, the corresponding proportions were 33.3%, 24.6%, 10.5%, and 31.6%, respectively. Although pre-eclampsia appeared proportionally more frequent in the earlier gestational age category, the overall difference in subtype distribution did not reach statistical significance ($p = 0.219$).

When stratified by parity, pre-eclampsia remained the most frequent subtype in both groups, affecting 36.5% of women with parity of 2 or less and 38.9% of women with parity greater than 2. Chronic hypertension was found in 31.7% and 27.8% of the two groups, respectively, while eclampsia accounted for 23.8% and 22.2%. These differences were small and statistically non-significant (p = 0.753), indicating that parity was not associated with a distinct hypertension pattern in this sample. Likewise, the distribution across body mass index categories showed minimal variation. In the lower body mass index category, pre-eclampsia, eclampsia, gestational hypertension, and chronic hypertension were recorded in 37.5%, 22.5%, 10.0%, and 30.0% of women, respectively, compared with 36.6%, 24.4%, 7.3%, and 31.7% in the higher category. No significant association was demonstrated between body mass index category and hypertension subtype (p = 0.935).

Table 3. Stratification of Hypertensive Disorder Subtypes by Maternal and Obstetric Characteristics

Stratification Variable	Category	Pre-eclampsia n (%)	Eclampsia n (%)	Gestational Hypertension n (%)	Chronic Hypertension n (%)	Total n (%)	p-value
Age	≤30 years	13 (37.1)	8 (22.8)	3 (8.6)	11 (31.4)	35 (100.0)	0.842
	>30 years	17 (37.0)	11 (23.9)	4 (8.7)	14 (30.4)	46 (100.0)	
Gestational age	≤28 weeks	11 (45.8)	5 (20.8)	1 (4.2)	7 (29.2)	24 (100.0)	0.219
	>28 weeks	19 (33.3)	14 (24.6)	6 (10.5)	18 (31.6)	57 (100.0)	
Parity	≤2	23 (36.5)	15 (23.8)	5 (7.9)	20 (31.7)	63 (100.0)	0.753
	>2	7 (38.9)	4 (22.2)	2 (11.1)	5 (27.8)	18 (100.0)	
Body mass index	Lower study category	15 (37.5)	9 (22.5)	4 (10.0)	12 (30.0)	40 (100.0)	0.935
	Higher study category	15 (36.6)	10 (24.4)	3 (7.3)	13 (31.7)	41 (100.0)	

Overall, the results show that pre-eclampsia was the leading hypertensive disorder, affecting more than one-third of hypertensive pregnancies, followed closely by chronic hypertension. The inferential analysis did not demonstrate statistically significant differences in the subtype distribution across age, gestational age, parity, or body mass index categories, suggesting that the observed predominance of pre-eclampsia was relatively consistent throughout the main maternal subgroups represented in this cohort. These findings indicate that, in this tertiary care setting, the burden of hypertensive pregnancy disorders is driven primarily by clinically serious subtypes rather than by isolated gestational hypertension.

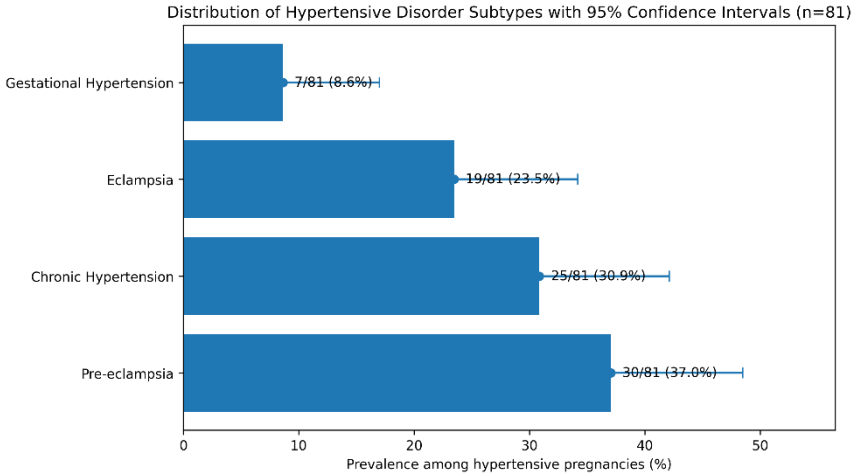

Figure 1 Distribution of Hypertensive Disorder Subtypes

The figure demonstrates a clear gradient in subtype burden, with pre-eclampsia accounting for 37.0% (30/81) of hypertensive pregnancies, followed by chronic hypertension at 30.9% (25/81), eclampsia at 23.5% (19/81), and gestational hypertension at 8.6% (7/81). The 95% confidence intervals show the

greatest estimated burden for pre-eclampsia (26.6%–48.5%) and chronic hypertension (21.1%–42.1%), while gestational hypertension remains both numerically and clinically the least frequent subtype (3.6%–17.0%). This distribution indicates that the case-mix presenting to the tertiary care setting is weighted toward more severe or clinically consequential hypertensive disorders, reinforcing the need for early antenatal surveillance and timely referral pathways in women at risk.

DISCUSSION

This study evaluated the frequency and pattern of hypertensive disorders among pregnant women presenting to a tertiary care hospital and found that pre-eclampsia was the most frequent subtype, affecting 37.0% of the cohort, followed by chronic hypertension in 30.9%, eclampsia in 23.5%, and gestational hypertension in 8.6%. These findings indicate that the hypertensive burden encountered in this hospital-based population was dominated by clinically significant disorders rather than milder pregnancy-associated blood pressure elevation alone. The predominance of pre-eclampsia is clinically important because it reflects a pattern of disease associated with increased maternal and fetal risk, particularly in referral settings where women may present later in the disease course or after progression from initially unrecognized hypertension. The relatively high combined proportion of pre-eclampsia and eclampsia also suggests that severe hypertensive disease remains a substantial contributor to obstetric morbidity in the local setting.

The baseline profile of the participants showed a mean maternal age of 29.68 years, with more than half of the women older than 30 years and the majority having parity of 2 or less. Most women were beyond 28 weeks of gestation at presentation, which is relevant because hypertensive disorders, particularly pre-eclampsia, commonly become clinically evident in the second half of pregnancy. Although this gestational pattern is biologically plausible, the stratified analysis did not demonstrate a statistically significant relationship between gestational age category and the specific hypertension subtype distribution. Women at 28 weeks or less had a numerically higher proportion of pre-eclampsia than those above 28 weeks, but this variation did not reach statistical significance. This suggests that while gestational age may influence the timing of presentation, the overall subtype pattern in this cohort remained relatively stable across the defined obstetric categories.

An important finding of this study was the absence of statistically significant differences in hypertensive subtype distribution across age group, parity, gestational age, and body mass index category. The proportion of pre-eclampsia remained remarkably similar in women aged 30 years or less and those older than 30 years, and comparable consistency was also observed across parity and body mass index strata. These findings imply that, in this tertiary care population, the burden of hypertensive pregnancy disorders may be broadly distributed rather than concentrated within one clearly dominant maternal subgroup. From a clinical standpoint, this supports the need for universal antenatal blood pressure surveillance rather than relying excessively on selective risk profiling alone. However, the lack of significant associations should be interpreted cautiously because the sample size was modest and the study was primarily descriptive rather than powered for subgroup effect detection.

The proportion of chronic hypertension in this cohort was also notable, accounting for nearly one-third of all cases. This may reflect the increasing recognition of pre-existing hypertension among women of reproductive age, improved clinical identification at presentation, or referral of more complex cases to tertiary care facilities. In practical terms, this pattern highlights the importance of distinguishing chronic hypertension from gestational hypertension and pre-eclampsia during clinical evaluation, as prognosis, monitoring, and treatment planning may differ substantially between these categories. The comparatively lower frequency of gestational hypertension in the present study may indicate either true lower occurrence in this referred population or underrepresentation of milder cases that are managed at the primary or secondary care level without escalation to a tertiary center.

The findings should also be interpreted in light of the institutional context of the study. As a tertiary care hospital-based cross-sectional study, the observed frequency pattern likely reflects a referral-enriched clinical population rather than the true community prevalence of hypertensive disorders in pregnancy. Women with more severe symptoms, diagnostic uncertainty, or complications are more likely to reach such centers, which may partly explain the relatively high proportions of pre-eclampsia and eclampsia and the lower proportion of uncomplicated gestational hypertension. Consequently, the results are most applicable to similar hospital settings and should not be generalized uncritically to the broader pregnant population without community-based comparative data.

Several methodological considerations are relevant when interpreting these results. The study provides useful descriptive evidence from a local tertiary care environment, but its cross-sectional design limits temporal interpretation and does not permit evaluation of maternal or neonatal outcomes over time. The sample size was adequate for descriptive reporting of frequency patterns but limited for more refined analytical comparisons across multiple subgroups. In addition, the hospital-based recruitment approach may have introduced selection bias toward more symptomatic or referred patients. Despite these limitations, the study remains valuable because it offers setting-specific information on the relative distribution of hypertensive disorders in pregnancy, an area in which local data have been limited.

From a public health and clinical perspective, the results reinforce the need for timely antenatal screening, early recognition of warning signs, and appropriate referral mechanisms for pregnant women with elevated blood pressure. Given that pre-eclampsia emerged as the dominant subtype and eclampsia still represented nearly one-quarter of the cases, strengthening routine antenatal monitoring and patient education may help reduce progression to severe disease. Future studies with larger, multi-center samples and longitudinal follow-up would be useful to clarify risk factors, maternal and neonatal outcomes, and the effectiveness of earlier screening and referral strategies in this population.

CONCLUSION

Hypertensive disorders in pregnancy were common in this tertiary care hospital cohort, with pre-eclampsia emerging as the most frequent subtype, followed by chronic hypertension, eclampsia, and gestational hypertension. The distribution of these disorders did not differ significantly across age, gestational age, parity, or body mass index categories, suggesting that the burden of disease was broadly distributed across the studied maternal groups. These findings emphasize the importance of routine blood pressure surveillance, early case identification, and timely referral during pregnancy, particularly in hospital settings managing women at risk of severe hypertensive complications.

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