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DECREASE PLATELETS COUNT IN DIABETES MELLITUS

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ABSTRACT

Diabetes mellitus is (DM) a global public health problem and a complex disease characterized by chronic hyperglycemia that leads to long-term macrovascular and microvascular complications. Platelets play major role in integrity of normal hemostasis, and mean platelet volume (MPV) is an indicator for its function. **Objective**: The present study was conducted to study the effect of diabetes mellitus on platelets count. **Material and method**: A sample of 100 person were selected, 50 patients suffering from DM, from Al-wahda teaching hospital, Derna-Libya. At the same time a group of 50 randomly selected healthy adults were invited to participate in the study as control group. **Result**: Mean levels of platelets count were significantly lower in diabetic (145.04 ± 60 × 10^9/l) as compared with healthy control (291±38 × 10^9/l), P ≥ 0.05. **Conclusion:** Platelets count decrease in diabetic mellitus more than healthy control, this may result from change in morphology of platelets.

INTRODUCTION

Diabetes mellitus (DM) is a major global health problem.[1,2] DM is a disease of glucose metabolism characterized by deficiency of insulin which produced by islets of langerhans in the pancreas.[3]

Platelets are small discoid blood cells that circulate and participate in hemostasis. Primary plug formation due to platelets seals the vascular defects and provides the required phospholipid surface for the recruited and activated coagulation factors[4] In response to stimuli generated by the endothelium of blood vessels, platelets change shape, adhere to sub endothelial surfaces, secrete the contents of intracellular organelles, and aggregate to form a

thrombus.[4] These pro-aggregatory stimuli include thrombin, collagen, epinephrine, ADP (dense storage granules), and thromboxane A2 (activated platelets).[4] Thus, platelets may assume an important role in signaling of the development of advanced atherosclerosis in diabetes.[4,5]

Intact healthy vascular endothelium is central to the normal function of smooth muscle contractility as well as its normal interaction with platelets. What is not clear is the role of hyperglycemia in the functional and organic micro vascular deficiencies and platelet hyperactivity in individuals with diabetes. The entire coagulation cascade is dysfunctional in diabetes. Increased levels of fibrinogen and plasminogen activator inhibitor 1 favor both thrombosis and defective dissolution of clots once formed.

Platelets in type 2 diabetic individuals adhere to vascular endothelium and aggregate more readily than those in healthy people.

Hyperglycaemia is invariable in type 1 and type 2 diabetes and it induces a hypercoagulable condition since it induces platelet vascular activation and post-prandial coagulation activation.[6]

The aim of this study to see quantitative change in platelets in diabetes mellitus.

MATERIAL AND METHODOLOGY

Study Design

A case control study was designed as a comparative study to satisfy the previous mentioned aim.

Ethical approval: Approval was granted from the Research and Ethics Committee of the faculty. Consent was gotten from all participated patients at alwahda hospital.

Sample size and sampling method

A sample of 100 person were selected, 50 patients suffering from DM from Al-wahda teaching hospital, Derna-Libya. At the same time a group of 50 randomly selected healthy adults were invited to participate in the study as control group.

The diabetic group consisted of subjects recently diagnosed, those on regular treatment and individuals with irregular medication. This group included individuals with both vascular

complications and without complications. Healthy controls included who were not diabetic and without any vascular complications.

Five ml of venous blood specimen were collected from all fasting patients and control in medical laboratory at alwahda. Plasma were separated for testing fasting blood sugar and platelets count by using auto analyzer and automated cell counter (sysmex K-x21)[7].

Inclusion criteria

1. DM individuals of either sex (male and female) between the age group of 33 to 80 years.
2. Healthy individuals of either sex (male and female) between the age group of 33 to 60 years.

Exclusion criteria

Healthy controls included who were not diabetic and without any vascular complications.

Procedure for platelets count test

- Collected samples from both the patients and controls in clean container tube having EDTA.
- Immediately mixed the blood with anticoagulant avoiding foam formation. Centrifuge the sample for 15 min at approximately 3000 rpm and collect the plasma in separate tube.
- Fresh plasma is preferred for testing as it performs best when tested immediately.
- Sample may be tested within 2 hours at 25 to 30° C and within 3 hour at 2 to 8° C.
- Platelets count by an automated cell counter platelets (Sysmex K-X21) from all the investigated people.
- Our laboratory reference ranges of Platelets count 150-450× 10^9/l

Statistical Analysis

Result were expressed as mean values ± SD. Data were analyzed by t test using. Significant difference was considered to exist at P value less than 0.05.

RESULTS

In this study, samples from 50 diabetics and 50 healthy controls were analyzed for platelet counts, and FBS. There were 30 males and 20 females in diabetic individuals with male to female ratio of 3:1 as in table 1. Most of the diabetic patients were exhibiting a further

diabetic complications. They included cardiac diseases about 70 %, neuropathy syndrome 10% and gangrenous cases about 20 % from the total examined cases.

Mean levels of blood glucose were significantly higher (221.6 ± 38.8) mg/dl when compared with control group (93.2 ± 15.8) mg/dl P > o.o5 as shown in table 2

Mean levels of platelets count were significantly lower in diabetic (145.04 ± 60 × 10^9/l) as compared with healthy control (291±38 × 10^9/l). By applying unpaired t test, there were significant decreased value of platelets count among DM individuals than healthy individuals (p > o.o5).

Table 1: **Age and sex distribution in diabetics and healthy control**

	Diabetics	**Healthy control**
Number	50	50
Age	58.8	51.8
Female	20	18
Male	30	32
Duration of diabetic(years)	≥ 6	
Complication	20%	

Table 2: Comparison of fasting blood sugar and platelets count in diabetics and healthy controls.

Parameter	**Diabetics**	**healthy controls**	**P value**
FBS	221.6	93	**≥.05**
Platelets count	145.4±60	291.9±38	**≥ .05**

DISCUSSION

Platelets play a key role in the development of atherothrombosis, a major contributor of cardiovascular events [1].The contribution of platelets to cardiovascular events has been noted for decades. Since there have been numerous studies underlying the importance of platelets in thrombotic complications [1]. To further solidify the platelets activity have been demonstrated to be very effective at decreasing myocardial infarction, stroke, and death [2].

Metabolic syndrome, a precursor to diabetes, is an independent predictor of cardiovascularevents[4]. In a landmark study, Davìet al.[5] noted that thromboxane biosynthesis was elevated in subjects with cardiovascular disease who had inadequately controlled diabetes compared with healthy volunteers[5]. Several studies since then have suggested that diabetic patients have altered platelet morphology and increased platelet

activity[6,8]. However, the importance of platelet activity in the setting of diabetes was noted in small selected populations, and specialized laboratory technique Long-term complications of diabetes were present in 41% of patients with DM, and they are distributed as follows – atherosclerotic vascular disease (coronary artery disease/stroke): 70%, nephropathy: 20%, 10% microvascular complication as gargarine.

Also, an increased platelet counts and activity have been reported in diabetics as demonstrated by increases in GPs IIb/IIIa, 1b-IX, and 1a/IIa[9] , CD62 and CD63[10] Mean Platelet Volume (MPV), the average volume of platelets, a parameter in full blood count measures platelet size distribution, and is not influenced by glycaemic control[11]. our study about platelets count in DM show decrease in platelets count and this may result from change in morphology of platelets and this may result from platelets adhere and aggregate more rapidly than those in healthy people.

The mean of total platelet count was statistically different in diabetics than healthy controls. The counts were slightly lower in diabetics. This was similar to studies done by Hekimsoy et al.[12] but opposite findings that is higher values in diabetics than non diabetics were observed by Zuberi et al.[13]; Kodiatte et al[14]. In this study platelets count in DM decrease and this may result from change in morphology of platelets and this may result from platelets adhere and aggregate more rapidly than those in healthy people.

Decrease in platelet count can be due to participation of platelets in thrombotic process.

CONCLUSION

In conclusion, the present study points to significant differences in platelet count in patients with DM, especially those with vascular complications, when compared to non-diabetic individuals.

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