

Evaluating the Utility of Uric Acid, Mg and Haptoglobin in Sera of Diabetes Mellitus DM II Iraqi Patients

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Abstract:

The objective of present study is to evaluate the levels of [Uric acid, Magnesium and haptoglobin] in sera of (20) Iraqi diabetes mellitus DM II and compare the value with (10) healthy control. The biochemical parameters which were measured include *Uric acid*, Magnesium and haptoglobin.

The results revealed a significant increase in levels of uric acid and haptoglobin and a significant decrease in Mg in sera of patient compared with healthy control. In conclusion the increasing of the positive acute phase protein (HP) due to the inflammatory process that occur in the DM II.

Key Words: Diabetes mellitus, Uric acid, Magnesium, Haptoglobin.

Introduction:

Diabetes mellitus is a heterogeneous group of syndromes characterized by an elevation of fasting blood glucose caused by a relative or absolute deficiency in insulin⁽¹⁾. Over the last decade, there has been a significant interest in oxidative stress and its role in the development of complications in diabetic patients⁽²⁾.

Uric acid is the end product of purin catabolism and seems to be a major protective antioxidant against NO₂. Antioxidant ability of uric acid is shown both by binding iron and copper ions in form that do not accelerate free radical reaction and by directly scavenging oxidizing species such as singlet oxygen O₂, hypochloride acid HOCl and peroxy radical^(3,4). In human, uric acid is excreted in the urine, while in other mammals, it is further oxidized to allantoin before excretion⁽⁵⁾.

Magnesium [Mg] is an essential co-factor for more than (300) enzymes it is necessary for all energy-dependent transport system such as glycolysis and oxidative energy metabolism and biosynthesis reactions. Generally, Mg level is decreased in blood of diabetes patients and excreted in urine⁽⁶⁾. Magnesium

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action against diabetes involves decreasing the antioxidant that decreases the concentration of xanthourea acid in blood. In addition to that magnesium is necessary activated enzymes containing vitamin B₆, therefore, it may be favorable for any person with diabetes or a family history of the disease to take at least 500mg of Mg daily⁽⁷⁾.

Haptoglobin (HP) is among positive acute phase proteins (APPS). The plasma glycoprotein that binds extra corpuscular hemoglobin in a tight noncovalent complex. Approximately 10% of the hemoglobin that is degraded each day is released into the circulation and is account for corpuscular.

The other 90% is present in old, damaged red blood cells, which are degraded by cells of the histocytic system⁽⁸⁾.

The aim of the present study is to evaluate the levels of uric acid, Mg as antioxidants and Haptoglobin as Acut phase protein in the sera of DM II Iraqi patients and to compare the values with healthy control.

Experimental:

Chemical used and their suppliers:

- Uric acid-kit from Biocon diagnostic-Germany.
- Magnesium-kit from Gisse diagnostic Roma-Italy.
- Haptoglobin-kit from Bindarit, USA.

Instrument and Manufacturers:

- PH-Meter- Radiometer (Denmark).
- Bench centrifuge – Universal 16A, Germany.
- U.V visible spectrophotometer shimadzu 160, Japan.
- Incubator – Gallen kamp (England) Oven-Memert (Germany).

Subjects:

The studied groups comprised 20 patients from both sexes with DM II diagnosed by phsicians at AL-Kadhymia teaching hospital in addition to ten healthy control matching the age. The age range in (45-65) years.

Blood samples:

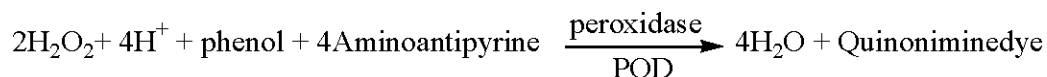
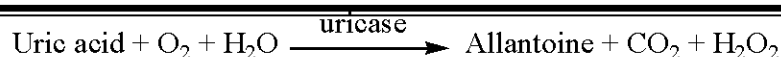
About five milliliters of venous blood were collected from each subject in the study after 12-hour fast. The blood samples were collected in plain tubes left at room temperature for 15min than centrifuged at 3000rpm for 15min. Serum was separated and aliquoted for subsequent measurement of uric acid, Mg and haptoglobin.

Determiration of uric acid concentration:

Uric acid was measured in the sera of patients and healthy control groups using a ready kit from Bio con Diagnostik no. 34516 Germany. Uric acid was oxidized by uricase to allantoin and hydrogen peroxide, according to the following equations:

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Which absorbed at 510nm.

Determination of Magnesium concentration:

Magnesium was measured in according to the kit from Giesse Diagnostics Roma Italy no.45 in the sera of the same patients, and healthy control.

Magnesium and blue xilidile react in alkaline medium producing a purple colour water soluble chelate. The intensity of the colour is proportional to the magnesium concentration in the sample. Moreover the blue xilidile generated absorption decreases proportionally with the chelate formation. Therefore magnesium can be determined by measuring the chelate increasing the absorbance at 512nm.

Determination of Haptoglobin:

Haptoglobin determined according to the kit from Bindarid, RNO58.3UK. This protein was measured by end point method with clinical application of redial immunodiffusion (RID). The procedure includes an immunoprecipitation in agarose between an antigen and its homologous antibody. It is performed by incorporation of one of the two Immune reactants (usually antibody) uniformly throughout a layer of agarose gel, then introducing the other reactants (usually antigen) into wells punched in the gel. Antigen diffuses radially out of the well into the surrounding gel-antibody mixture. A visible ring of precipitation forms where the antigen and antibody reacted. A quantitative relationship does exist between ring diameter and antigen concentration.

Statistical analysis:

Data are expressed as mean \pm standard deviation. Statistical significance was determined by unpaired student's t-test. They were analyzed of variance (ANOVA).

P-values-equal or lower than 0.05 were considered statistically significant.

Results and Discussion:

Table(1) shows the mean \pm SD of UA concentration for patients with DM II and healthy control which were: $(7.290 \pm 0.892$ and $4.5 \pm 0.969)$ mg/dL respectively.

The present study shows a significant increased of UA concentration in patients of DM II as a compared with healthy control. Hyperuricemia is a common finding in (DM II) but its significances as an independent risk factor for cardiovascular disease in DM patients has remained uncertain⁽⁸⁾.

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Uric acid is physiological free radical scavengers therefore it is play a central role in antioxidant defense⁽⁹⁾.

The elevation of UA may be due to the elevation of xanthine oxidase (XO) activity or could be due to increasing of lipid peroxidation (LPO) level that needs a large number of free radical scavengers which are generated by xanthin oxidase⁽¹⁰⁾. Our results are in agreement with Isma (2007)⁽⁸⁾.

Table (1): Uric acid concentration (mg/dL) in serum of patients with DM II and healthy control.

Group	No.	UA. Concentration mg/dL (Mean±SD)	P value
Patients	20	7.290 ± 0.892	S ≤ 0.05
Control	10	4.5 ± 0.969	

S. significant.

Data in table (2) represent the mean ± standard deviations values of serum Mg level in the control and patient groups. The present study showed lower levels of serum Mg in patient group as a compared with control.

It has been reported that Mg level decreased in sera of type1 and type2 diabetes patients due to its excreted in urine^(5,7). This decrease affects body activity because Mg acts as a co-factor ion for many enzymes in energy metabolism⁽⁶⁾.

Magnesium is an essential trace element. It is found in a very small quantity in our bodies. This element performs different function as a co-factor for enzymes that cause inhibition of LPO and prevention of various disease (including DM) and it's complication⁽¹¹⁾.

The importance of Mg as antioxidant could be explained on the basis that this trace element decreases the need to vitamin B₆ and if Mg concentration increased in nutrition this will activate the enzymes containing vitamin B₆. It may therefore be advisable for any person with diabetes or a family history of the disease to take at least of Mg and 10mg of B₆ daily^(5,7).

Hypomagnesemia may have negative impact on glucose homeostasis and insulin sensitivity in DM II patients. In recent studies it have been indicated that Mg deficiency may be associated with increased oxidative stress through reduction in enzymatic antioxidants leading to increase lipid peroxidation⁽¹¹⁾.

Our results are also in agreement with previous research⁽⁶⁾ Belinda (2007) and Ankush (2009)⁽¹¹⁾..

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Table (2): Magnisum concentration mg/L in serum of patients with MD II diabetes mellitus and healthy control.

Group	No.	Mg Concentration mg/L (Mean±SD)	P value
Patients	20	1.254 ± 0.333	S ≥ 0.05
Control	10	2.059 ± 0.172	

Table (3) showed the level of Haptoglobin in sera of patients with DM II and healthy control. The results in that table represent a significant increase in levels of haptoglobin of patients compared with control.

Haptoglobin a hepatocyte derived serum α_2 - sialoglycoprotein, is a positive acute phase reactant and hemoglobin binding protein that is essential in protecting against hemedriven oxidative stress⁽¹²⁾. Haptoglobin is expressed by a gentic polymorphism as three major phenotypes⁽¹³⁾.

It has been reported that HP phenotypes are an apparent risk factor for the development of gestational diabetes mellitus⁽¹⁴⁾. Moreover, serum HP may be good prognostic factors for the development of nephropathy in the course of diabetes mellitus. Our results are in agreement with previous study Sahar (2007)⁽¹⁵⁾.

Table (3): Haptoglobin concentration mg/L in serum of patients with DM II and healthy control.

Group	No.	Haptoglobin mg/L (Mean±SD)	P value
Patients	20	2057.33 ± 235.839	S ≤ 0.05
Control	10	800 ± 167.332	

Conclusions:

A conclusion could be drawn that DM II is an inflammatory disease which confirm by the increase levels of acute phase reactant, haptoglobin. The oxidative stress is a prominent feature of DM, confirmed by excess synthesis in the antioxidant uric acid.

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التقدير الاستهلاكي لحمض اليوريك والمغنسيوم والهبتاكلوبين في مصل دم

المرضى العراقيين بداء السكري النوع الثاني.

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الخلاصة:

الهدف من الدراسة المقدمة لحساب مستويات حامض اليوريك والمغنسيوم والهبتاكلوبين في مصل دم عشرون مريضاً عراقياً مصاباً بداء السكري من النوع الثاني مقارنة مع عشرة اشخاصاً من الاصحاء كمجموعة سيطرة.

عند الخوض في هذه الدراسة وجد زيادة ملحوظة في مستويات حامض اليوريك والهبتاكلوبين مع نقصان ملحوظ في مستوى المغنسيوم في مجموعة المرضى مقارنة مع مجموعة الاصحاء. في المحصلة النهائية الزيادة في بروتين الطور الحاد الموجب (الهبتاكلوبين) بسبب العملية الالتهابية التي تحدث في داء السكري من النوع الثاني.