Research Article

Some hematological and biochemical parameters in type 2 diabetic patients Missan/ Iraq

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Abstract

This study was planned to evaluated some hematological and biochemical parameters in patients with type 2 diabetes mellitus by measuring hemoglobin (Hb), packed cell volume (PCV), white blood cell count(WBC), aspartate aminotransferase(AST),alanine aminotransferase (ALT), alkaline phosphatase (ALT), serum glucose, cholesterol, total protein, albumin, urea and uric acid. This study was carried out in Al-Sadder general hospital, 100 patients with type 2 diabetes mellitus (55male and 45 female) were included in the study. Their ages ranged between 28-70 years. 100 matched normal individuals were taken as control group. In the present study WBC count, serum glucose, AST, ALT and uric acid were significantly higher in patients than in the control (p<0.05 and 0.01).Total protein and albumin concentrations were significantly decrease in patients than in the control (p<0.01). The mean values of other parameters including Hb, PCV, ALP, cholesterol and urea were found to be unchanged.

Keywords: Hematological, aspartate aminotransferase, serum glucose.

Introduction

Within high morbidity and mortality worldwide, diabetes mellitus remain one of the clinical condition of public health importance especially in developing countries (**Rolgic *et al*, 2005**). Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. Lack of insulin, whether absolute or relative, affects the metabolism of carbohydrate, protein, fat, water and electrolytes (**Sacks, 1997**). Many people with metabolic syndrome have a low-grade inflammation that may place them at risk for the development of cardiovascular diseases. Epidemiological study by (**Wang *et al*, 2004**) noted relationship between some components of metabolic syndrome and leukocytes. Reduced hemoglobin concentrations are common findings in diabetic patients (**Thomas *et al*, 2003**). The liver plays a major role in the regulation of carbohydrate metabolism, as it uses glucose as a fuel,

it has the capability to store glucose as glycogen and also synthesize glucose from non-carbohydrate sources. This key function of liver makes it vulnerable to diseases in subjects with metabolic disorders, particularly diabetes (**Levinthal and Tavill, 1999**). Increased activities of liver enzymes such as aspartate aminotransferase (AST) and alanineaminotransferase (ALT) are indicators of hepatocellular injury. Increased activity of these markers is associated with insulin resistance (**Marchesiri *et al*, 2001**), metabolic syndrome and type 2 diabetes (**Sattar *et al*, 2004; Nakanishi *et al*, 2005 and Wannamethee *et al*, 2005**). The typical lipid disorder in patient with diabetes, diabetic dyslipidemia, is characterized by elevated triglycerides, low levels of HDL cholesterol and increased numbers of small, dense LDL particles (**ADA, 2007 and The Expert panel, 2004**). Hyperuricemia-uric acid is end product of purine

metabolism, it is filtered in glamorous filtration and excretion in urine (**Laster and Howell, 1963**). For patients in type 1 diabetes, high serum uric acid may be the early sign of diabetes nephropathy before any significance change in urine albumin level (**Tuomilchto et al, 1988**).Diabetes mellitus has become a widely spread disease in Iraq, the present study was aimed to evaluated some haematological and biochemical parameters in patients with diabetes compared to non-diabetic control group.

Materials and Methods

Study design and subjects

Cross-sectional study was done in diabetes patients with long period of suffering from diabetes. This study was carried out in Al-Sadder general hospital / Missan governorate, from 100 patients (55 male and 45 female) having age group (28-70), year and same number of non-diabetic subjects having age group (20-62) year .

Blood group

10 ml of venous blood were drawn from each volunteer in this study using a disposable plastic syringe.

Hematological analysis

2 ml of blood which collected in tubes containing (EDTA) were used to assess hematological changes which include: hemoglobin (Hb), packed cell volume (PCV) and white blood cell count (WBC) (**Sood, 1996**).

Biochemical analysis

8ml of the blood was poured in a plane container and then centrifuged after clotted. Serum was kept at 20ºC in sterile condition till used. Aspartate aminotransferase (AST), alanineaminotransferase (ALT) and alkaline phosphatase (ALP) were determined using (**Kind and King, 1954 and Reitman and Frankel, 1957**). Serum total protein and albumin were determined according to **Varely, (1980)**, serum cholesterol was assayed by (**Meiattini, 1978**). Urea and uric acid were determination using (**Will and Savory, 1981**).

Statistical analysis

The data obtained during the current study were analyzed statistically to determine the significance of the different parameters by mean of student s t-test. The values present as means $\pm$ SE (**Al- Mashadani and Hermz, 1989**).

Results

The values of hematological parameter in diabetic and non-diabetic are shown in Table (1). Hb concentration and PCV percentage were found significantly unchanged in both diabetic patients and non-diabetic, while the WBC count were found significantly increased (p< 0.01) in diabetic patients than non-diabetic .

Table 1: Some hematological parameters in diabetic patients and control group.

Parameters	Patients	Control	P value
Hb (g/dl)	9.80±0 .22	10. 27± 0.17	NS
PCV (%)	30.40±2.70	31.80± 2.90	NS
WBC(cell/mm^3)	8497±5180	6125± 3250	o.o1

∗Values are expressed as mean $\pm$ SE.
∗ NS: Non-significant.

Table (2) represents the activity of serum marker enzymes (AST, ALT and ALP) in diabetic and non-diabetic. It was found a significant increasing (p< 0.05) in AST and ALT in diabetic patients compared to non- diabetic, while there was no significant difference in ALP level between two groups (p< 0.05).

Table 2: Some serum enzymes (AST, ALT and ALP) in diabetic patients and control group

Serum enzymes	Patients	Control	P value
AST(U/ L)	15.71± 1.90	9.63±0.70	0.05
ALT (U/ L)	18.15±2.10	13.47±0.70	0.05
ALP (U/ L)	84.15±6.20	90.60±2.80	NS

∗Values are expressed as mean $\pm$ SE.
∗ NS: Non-significant.

The biochemical parameters of diabetic patients and non-diabetic group are shown in Table (3). Serum cholesterol and urea were a non-significant difference of both diabetic and non-diabetic group. While the total protein and albumin were decreased significantly (p<0.01) in diabetic patients compare to control group. There were increased significantly (p< 0.01) of serum glucose and uric acid in diabetic patients than control group (Table 3).

Table 3: Some biochemical parameters in diabetic patients and control group

Parameters	Patients	Control	P value
Glucose mmol/L	12.95 ± 1.18	5.24± 0.11	0.01
Cholesterol mmol/ L	4.98 ± 0.70	5.13 ± 0.17	NS
Total protein mg / dl	6.46 ±0.20	8.02 ± 0.20	0.01
Albumin mg / dl	4.56 ± 0.12	5.33 ± 0.12	0.01
Urea mg / dl	50.42 ± 4.21	51.93 ± 3.72	NS
Uric acid mg / dl	5.29 ± 0.21	4.52 ± 0.18	0.01

∗Values are expressed as mean ± SE.
∗NS:Non-significant.

Discussion

Many studies showed that hemoglobin level was lower in diabetic patients than in non-diabetic subjects (**Chung et al, 2012 and Kwon and Ahn, 2012**). In the present study, the decreases of hemoglobin concentration don't reach to the significant level. The difference was statistically significant in mean of WBC count in diabetic patients compare to control. This is agreement with (**Al-Hakak, 2010**) and Almamory (**Almamory, 2014**) whom found significant increase in WBC count in diabetic patients compare to control. The stimulation of immunity system and stimulation led to increase symbol of infelmantry like WBC and cytokines because relationship of infelmantry, insulin and human blood components formed a critical signal for abnormalities resulted by invading of foreign agents or inflammation these invaders led to changes in levels of blood parameters such as WBC, PCV, phagocytes percentage as a result of defense mechanism (**Weyer et al, 2000**). The differences were statistically significant in means of ALP and AST in patients compare to control. This is agreement with(**Salmela et al, 1984**), 57 % of the 175 diabetic outpatients (100 subjects) had at least two abnormal test and agreement with (**Idris et al, 2011**), whom found significant increase in liver function tests (ALT and AST) in type2 Sudanese diabetic patients compared to control. **Doi et al,(2007**) suggest that serum GGT and ALT concentration are strong predictors of diabetes in the general population independent of known risk factors. Some investigators have suggested that the increase in liver enzymes levels in patients with diabetes mellitus resulted from the influence of insulin on liver and muscle tissue (**Clore et al, 1992**).**Vazarova et al, (2002**) suggested that a raised ALT reflects fatty changes in the liver and that this abnormality antedates the development of type 2 diabetes. The differences were statistically significant in means of total protein, albumin and uric acid in diabetic patients compare to control this results is agreed with the finding of (**Lal et al, 2009**), whom noted a low levels of total protein and high levels of urea and uric acid among Indians with diabetes. The biochemical changes may be because patients having long term diabetes there is repression of glycolytic enzyme and depression of gluconeogenic enzyme which promotes gluconeogenesis in liver, and further contributes to hyperglycemia (**Wun et al, 2008**).

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