



Research Paper

COMPARATIVE STUDY OF PLATELET AND FIBRINOGEN LEVELS IN DIABETIC PATIENT

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Aim: This study was carried out to determine the level of platelet and fibrinogen in diabetic patients. **Materials and Method:** 50 diabetic patients within the age of 35 and 65 years attending clinic at federal Medical Centre Owerri, were used as test subject in the determination of platelet and fibrinogen levels in diabetic patient while the control subjects are of the same age bracket and population but non-diabetic patients. **Results:** The results show that the level of platelet count in diabetic patients ($134.2 \pm 18.9 \text{ mmx}10/\text{L}$) was significantly ($p<0.05$) lower when compared with the control patients ($404.8 \pm 57.2 \text{ mmx}10/\text{L}$). Also, the level of fibrinogen in diabetics ($6.30 \pm 0.939 \text{ g/L}$) was significantly ($p<0.05$) higher when compared with the control ($2.51 \pm 0.35 \text{ g/L}$). **Conclusion:** This shows that platelets is reduced while fibrinogen is increased in diabetics and could be probably cause delayed process in wound healing in diabetic patient.

Keywords: Platelets, Diabetes mellitus, Fibrinogen levels, Wound healing

INTRODUCTION

Diabetes is a multifactorial disease, characterized by pancreatic beta cell dysfunction and insulin resistance in the peripheral tissue. Insulin resistance is a uniform finding in type 2 diabetes as are abnormalities in the micro vascular and macro vascular circulation (Nnodim and Opara, 2012). These complications are associated with dysfunction of platelets and fibrinogen (Nnodim *et al.*, 2013).

Platelets are essential for haemostasis and knowledge of that function is the basis for

understanding the pathophysiology of vascular disease in diabetes. Platelets are small nonnucleated discoid cell circulating in blood stem and participating in haemostasis with major function of plug formation (Nnodim *et al.*, 2013).

Activation of platelets also result in change in the level of expression of surface glycoprotein which act as receptors for platelet and for adhesive proteins involved in platelet aggregation (Mustard, 1984).

Fibrinogen are sticky, fibrous coagulant in the blood that appears to significantly increase the

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risk of experiencing one of the leading cause of death and disability (Low *et al.*, 2004) and their levels are increased in diabetes. Fibrinogen association with increased mortality is probably directly related to its inability to promote thrombosis, by causing platelets to clump inside blood vessels (James *et al.*, 2000). Fibrinolytic activity has been reported to be low in type – 2 diabetes. Due to high levels of PAL-1, which inhibits the formation of fibrinolytic plasmin from plasminogen.

Fibrinogen is the major plasma protein coagulation factor. Low plasma fibrinogen concentrations are associated with an increased risk of bleeding due to impaired primary and secondary hemostasis. Higher plasma fibrinogen concentrations are associated with cardiovascular diseases.⁷

In Owerri, the capital city of Imo State, much work has not been done on platelet and fibrinogen levels, hence it becomes apparent and necessary to carry out this research to monitor fibrinogen and platelets in diabetes which could help in enhancing and maintaining healthy living among them by avoiding drug that could lead to poor platelet generation and as well to add to previously few existing data.

MATERIALS AND METHODS

This study was carried out in Federal Medical Centre (FMC) located in Owerri, the capital city of Imo State which is in the Eastern part of Nigeria. The study was done on fifty diabetic patient (as

Test subject) attending clinic at FMC and the ages of 35 and 65 years of different sexes while fifty non-diabetic patient where used as control. They are also of different sexes and between the ages of 35 and 65 years. Their consent was obtained as well as ethical approval from the ethical committee of the hospital. Patients who refuse to give their consent below or above the age bracket and those with other underlying disease outside diabetics were excluded.

Method of Assay

The method used for platelet and fibrinogen levels were those described by Cheesbrough (Dacie, 2005).

Statistical Analysis: The results obtained were expressed as mean \pm Standard deviation. The student t-test was used to calculate the significance level at $p<0.05$

RESULTS

Table 1 below shows the platelet and fibrinogen levels of diabetic and non-diabetic subjects.

DISCUSSION

Diabetics is a metabolic disease characterized by pancreatic beta cells dysfunction and insulin resistance in the liver and peripheral tissue (Subratti and Birbul, 1999). Platelet are small enucleated discoid cells that circulate in the blood and participating in haemostasis (Dotvalli, 1981).

Platelets mainly function to plug holes in blood vessel walls by undergoing a change in shape,

Table 1: The Platelet And Fibrinogen Levels of Diabetic and Non-diabetic Subjects

Parameters	Non diabetics	Diabetics	P-value
Platelet count ($\times 10^9/L$)	404.8 ± 57.2	134.2 ± 18.9	$p<0.05$
Fibrinogen (g/ L)	2.51 ± 0.35	6.30 ± 0.89	$p<0.05$

adhering to endothelial surface secreting the contents of intracellular organelles and aggregating to form a thrombus in response to stimuli generated in endothelial of damaged blood vessel (Giovanni et al., 1986). During aggregation, platelets secrete components of the bold coagulation pathway and growth factors necessary for wound healing (Ang et al., 2008).

Increased platelet activity and an increased tendency for thrombus formation occur in diabetics and this is secondary to loss of the restraining action of anti aggregatory mechanism and this results in the inhibitory action of insulin coupled with defective endothelial production of the anti-aggregants NO and PG12 (Deepak and Bhatt, 2008). Platelets from diabetic subjects have been reported to have diminished sensitivity to NO and PG12 (Verdoia et al., 2014), due to impaired PG12 receptor activity in diabetes.

From the result, it can be deduced that patients with diabetes often have higher level and greater risk of developing cardiovascular diseases (Deluka et al., 2011).

Fibrinogen plays a central role in hemostasis and recent data indicate that high circulating levels of fibrinogen are associated with the occurrence of thrombotic episodes. It has been shown that platelets from nonretinopathic diabetic patients bind more fibrinogen than do platelets from normal subjects, that this is correlated with the exposure of more fibrinogen binding sites that are similar to the receptors for fibrinogen on normal platelets, and that greater exposure of fibrinogen binding sites is related to greater formation of prostaglandin endoperoxides/thromboxane by the platelets from nonretinopathic diabetic patients (Bilici et al., 2011). Also, a number of studies shows elevated fibrinogen to be a major risk factor

for coronary heart disease and cerebrovascular disease and this is in correlation with the result obtained. Fibrinogen is the major coagulation protein in blood by mass, the precursor of fibrin and an important determinant of blood viscosity and platelet aggregation (Correalite, 2011). Fibrinogen may be involved in the development of atherosclerotic lesions beginning with the early stages of plaque formation. Fibrinogen plays a vital role in a number of physiopathological processes in the body, including inflammation, atherogenesis and thrombogenesis (Low et al., 2014). Nevertheless, our understanding of the mechanisms leading to the atherothrombogenic action of fibrinogen is fragmentary. Proposed mechanisms include the infiltration of the vessel wall by fibrinogen, increase in blood viscosity, increased platelet aggregation and thrombus formation (Rashmiet al., 2011). Furthermore, plasma fibrinogen is also a prominent acute-phase reactant fibrinogen to be significantly higher in patients with diabetes than the control. Carr (2001) found fibrinogen to be higher in diabetic patients than the control. He also showed fibrinogen to be higher in patients with coronary artery disease than without the disease.

CONCLUSION

The significantly reduced platelet value in diabetic subjects observed in this work is in line with the work of Nnodim et al (2013). Furthermore, it was observed that fibrinogen level in diabetes was also significantly increased when compared with the work of Giovanni et al. (1986).

Hence, it can be deduced generally from the results obtained and previous works that platelet count is reduced in diabetic patient while fibrinogen is increased respectively.

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