



Prevalence of Pregnancy Complications of Hypertension and Associated Risk Factors among Women Admitted at Kampala International University Teaching Hospital, Uganda

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ABSTRACT

Hypertension-related complications are a significant contributor to maternal and neonatal morbidity and mortality worldwide. Despite clinical observations suggesting the prevalence of hypertension and its complications among pregnant women at Kampala International University Teaching Hospital, comprehensive data on prevalence and associated factors were lacking. This retrospective study aimed to fill this gap by examining the prevalence of hypertension-related pregnancy complications and associated risk factors among admitted pregnant women. Medical records of pregnant women admitted to the hospital from May 2018 backwards were reviewed using a predetermined data collection sheet. Data entries were recorded in MS Excel and analyzed using logistic regression in STATA version 14 to calculate the odds ratio for risk factors. Results showed an overall hypertension prevalence of 5.87%, with preeclampsia/eclampsia incidence at 10.0%. Maternal complications affected 40.0% of hypertensive women, including abruptio placentae (6.9%), preterm labor (19.2%), and renal complications (3.1%). Maternal deaths occurred in 0.8% of cases, contributing 0.1% to total maternal mortality in the hospital over three months. Notably, blood pressure deviations from normal were identified as the sole significant risk factor associated with hypertension-related pregnancy complications. In conclusion, hypertension and its associated disorders during pregnancy are prevalent at Kampala International University Teaching Hospital, posing significant risks to maternal and perinatal health. Blood pressure deviations from normal emerged as the primary significant risk factor for hypertension-related pregnancy complications, emphasizing the importance of early and accurate diagnosis for timely and appropriate management.

Keywords: Hypertensive disorders, Pregnancy complications, Prevalence, Maternal morbidity, Perinatal mortality

INTRODUCTION

Hypertension, a common medical condition characterized by elevated blood pressure levels, poses significant risks to maternal and fetal health during pregnancy. Pregnancy-induced hypertension (PIH) encompasses a spectrum of hypertensive disorders, including gestational hypertension, preeclampsia, and eclampsia, which are among the leading causes of maternal and perinatal morbidity and mortality worldwide [1]. The prevalence of these complications varies across different populations and regions, influenced by a multitude of factors such as socioeconomic status, maternal age, ethnicity, and pre-existing medical conditions. In recent years, there has been a growing concern regarding the escalating rates of pregnancy complications associated with hypertension, particularly in low- and middle-income countries (LMICs) where access to quality maternal healthcare services may be limited. This concern is echoed by findings from studies conducted in various LMIC settings, which highlight the disproportionate burden of hypertensive disorders of pregnancy (HDP) and their adverse outcomes on maternal and fetal health [2, 3]. Understanding the prevalence and risk factors associated with these complications is crucial for informing evidence-based interventions and improving maternal and neonatal outcomes globally. The etiology of HDP remains multifactorial, involving complex interactions between genetic predisposition, environmental factors, and maternal physiology. While the exact mechanisms underlying the development of preeclampsia and other hypertensive disorders are not fully understood, researchers have identified several contributing factors, including impaired placental development, endothelial dysfunction, immune maladaptation, and oxidative stress [4]. These pathophysiological processes culminate in the clinical

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manifestations of hypertension, proteinuria, and end-organ damage characteristic of severe preeclampsia and eclampsia. A comprehensive understanding of the epidemiology and risk factors associated with HDP is essential for developing effective preventive strategies and optimizing antenatal care practices. Epidemiological studies have highlighted disparities in the prevalence of HDP across different populations, with higher rates reported among women of African descent compared to their Caucasian counterparts [5]. Moreover, advanced maternal age, obesity, pre-existing hypertension, and certain genetic factors have been consistently identified as independent risk factors for the development of HDP [6, 7]. In addition to maternal risk factors, environmental and socioeconomic determinants play a significant role in shaping the burden of HDP within communities. Socioeconomic disparities in access to healthcare services, inadequate prenatal care, and suboptimal nutrition contribute to the disproportionate burden of maternal morbidity and mortality observed in resource-constrained settings [8]. Addressing these social determinants of health requires a multifaceted approach that encompasses health system strengthening, community empowerment, and targeted interventions to improve maternal and child health outcomes. Furthermore, the impact of HDP extends beyond the immediate perinatal period, with growing evidence linking hypertensive disorders in pregnancy to long-term maternal health sequelae, including cardiovascular disease and chronic hypertension [9]. Women with a history of preeclampsia or gestational hypertension are at increased risk of developing cardiovascular complications later in life, underscoring the importance of postpartum monitoring and preventive interventions. Despite advances in medical technology and clinical management protocols, challenges persist in the early detection and management of HDP, particularly in resource-limited settings where access to antenatal care services may be constrained. Improving access to prenatal screening, implementing evidence-based management guidelines, and strengthening health systems are essential components of comprehensive strategies aimed at reducing the burden of HDP and improving maternal and neonatal outcomes [10]. In light of the aforementioned considerations, this study seeks to explore the prevalence of pregnancy complications associated with hypertension and identify associated risk factors among women admitted to Kampala International University Teaching Hospital in Uganda. By elucidating the epidemiological patterns and determinants of HDP within this population, the findings of this study aim to inform targeted interventions and policy initiatives aimed at improving maternal healthcare delivery and reducing the burden of hypertensive disorders in pregnancy.

METHODOLOGY

Study Design

The study was a retrospective descriptive analysis conducted on medical records (admission books and patient files). It involved reviewing the records of pregnant women admitted at KIU-TH from July to May 2018, extending backward until the desired sample size was achieved. Variables considered included the patient's age, parity, type of complications and outcomes, socioeconomic status, booking status, body-mass index (BMI), comorbidities, blood pressure, gestational age, and birth weight. The study also differentiated between different types of hypertensive complications.

Study Area

The study was conducted at KIU-TH, situated in Bushenyi District, southwestern Uganda. The hospital is positioned within the Ishaka-Bushenyi municipality along the Mbarara-Kasese Highway. Approximately 306km from Kampala, the capital city of Uganda, KIU-TH served as the data collection site. Data were gathered from records of pregnant women admitted for delivery and pregnancy-related complications in the postnatal ward and antenatal clinic.

Study Population

The study population comprised pregnant women admitted at KIU-TH between May and July 2018, reviewed retrospectively.

Inclusion and Exclusion Criteria

Pregnant women admitted at KIU Teaching Hospital from May to July 2018 were included. Archived patient files from pregnant women were considered. The complications of interest included pregnancy-induced hypertension (PIH), preeclampsia, eclampsia, gestational hypertension, chronic hypertension, and associated complications such as acute renal failure, preterm labor, and abruptio placenta. Mothers residing in Bushenyi District were included. Pregnant women with comorbidities potentially confounding the complications of interest and those not residing in Bushenyi District were excluded.

Sample Size

The sample size was determined using a table formulated by Krejcie and Morgan (1970), resulting in a sample size of 175 respondents.

Sampling Technique

A systematic random sampling technique was employed. With a population size of 320 files and a calculated sample size of 175 files, every 2nd file was selected. Information within the chosen documents was filtered based on predefined criteria.

Data Collection Methods

A pre-designed data collection sheet with variables of interest was utilized. It encompassed complications of hypertension in pregnancy and potential risk factors. These variables were coded before being inputted by research assistants using MS Excel spreadsheet.

Study Variables

Data collected included patient age, booking blood pressure, clinical findings, parity, booking records, smoking habits, BMI, gestational week, maternal and neonatal outcomes, and route of delivery.

Data Analysis and Presentation

Data entries were made into MS Excel and then imported into STATA version 14 for analysis using logistic regression to determine odds ratios for the risk factors. P-values less than 0.05 at a 95% confidence interval were considered statistically significant. Results were presented using tables.

Ethical Considerations

The study obtained necessary approvals from relevant authorities including the School of Pharmacy, the Head of Department of Obstetrics and Gynecology, the hospital superintendent, and the KIU Teaching Hospital. Ethical approval was also secured from the KIU Research Ethics Committee. Given that the study solely involved anonymized confidential record review, informed consent was not deemed necessary. Personal identifier data were kept separate from collected data to ensure confidentiality. As a minimal risk study, potential social harm due to breaches of confidentiality was mitigated through precautions.

RESULTS

Socio-demographic and Clinical Characteristics of the Study Population

The age range of hypertensive patients was 14 to 45 years, with the 20-29 age bracket being the most frequent, constituting 82 (63.1%) of the total sample. Patients below 30 years accounted for 72.3%, while those above 30 years comprised 27.7%. The majority of hypertensive patients were single (n=93, 73.8%), followed by 28 (22.2%) who were married, and 5 (4.0%) who were divorced. Regarding employment status, 87 (68.0%) were unemployed, while 41 (32.0%) were employed. Regarding antenatal care, 79 (64.2%) of pregnant mothers were booked for care, while 44 (35.8%) did not undergo antenatal care. Most patients were non-smokers (107, 95.5%), while 5 (4.5%) reported smoking cigarettes; smoking history was not available for 18 patients (13.85%). Among the patients, 31 (28.4%) had comorbidities, while 78 (71.6%) did not; information for the remaining patients was either missing or unknown. Additionally, 5 (4.1%) of the patients had a Body Mass Index (BMI) of 25 and above, while 10 (8.1%) had a BMI less than 25. The BMI of 108 (87.8%) patients could not be calculated due to missing height, weight, or both. Furthermore, 94 (77.7%) of the mothers studied had no previous history of obstetric complications, while 27 (22.3%) had a history of obstetric complications.

Table 1: Socio-demographic characteristics and clinical information of the subjects

Characteristic	Frequency, n (%)
Age (years)	
<20	12 (9.2)
20-29	82 (63.1)
30-39	30 (23.1)
>40	6 (4.6)
Marital status	
Single	28 (22.2)
Married	93 (73.8)
Divorced	5 (4.0)
Employment status	
Employed	41 (32.0)
Unemployed	87 (68.0)
Smoking	
Yes	5 (4.5)
No	107 (95.5)
Family history	
Hypertension	11 (52.4)
Diabetes	4 (19.0)
Hypertension and diabetes	6 (28.6)
Antenatal clinical attendance (booking status)	
Booked	79 (64.2)
Unbooked	44 (35.8)
Comorbidity	
Present	31 (28.4)
Absent	78 (71.6)
Body mass index	
25 and above	5 (4.1)
<25	10 (8.1)
Unknown	108 (87.8)
Previous history of OB complication	
Yes	27 (22.3)
No	94 (77.7)

Prevalence of Specific Complications

The total prevalence of complications in the study population is 40.0% (95% confidence interval). The individual complication profiles are as follows: eclampsia/pre-eclampsia 10.0%, abruptio placenta 6.9%, renal complications 3.1%, maternal death 0.8%, and preterm labor, which has the highest proportion at 19.2%.

Table 2: Complication profile of the study population

Complication	Percentage	95% Confidence Interval
Eclampsia	10	5.9-16.6
Abruptio placenta	6.9	3.6-12.9
Preterm labor	19.2	13.3-27.0
Renal complication	3.1	1.1-8.0
Maternal death	0.8	0.1-5.3
Prevalence of hypertension		
Percentage proportion	95% Confidence Interval	
40	31.8-48.8	

Risk Profile Pattern of the Study Population

Blood pressure deviations from normal significantly increased the risk of developing preeclampsia ($p=0.013$), with an odds ratio of 2.02 and a confidence interval of 1.16-3.52. Notably, preeclampsia tended to develop at a younger age compared to women without it. However, no significant associations were found between preeclampsia/eclampsia and birth weight ($p=0.843$), gestational age ($p=0.765$), or smoking history ($p=0.973$), as all p -values exceeded 0.05. Similarly, BMI was not significantly associated with preeclampsia ($p=0.274$), with a 95% confidence interval of 0.37-32.96. Women with a previous history of complications did not show a higher risk of developing preeclampsia compared to those without such complications ($p=0.176$). Likewise, co-morbid medical conditions were not significant risk factors for eclampsia ($p=0.104$). Family history ($p=0.942$) and booking status ($p=0.110$) were also not significant factors in causing hypertension in pregnant mothers.

Table 3: Risk factors for hypertension

Factor	Frequency, % (n)	Odds ratio	P value	95% Confidence Interval
Smoking		1.03	0.973	0.17 – 6.44
No	95.4 (42)			
Yes	4.6 (2)			
Booking status		1.90	0.110	0.87 – 4.16
Unbooked	27.1 (13)			
Booked	72.9 (39)			
Comorbid condition		2.01	0.104	0.87 – 4.69
Absent	62.8 (27)			
Present	37.2 (16)			
Family history		0.96	0.942	0.36 – 2.61
Hypertension	58.3 (7)			
Diabetes	8.3 (1)			
Both	33.3 (4)			
Body mass index		3.50	0.274	0.37 – 32.97
<25	50.0 (3)			
25 and above	50.0 (3)			
History of OB complication		1.82	0.176	0.77 – 4.30
No	71.4 (35)			
Yes	28.6 (14)			
Blood pressure		2.02	0.013	1.16 – 3.52
Low	4.6 (2)			
Normal	70.4 (31)			
High	25.0 (11)			
Gestational age		1.09	0.765	0.62 – 1.90
Normal	82.3 (28)			
Low	17.7 (6)			
High	0.0 (0)			
Birth weight		1.10	0.847	0.42 – 2.88
Normal	82.3 (28)			
Low	17.7 (6)			
High	0.0 (0)			

DISCUSSION

The prevalence of hypertensive disorders of pregnancy exhibits considerable variation across different geographic regions worldwide. Reports have shown a range from as low as 1.5% in Sweden to a high of 7.5% in Brazil, with figures between 2.6% and 3.7% for Saudi Arabia [11]. Ethiopia, Iran, and South-Western Bosnia and Herzegovina reported prevalence rates of 5.3%, 3.3%, and 6.5%, respectively [12, 13, 14]. A cross-sectional study by Leffert *et al.* [15] revealed that hypertensive disorders of pregnancy-associated stroke has a higher frequency and higher rate of stroke-related complications compared to pregnancy-associated stroke without hypertensive disorders. In this study, hypertensive disorders complicated 5.87% of all deliveries (equivalent to 40.0% per 30 deliveries) at Kampala International University Teaching Hospital (KIU-TH) over a three-month period. This figure is lower compared to other regions in Uganda, notably the Central Region with a prevalence of 28.5% [16], followed by the Eastern Region at 26.4%, Western Region at 26.3%, and Northern Region at 23.3%. Urban areas reported a prevalence of 28.9%, while rural areas reported 25.8% [17]. The lower prevalence in my study might reflect the demographic served by the hospital. Earlier studies by Moodley [18, 19] and Panday [20] reported lower figures of 18%, 15.5%, and 12% respectively for hypertension complications. Regarding preeclampsia, my study reported a 10.0% incidence, lower than the 66% reported for Ithatha General Hospital in South Africa and the 15.1% reported at the University of Adelaide but comparable to the 32.7% reported in a cardiac clinic in Nigeria [2, 21, 23]. However, these figures should be approached with caution as they may not fully represent the prevalence of preeclampsia due to challenges in patient categorization, particularly among late or unbooked patients. Recent literature consistently highlights the impact of hypertensive disorders of pregnancy on maternal morbidity and mortality [23]. In my study, 40.0% of hypertensive pregnant women experienced complications, with maternal deaths resulting primarily from eclampsia, abruptio placenta, and multi-organ failure, especially among unbooked, unemployed, unmarried patients from low socioeconomic backgrounds. These findings align with previous studies where hypertensive disorders contributed significantly to maternal mortality rates [2, 13, 18, 19].

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The sociodemographic profile of patients in my study corresponds with contemporary literature, indicating a predilection for hypertensive complications among women of low socioeconomic status, unemployed, and single individuals [11, 18, 24]. Contrary to some retrospective studies, which associated increased BMI with hypertensive disorders, my study showed an inverse relationship between BMI and preeclampsia, consistent with previous findings [25, 26, 27]. Similarly, previous complications did not increase the risk of preeclampsia in my study, possibly due to limitations in documenting previous complications.

Blood pressure occurrences were higher in primigravida and low parity women in my study, in agreement with previous studies [18, 28]. Renal complication rates were surprisingly low, possibly indicating improved labor management and prompt interventions in potentially complicated deliveries. However, further investigation is necessary for a comprehensive assessment of obstetric and perinatal services.

CONCLUSION

The prevalence of hypertension in pregnancy at KIU-TH was found to be 5.87% (7.6 per 130 deliveries), indicating its common occurrence and significant contribution to maternal and perinatal morbidity and mortality. Notably, abnormal blood pressure was identified as the sole significant risk factor associated with hypertension complications during pregnancy, while other assessed risk factors showed no significant correlation.

Recommendations

To address the limitations identified and improve maternal healthcare, several recommendations are proposed. Firstly, enhancing primary healthcare services through training and education of primary healthcare nurses is crucial. This includes improving patient education for early booking, promoting healthy lifestyles, and recognizing pregnancy danger signs. At the clinic level, health personnel should receive training on proper antenatal card utilization and conduct regular measurements such as blood pressure, anthropometric, and dipstick protein assessments during every visit, with an emphasis on early referral to hospitals. Secondly, standardizing patient management protocols and guidelines at the hospital level is essential. This entails implementing protocols for the collection and analysis of 24-hour total urinary protein, particularly for patients with elevated blood pressure, and increasing the utilization of ultrasonography and Doppler studies for early complication detection. Lastly, addressing concerns regarding recording and record-keeping practices is vital. Periodic auditing of patient files for proper documentation and the development of a standardized, user-friendly filing system to simplify file retrieval and management are recommended.

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