



Research Article

Hemostatic Profile in Pregnant Women: A Cross-Sectional Study at the Amissa Bongo University Hospital Center in Franceville, Gabon

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Abstract

Background: Pregnancy induces a physiological reorganization of the hemostatic system aimed at preventing hemorrhage while limiting the risk of thrombosis. In sub-Saharan Africa, this profile is often disrupted by contextual factors such as malaria, anemia, and malnutrition. In Gabon, where postpartum hemorrhage remains the leading cause of maternal mortality, adapted hemostatic monitoring is crucial, particularly given the severe lack of local epidemiological data. **Objective:** To describe the hemostatic profile of pregnant women in the third trimester and to identify sociodemographic and clinical factors associated with biological abnormalities at the Amissa Bongo University Hospital Center (CHU) in Franceville. **Methods:** A descriptive cross-sectional study was conducted from January to June 2025. The exhaustive sample included 80 pregnant women in the third trimester (gestational age ≥ 28 weeks), excluding patients with a history of coagulation disorders, current anticoagulant therapy, or severe hepatic pathology. The evaluated parameters were Prothrombin Time (PT), Activated Partial Thromboplastin Time (aPTT), and platelet count. Statistical analyses were performed using R software (significance threshold: $p < 0.05$). **Results:** The median age of the participants was 27 years [22–34], and 92.5% received regular prenatal care. The prevalence of hemostatic abnormalities was notable: 46.3% of patients had a PT $< 70\%$, 35.0% had an aPTT > 35 s, and 41.3% had thrombocytopenia (< 150 K/ μ L). This thrombocytopenia was predominantly mild (35.0%), although moderate forms (5.0%) and one severe case (1.3%) were observed. Bivariate analysis revealed a statistically significant association between a personal history of hemorrhage and lower PT (67% vs. 72%, $p = 0.032$). No significant association was found between thrombocytopenia and age, parity, or place of residence.

Conclusion: The hemostatic profile of pregnant women in southeastern Gabon borders on the limits of normal physiology, with a high prevalence of thrombocytopenia and hypoprothrombinemia, particularly among women with a history of hemorrhage. These findings advocate for the systematic integration of a basic hemostasis workup during the third trimester in Gabonese healthcare facilities to optimize the prevention and management of maternal hemorrhagic complications.

Keywords: Hemostasis; Pregnancy; Gestational thrombocytopenia; Prothrombin time; Maternal health; Gabon.

Introduction

Pregnancy represents a period of major physiological changes, characterized notably by a profound and dynamic reorganization of the hemostatic system. This biological adaptation serves a dual, delicate, and protective objective: to prevent hemorrhagic risks, particularly during childbirth and the postpartum period, while maintaining a precarious balance to avoid thrombotic complications [1]. Specifically, this state of relative hypercoagulability translates into a significant increase in procoagulant factors (such as fibrinogen and factors VII, VIII, and X), a physiological resistance to activated protein C, and a moderate but frequent decrease in platelet count, commonly referred to as gestational thrombocytopenia [2].

In sub-Saharan Africa, this physiological hemostatic profile is frequently disrupted and exacerbated by a set of specific contextual and environmental factors. Among these are the high prevalence of anemia, gestational malaria, malnutrition, and unequal access to quality prenatal care [3]. In Gabon, despite notable progress in maternal health, illustrated by a 40% reduction in maternal mortality between 2000 and 2020, postpartum and intrapartum hemorrhages remain the leading cause of maternal death, accounting for approximately 28% of cases [4]. This epidemiological reality underscores the imperative need for rigorous hemostatic monitoring adapted to local realities.

However, there is a glaring lack of scientific data accurately describing the hemostatic profile of pregnant women in Gabon. This gap is particularly marked in the interior provinces, such as Haut-Ogooué, where demographic and epidemiological specificities may differ from those observed in the capital. Furthermore, applying reference values established in Western populations can lead to clinical interpretation errors, either by inappropriately medicalizing benign physiological variations or by overlooking early warning signs of severe pathologies, such as disseminated intravascular coagulation (DIC) [5]. Consequently, this absence of local data considerably limits the optimization of transfusion protocols and the implementation of effective preventive strategies against hemorrhagic or thrombotic complications [6].

It is within this context that the present cross-sectional study was undertaken, with the primary objective of describing the hemostatic profile (prothrombin time, activated partial thromboplastin time, and platelet count) of pregnant women in their third trimester, followed at the Amissa Bongo University Hospital Center (CHU) in Franceville. Secondly, this research aimed to identify sociodemographic and clinical factors (such as age, parity, or place of residence) potentially associated with the observed biological abnormalities. Ultimately, the results of this work should contribute to the development of context-specific reference thresholds, which

are essential for improving obstetric care and ensuring maternal safety in our healthcare environment.

Materials and Methods

Study Setting

The study was conducted at the Amissa Bongo University Hospital Center (CHUAB) in Franceville (Haut-Ogooué, Gabon), the main referral center for obstetrics in the southeastern part of the country.

Design and Period

A descriptive cross-sectional study conducted from January to June 2025.

Study Population

Inclusion Criteria:

All pregnant women presenting at the Amissa Bongo University Hospital Center in Franceville for their prenatal care or delivery were included in this study, provided they cumulatively met the following conditions: being in the third trimester of pregnancy, defined by a gestational age of 28 weeks or more; being aged 15 to 49 years, the age range corresponding to the period of reproductive activity; residing stably in the Franceville health zone for at least three months, to ensure consistent clinical follow-up and minimize biases related to geographical variations in care practices; and having provided written informed consent after being fully informed about the objectives and conduct of the study.

Exclusion criteria:

Conversely, women presenting with factors likely to significantly alter their hemostatic profile, independently of gravid physiology, were excluded from the study. More specifically, exclusion applied to patients with a documented thromboembolic history (deep vein thrombosis, pulmonary embolism), those currently receiving anticoagulant therapy (heparin, direct oral anticoagulants), multiple pregnancies (twins or more), as well as patients with known constitutional or acquired hemorrhagic pathologies, such as hemophilia, hereditary or acquired thrombocytopathies, von Willebrand disease, or severe pre-existing thrombocytopenia ($< 100,000$ platelets/mm³) unrelated to pregnancy. Finally, women with known severe hepatic pathology (cirrhosis, acute hepatitis), likely to alter the synthesis of coagulation factors, as well as those who had experienced an episode of pre-eclampsia or eclampsia during the current pregnancy, were excluded, as these conditions are associated with specific hemostatic abnormalities that would have biased the analysis of the physiological profile.

Sample Size

The 80 included patients corresponded to all eligible women consulting during the study period (exhaustive sampling).

Data Collection

Data were collected using a structured and pre-tested questionnaire, administered face-to-face by trained personnel. This collection focused on three main areas: sociodemographic data (age, residence, parity, prenatal care), medical and surgical history (hemorrhages, thromboses, chronic pathologies), and biological parameters. The latter were evaluated according to standardized protocols, including Prothrombin Time (PT, Quick method, ref. 70–100%), Activated Partial Thromboplastin Time (aPTT, ref. 25–35 s), and platelet count (Sysmex XN-1000® analyzer, ref. 150–400 K/ μ L). Finally, strict pre-analytical conditions were rigorously applied during sampling to guarantee the reliability and reproducibility of the biological results.

Operational Definitions

Gestational thrombocytopenia: Platelets < 150 K/ μ L without any other identifiable cause [6].

Low PT: < 70% of activity.

Prolonged aPTT: > 35 seconds.

Statistical Analysis

Data were analyzed using R software version 4.4.0. Quantitative variables are presented as medians [IQR]; categorical variables as counts (%). Comparisons used the Mann-Whitney U test or Fisher’s exact test (significance threshold: $p < 0.05$).

Ethical Considerations

The study was approved by the USTM Ethics Committee (ref.: 143/2024/CER-USTM). Written informed consent was obtained from each participant.

Results

Sociodemographic Characteristics

The median age was 27 years [22–34]. The distribution was balanced between primiparas (31.3%) and multiparas (68.8%). The majority resided in an urban area (85.0%) and benefited from regular prenatal care (92.5%). Only 12.5% of the patients reported a personal history of hemorrhage (Table 1).

Variable	Category	Count (n)	Percentage (%)	Median [IQR]
Age (years)	—	—	—	27 [22–34]
	< 20 years	8	10.0 %	—
	20–34 years	48	60.0 %	—
	$\geq$ 35 years	24	30.0 %	—
Place of residence	Urban	68	85.0 %	—
	Rural	12	15.0 %	—
Parity	0–1 child	25	31.3 %	—
	$\geq$ 2 children	55	68.7 %	—
Prenatal care	Yes	74	92.5 %	—
	None	5	7,5 %	—
Hemorrhagic history	Yes	10	12.5 %	—
	No	70	87,5 %	—
Thromboembolic history	None	80	100.0 %	—
Anticoagulant therapy	None	80	100.0 %	—

Table 1: Sociodemographic and clinical characteristics of the population (n = 80)

IQR: Interquartile range

None: Unremarkable / No history

Descriptive Analysis of Global Hemostatic Parameters in the Population (n = 80)

Table 2 presents the global hemostasis parameters for our 80 patients, revealing a profile at the limits of physiological values, yet marked by a notable prevalence of abnormalities. Regarding plasma coagulation, the median Prothrombin Time (PT) was established at 71% [IQR: 67–77], at the lower limit of normal, while the median Activated Partial Thromboplastin Time (aPTT) reached 34 s [IQR: 31–38], brushing against the upper threshold. Similarly, the median platelet count (158 K/ μ L [IQR: 139–210]) remained in the lower limits, consistent with physiological gestational thrombocytopenia. However, pathological extreme values were observed, such as severe hypoprothrombinemia (minimum PT of 12%), significant aPTT prolongations (up to 57 s), and profound thrombocytopenia (55 K/ μ L). Even more concerning, nearly half of the patients (46.3%) presented with a PT < 70%, 35.0% with an aPTT > 35 s, and 41.3% with thrombocytopenia (< 150 K/ μ L).

Parameter	Median value [IQR]	M i n i m u m value	Minimum value	Clinical reference	Abnormality (%)
Prothrombin Time (PT)	71 % [67–77]	12 %*	100 %	70–100 %	46.3 % (< 70 %)
Activated Partial Thromboplastin Time (aPTT)	34 s [31–38]	15 s*	57 s	25–35 s	35.0 % (> 35 s)
Platelet count	158 K/ μ L [139–210]	55 K/ μ L	522 K/ μ L	150–400 K/ μ L	41.3 % (< 150 K/ μ L)
*Atypical cases: 1 patient with PT = 12% (probable data entry error or undocumented hepatic pathology); 1 patient with aPTT = 15 s (outlier value, excluded from final analyses).					

Table 2: Global hemostatic parameters (n = 80)

Distribution of Thrombocytopenia According to Clinical Severity Thresholds

Table 3 details the distribution of patients according to different clinical thresholds of platelet count, highlighting both the prevalence and severity of platelet abnormalities within our cohort. While the majority of pregnant women (58.8%, n = 47) had a platelet count within normal limits (150–400 K/ μ L), it is important to emphasize that over 40% of the sample (41.2%) presented with a variable degree of thrombocytopenia. This platelet decrease was predominantly mild (100–149 K/ μ L), affecting 35.0% of the patients (n = 28). However, more concerning forms were also identified. Moderate thrombocytopenia (50–99 K/ μ L) was observed in 5.0% of the women (n = 4). Critically, one isolated case (1.3%) presented with severe thrombocytopenia (< 50 K/ μ L).

Platelet category	Count (n)	Percentage (%)
< 50 K/ μ L	1	1.3 %
50–99 K/ μ L	4	5.0 %
100–149 K/ μ L	28	35.0 %
150–400 K/ μ L	47	58.8 %
> 400 K/ μ L	0	0.0 %
Total	80	100.0 %

Table 3: Distribution of thrombocytopenia according to clinical thresholds

Note: No severe thrombocytopenia (< 50 K/ μ L) was documented after verification of the raw data.

Influence of Hemorrhagic History on the Current Hemostatic Profile

To evaluate the impact of a hemorrhagic history on the current state of coagulation, a comparative analysis of hemostatic parameters was performed between patients with a history of hemorrhage (n = 10) and those without (n = 70), as detailed in Table 4. Statistical analysis revealed a significant difference regarding Prothrombin Time (PT). Indeed, patients with a history of hemorrhage presented a significantly lower median PT (67% [IQR: 64–70]) compared to the group without such history (72% [IQR: 68–77]), corresponding to a median difference of -5 percentage points (p = 0.032). Conversely, no statistically significant difference was observed for the Activated Partial Thromboplastin Time (aPTT) (p = 0.410) or for the platelet count (p = 0.280). Although the median platelet count appears numerically lower in the group with a history (146 K/ μ L vs. 159 K/ μ L), this trend does not reach the threshold of statistical significance.

Parameter	Hemorrhagic history (n = 10)	No history (n = 70)	p-value	Median difference
PT (%)	67 [64–70]	72 [68–77]	0.32	–5 points
aPTT (s)	35 [32–40]	34 [31–37]	0.410	NS
Platelets (K/ μ L)	146 [131–164]	159 [140–212]	0.280	NS
NS: Not significant				

Table 4: Comparison of hemostatic parameters according to hemorrhagic history (Mann-Whitney test, significance threshold p < 0.05)

Analysis of Associations between Clinical/Sociodemographic Factors and Hemostatic Abnormalities

To identify potential clinical or sociodemographic determinants associated with the hemostatic abnormalities observed in our cohort, a bivariate analysis was performed between the main explanatory variables (history of hemorrhage, parity, place of residence, age) and the biological parameters of interest (PT, aPTT, platelet count). The results of this analysis are summarized in Table 5. Among all the associations tested, only one reached the threshold of statistical significance. Patients reporting a personal history of hemorrhage presented a significantly lower median Prothrombin Time (PT) (67% vs. 72%; p = 0.032). Conversely, no significant association was found between the occurrence of thrombocytopenia and age (p = 0.680), parity (p = 0.340), or place of residence (p = 0.520). Furthermore, a non-significant trend was observed between multiparity and the prevalence of prolonged aPTT (42.3% in multiparous women vs. 28.0% in primiparous women; p = 0.190).

Variable studied	Hemostatic parameter evaluated	Group 1 (Value or %)	Group 2 (Value or %)	p-value
History of hemorrhage	Prothrombin Time (PT, %)	67% (with history)	72% (without history)	0.032*
Parity	Prolonged aPTT (> 35 s, %)	42.3% (multiparous)	28.0 % (primiparous)	0.190
Parity	Thrombocytopenia (< 150 K/ μ L, %)	-	-	0.340
Lieu de résidence	Thrombocytopenia (< 150 K/ μ L, %)	-	-	0.520
Âge	Thrombocytopenia (< 150 K/ μ L, %)	-	-	0.680
* Mann-Whitney test for continuous variables (PT) and Chi-square or Fisher's exact test for categorical variables. Significance threshold set at p < 0.05.				

Table 5: Association between clinical/sociodemographic factors and hemostatic abnormalities (n = 80)

Discussion

This cross-sectional study, conducted at the Amissa Bongo University Hospital Center in Franceville, provided an unprecedented portrait of the hemostatic profile of pregnant women in the third trimester in the Haut-Ogooué province of Gabon. Our main results revealed a high prevalence of hemostatic abnormalities, despite a cohort that was generally young (median age of 27 years), predominantly urban (85.0%), and benefiting from excellent prenatal care (92.5%). Pregnancy naturally induces a state of relative hypercoagulability, characterized by an increase in coagulation factors and a slight physiological decrease in platelets, aimed at preventing delivery hemorrhage [7]. However, in our cohort, plasma coagulation parameters were systematically at the extreme limits of normality: the median Prothrombin Time (PT) was established at 71%, and the median Activated Partial Thromboplastin Time (aPTT) at 34 s. More concerning, nearly half of the patients (46.3%) presented with a PT below 70%, and 35.0% with an aPTT prolonged beyond reference values. These abnormality rates exceed what is classically expected in normal physiological adaptation [8]. This observation could be explained by environmental or nutritional factors endemic to sub-Saharan Africa, such as vitamin K deficiencies or subclinical hepatopathies (e.g., gestational malaria or viral hepatitis), which are known to alter the hepatic synthesis of vitamin K-dependent factors, although these parameters were not systematically evaluated in the present study [9]. Regarding primary hemostasis, thrombocytopenia was observed in 41.3% of pregnant women, a figure consistent with literature data in Africa, where prevalences generally range between 10% and 45% depending on the region [10]. The majority of these cases (35.0%) were mild (100–149 K/ μ L), which is highly suggestive of benign gestational thrombocytopenia, a physiological phenomenon primarily linked to hemodilution and increased platelet consumption at the level of the placental vascular bed [11]. However, the presence of moderate cases (5.0%) and extreme values (up to 55 K/ μ L) imposes increased clinical vigilance. Indeed, although severe thrombocytopenia (< 50 K/ μ L) was extremely rare in our sample (1.3%), it represents a major risk factor for postpartum hemorrhage, which remains the leading cause of maternal mortality in Gabon [12]. A striking and clinically relevant result of our analysis was the statistically significant association between a personal history of hemorrhage and a lower PT (67% vs. 72%; $p = 0.032$). This link suggests that residual hypoprothrombinemia or fragility of the extrinsic coagulation pathway may persist in these women, predisposing them to abnormal bleeding. This finding corroborates recent work highlighting the crucial importance of a meticulous obstetric interview, as a hemorrhagic history constitutes an independent predictor of recurrence during childbirth [13]. Conversely, unlike some studies that have reported a link between multiparity,

advanced age, or rural settings and hemostatic disorders [14], we did not demonstrate a significant association between these sociodemographic factors and the occurrence of thrombocytopenia ($p > 0.30$ for all). Interestingly, a non-significant trend was observed between multiparity and the prevalence of prolonged aPTT (42.3% in multiparous women vs. 28.0% in primiparous women; $p = 0.190$). This lack of frank correlation could be explained by the relatively modest size of our sample ($n = 80$), which limits the statistical power of the analysis. Furthermore, the homogeneity of our cohort, predominantly urban and well-monitored prenatally, likely mitigated the disparities usually observed between urban and rural settings regarding access to care and nutritional status [15].

Strengths and Limitations of the Study

The main strength of this work lies in its pioneering nature for the Haut-Ogooué region, providing valuable local data for the adaptation of transfusion protocols and obstetric management. Nevertheless, several limitations must be acknowledged. First, the cross-sectional design and the restricted sample size do not allow for the establishment of formal causal links or the generalization of the results to the entire national territory. Second, the absence of specific coagulation factor assays or platelet function tests limits the elucidation of the exact pathophysiological mechanisms of the observed abnormalities. Finally, the presence of outlier values (e.g., aPTT of 15 s) underscores the critical importance of pre-analytical rigor, although these cases were excluded from the final analyses to avoid biasing the results.

Conclusion and Perspectives

In conclusion, this study revealed a hemostatic profile at the limits of physiology among pregnant women in southeastern Gabon, with a notable prevalence of thrombocytopenia and PT prolongation, particularly among women with a history of hemorrhage. These data advocate for the systematic integration of a basic hemostasis workup during the third trimester of pregnancy in Gabonese healthcare facilities, in accordance with international recommendations for the management of obstetric complications [16], in order to identify at-risk patients early. Larger-scale prospective studies, including specific coagulation factor assays and follow-up through the postpartum period, would be necessary to validate these alert thresholds and evaluate their actual impact on reducing maternal hemorrhagic morbidity.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest related to this article.

AUTHOR CONTRIBUTIONS

Doré Levid MABIKA designed the study and performed the sample collection. Carson Béchir EBIENGA performed the laboratory analyses and wrote the first draft of the manuscript. Thiéry NDONG MBA supervised the methodology, performed the statistical analyses and critically revised the manuscript. All authors approved the final submitted version.

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