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Assessment of Some Haemostatic Indices Among Hypertensive Pregnant Women Attending University of Port Harcourt Teaching Hospital, NigeriaBeauty Eruchi Echonwere-Uwikor*¹, Fred Kpane Uwikor²Department of Haematology and Blood Transfusion Science, Faculty of Medical Laboratory Science, Rivers State University, Port Harcourt ¹, Department of Haematology and Blood Transfusion Science, University of Port Harcourt Teaching Hospital, Rivers State ².

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<https://dx.doi.org/10.4314/sokjmls.v9i4.12>**Abstract**

Hypertensive disorders in pregnancy, including pre-eclampsia and gestational hypertension, are leading contributors to maternal and foetal complications. These conditions are associated with significant haemostatic alterations, which predispose affected women to thrombotic risks. Haemostasis involves a balance between clot formation and breakdown, and disruptions in this balance, often seen in hypertensive pregnancies, may increase the likelihood of thrombotic events such as deep vein thrombosis or pulmonary embolism. The aim of this study was to assess haemostatic alterations in hypertensive pregnant women and evaluate the implications for thrombotic risks. This cross-sectional study was conducted to assess haemostatic parameters among hypertensive pregnant women attending antenatal clinic at University of Port Harcourt Teaching Hospital, Nigeria. A total of 150 pregnant women were recruited, they comprised 75 hypertensive pregnant women and 75 normotensive who served as control, all within the ages of 18 and 43 years. A well-structured questionnaire was used to obtain the socio-demographic data from the pregnant women. Three (3) ml of venous blood was collected aseptically from the participants to assess haemostatic variables and dispensed into 0.3 ml of trisodium citrate anticoagulant bottle for estimation of prothrombin time and activated partial thromboplastin time, giving a blood to anticoagulant ratio of 9:1. The prothrombin time (PT) and activated partial thromboplastin time was done manually. The data generated from this study was analyzed using Graphpad Prism software version 6.00, USA. Data was presented as means and standard deviation and comparison between two means was done using student t-test analysis. Among the 75 hypertensive women studied, 27 (36%) were

classified as having stage 1 hypertension and 48 (64%) as stage 2 hypertension. The systolic and diastolic blood pressure status of women in the hypertensive group was significantly higher than those women in the normotensive control group ($p < 0.001$). The mean prothrombin time (PT) and mean thromboplastin time (APPT) among hypertensive women were 8.53 ± 0.68 and 33.3 ± 0.83 respectively, and this did not differ significantly among normotensive controls. Prothrombin time (PT) and activated partial thromboplastin time (APPT) did not correlate significantly with severity of hypertension. The study revealed that hypertensive pregnant women exhibit haemostatic alterations that can potentially predispose them to a higher risk of thrombotic events. These findings underscore the need for regular haemostatic monitoring and early interventions to mitigate thrombotic risks in hypertensive pregnancies in Port Harcourt.

Keywords: *Haemostatic alterations, Hypertensive pregnancy, Thrombotic risks, Port Harcourt.*

Introduction

Hypertensive disorders of pregnancy (HDP), which encompass gestational hypertension, preeclampsia, and eclampsia, are among the leading causes of maternal and fetal morbidity and mortality worldwide. These conditions affect approximately 10% of pregnancies globally and are particularly common in low and middle-income countries (LMICs) such as Nigeria, where access to quality prenatal care may be limited (Kintiraki *et al.*, 2015; Magee *et al.*, 2022). In Nigeria, HDP contributes significantly to the high maternal mortality rate, as many women lack timely diagnosis and management of these life-threatening conditions (Akinmoladun *et al.*, 2021). One of the primary complications associated with HDP is the profound

alteration in haemostatic processes, which increases the risk of thrombotic events such as deep vein thrombosis (DVT), pulmonary embolism (PE), placental abruption, and stroke (Sibai *et al.*, 2021; D'Souza *et al.*, 2022).

Haemostasis, is the process by which the body prevents and stops bleeding. It involves a delicate balance between procoagulant and anticoagulant pathways. In normal pregnancies, physiological changes occur within the haemostatic system, leading to a mild hypercoagulable state that helps to prevent excessive blood loss during childbirth. These changes include increased levels of clotting factors, reduced fibrinolytic activity, and enhanced platelet aggregation (Dekker *et al.*, 2021). It has been established that normal pregnancy is associated with major changes in many aspects of haemostasis all contributing to maintain placental function during pregnancy and to prevent excessive bleeding in delivery (Echonwere-Uwikor *et al.*, 2022). However, in hypertensive pregnancies, this balance is disrupted due to endothelial dysfunction, increased vascular resistance, and systemic inflammation, all of which contribute to exaggerated haemostatic alterations. As a result, hypertensive pregnant women are at a heightened risk of developing thrombotic complications (López-Pedreira *et al.*, 2021).

In hypertensive pregnancies, haemostatic alterations are often marked by elevated levels of fibrinogen, decreased platelet counts (thrombocytopenia), prolonged prothrombin time (PT), and activated partial thromboplastin time (APTT), which reflect the systemic activation of coagulation pathways. These changes not only increase the risk of thrombosis but also contribute to adverse maternal outcomes such as disseminated intravascular coagulation (DIC), HELLP syndrome (haemolysis, elevated liver enzymes, and low platelet count), and increased risk of severe postpartum haemorrhage (Eddins *et al.*, 2021; Magee *et al.*, 2022). Moreover, evidence suggests that the severity of haemostatic alterations correlates with the degree of hypertension, with preeclampsia being associated with more profound coagulopathy compared to gestational hypertension (Rana *et al.*, 2022).

The impact of haemostatic changes in hypertensive pregnancies extends beyond maternal health to affect foetal outcomes. Poor placental perfusion, driven by endothelial dysfunction and thrombotic events in the uteroplacental circulation, is a major contributor to intrauterine growth restriction (IUGR), preterm birth, and fetal distress in women with HDP (Sibai *et al.*, 2021). These complications highlight the importance of early detection and management of haemostatic alterations to mitigate the risks of maternal and foetal morbidity.

In Nigeria, and particularly in urban areas such as Port Harcourt, hypertensive disorders during pregnancy remain a significant public health issue. Despite the high prevalence of these conditions, there is a paucity of data on the specific haemostatic changes that occur in hypertensive pregnant women in this region and the corresponding implications for thrombotic risk. This lack of data poses a challenge to healthcare providers, as optimal management of HDP requires a clear understanding of the coagulation dynamics in affected patients (Reddy *et al.*, 2021).

Materials and Methods

Study Design

A cross-sectional study was carried to access the haemostatic parameters among hypertensive pregnant women attending antenatal care at University of Port Harcourt Teaching Hospital Rivers State.

Study Area

The study was carried out to access the haematological parameters among hypertensive pregnant women attending antenatal care at University of Port Harcourt Teaching Hospital, Rivers State.

Study Population

The study was carried out among hypertensive pregnant women attending antenatal care University of Port Harcourt Teaching Hospital, Rivers State. A total of 150 samples were collected for this study. Seventy-five (75) samples from confirmed hypertensive pregnant women and 75 from apparently healthy normotensive pregnant women all between the ages of 18-43 years.

Eligibility Criteria

Inclusion criteria

The inclusion criteria include:

1. Pregnant women more than 28 weeks gestation of pregnancy with blood pressure >140/90mmhg.
2. Women between the ages 18 to 45 years.
3. Consenting hypertensive pregnant women

Exclusion criteria

The exclusion criteria include:

1. Non-pregnant women.
2. Pregnant women who are not hypertensive.
3. Women with previous history of hypertension and proteinuria before conception or before 20 weeks of gestation.
4. Pregnant women with history of systemic illnesses like diabetes mellitus, renal disease, and liver disease.
5. Non-consenting hypertensive pregnant women

Informed Consent

Informed consent was obtained from participants before blood collection. Blood pressure was confirmed for each participant prior to blood collection and the participants were made to understand the nature of the study and the fact that the participation is voluntary with confidentiality of recovered data

maintained at all times during and after the study. Using a well-structured questionnaire socio-demographic data was obtained from the pregnant women. Ethical approval was obtained from the Ethical Committee of the Rivers State Hospital Management Board.

Blood collection

Three (3) ml of venous blood was collected aseptically from the participants and dispensed into 0.3 ml of trisodium citrate for estimation of prothrombin time and activated partial thromboplastin time.

Sample Analysis

The Prothrombin Time (PT) and Activated Partial Thromboplastin Time (APTT) were done manually as described by Cheesbrough (2006).

Data Analysis

The data obtained was analyzed using Graphpad prism software version 6.00 produced by Graphpad software Inc. USA. Data was presented as means and standard deviation and comparison between two means was done using student t-test analysis while comparison between more than two was done using the one-way analysis of variance (ANOVA).

Results

Table 1: Demographic Characteristics of Study

	Hypertensive (n=75)		Normotensive (n=75)		T	p-value
	Frequency	Percent	Frequency	Percent		
Age group (years)						
Less than 30	34	45.3	39	52	0.667	0.414
30 and above	41	54.7	36	48		
Mean age (SD) (years)	29.99 (5.78)		29.2 (5.93)		0.823	0.412
Parity						
Nil	14	18.7	16	21.3	5.233	0.264
One	25	33.3	26	34.7		
Two	25	33.3	22	29.3		
Three	7	9.3	11	14.7		
Four	4	5.3	0	0		
Blood Pressure Status					T	p-value
Mean SBP (SD)	153.83 (16.23)		123 (9.34)		14.259	<0.001*
Mean DBP (SD)	100.85 (8.42)		78.04 (12.15)		13.364	<0.001*

Table 2: Mean ± SD of Haemostatic Parameters

Parameter	n	Normotensive		T	p-value
		Mean ± SD	n		
PT	75	8.53 ± 0.68	75	8.51±0.50	0.272
APPT	75	33.30 ± 0.83	75	33.21 ±0.72	0.712

Discussion

There was no significant difference observed in the PT and APTT values among the normotensive and hypertensive pregnant women in the study. Also, the association of severity with the parameters did not show any significant difference in the PT and APTT values. A hypercoagulative or thrombophilic tendency has been found to be a physiologic feature of late stages of pregnancy, and it is said to be more pronounced in hypertensive disorders of pregnancy compared to normotensive. This has been attributed to increased thrombin generation in pregnant women with hypertension (Benedetto *et al.*, 2010; Macey *et al.*, 2010). These findings were not reflected in the present study as both groups had similar PT and APTT values. Mtali *et al.* (2019) revealed that the median prothrombin time (PT) was lower in the pregnant women with hypertension than in the normotensive group. Bhutani *et al.* (2022) revealed that the mean prothrombin time of patients with gestational hypertension was 16.6 s, mild preeclampsia patients was 17.6 s and severe preeclampsia patients was 18.8 s as this yielded a statistically significant difference between the prothrombin time of patients with gestational hypertension, mild preeclampsia and severe preeclampsia. Mushtaque (Mushtaque, 2012) also found a significant difference in the mean APTT for normal pregnancy, gestational hypertension and mild preeclampsia and severe eclampsia.

Conclusion

This study assessed some haemostatic indices among hypertensive pregnant women in Port Harcourt and compared them to normotensive controls. Despite the well-established hypercoagulable state in hypertensive pregnancies, the findings of this study did not reveal significant differences in prothrombin time (PT) or activated partial thromboplastin time

(APTT) between the hypertensive and normotensive groups. Moreover, the severity of hypertension did not significantly correlate with changes in these haemostatic parameters. These results suggest that while hypertension in pregnancy is known to heighten thrombotic risks, the specific haemostatic alterations observed in this study may not fully capture the risk. Nevertheless, the potential for thrombotic events in hypertensive pregnancies highlights the importance of continuous haemostatic monitoring and early intervention to manage thrombotic risks effectively. Further research with a broader range of coagulation markers may be needed to better understand the haemostatic dynamics in hypertensive pregnancies in this population.

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