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Evaluation of plasma fibrinogen in diabetes mellitus type 1 patients

ABSTRACT:

Background Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. Death may result from acute metabolic decompensation.

Aim: To evaluate the level of plasma fibrinogen in diabetic patients type 1 and compare the results with the normal subjects and to estimate the effect of glycemic control and the duration of the disease on the level of plasma fibrinogen.

Patients&Methods: This study was conducted on fifty patients, having type 1 diabetes mellitus DM and were insulin dependent. All the patient were attending the National Diabetes center, Al-Mustansiriyah University, from February to April 2010.

Results: This study was conducted on 50 patients all with type 1 diabetes mellitus, they include 30 female and 20 male ,with female/male ratio was 1.5/1 ,the age range of patients among 1-20 years ,also included a control group of fifty, age and sex matched, normal healthy volunteers, had no family history of diabetes.

Conclusions: By comparing the coagulation parameters in diabetic and control subjects there was a significant increase in plasma fibrinogen in diabetic patients ,also there was improvement in fibrinogen level with glycemic control in patients with type 1 diabetes mellitus, thus will modulate the hypercoagulable state associated with this disease, plasma fibrinogen level is unaffected by the duration of the illness and sex of patients.

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Introduction

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. This can arise in many different ways but is most commonly due to autoimmune type 1 diabetes or adult-onset type 2 diabetes. Lack of insulin affects the metabolism of carbohydrate, protein and fat and can cause a significant disturbance of water and electrolyte homeostasis. Death may result from acute metabolic decompensation.⁽¹⁾ Recent studies have found that elevated levels of coagulation factors are associated with an increased risk of thrombosis.⁽²⁾ Fibrinogen Level improve with glycemic control in patients with type 1 diabetes mellitus.⁽³⁾

Patients & Methods :

This study was conducted on fifty patients, including 20 male and 30 female, having type 1 diabetes mellitus DM and were insulin dependent. All the patient were attending the National Diabetes center, Al-Mustansiriyia University, from February to April 2010 .

-Criteria for inclusion of patients :

- 1- All patients were type 1 diabetes mellitus , insulin dependent.
- 2-All patients were within the first two decades of age.
- 3-Randamly selected regarding the duration of disease, severity of the disease, the gender of the patients and family history .

-Coagulation screening tests, including *Prothrombin time*(PT),activated partial thromboplastin time(APTT), Plasma fibrinogen measurement were done for each patient at al-Yarmok Teaching Hospital Laboratories. Glycosylated HbA1c measurement was done at the National Diabetes Center.

Control group :

This study included fifty healthy, age and sex matched control subjects, who had no family history of diabetes. Coagulation screening tests including PT, APTT, Plasma fibrinogen measurement were done .

A total of 3 ml of venous blood was collected by clear venipuncture into two collecting plastic tubes ; In the first tube : 1.8 ml of blood was added to 0.2 ml of Trisodium citrate , to obtain a

ratio of 1:9 .Platelet poor plasma was obtained by centrifugation of blood at room temperature (20-25C°) at 2000 g (approximately 4000 rpm) for 10-15 minutes .⁽⁴⁾The plasma obtained then was immediately used to perform the coagulation screening tests *Prothrombin time (PT)* ,*Activated partial thromboplastin time (APTT*

)and fibrinogen estimation . The rest of blood was dispensed into an ethylene diamine tetra acetic acid (EDTA) containing tube and used for the measurement of Glycosylated HbA1c percentage from total hemoglobin.

Results:

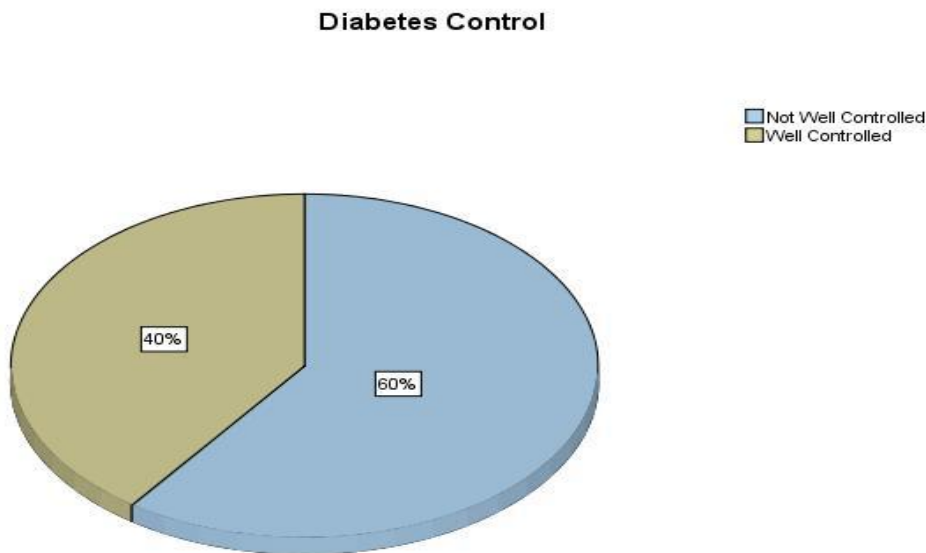


Fig. 1 show the distribution of pateints according to control of diabetes.

Table 1 : Comparism of the coagulation factors parameters in diabetic patients and control subjects.

Coagulation parameters	Patient Number= 50		Control Number= 50		T	P
	Mean ± SD	Range	Mean ± SD	Range		
PT sec.	12 ± 1.3	9-14	13.4 ± 1.03	11-15	-5.735	0.002
PTT sec	29.6 ± 1.1	25-33	33.5±2.73	29-37	-2.928	0.004
Plasma fibrinogen g/l	4 ± 0.44	3.2-4.8	2.4 ± 0.38	1.8-3	9.89	0.001

By comparing the parameters between controlled and uncontrolled patients according to the level of HbA1c ,there was a significant increase in plasma fibrinogen in uncontrolled compared to controlled patients ,where as there was no significant change in PT and PTT in both groups.

Table 3 . show that the gender of diabetic patients had no significant effect on coagulation factors parameters (P>0.05)

Coagulation parameters	Male (number=20)	Female (number= 30)	T	P
	Mean ± SD	Mean ± SD		
PT sec.	12.1 ± 1.2	11.9 ± 1.4	0.63	0.529
PTT sec.	29.2 ± 1.5	28.6 ± 1.9	1.129	0.264
Plasma fibrinogen g/l	4.3 ± 0.89	3.95± 0.92	1.343	0.186

Table 4 .Correlation of coagulation parameters with the duration of disease &BMI .

coagulation parameters	Duration of Disease (yr)		BMI Kg/(M)2	
	r	P	R	P
Prothrombin Time (sec)	-0.002	0.989	0.267	0.061
Partial Thromboplastin Time (sec)	0.019	0.897	-0.228	0.111
Fibrinogen Level (g/L)	-0.006	0.966	0.201	0.162

Discussion:

Diabetes mellitus type 1 (IDDM, or juvenile diabetes) is a form of diabetes mellitus that results from autoimmune destruction of insulin-producing beta cells of the pancreas.⁽⁵⁾ The subsequent lack of insulin leads to increased blood and urine glucose. The classical symptoms are polyuria (frequent urination), polydipsia (increased thirst), polyphagia (increased hunger), and weight loss.^(6,7) Numerous studies had regarded that diabetes mellitus type 1 is associated with hypercoagulability state, with alteration in the coagulation screening tests, as well as in many coagulation inhibitory factors.⁽⁸⁾ This study showed that both PT and PTT

were significantly lower in diabetes mellitus compared to healthy control subjects , which is similar to the result of Gosh K.et al , who show that this results may be due to increased synthesis of coagulation factors from the liver in diabetic patients⁽⁹⁾ ,furthermore Marcus E.et al study ,had showed that the plasma levels of many clotting factors including fibrinogen, factor VII, factor VIII, factor XI and von Willebrand factor are elevated in diabetes ,which are responsible for the hypercoagulable state observed in diabetes mellitus type 1.⁽¹⁰⁾This study showed that plasma fibrinogen was significant higher in diabetic patients type 1 compared to non diabetic, these

results were in agreement with many studies, which stated that since plasma fibrinogen is an acute phase reactant and its concentration is influenced by several environmental factors, therefore we may propose that plasma fibrinogen increased reactively in diabetic patients type 1 as response to disturbance in body metabolism. ^(11,12) Furthermore in this study plasma fibrinogen was significant increase in uncontrolled diabetic patients type 1 compared with controlled group, which is in agreement with John A. et al, who revealed that plasma Fibrinogen was increased in uncontrolled patients and its level reduce when the Hb1Ac level reduce and he had proposed that this may be due to the inhibitory effect of insulin on fibrinogen synthesis. ⁽¹²⁾ Similar results had found in other two studies, showing that on administrating insulin in diabetic patients type 1 the level of fibrinogen had decreased. ^(13,14) This study revealed that plasma fibrinogen level is unaffected by the duration of the illness and sex which is in agreement with the study of Charlis F. et al, and this may be due to the fibrinogen's nature as an acute phase

reactant protein which is affected by multiple factors. ⁽¹⁵⁾

Conclusions:

1-The present study revealed that there was a significant shortened prothrombin time and partial thromboplastin time in diabetic type 1 patients versus control subjects.

2- The present study revealed that there was a significant elevated in the levels of plasma fibrinogen in diabetic patients type 1 compared to normal controls.

3- This study revealed that there was improvement in fibrinogen level with glycemic control in patients with type 1 diabetes mellitus, thus will modulate the hypercoagulable state associated with this disease.

4- This study revealed that plasma fibrinogen level is unaffected by the duration of the illness and sex of patients.

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