

Study of the erythrocyte sedimentation rate in diabetic patients

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Abstract

The morbidity and mortality of diabetes mellitus - related complications can be greatly reduced by constantly checking patients blood sugar (self – monitoring or HbA1c testing). Some patients can not receive this comprehensive diabetic care. This study try to clarify the relation between some inflammatory markers and sugar control in diabetic patients. The study includes 50 patients (18 males and 32 females) from samarra city . All were reviewed with history, thorough examination, and investigations. Out of 50 patients with diabetes, 39 had high blood sugar, 40 had high ESR, 9 had increase in both blood sugar and ESR, 17 had abnormal (high) blood sugar and albuminuria, 17 had high ESR and albuminuria. Other causes of high ESR should be excluded such as rheumatoid arthritis, anemia, haematological diseases and infection like brucellosis .

دراسة نسبة ترسب كريات الدم الحمراء في مرضى السكري مهيب احمد صالح

المستخلص

مضاعفات داء السكري من الأمراض والوفيات ، يمكن تقليلها بشكل كبير عن طريق الفحص المنتظم لمستوى السكر في دم المرضى (عن طريق الفحص الذاتي أو ما يسمى بفحص HbA1c والمسمى بالهيموكلوبين ذات الارتباط السكري) ، بعض المرضى لا يمكنهم توفير هذه الفحوصات المكلفة الغاية من هذه الدراسة لتبيان الارتباط بين تنظيم نسبة السكر في الدم وبعض العلامات الالتهابية غير المباشرة وقد ركزنا في دراستنا على بعض الفحوصات البسيطة مثل ترسب الكريات الحمراء . الدراسة شملت 50 مريض (18 من الذكور و 32 من الإناث) في مدينة سامراء . جميع المرضى خضعوا لتفاصيل تاريخ المرض والفحص السريري وإجراء بعض التحاليل . من العدد الكلي للمرضى (50 مريض) ، 39 لديهم ارتفاع بنسبة السكر في الدم عن الحد الطبيعي (تنظيم سـيـء) ، 40 من المرضى لديهم ارتفاع في نسبة ترسب الكريات الحمراء في الدم ، 9 لديهم زيادة في نسبة السكر مع ارتفاع نسبة ترسب الكريات الحمراء ، 17 من المرضى لديهم زيادة نسبة السكر مع ظهور الزلال في الإدرار ، 17 لديهم زيادة في نسبة الترسيب للكريات الحمراء مع ظهور الزلال في الإدرار . أخذنا في هذه الدراسة بنظر الاعتبار استبعاد المشاكل الأخرى التي تؤدي إلى زيادة نسبة ترسب الكريات الحمراء مثل التهاب المفاصل الرثوي ، فقر الدم ، الخمج مثل الإصابة بحمة مالطة ، أمراض الدم الأخرى كالسرطانات الدموية وتم ذلك بإجراء التحاليل الخاصة بكل مرض .

Introduction

In humans, blood glucose is tightly regulated by homeostatic mechanisms and maintained within a narrow range (1). A balance is preserved between the entry of glucose into the circulation from the liver, supplemented by intestinal absorption after meals, and glucose uptake by peripheral tissues, particularly skeletal muscle (1). In diabetes mellitus, the pancreas no longer produces enough insulin or cells stop responding to insulin that is produced, so that glucose in the blood cannot be absorbed into the cells of the body (2). Insulin is an anabolic hormone with profound effects on the metabolism of Carbohydrate, Fat and Protein (1). Diabetes mellitus is a chronic disorder characterized by the impaired metabolism of glucose and other energy yielding fuels as well as by the late development of vascular and neuropathic complications (3). The causes of diabetes mellitus are unclear, however, there seem to be both hereditary and environmental factors involved (1-3). There are 4 types of diabetes mellitus (Type I, Type II, specific type and gestational diabetes mellitus). The most common form of diabetes, Type II, occurs in approximately 10-15 % of americans over 50 years of age. More than 90% of the diabetics in the united states are type II (2). The erythrocyte sedimentation rate (ESR)determination is a simple and inexpensive laboratory test that is frequently ordered in clinical medicine . The test measures the distance that erythrocytes have fallen after one hour in a vertical column of anticoagulated blood under the influence of gravity (4-6).It is an indirect index of acute phase protein concentrations and is a sensitive but non specific index of plasma protein

changes which result from inflammation or tissue damage (7). Women, elderly and obese people tend to have higher ESR values (5, 6). Any condition that elevates fibrinogen (example, pregnancy, diabetes mellitus, end stage renal failure, heart disease, collagen vascular diseases and malignancy) may also elevate ESR (6) . In anemia, the red blood cell aggregates fall faster (4-6) . The normal values of ESR in adults according the westergren method are as follow : Men under 50 years old : less than 15 mm/hr , Men over 50 years old : less than 20 mm/hr, women under 50 years old : less than 20 mm/hr, women over 50 years old : less than 30 mm/hr (8). Pentosidine is an advanced glycation end product (AGE) formed by combined processes of glycation and oxidation between carbohydrate – derived carbonyl group and protein amino group. Pentosidine levels increased not only in diabetic patients with hyperglycemia but also in normoglycemic uremic patients and chronic inflammatory conditions with increased oxidative stress as in rheumatoid arthritis (9,10) . The aim of the study is to evaluate the erythrocyte sedimentation rate in diabetic patients .

Patients and methods

The present study carried out from may 2007 to december 2008. It includes 50 patients, 18 were males and 32 were females. The ages of patients were 20-70 years; the mean of age was 55 years. All patients were reviewed as outpatient, with full history, physical examination, and blood was send for investigations that include : Random blood sugar (RBS), Erythrocyte sedimentation rate (ESR), Renal function tests including blood urea and serum creatinine, Urine

examination for albumin, in addition to other investigations such as haemoglobin level and Rose Bengal test to exclude other causes of high ESR such as anemia and infection such as brucellosis . Blood film and count and Bone marrow examination done for patients with extreme elevation of the ESR,

Results

Out of 50 patients with diabetes mellitus , 39 patients (78%) had high blood Sugar , table (1) . twenty two (22 %) had normal blood sugar table(2) . Forty patient (80%) had abnormal high ESR , of them 8 cases shows very

high ESR (more than 100 mm/hr) . Two of these 8 cases shows high plasma cell count by bone marrow examination. Ten (20%) had normal ESR . thirty five (70%) had increase in both blood sugar and ESR , while abnormal renal function (increase blood urea and seum creatinine) with high ESR detected in 9 (18 %) of the patients. However albuminuria with normal renal function and high Blood sugar were detected in 17 (34%) patients and the same number (34 %) shows albuminuria with high ESR, 6 (12%) patients had abnormal ESR, associated with albuminuria & impaired renal function (Table 1) .

Table (1):-Frequency of elevated investigations in diabetic patients .

Investigation	Number	Percentage
Blood sugar	39	78
ESR	40	80
Blood sugar and ESR	35	70
Blood sugar and albuminuria	17	34
ESR and albuminuria	17	34
ESR and blood urea	9	18

Table(2):-Frequency of normal investigations in diabetic patients

Investigation	Number	Percentage
Blood sugar	11	22
ESR	10	20
Blood sugar and ESR	5	10

Discussion

Worldwide, diabetes mellitus affects more than 135 million people; this figure is projected to reach 300 million cases by 2025. Unfortunately, the rate of growth of diabetes is largest in developing nations. Diabetes is a leading cause of both mortality and early disability (3). The present study revealed that more than two thirds (70%) of cases with high blood sugar

had high ESR , and this result may be due to increased oxidative stress associated with chronic inflammation and diseases that leads to increase pentosidine and ESR which correlated with each other as detected by other comparable studies (9 , 11) . Lopez-Bermejo A, reported that ESR is independently associated with either insulin resistance or obesity in a sex-specific manner, and this result is

comparable with the present findings (12) . High ESR found in (18 %) of diabetic patients with impaired renal function (increase blood urea and serum creatinine), and high ESR detected in (34 %) of diabetic patients with albuminuria might be due to accumulation of carbonyls which accelerates the formation of pentosidine which increase in uremic patients as detected by other study (13) .Masaaki T, reported increased serum pentosidine with age in healthy subjects and correlated to serum creatinine (14). while other study shows high association between pentosidine and ESR in serum of patients with rheumatoid arthritis (15). These findings might explain the detected high ESR in this study.

Conclusion and recommendations

The present study conclude that uncontrolled diabetes mellitus is associated with high (ESR) and to less extent with early diabetic nephropathy . The following points are recommended :

- 1- Repeated blood sugar samples from the same patients under study to decide whether those patients had uncontrolled diabetes mellitus or only one abnormal reading .
- 2- Study the value of using ESR with HbA1c or as substitute for HbA1c in patients with diabetes mellitus as a guide for sugar control.

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