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Evaluation of Haemostatic Parameters of Diabetic Patients Accessing Care in Some Selected Health Care Facilities in Port Harcourt Metropolis, Nigeria

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Abstract

It is an established fact that diabetic patients are prone to microvascular and macrovascular complications that could affect the entire body system therefore, worsen their health status increasingly. This literally poses huge health burden that leads to massive disease progression, more often, the life expectancy of the patients are grossly reduced systematically as the disease condition continue to progress unabatedly in their life time. Thus, understanding the nature and extent of haemostatic derangement that underscore these complications remain a challenge. This study aimed at evaluating the prevalence of haemostatic disorder among diabetic patients and ascertaining the association between diabetes and haemostatic abnormalities. The observational cross-sectional study randomly recruited fifty subjects, thirty known diabetic patients and twenty non diabetic subjects (control) all in Port Harcourt Metropolis. The laboratory investigations were performed following enzymatic and clot formation methods. The haemostatic parameters of the Diabetic patients descriptively revealed means and standard deviations of 42.17±16.56 years, 15.22±4.22 mmol/L, 5.33±1.81 minutes, 6.60±3.33 minutes, 46.10±12.06 seconds, 19.18±2.65 seconds and 1.37±0.34 for age, FBS (Fasting Blood Sugar), BT (Bleeding Time), CT (Clotting Time), (APTT, PT (Prothrombin Time) and INR values respectively. The twenty (20) control subjects recorded a mean age of 47.35±16.94years, FBS 4.41 ± 0.19, and haemostatic parameters; 4.25 ± 1.43 minutes, 34.50 ± 2.42 seconds, 14.95 ± 1.27 seconds and 1.07 ± 0.31 for bleeding time (BT), APTT, PT and INR respectively. BT were all normal in both groups (p=0.012) whereas, others showed percentage abnormalities with a proof of marked significance value; CT 4 {(8%) (p=0.005)}; APTT 24 {(48%) (p=0.000)}and PT 26 {(52%) (p=0.000). Correlation analysis showed that there exist a correlation between the FBS and APTT, PT and INR (r=0.563, p=0.000; r=0.601, p=0.000 and r=0.427, p=0.002) in that order at 0.01 level of significance. Remarkably, higher levels were pronounced in the haemostatic parameters of Diabetic patients than non-diabetics (control subjects) thus, these have explained the presumed roles played by hyperglycemia in haemostatic derangement. It is therefore; very pertinent that coagulation screening assay be done also, factor assay and fibrinolytic parameters should be considered.

Keywords: Diabetes Mellitus, Haemostasis, Prothrombin, APTT, Accessing Care, Health Facility, Niger Delta

Introduction

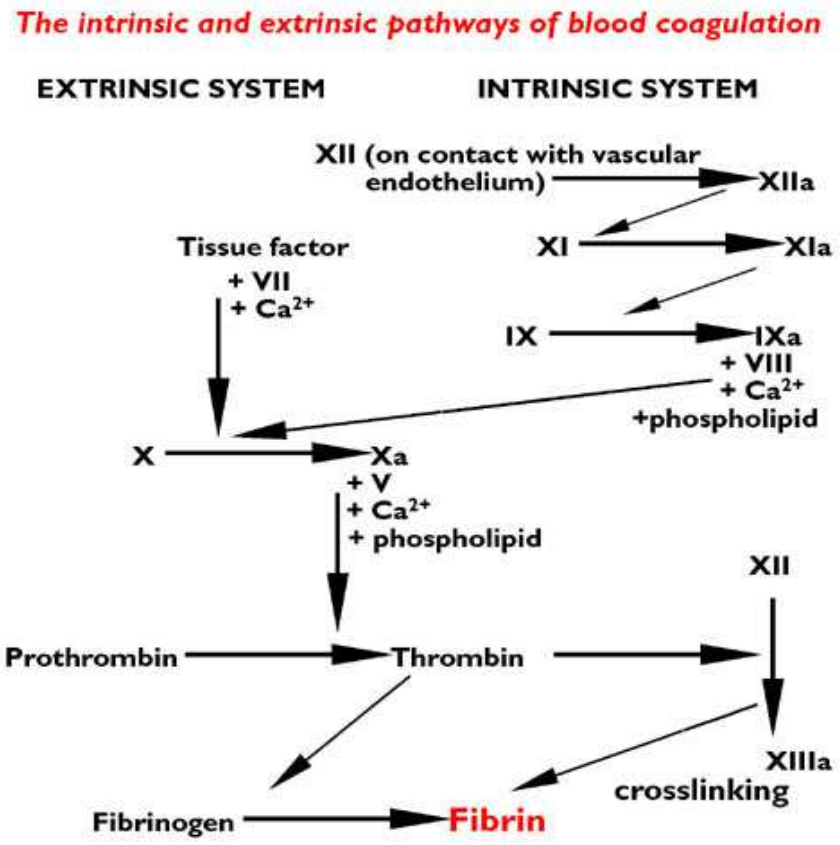
Diabetes mellitus is a common endocrine disease of multiple etiological agents (Ogunkolo & Alebiosu, 2006; Oguntona & Amballi, 2005). It is characterized by chronic high level of glucose in the blood with consequent impairment of carbohydrates, fat and protein metabolism at critical levels (Momo *et al.,* 2006). Studies have shown that patients with diabetes (DM) have abnormal metabolic and hemostatic parameters and whereas other researchers have also reported no form of abnormality hence promoting conflicting report of evidence with respect to the association of Diabetics mellitus with the disease of the endocrine system (Fayeza *et al.,* 2015; Dallatu *et al*., 2010). Nonetheless, at some point in the previous few years, increased awareness has been given to the complex metabolic changes that are associated with diabetes mellitus type 2 and insulin resistance condition across the globe. In Nigeria and the world at large, Diabetes is a major public health problem with about 90% of diabetic patients having non insulin type II while about 10% have insulin dependent associated illness (Ohwworiola *et al*., 1998). Diabetes mellitus have a high risk of atherothrombotic events health outcome. Many studies have shown a variety of diabetes mellitus related abnormalities in hemostasis and thrombosis; thus, diabetic patients are prone to high risk of atherothrombosis, which contributes to initiation and progression of both microvascular and macrovascular complications (Todd, 2008). Abnormal haemostasis is expressed either as high or low as reported by some studies. A recent cross sectional study which was conducted in Dhaka from July 2013 to June 2014 recruited one hundred (100) male patients with the type 2 Diabetes mellitus, the study was done with respect to age, BMI matched healthy subjects were included as control. The study showed that PT and APTT were significantly lower in diabetes mellitus patients than those of the control subjects; though the study considered only male type 2 diabetes mellitus hence, may lack evidence based research outcome to generalize some key research findings especially in a mixed population of male and female (Fayeza *et al.,* 2015).

Abnormal haemostasis hugely occur in diabetes due to the factors involved in blood clotting that are basically synthesized in the liver organ and present in plasma thus, any alteration in the liver or plasma could affect the coagulation factors synthesis as well as storage. The liver has about 5-8% of glycogen, excess glycogen stored in the liver results in malfunctioning of the liver which in-turn results to impairment in the synthesis of coagulation factors (Erika, 2012).

It was strongly reported that vitamin K deficiency can cause a suppression in the synthesis of coagulation factors like prothrombin, factors VII, IX, X and protein C (Coller, 2012). Nonetheless, Vitamin K is synthesized in the gastrointestinal tracts by bacteria hence, disturbances in the GIT such as mal-absorption of fat may probably affect it's synthesis and subsequent absorption since vitamin K is fat soluble compound and it is absorbed into the blood circulation vessel alongside with the fat compounds (Guyton & Hall, 2006). Nonetheless, many studies have shown the effects of hyperglyceamia on the haemostasis ranging from low according to Fayeza *et al.* (2015) to prolonged levels of coagulation parameters in blood according to Dallatu *et al*. (2010). The coagulation factors are present in the plasma and prolonged exposure of the blood cells to high glucose level causes glycation of haemoglobin and decrease of other clotting factors according to Selvin *et al.,*(2010); this results to

an incomplete activation of the coagulation cascade (extrinsic and intrinsic) (Lippi *et al*., 2009; Qin, *et al*., 2004).

Nevertheless, clotting factors are mainly proteins compounds and numerous complex molecules, they are also found to be in inactive states in the blood but can be activated when a blood vessel or tissue is potentially damaged (Alesci *et al*., 2008). The activation of these clotting factors follows two pathways (cascades) namely: intrinsic and extrinsic pathways. some specific factors have been proposed as diagnostic marker for the various pathways such as prothrombin time (PT) and activated partial thromboplastin time (APTT) (Hinchcliff *et al.,* 2004; Kucharska-Newton *et al*., 2009; Merlo *et al*., 2002). Prothrombin time which measures the extrinsic cascade of the coagulation involving the activity of the factors I, II, V, VII, and X of the extrinsic and common pathways (Hinchcliff *et al.,* 2004). Activated partial thromboplastin time is used to screen for abnormalities of the intrinsic and common clotting systems; it measures the activities of factors I, II, V, VIII, IX, XI, and XII respectively (Iazbik *et al.*, 2001).



Schematic representation of the coagulation pathways (Coller, 2005).

The prolongation of the PT indicates disorder of the extrinsic pathway of coagulation involving factor VII, whereas prolongation of the PTT strongly suggest disorder of

the intrinsic pathway, most commonly factor VIII or IX, and uncommonly deficiency in factor XI or XII. The abnormality of both the PT and PTT leads to consideration of either abnormalities of multiple coagulation factors or less commonly a deficiency or inhibitor of the common pathway factors II, V, X, or fibrinogen. In addition, haemostatic derangement arises when there is a total lack or inadequacy in any of the coagulation factors or the presence of acquired inhibitors (Hinchcliff *et al.,* 2004; Iazbik *et al.*, 2001; Kucharska-Newton *et al*., 2009; Lippi *et al*., 2009; Merlo *et al*., 2002; Qin, *et al*., 2004).

Table1
Summary of the Haemostatic changes observed in diabetic patients

Haemostatic Parameters	**Function**	**Factor Changes in DM**	**Effect in DM**
Bleeding Time	Measures platelet function and vascular integrity	↑levels or normal	↑platelet activation
Clotting Time	Measures the integrity of intrinsic pathway (Factors xii, xi, x, ix, viii, vii & v)	↑levels or normal	↑thrombosis
APTT	Measures intrinsic pathway (Factors xii, xi, x, ix, viii, vii, v & fibrinogen)	↑levels / ↑glycation	Altered clot structure/ ↑thrombosis
Prothrombin Time	Measures extrinsic pathway (Factors i, ii, v, vii & x)	↑levels / ↑glycation	↑thrombosis/ Altered clot structure

↑= Increased;

(Colman, *et al.,* 2003; Dallatu *et al*., 2010; Hinchcliff *et al.,* 2004; Iazbik *et al.*, 2001; Kucharska-Newton *et al*., 2009; Merlo *et al*., 2002).

Diabetes Mellitus is a major health problem that results to significant morbidity and mortality from diverse complications. Diabetes mellitus is associated with disturbances in haemostasis that could massively contribute to the development of thrombohaemorrhagic complications that are critically recognized among diabetic populations (Dallatu *et al*., 2010). A lot of the previous studies in Diabetes mellitus did not fairly consider haemostasis as a serious public health issue, hence, there is a huge

death of data/information from this part of the country (Niger Delta) on the subject matter. Thus, this present study was undertaken to determine the activities of coagulation variables in Diabetes mellitus as these would help to understand their roles and health implication. Furthermore, this study by extension also, intends to further establish the association between diabetes mellitus with the disturbance of the haemostatic system. It is however believed, that the information from this study will enhance the robust understanding of this disorder, and the utilization of these data would help for better patient management strategy, prevention and diagnosis of the disease in general especially in developing communities where access to functional health facilities still remains a huge challenge with massive confounding public health implications.

Research Location/Population Recruitment

The study explored patients attending Diabetology Clinics of University of Port Harcourt Teaching Hospital, Braithwaite Memorial Specialist Hospital and Christian Medical Centre. Control subjects were staff and students of Rivers State University of Science and Technology all in Port Harcourt, Rivers State, Niger Delta Region of Nigeria.

Description of Research Location

Port Harcourt is the capital of Rivers state and headquarter of all Niger Delta States in Nigeria which are also known as, oil producing states in Nigeria (Azuonwu *et al*., 2015). It lies along the Bonny River and is located in the Niger Delta region. According to the 2006 Nigerian population census, Port Harcourt has a population of 1,382,592. Its main purpose was to export the coal through the creeks to the south of the original port were the fishing camps are located. After the discovery of crude oil in Oloibiri in 1956, Port Harcourt exported the first shipload from Nigeria in 1958. Port Harcourt is the centre of the Nigerian oil economy and had subsequently reaped both good and bad benefits of its associations with the petroleum industry through the various processes of modernization and urbanization. The city is a major industrial centre as it has a large number of multi-national firms as well as other industrial activities, particularly business related to the petroleum industry. It is believed to be the most prominent oil-refining city in Nigeria and harbours two main oil refineries that process about 210,000 barrels of crude oil per day. Rivers State is one of the wealthiest states in Nigeria in terms of gross domestic product and foreign exchange revenue from the oil industry despite the current economic challenges that is facing Nigeria as at today. Crude oil has been its main export earnings. Port Harcourt's growth is further increasing exponentially due to its position as the commercial nerve Centre, the foremost industrial city of the former eastern region of Nigeria and its importance as the centre of social and economic life of Rivers State. From an area of 15.54 km^2 in 1914, Port Harcourt grew uncontrollably to an area of 360 km^2 in the 1980s. Port Harcourt features a tropical monsoon climate with lengthy and heavy rains and very short dry season across the year. The major occupations of the citizens are petty trading, fishing and farming (Williams, 2008; Hudgens &Trillo, 2003).

Inclusion Criteria*:* The study included a total of fifty participants; thirty diabetic patients and twenty non diabetic subjects. All subjects recruited for this study were willing to participate and Volunteer normoglycaemic subjects were used as control subjects. Normoglycaemia was determined by performing fasting blood sugar to estimate glucose level and subjects with normal range 3.3 – 5.5mg/dl were included. All subjects who were 17years and above resident in the Niger Delta communities were recruited to participate in the research. In addition, those diagnose of diabetes for at least six months and above from the time of the study and those with no known history of cardiovascular diseases as well as those with no other metabolic disorders apart from diabetes were recruited. These formed very strong elements as inclusion criteria.

Exclusion Criteria: Those with other metabolic disorders were excluded from the study. Those less than 17 years of age were not allowed to participate as well as individuals who did not consent to be involved were also removed from the study. Those not fasting i.e. who must have eaten their meal before coming to the clinic because a fasting blood sample was needed for the determination of the blood glucose, smokers and those with known cases or family history of obesity, cardiovascular disease, other metabolic disorders like high lipid profile to rule out confounders were excluded. Metabolic disorder was evaluated by checking the blood pressure of the participants, glucose estimation, body mass index and lipid profile with the use of the participant's personal/family history.

Methodology and Experimental Design

Observational cross-sectional study design was the approach used for this study. Sample Size was determined using sample size calculator (WinPepi version 11.44). The Study participants were selected by simple random sampling technique with the use of the routine clinic attendance. Data collection was done using a structured questionnaire on socio-demographic data was used in this study. Patient's history including life style were collected to capture risk factors like such as age, sex, level of education, marital status, occupation, dietary habits, smoking habits, family history of heart attack, alcohol consumption, drug history of lipid lowering drugs, antidiabetic drugs and antihypertensive. Past medical history of hypertension and diabetes. Blood pressure (BP) was measure on the right arm and in the sitting position using mercury sphygmomanometer. Physical Examination including height and weight using a standard method, and this was used to calculate body mass index.

Laboratory investigation involved sample collection of 9.0mls of venous blood sample from each patient into disodium citrate anticoagulant (32g/l) container for PT, clothing time and APTT. The blood and anticoagulant were mixed, centrifuged at 1200g - 2000g for 15 minutes, after which the plasma was aspirated using the Pasteur pipette and was analysed with Rayto Coagulation analyzer (RT-2204C) made in China. For glucose estimations, a fasting blood sample was collected and dispensed into a fluoride oxalate and analysed using glucose oxidase method (enzymatic) with SP-300 Optima spectrophotometer (Japan). On the other hand, the above mentioned method was not applicable to bleeding time; it was collected by finger tip or ear lobe

after aseptic precautionary method were applied using Dukes method (Ramnik, 2003; Dacie *et al.,* 2006).

Statistical Analysis

The SPSS statistical package version 21 was used for the analysis. Test of normality was performed using Shapiro-Wilk (S-W) test which provides a better power. The S-W test compared the data to a normal distribution with the same mean and standard deviation of the sample and it showed no evidence of significance ($p>0.05$) which indicated that the samples were normally distributed. Statistical analysis involved comparison between groups. Mean, standard deviations were obtained as well as parametric tests using Pearson correlation and independent t-test were explored to analyze numerical data, to show association and compare means respectively.

Ethical Consideration

Ethical authorization for this study was sought from the ethical committees of the selected Health facilities and Department of Medical Laboratory Science, Rivers State University of Science and Technology respectively. Informed written consent was obtained from the subjects after a detailed information and procedural protocol of the research were duly explained to them; they consented to participate in the research by endorsing on the consent form respectively.

Limitations of Study

The act of unwillingness of some patients to participate, improper documentation of some vital information, short study time duration affected the study to some extent. Also, the study was only focused to those within the Port Harcourt metropolis who are basically living in urban city, hence excluding those living in remote communities of Rivers state, Nigeria.

Results

Haemostatic Parameters in Diabetic Patients of the studied population

The descriptive statistics of haemostatic parameters of the Diabetic patients showed the means and standard deviations of 42.17±16.56 years, 15.22±4.22mmol/L, 5.33±1.81minutes, 6.60±3.33minutes, 46.10±12.06seconds, 19.18±2.65seconds and 1.37±0.34 for age, FBS, BT, CT, APTT and INR values respectively.(table 1)

Table: 1. Descriptive Statistics of Haemostatic Parameters in Diabetic Patients of the studied population

N = 50 Variable Classification	Frequency (%)	Mean±SD	T-Value	P-Value	Remark
Fasting Blood Sugar 3.3 – 5.5mmol/L (Normoglycaemia) >5.5mmol/L (Hyperglycaemia)	20 (40%) 30 (60%)	10.89±6.28	11.279	<0.00001	Sig
Bleeding Time 3 – 10 Minutes (Normal) >10 Minutes (Prolonged)	50 (100) 0 (0%)	4.90±1.68	2.331	0.012002	Sig
Clotting Time 2 - 9 Minutes (Normal) 10 Minutes and above (Prolonged)	46 (92%) 4 (8%)	5.76±2.90	2.656	0.005356	Sig
APTT Equal/Greater than 38seconds 26 - 37 seconds (Normal)	24 (48%) 26 (52%)		4.238	0 .00005	Sig
Prothrombin Time 11.00 - 15.00seconds (Normal) >15seconds (Prolonged)	24 (48%) 26 (52%)	17.40±0.179	7.091	< 0.00001	Sig
INR		1.25±0.31	3.810	0.0004	Sig

The result showed that, all diabetic patients had normal BT (100%), 26 (86.7%) diabetic patients had normal clothing times. The APTT result showed that 24 (80%) of diabetic patients had abnormal results with 6 (20%) having normal values. Similarly, the PT showed 26 (86.7%) prolonged PT and 4 (13.3%) normal results.

Haemostatic Parameters in Non-Diabetic Patients (Control Subjects)

The non-diabetic (control subjects), all had normal results with values either on the lower limits of the normal ranges or mid limit. The twenty (20) control subjects recorded with a mean age of 47.35±16.94 years, FBS 4.41 ± 0.19, and haemostatic parameters; 4.25 ± 1.43 minutes, 34.50 ± 2.42 seconds, 14.95 ± 1.27 seconds and 1.07 ± 0.31 for bleeding time, APTT, PT and INR respectively.

Haemostatic Parameters in Diabetic Patients and Non Diabetic Patients (Control Subjects)

Comparatively, there is an evidence of statistical significances (P=0.000) in the FBS results with a t-value of 11.279. The bleeding times though both groups showed normal values had a t-value of 2.33 (p=0.012) however, the individual values of the diabetic patients were high when compared with the control values (i.e. DM patients had values near the upper limit of the reference range as opposed to the control subjects). Clotting time revealed an indication of statistical significance (p=0.005) with about 4 (8%) of the total study population prolonged/abnormal which are all from the diabetic patients. Also, the 24 (48%) of the subjects with prolonged APTT were all diabetics with a proof of marked significance (p=0.000). Similarly, PT had an abnormality of about 52% which were the diabetic patients showing an indication of significance (p=<0.000); likewise the INR (p=0.000).

Table 2: Mean and Standard Deviation of the Diabetes (N=30) and Non Diabetic - Control (N=20) group

	Age (Years)	**FBS (mmol/L)**	**BT (Minutes)**	**CT (Minutes)**	**APTT (Seconds)**	**PT (Sec-onds)**	**INR**
Diabetes (N=30)							
Mean	42.17	15.22	5.33	6.60	46.10	19.18	1.37
SD	16.56	4.22	1.81	3.33	12.06	2.65	0.34
N	30	30	30	30	30	30	30
Non Diabetic - Control (N=20)							
Mean	47.35	4.41	4.25	4.50	34.50	14.95	1.07
SD	16.94	0.19	1.25	1.43	2.42	1.27	0.31
N	20	20	20	20	20	20	20

Correlation analysis reported that there is a correlation between the FBS and APTT, PT and INR (r=0.563, p=0.000; r=0.601, p=0.000 and r=0.427, p=0.002) in that order for a two tail and at 0.01 level of significance. Furthermore, at 0.05 level of significance a weak correlation (r=0.281, p=0.04) exist between FBS and clotting time; on the contrary, no evidence of correlation existed between FBS and age as well as BT. In addition, the study reported a positive correlations between some haemostatic parameters like PT with CT and APTT (r=0.494, p=0.000 & r=0.377, p=0.007) however, others reports no evidence of correlation.

Table 3:
Correlation between Age, FBS and Haemostatic Parameters in the studied population

	FBS	**BT**	**CT**	**PT**	**INR**	**APTT**	
AGE	Pearson Correlation	-.216	-.065	-.048	-.010	.191	-.081
	P-value	.131	.653	.739	.947	.183	.577
FBS	Pearson Correlation	1	.162	.281*	.601**	.427**	.563**
	P-value		.262	.048	.000	.002	.000
	P-value	.048	.085		.000	.118	.090
PT	Pearson Correlation	.601**	.226	.494**	1	.631**	.377**
	P-value	.000	.114	.000		.000	.007
	N	50	50	50	50	50	50

** Significant at 0.01 and * Significant at 0.05

Discussion

Haemostatic derangement seems to be a serious disorder in Diabetes mellitus Disease. The liver is the principal organ in the body that plays a vital role in the synthesis of clotting factors and in the regulation of blood glucose respectively. Therefore, any hepatic disease might cause haemostatic derangement. Many researchers have reported an abnormal blood glucose levels in cirrhosis and necrosis of the liver organ (Colman, 2004). However, in this study, haemostatic parameters of thirty Diabetic patients were investigated; the diabetic patients had prolonged prothrombin times and activated partial throumboplastin time compared to that of the control subjects, this could be as a result of Vitamin K deficiency which can cause a repression in the synthesis of coagulation factors like prothrombin, factors VII, IX, X and protein C responsible for coagulation (Coller, 2012). However, this present work agrees with work of Dallatu *et al.,* (2010) on the effect of hyperglyceamia on haemostasis and also the work of Selvin *et al.,* (2010) which revealed that prolonged exposure of the blood cells to high glucose concentration causes glycation of haemoglobin and decrease of clotting factors. Furthermore, other studies have also revealed to be in agreement with this current study; based on the effect of hyperglycaemia on the coagulation cascade of intrinsic and extrinsic variables which are hugely measured by APTT and PT (Hinchcliff *et al.,* 2004; Iazbik *et al.*, 2001; Kucharska-Newton *et al*., 2009; Merlo *et al*., 2002), as high glucose level causes incomplete activation of the coagulation cascades of extrinsic and intrinsic pathways (Lippi *et al*., 2009; Qin *et al*., 2004). On the contrary, Fayeza *et al.,* (2015) suggested that hyperglyceamia reduces the values of the haemostastic parameters as compared to non-diabetic subjects. These obviously seems to be a new perspective of idea and knowledge of a strong contrary view of findings, the reasons for this, is not known per se, although it may probably be linked to difference in research design, sample size and variations in the interpretation of data and analysis.

The study further revealed that few Diabetics subjects had prolonged clotting time, and the bleeding time were all normal in both Diabetic patients and control subjects, though the Diabetic values were mainly on the upper limit of the reference ranges. This is in line with the previous work done by other researchers (Colman *et al.,* 2004), which states that bleeding and clotting times are usually seen when deficient factors are less than two percent. In addition, the test is mainly for platelet integrity and not necessarily for the assay of coagulation factors.

Correlation analysis from this study strongly suggested an association between glucose level with the intrinsic and extrinsic pathways via the measures of APTT and PT respectively. In addition, the clotting time demonstrated a weak association with the glucose level. Besides, this study reveals that direct associations exist between some of the haemostatic parameters (PT with CT and APTT).

Statistical comparison showed evidence of significances in all parameters studied which could be as a result of haemostatic derangement due to abnormal synthesis of coagulation factors by the liver in Diabetic patients (Dallatu *et al*., 2010). However, haemostatic abnormality in Diabetes may also be idiopathic. This could probably be attributed to the fact that insulin (hormone) inactivates liver phosphorylase, the principal enzyme that causes the breakdown of liver glycogen to glucose thus; this prevents the breakdown of liver stored glycogen. In addition, since mainly the liver syn-

thesizes the coagulation factors of the intrinsic and extrinsic pathways, this could be a pointer in the haemostatic derangement. Insulin also, causes the enhancement of glucose uptake from the blood by the liver hepatocytes, by increasing the enzymatic activity of glucokinase which is one of the enzymes that causes the initial phosphorylation of glucose after it diffuses into the liver hepatocytes, (Glyton *et al.,* 2005).

In summary, based on the empirical evidence from this study, there is an indication of statistically significant differences in all the parameters analyzed among the diabetes patient, thereby showing a marked difference between the two study groups (diabetic patients and control subjects).

Conclusion/Recommendation

This study has evaluated the relationship between the haemostatic parameters and metabolic control of Diabetes mellitus with normal bleeding time, clotting time, activated partial thromboplastin time and prothrombin time. Statistical significant higher levels were pronounced in Diabetic patients than non-diabetics (control subjects) this thus, explained the putative roles played by hyperglycemia in haemostatic derangement. It is strongly recommended that normal individuals should go for glucose estimation test to check their sugar levels because so many have hyperglyceamic without knowing in good time for proper diagnosis and management. It is also, recommended that an in-depth study should be explored in areas like platelet aggregation test, fibrin degradation product, plasminogen activator inhibitor (PA1-1), factor assay, plasmin antiplasmin complex (PAP) to critically analyse coagulation and fibrinolysis parameters in Diabetes mellitus with and without complications. It is strongly believed that these would underpin deep-rooted understanding of the subject matter for better management of the health situations and improvement of the public health outcome which has remained the hallmark for evidence base clinical research globally.

Conflict of Interest

There was no observed conflict of interest in cause of doing this research as all the parties involved, participated equitably to the final completion of the study.

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KEY NOTES

APTT	Activated Partial Thromboplastin Time
BT	Bleeding Time
CT	Clotting Time
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
NDM	Non Diabetes Mellitus
INR	International Normalized Ratio
PT	Prothrombin Time

Formal Number of Clotting Factors	Synonyms
I	Fibrinogen
II	Prothrombin
III	Tissue Thromboplastin
IV	Calcium
V	Labile Factor (Proaccelrin)

VII	Stable Factor(Proconbertin)
VIII	Anti-haemophilic Factor A
IX	Christmas Factor (Anti-haemophilic Factor B)
X	Stuart Prower Factor
XI	Plasma ThromboplastinAnticedent
XII	Hagman Factor
XIII	Fibrin Stabilizing Factor