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Original Research

Risk factors of thrombocytopenia among pregnant women attending antenatal clinic at Parirenyatwa Group of Hospitals, 2023 – 2024

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ABSTRACT

Background: Thrombocytopenia is a common hematological finding during pregnancy, affecting approximately 7-12% of pregnancies globally. The prevalence of thrombocytopenia among pregnant women in Africa is around 10.23%. Specific data might be less readily available in Zimbabwe hence the present study

Objective:This study aimed to determine the prevalence of thrombocytopenia and identify associated risk factors among pregnant women attending antenatal clinics at Parirenyatwa Group of Hospitals(PGH)

Method: The study used an analytical cross sectional design conducted at the PGH Haematology Laboratory. Using purposive sampling we enrolled all pregnant women over 18 years of age receiving ANC at PGH, from June 2023 to June 2024 at PGH. Chi square test was used to test association between thrombocytopenia and various risk factor $P < 0.05$ was set as statistically significant

Results: A total of 380 pregnant women were enrolled in this study. The prevalence of thrombocytopenia was 18.7%. Pregnant women In their majority were located in urban high-density areas (45%) and were young (18–25 years: 31% of cases). With regard to the disease severity the severe thrombocytopenia peaked in the third trimester (55%), correlating with hypertensive disorders. Hypertension (OR=2.51, 95% CI=1.25–5.03, p=0.024) and iron deficiency anaemia (IDA); OR=1.81, 95% CI=1.01–3.26, p=0.042) were significant predictors as well as age being lesser than 30 years old OR 0.27 CI (0.14-0.5), p=0.0001) but gestational diabetes mellitus (GDM) showed no association (OR=0.96, p=0.939)

Conclusion: Thrombocytopenia is a significant concern in pregnancy, particularly in early gestation, with mild cases dominating. IDA and high-density residency emerged as critical risk factors, while hematological biomarkers demonstrated predictive utility.

1. Introduction

Thrombocytopenia is a common hematologic abnormality, defined as a platelet count of less than 150×10^9/L. Hematologic changes during pregnancy are frequent and can

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contribute to both maternal and fetal morbidity. Approximately 8–10% of pregnant women—particularly in the third trimester—are affected by thrombocytopenia, with 75% of these cases attributed to the benign condition known as gestational thrombocytopenia (Asrie et al., 2017). Despite its often mild and asymptomatic presentation, thrombocytopenia can pose significant risks to both mother and fetus. Understanding the prevalence and risk factors associated with thrombocytopenia in specific populations is crucial for effective management and intervention. Globally, thrombocytopenia is observed in 7–12% of globally (Cines & Levine, 2017). Although many cases are mild, severe thrombocytopenia—defined as platelet counts below $50 \times 10^3/\mu L$—can occur, increasing the risk of postpartum hemorrhage, a major contributor to maternal morbidity and mortality, particularly in low-resource settings (Ngene & Moodley, 2024).

The etiology of thrombocytopenia in pregnancy is multifactorial, encompassing both physiological changes and underlying pathological conditions. Key contributors include hypertensive disorders of pregnancy such as preeclampsia and eclampsia, which are responsible for approximately 21% of gestational thrombocytopenia cases (Begam et al., 2017). Gestational thrombocytopenia itself accounts for up to 70% of all thrombocytopenia subtypes during pregnancy. Additional etiological factors include HELLP syndrome, iron deficiency anemia (IDA), and various autoimmune disorders (Cines & Levine, 2017). Understanding the relative contribution of these risk factors within specific populations is essential to developing targeted management strategies. The prevalence and associated risk factors for thrombocytopenia can vary significantly depending on geographical location, socioeconomic status, and access to healthcare.

The prevalence and associated risk factors for thrombocytopenia can vary significantly depending on geographical location, socioeconomic status, and access to healthcare. In sub-Saharan Africa, the prevalence of gestational thrombocytopenia is higher, estimated at around 15.3%. In developing countries, including those within sub-Saharan Africa, thrombocytopenia contributes to a maternal mortality rate of approximately 5.26% (Hamad et al., 2018). Although country-specific data for Zimbabwe are limited, regional estimates suggest a prevalence of 10.23% among pregnant women (Getawa et al., 2022). The limited availability of localized data restricts the development of focused interventions and evidence-based management strategies.

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At the Parirenyatwa Group of Hospitals (PGH) hematology department, an increasing number of pregnant women attending antenatal care at Mbuya Nehanda are presenting with low platelet counts. Informal observations suggest that approximately 3 to 4 out of every 20 women have thrombocytopenia. However, no formal study has been conducted to determine the prevalence or to explore the associated risk factors for thrombocytopenia in this specific clinical setting. Given the resource-constrained environment, understanding the local burden and contributing factors of thrombocytopenia is critical for optimizing resource allocation and improving both maternal and neonatal outcomes. Therefore, this study aims to determine the prevalence of thrombocytopenia among pregnant women attending antenatal clinics at PGH, to evaluate associated risk factors, to describe the socio-demographic and hematological characteristics of affected individuals, and to generate evidence-based recommendations for improving maternal and neonatal health outcomes.

2. Method

Research Design

This study employed an analytical cross-sectional design, which is appropriate for determining the prevalence of thrombocytopenia and its associated risk factors. This design was chosen as it enables simultaneous data collection from a population of pregnant women at a specific point in time, facilitating the analysis of relationships between variables. The study was conducted at the Haematology Laboratory of Parirenyatwa Group of Hospitals (PGH), where samples from various wards are processed through the central sample reception unit. For this study, samples were obtained specifically from the maternal wards at Mbuya Nehanda Antenatal Clinic. Thrombocytopenia was defined as a platelet count of less than 150×10^9/L in pregnant women aged over 18 years.

Population and Sasmple Size

The study population consisted of all pregnant women aged 18 years and above receiving antenatal care at PGH between June 2023 and June 2024. Pregnant women under the age of 18 and non-pregnant women were excluded from the study. Only pregnant women aged 18 years or older during the study period were included. The required sample size was calculated using Cochran's formula:

$$n = \frac{z^2.P(1-P)}{E^2}, \quad n=\frac{1.96^2.0.45(1-0.45)}{0.05^2}, \quad n=380$$

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Where:

n = required sample size

Z = 1.96 (for 95% confidence level),

P = 0.45 (expected prevalence),

E = 0.05 (margin of error).

A total of 380 respondent were enrolled through purposive sampling approach which guaranteed representation across the population of pregnant women.

Data Collection

This study collected data through two primary sources to ensure comprehensive information gathering. The first source was the hospital's laboratory information system, which provided full blood count (FBC) results for all participants. The FBC data included key parameters such as platelet count (the primary outcome), along with supporting parameters like white blood cell count, hemoglobin levels, and mean corpuscular volume (MCV).

The second data source came from electronic medical record reviews of study participants. The research team extracted basic demographic characteristics including age, parity, and gestational age. Additionally, they recorded any comorbid conditions such as gestational hypertension, gestational diabetes mellitus, and various types of anemia that participants might have had.

The data collection process was specifically designed to protect patient confidentiality. All personal identifiers were removed before analysis by assigning unique identification codes to each participant. The anonymized data was then stored on a secure server with encryption and restricted access limited to principal investigators only.

Data Analysis

The study employed a comprehensive, multi-stage statistical analysis approach. The initial stage involved descriptive analysis to map the basic characteristics of the study population. This analysis produced statistical measures including frequency distributions, percentages, and mean values with standard deviations for continuous data. The subsequent analytical stage applied univariate approaches to examine relationships between thrombocytopenia and each independent variable. Laboratory parameters such as platelet count, white blood cells, hemoglobin, and MCV were analyzed for their association with the primary outcome. Similar analyses were conducted for potential risk factors including

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comorbid conditions and demographic characteristics.

Chi-square tests were performed using GraphPad Prism version 6.0 software used for categorical datas. A p-value <0.05 was established as the threshold for statistical significance, following accepted scientific standards. The entire data analysis process was supervised by a biostatistician to ensure methodological validity.

Ethical Considerations

Ethical aspects received special attention from the planning stages onward. The research team first obtained ethical approval from the Africa University Research Ethics Committee (approval number AUREC 3546/25), along with official authorization from the PGH Clinical Directorate before commencing data collection.

3. Result

Haematological Characteristics

This study analyzed the hematological profiles of 380 pregnant women, with a focus on the prevalence and severity of thrombocytopenia. Among the participants, 71 women (18.7%) were identified as thrombocytopenic cases. The condition was most frequently observed in the 21–25-year age group, while the highest severity cases were reported among women aged 36–40 years. Table 1 summarizes the distribution of thrombocytopenia cases across age groups, along with their classification into mild, moderate, and severe categories based on platelet counts and associated hematological markers.

Table 1. Distribution of thrombocytopenia cases and severity by age group

Age Groups	Cases	Non-case	Mild	Moderate	Severe
18-20	8 (11.3%)	98 (32%)	4 (50%)	4 (50%)	0 (0%)
21-25	22 (31.0%)	110 (36%)	15 (68%)	5 (23%)	2 (9%)
26-30	21 (29.6%)	71 (22%)	11 (52%)	7 (33%)	3 (14%)
31-35	12 (16.9%)	14 (5%)	8 (66%)	2 (17%)	2 (17%)
36-40	7 (9.9%)	9 (3%)	3 (43%)	0 (0%)	4 (57%)
41-45	1 (1.4%)	7 (2%)	0 (0%)	0 (0%)	1 (1.4%)
Total	71	309	41	18	12

Notes: Thrombocytopenia cases defined by platelet count <150 × 10^3/µL, with ↓Hb (low hemoglobin), ↑WBC (elevated white blood cells), ↓MCV (low mean corpuscular volume). Classification: Severe (platelet < 50); Moderate (50 ≤ Platelet < 100); Mild (100 ≤ Platelet < 150)

Age and Residency Patterns Among Thrombocytopenic Pregnant Women

The analysis of socio-demographic characteristics revealed distinct trends among

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thrombocytopenic women (n=71). As shown in Table 2, the highest proportion of cases occurred in younger age groups (21-25 years: 31.0%, n=22/71), with a gradual decline to 1.4% (n=1/71) in the 41-45 year group. Residency density patterns showed a striking age-dependent variation where is 87.5% of thrombocytopenic women aged 18-20 years (7/8 cases) resided in high-density areas, while older age groups (≥26 years) demonstrated increased prevalence in low-density areas (peaking at 57.1% in 26-30-year-olds). These findings suggest maternal age and urbanicity may influence thrombocytopenia risk during pregnancy.

Table 2. Characteristics of thrombocytopenic women by age group and residency density

Age range	Thrombocytopenic n (% of total cases)	Low density n (% of total cases)	Medium density n (% of total cases)	High density n (% of total cases)
18-20	8 (11.3%)	0 (0%)	1 (12.5%)	7 (87.5%)
21-25	22 (31.0%)	3 (13.6%)	2 (9.1%)	17 (77.3%)
26-30	21 (29.6%)	12 (57.1%)	6 (28.6%)	3 (14.3%)
31-35	12 (16.9%)	5 (41.7%)	3 (25.0%)	4 (33.3%)
36-40	7 (9.9%)	3 (42.9%)	3 (42.9%)	1 (14.3%)
41-45	1 (1.4%)	1 (100%)	0 (0%)	0 (0%)
Total	71 (100%)	24 (33.8%)	15 (21.1%)	32 (45.1%)

Note: Percentages in the Thrombocytopenic Cases column represent the proportion of each age group among all thrombocytopenic women (N=71). Residency percentages show the distribution within each age group (e.g., 7 out of 8 thrombocytopenic women aged 18-20 years lived in high-density areas = 87.5%).Total residency percentages are calculated out of 71 thrombocytopenic cases.

Thrombocytopenia Prevalence and Severity Stratified by Trimester

Among 380 pregnant women screened, 71 (18.7%) were diagnosed with thrombocytopenia. The condition exhibited distinct patterns across gestational trimesters, with severity distributions shifting significantly as pregnancy progressed (Table 3). Mild cases predominated in the first trimester (26/41, 63.4%), declining sharply by the third trimester (3/41, 7.3%). Moderate cases peaked in the second trimester (13/19, 68.4%), suggesting mid-pregnancy physiological impacts. Severe cases were most frequent in the third trimester (6/11, 54.5%), highlighting late-gestation risks.

Table 3. Thrombocytopenia cases by trimester and severity

Severity	1st Trimester	2nd Trimester	3rd Trimester	Total
	n (% within severity)	n (% within severity)	n (% within severity)	

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Mild	26 (63.4%)	12 (29.3%)	3 (7.3%)	41
Moderate	2 (10.5%)	13 (68.4%)	4 (21.1%)	19
Severe	3 (27.3%)	2 (18.2%)	6 (54.5%)	11
Total	31 (43.7%)	27 (38.0%)	13 (18.3%)	71

Comorbidities associated with thrombocytopenia among pregnant women

The table 4 stratifies thrombocytopenia cases by age, severity, and comorbid conditions (hypertension, iron deficiency anemia [IDA], gestational diabetes mellitus [GDM], and no comorbidity case [CC]). Hypertension dominates in younger (18–25 years: 51%) and older women (36–45 years: 55%), while IDA peaks in the 26–35 age group (36%). GDM prevalence rises with age (3% in 18–25 vs. 24% in 26–35) and severity (9% mild vs. 29% severe). Notably, 24% of mild cases had no comorbidities, but this drops to 0% in severe cases. Moderate-severity thrombocytopenia shows the highest hypertension burden (50%), whereas IDA is most frequent in mild cases (36%). Across all severities, comorbidities are nearly universal in older women (36–45 years: 0% no comorbidities).

Table 4. Comorbidities associated with thrombocytopenia among pregnant women (N=185)

	Hypertension	IDA	GDM	No CC	Total
Age					
18-25	19(51%)	11(30%)	1(3%)	6(16%)	37
26-35	12(27%)	16(36%)	11(24%)	6(13%)	45
36-45	6(55%)	3(27%)	2(18%)	0(0%)	11
Severity					
Mild	14(31%)	16(36%)	4(9%)	11(24%)	45
Moderate	13(50%)	7(27%)	5(19%)	1(4%)	26
Sever	9(42%)	6(29%)	6(29%)	0(0%)	21

Risk Factors Associated with Thrombocytopenia in Pregnancy

Chi-square analysis identified significant associations between thrombocytopenia and maternal comorbidities (Table 5). Hypertension (OR=2.5, 95%CI=1.2–5.0, *p*=0.024) and iron deficiency anemia (IDA; OR=1.8, 95%CI=1.01–3.26, *p*=0.042) were independent risk factors. In contrast, gestational diabetes mellitus (GDM) showed no significant association (OR=0.96, *p*=0.9). Notably, age <31 years demonstrated a protective effect (OR=0.27, 95%CI=0.14–0.5, *p*<0.001), with younger women having lower thrombocytopenia prevalence.

Table 5 Chi square test risk factor of thrombocytopenia among pregnant women (N=380)

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Morbidities	Thrombocytopenia (Yes)	Thrombocytopenia (No)	OR at 95%CI	P value
Hypertension			2.5(1.2–5.0).	0.024
Yes	17	40		
No	54	269		
IDA			1.8(1.01-3.26)	0.042
Yes	20	55		
No	51	254		
GDM			0.96(0.3-3.09)	0.9
Yes	4	18		
No	71	309		
Age <31 Years				
			0.27(0.14-0.5)	0.0001
Yes	51	279		
No	20	30		

4. Discussions

The prevalence in this study was 18.7%, higher than the global prevalence of 7–12% reported in pregnancies worldwide (Cines & Levine, 2017). This discrepancy may stem from geographical variations (e.g., environmental or nutritional factors), the study's moderate sample size limiting generalizability, and potential biases in the study design (e.g., selection bias). The observed socio-demographic patterns align with recent literature: younger women (18–25 years) living in high-density urban areas had higher thrombocytopenia prevalence, likely due to environmental stressors (e.g., pollution) and nutritional deficiencies. Low parity further exacerbated this risk, as multiparity is known to be protective. Studies suggest urban stressors such as pollution may exacerbate hematological dysfunction, as noted by Chen et al. (2021), who linked Particulate Matter 2.5 exposure to reduced platelet counts in pregnancy. The predominance of younger women mirrors findings by Eisa et al. (2021), who attributed the elevated thrombocytopenia risk in this group to iron deficiency anemia (IDA) and physiological stress in first pregnancies, while declining incidence with age parallels multiparity' s protective role via improved iron reserves (Zhang, 2024). The urban-rural disparity aligns with Harrington et al. (2023), who reported underdiagnosis in rural settings due to healthcare access gaps, contrasting with urban areas' higher detection rates despite environmental risks. However, the increased severity in older women (e.g., 57% severe cases in 36–40-year-olds) contrasts with Pishko & Marshall (2022), who reported milder

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thrombocytopenia in advanced maternal age. This discrepancy suggests regional differences in etiology, such as higher preeclampsia rates in our population. These findings underscore the need for tailored public health strategies: urban areas may require pollution control and nutritional programs, while rural settings need improved access to antenatal diagnostics.

The observed thrombocytopenia prevalence of 18.7% in this study exceeds the global average (5–12%). Still, it aligns with rates reported in low-resource settings, such as Libya 17% (Getawa et al., 2022) and Nigeria 13.5%, where comorbidities like iron deficiency anemia (IDA) and environmental stressors (e.g., urban pollution) are prevalent (Erhabor et al., 2020). This contrasts with high-income countries like the U.S., where gestational thrombocytopenia dominates and nutritional interventions are routine (Mangla & Hamad, 2024). The elevated prevalence here likely reflects local risk factors, including IDA (20/71 cases), high-density urban residency (45% of cases), and younger maternal age, compounded by limited antenatal supplementation.

The observed trimester-specific severity patterns, mild thrombocytopenia peaking in the first trimester (63%) and severe cases escalating in the third (55%) align with studies attributing early gestational cases to haemodilution or immune adaptations Fogerty & Kuter, 2024), but contrast with the classic understanding of gestational thrombocytopenia, which typically manifests as mild, late-pregnancy phenomena (Mangla & Hamad, 2024). The second-trimester surge in moderate cases (68%) may reflect emerging placental pathologies (e.g., preeclampsia precursors), as noted by Kebede et al. (2024), while the third-trimester severity spike mirrors risks from hypertensive disorders, supported by Ye et al. (2025), linking late-term thrombocytopenia to HELLP syndrome. While the data strongly maps epidemiological trends, its clinical utility hinges on prospective validation of these risk strata.

In this study, the significant association between hypertension and thrombocytopenia aligns with studies linking hypertensive disorders (e.g., preeclampsia) to platelet destruction via endothelial dysfunction (Ye et al., 2025), while the IDA-thrombocytopenia link mirrors findings by Morris et al. (2010) and Hassan & Campos (2018), who reported that patients with IDA and thrombocytopenia often show normalization of both hemoglobin and platelet counts following iron therapy, eliminating the need for invasive procedures. However, the absence of an association with GDM conflicts with Guglielmini et al. (2025), who identified hyperinsulinemia-induced platelet hyperactivity as a thrombocytopenia risk. This discrepancy

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may be due to the low GDM prevalence (5.6%) in this cohort, which could have limited statistical power for detection. The dominance of hypertension in older women (55% in 36–45-year-olds) aligns with Pacinella et al. (2022) but contrasts with (Gemecu et al., 2020), who reported higher gestational hypertension rates in younger women. This discrepancy may reflect differences in study populations (e.g., preexisting hypertension vs. pregnancy-induced hypertension). Similarly, the IDA peak in 26–35-year-olds (36%) aligns with global anemia trends in reproductive-aged women and also highlights factors like folate deficiency (Babah et al., 2024).

5. Conclusion

This study confirms that thrombocytopenia is a significant concern in pregnancy, particularly in early gestation, with mild cases dominating. IDA and high-density residency emerged as critical risk factors, while haematological markers (Hb, WBC, MCV) demonstrated predictive utility. Increased parity (number of pregnancies) correlates with greater thrombocytopenia risk. Strengthen protocols for managing IDA and hypertension in pregnancy to mitigate thrombocytopenia risk.

6. Conflict of interest

All authors declare no conflict of interest.

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