

## Study Some of Biochemical Changes in Sera of Reaven's Syndrome Patient,s and it, s relationship with Diabetes Mellitus type II

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### ABSTRACT

Aim of this study to investigate the correlation of Reaven's Syndrome with the number and type of Diabetes Mellitus in both males and females diagnostic criteria in Iraqi patients /Babylon city .This study involved 85 diabetic patients(45 males and 40 females) with age (46-52 year) have a history of diabetes for 10 years and 80 healthy controls (40 males and 40 females) were randomly selected and they were examined for dyslipidaemia and Reaven's factors. Consulting the outpatient clinic at Merjan Teaching Hospital/Babylon city during May –July 2014 . For all patients anthropometric measures were obtained and fasting blood samples were taken for determination of blood glucose, lipid profile and C reactive protein ( CRP) level.Reaven's syndrome was diagnosed in all the samples under this research. The level of CRP was found to be significantly increased with increasing number of components of Reaven's syndrome(3.21 mg/dl) . While the lowest value of (0.13 mg/dl) was found in people with absent components of Reaven's syndrome (control). A significant positive correlation was observed between CRP, fast blood sugar (FBG) and triglycerides(TG)(3.21mg/dl ,120.7 mg/dl, and 189.14 mg/dl ,respectively,  $P<0.001$ ) in patient with diabetic mellitus and a negative correlation with high density lipoprotein-cholesterol (HDL-cholesterol )(25.26 mg/dl,  $p=0.058$ ) in the same time .

### دراسة التغيرات الكيموحيوية المرافقة لأمصال مرضى متلازمة ريفين وعلاقته بداء السكري النوع الثاني

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**الكلمات المفتاحية:** متلازمة ريفين، الكوليستيرول، الكليسيريدات الثلاثية، مستوى السكر

### الخلاصة

الهدف من البحث هو إيجاد علاقة بين داء السكري من النوع الثاني وبين متلازمة ريفين ،اشتملت الدراسة على 85 مريض لديهم تاريخ بمرض السكري ومن كلا الجنسين (45 رجال ،40 نساء ) وتم مقارنة النتائج بعينات السيطرة والتي تم اختيارهم عشوائيا وبالغ عددهم 80 (40 رجال ،40 نساء ) . تمت الدراسة في مستشفى مرجان التعليمي (محافظة بابل ) وأخذت عينة الدم من المرضى ومجموعة السيطرة في حالة صيام من الصباح الباكر لإجراء الفحوصات اللازمة للدراسة والمشملة على قياس نسبة الكلوكوز في الدم ، الكليسيريدات الثلاثية ، لبروتينات عالية الكثافة إضافة للبروتين الفعال نوع سي لغرض إثبات العلاقة بين مرض السكري ومتلازمة ريفين حيث لوحظ من خلال البحث وجود ارتفاع بمستويات كلا من الكليسيريدات الثلاثية ومستوى الكلوكوز بالدم إضافة الى البروتين الفعال مقارنة بمجموعة السيطرة وعلى خلاف ذلك وجد انخفاض بمستويات البروتينات العالية الكثافة لدى المصابين بمتلازمة ريفين مقارنة بمجموعة السيطرة .حيث كانت قيمة مستوى البروتين الفعال (3.21 ملغم/ديسيلتر) للمصابين بداء السكري بينما

للإصحاء كانت (0.13 ملغم/ديسيلتر) وهي قيمه منخفضة عادة كذلك وجدت قيمة كل من الكلوكونز و الكليسيريدات الثلاثيه كالاتي (120.7 ملغم/ديسيلتر، 189.14 ملغم/ديسيلتر ) على التوالي وهي قيم مرتفعه اذا ما قورنت مع القيم التي وجدت عند مجموعة السيطره (جدول رقم 1 ) وعلى العكس من ذلك لوحظ وجود علاقة عكسية بين مستوى البروتينات عالية الكثافه (25.26 ملغم/ديسيلتر) وهي قيمه منخفضه اذا ما قورنت بمجموعة السيطره (48.43 ملغم/ديسيلتر) .

## 1. INTRODUCTION

Reaven's syndrome is a disorder of energy utilization and storage, diagnosed by a co-occurrence of three out of five of the following medical conditions: abdominal (central) obesity, elevated blood pressure, elevated fasting plasma glucose, high serum triglycerides, and high-density cholesterol (HDL-C) levels. this syndrome increases the risk of developing cardiovascular disease, particularly heart failure, and diabetes.[1] Some studies have shown the prevalence in the USA to be an estimated 34% of the adult population,[2] and the prevalence increases with age. [2,3] It is described with different terms such as insulin resistance syndrome[3]. Diabetes mellitus type 2 is the major health problem in developed countries. Obesity, high blood pressure, high cholesterol, smoking, and alcohol consumption are the most important causes of cardiovascular diseases. [4] On the other hand, Reaven's syndrome is also the most common metabolic disorder in endocrine glands which can be an independent risk factor for cardiovascular diseases. [5] In this regard, the present study was aimed to investigating the relation between blood sugar level ,total cholesterol , triglyceride and some factors in Reaven's syndrome patients hospitalized in Merjan Teaching Hospital .

Nowadays, this syndrome is one of the most common causes of hospitalizing patients in developing countries, due to aging population and rapid change in lifestyle especially smoking, consuming foods with high level of fat, inactivity, and taking industrialized life patterns, risk factors and rate of cardiovascular diseases are growing [3 , 4]. According to the reports of World Health Organization (WHO) in 2009, obesity, high blood pressure, high level of C- reactive protein low level of HDL- cholesterol, alcohol consumption, and smoking are mentioned as the most important causes of Reaven's syndrome [5] . Therefore, this kind of syndrome is related to risk of Diabetes Mellitus type 2 diseases [6]. Iraq is one of the Southwest Asian countries, where prevalence of such factors is quite common. [7- 9].

Evidence has showed that intensity and prevalence of these diseases vary in different regions of the country. According to various reports in Iraq, more than 40% of deaths were caused by Reaven's syndrome . 34.2% and 32.2% of people carry at least one risk factor and 19.3% and 15% of them have at least two risk factors of Reaven's syndrome [5,10] . Low intense cholesterol has been introduced as the most common risk factor in these studies [11]. High rate of death caused by coronary artery disease in Iraq necessitates finding effective methods to decrease these diseases and deaths caused by them. According to the results of the related studies, the prevalence of blood sugar disorder and cardiovascular diseases is high [12 & 13] and the rate of deaths caused by these diseases is high in Iran and they are the primary cause of death [14 & 15].. Brown Wald states that in the end of 20th century deaths caused by cardiovascular diseases account for approximately half and one-fourth of deaths in developed developing countries, respectively [16].

It has been predicted that in 2020 about 25 million deaths per year will be caused by Reaven's disorders, diabetes increase, smoking, and dyslipidemia are major independent risk factors of coronary heart diseases [17] and blood sugar disorder[18]. .Zaliunas' study

concluded that half of diabetes patients are prone to Reaven's disorders [19]. Diabetes is a chronic disease that involves all aspects of the individual's life and its treatment requires fundamental changes in the person's lifestyle [20].

Diabetes mellitus is the most common metabolic disorder of internal glands and in human communities its prevalence is between 2-8 percent [21]. Possibility of Reaven's syndrome and diabetes among these individuals is 4-5 percent per year. It has recently been distinguished that this condition can solely be an independent risk factor [22]. There has lately been more attention to this issue that after eating disorder is an important factor in the development in atherosclerosis and even in diabetes mellitus [23]. Since chronic diseases especially atherosclerosis, high blood pressure, and its complications are the most important health problems in undeveloped and developed countries, the present study was conducted to investigate the relation between blood sugar level, HDL-cholesterol, triglyceride and some factors in Reaven's syndrome patients hospitalized in (Merjan Teaching Hospital /Babylon city).

## 2. MATERIAL AND METHODS

The subjects who were enrolled in this study were diabetic patients who attended the Out-Patients of the Merjan Teaching Hospital /Babylon city during (May –July 2014). A total of 85 diabetic patients (45 males and 40 females) with a history of diabetes for 10 years and 80 healthy controls (40 males and 40 females) were randomly selected and they were examined for dyslipidaemia and Reaven's factors. Patients with other ailments and metabolic disorders were excluded from the study. Laboratory tests were used to confirm the absence of diabetes in the control group and also by asking questions about the signs of diabetes such as polyuria, polydipsia and recent weight loss. Ethical clearance was sought and obtained for the study from the hospital. In both the patients and the controls, about 5 ml of fasting blood was obtained by venipuncture, by using sterile disposable syringes and needles. The blood was collected into centrifuge tubes. It was allowed to clot and it was then centrifuged at 3000 rpm for 15 min at room temperature. The serum obtained was pipetted into a clean blood sample bottle and analyzed on the day of collection for serum sugar, C-reactive protein and lipid profile tests. Serum HDL-cholesterol was determined by an enzymatic (CHOD-PAP) colorimetric method [11] and triglycerides were determined by an enzymatic (GPO-PAP) method [12]. C-reactive protein was estimated by a precipitant method [13]. Serum glucose was determined by using the glucose oxidase enzymatic method [15]. All the parameters which were under investigation were determined in the serum of the subjects by using commercially available reagent kits. The lipid profile of the subjects was classified, based on the ATP III model [23].

The values of all the parameters were given in mg/dl and they were expressed as mean  $\pm$  SE. The statistical significance of the difference between the control and the study groups were evaluated by the Student's t-test. Pearson's correlation test was performed to examine various correlations.

## 3. RESULTS

The mean C-Reactive protein, triglyceride, and the fasting blood sugar levels were highly significant in the diabetics mellitus as compared to those in the controls. The correlation studies showed a non-significant negative correlation of FBG with HDL-C and a positive correlation of FBG with CRP, TG and LDL-C in patient with Reaven's syndrome

.So, in our search the mean age of the subjects were  $53.04 \pm 10.79$  and  $46.20 \pm 10.65$  years for the diabetic and the control groups respectively. [Table 1] shows the mean C-reactive protein, triacylglycerides, and the fasting blood sugar levels which were highly significant in the diabetics as compared to those in the controls, as we find low non significant level of HDL-C in (patient  $25.26 \pm 0.40$  mg/dl, control  $48.43 \pm 0.60$  mg/dl).

The mean TG was highly significant among the lipid profile of the male and female diabetic. ( $189.14 \pm 2.54$  mg/dl in patient while in normal  $91.62 \pm 1.45$  mg/dl) The correlation studies [Figure 1] showed a negative correlation of FBG with HDL-C and a positive correlation of FBG with CRP, TG in patient with Reaven,s syndrome. In patient with diabetics mellitus, C.R.P was very highly ( $3.21 \pm 6.14$  mg/dl) and in control group ( $0.13 \pm 5.13$  mg/dl)

#### 4. DISSCUTION

Diabetic patients have many complications which include elevated levels of C R P and triglyceride, low levels of HDL-C and a preponderance of abnormalities in the composition of the smaller, dense particles [17]. In the present study, the results showed that the lipid and the diabetics in patient with Reavan,s syndrome are higher than that of the controls and that is in agreement with the findings of Idogun et al. [18] and Albrki et al., [16]. This study also showed that TG and CRP were significantly different in the diabetic group. The results showed a gender difference in the lipid metabolism between the diabetic and the non-diabetic males and females, which was in agreement with the findings of Gustafsson et al., [20].

However, Vinter-Repalust et al., [21] reported no significant differences in the prevalence of type 2 diabetes mellitus between males and females. The prevalence rates for high CRP, combined high and very high TG and low HDL-C in the diabetic subjects were 10%, 8% and 71% respectively. The prevalence rates of high TC and TG in this study were 10% and 38% respectively. The correlation studies showed a negative non significant correlation between FBG and HDL-C, whereas positive significant correlations were recorded between FBG and TC and FBG and TG. This study revealed that dyslipidaemia was observed in the diabetic population, but that HDL-C was not significantly decreased. Reavan syndrome comprises a cluster of abnormalities with insulin resistance and adiposity as central features. Low-grade inflammation has been hypothesized to be involved in the pathogenesis of Reavan syndrome.[23] As this study demonstrated, high levels of CRP were observed in patients with Reavan syndrome. This was supported by the study of Ridker et al. that showed CRP levels to be elevated in patients with the Reavan Syndrom.[13] The present study found a significant correlation between CRP, FBS ,HDL-C and diabetes mellitus which was supported by work of Ouchi, et al. [24] who confirmed the expression of CRP, mRNA in human adipose tissue, and that adipose tissue is an important source for circulating CRP.

This correlation is further supported by the study of Festa, et al.[15] that showed strong association between CRP levels, central adiposity, and insulin resistance. Cytokine production by adipocytes might mediate the elevation of CRP levels. Adipose tissue secretes a number of cytokines, among which is interleukin 6 (IL-6) which regulates hepatic production of CRP.[16] The significant positive correlation between hs-CRP and fasting blood glucose could be attributed to the role of hs-CRP in insulin signaling. Xune, et al.[25] showed that recombinant CRP attenuates insulin signaling through the regulation of spleen tyrosine kinase, mitogen-activated.

## CONCLUSION

These results suggest that the correlation ship between Reaven's syndrome and diabetes mellitus type2 ,so this study involved measuring of some variables like CRP, TG,HDL-cholesterol, and FBG.to improve this relationship .Therefore we founded that the diabetic patients had a higher prevalence of high C-reactive protein , high triacylglyceraid and low HDL-C than the controls, indicating that diabetic patients were more prone to Reaven's syndrome .

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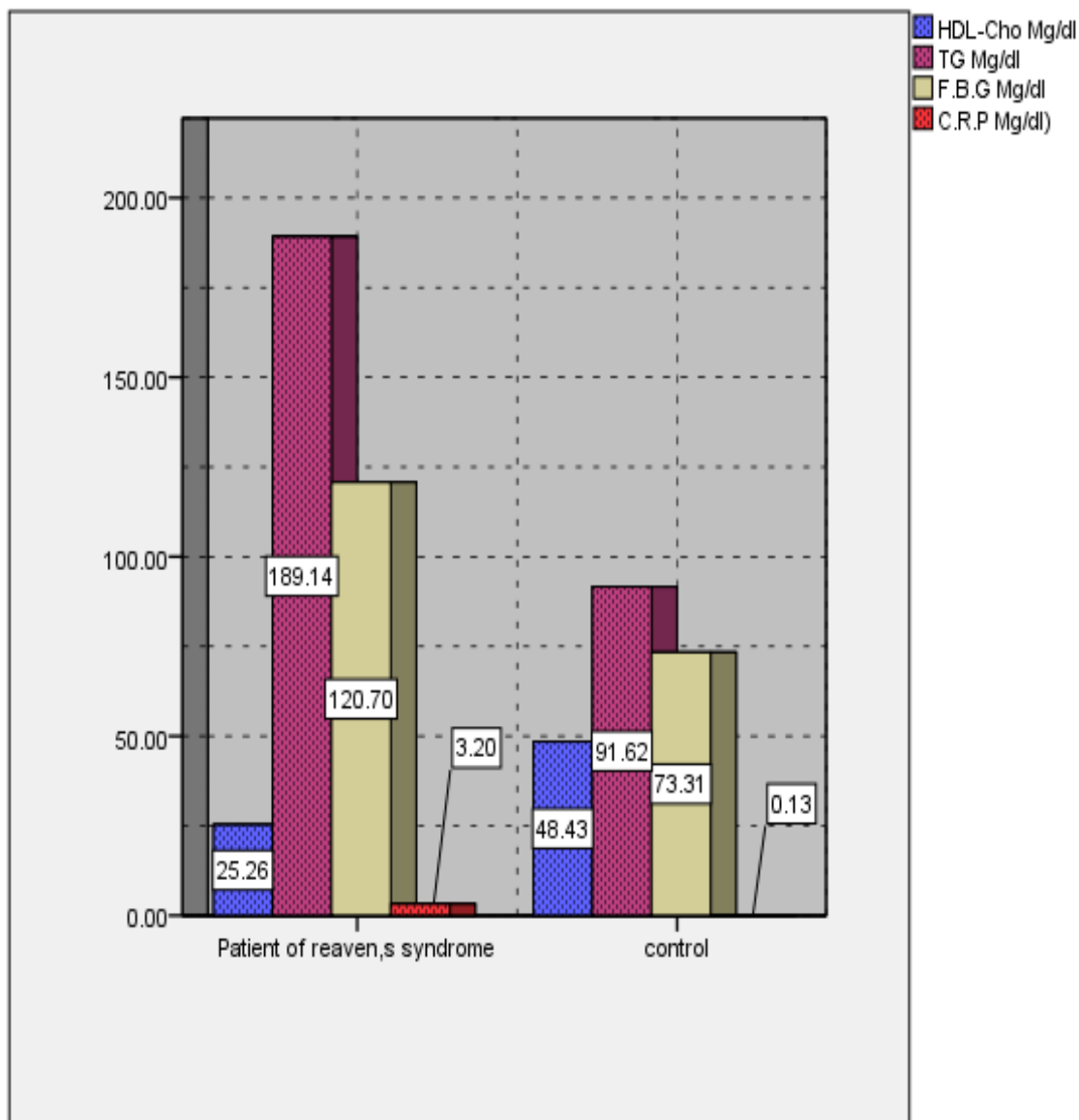
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**Table( 1)** Concentration of serum HDL-C ,TG ,C.R.P ,and F.B.G.in Patient of Reaven's syndrome and control groups

<b>Samples</b>	<b>HDL-C. (M±SE) mg/dl</b>	<b>TG (M±SE) mg/dl</b>	<b>F.B.G (M±SE) mg/dl</b>	<b>C.R.P (M±SE) mg/dl</b>
<b>Patient of Reaven's syndrome</b>	<b>*25.26±0.40</b>	<b>**189.14±2.54</b>	<b>**120.7±0.38</b>	<b>**3.21±6.14</b>
<b>Control</b>	<b>48.43±0.60</b>	<b>91.62±1.45</b>	<b>73.31±0.71</b>	<b>0.13±5.13</b>
<b>P-value</b>	<b>0.024</b>	<b>≤ 0.001</b>	<b>≤ 0.001</b>	<b>≤ 0.001</b>



**Figure (1)** Correlation between levels of TG,HDL-C, and CRP in normal and Reavan' s syndrome samples