The correlation of C- reactive protein and diabetes mellitus type 2.

Mohammad A. Abdul Hussein*, Najah R. Hadi**and Mohanad A. Hussein***

الخلاصه

الغرض من الدراسة: معرفة مدى العلاقة بين بروتين سي التفاعلي والنوع الثاني من داء السكري.

طريقة العمل: تم الاعتماد على دراسة مقارنة ل(65) مريض مصاب با النوع الثاني من داء السكري مع مجموعة من الاشخاص الاصحاء وعددهم (65) عن طريق بروتين التفاعل سي وذلك خلال الفترة من الاول من اذار ولغاية الاول من تشرين الاول علما" ان هاتين المجموعتين متفاربات بالعمر والجنس والوزن.

النتيجة:40 رجل و 25 امرأة مصابين بالنوع الثاني من داء السكري معدل اعمارهم7. 60 وجدنا هناك علاقة بين زيادة بروتين سي التفاعلي والنوع الثاني من داء السكري بصورة خاصة الذكورالاعمار الكبيرة والاكثر وزنا"

بينما لاتوجد زيادة ملوحظة في بروتين سي التفاعلي بين الاشخاص الاصحاء.

الاستنتاج:هناك علاقة بين بروتين التفاعل سي والنوع الثاني من داء السكري.

Abstract

Aim of study: To evaluate the association between C-reactive protein (CRP) and type 2 diabetes mellitus .

Method: The study sample consisted of (65) patients with type 2 diabetes mellitus(40) men and (25) women. The CRP was measured for all them and compared with (65) persons without DM as a control group well matched with age and sex to the patient group .BMI for patients in both groups were measured . A p-value of <0.05 was regarded as statistically significant .

Result: 40 males and 25 females with type 2 DM with mean age 60.7 years. The increase in CRP was significant (p value<0.05) in type 2 DM patients who are male with high BMI and increased age while no significant increase in the level of CRP in the control group (p value > 0.05) .

Conclusion : These result suggest, that there is an association between CRP and type2 diabetes mellitus .

*Assistant Professor
** professor } Kufa College of Medicine.
***Senior Physician Diwaniyah Health Authority.

Introduction

Diabetes Mellitus (DM), is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin[1].
Diabetes occurs world –wide and the incidences of both type 1 and type 2 diabetes are rising, it is estimated that, in the year2000,171 million people had diabetes, and this is expected to to double by 2030[1]. Type 2 DM is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production [2].
C-reactive protein (CRP), a sensitive marker of systemic inflammation, has been shown to be increased in patients with type 2 diabetes mellitus[3-4]. in addition, CRP levels are elevated in individuals with features of the metabolic syndrome[5] and with cardiovascular disease[5]. Although several prospective studies[6,7,8] have also consistently shown that CRP predicts myocardial infarction and other cardiovascular end points, little is known about the association between CRP and incident type 2 diabetes mellitus. Given the hypothesis that type 2 diabetes mellitus and atherosclerotic vascular disease may arise from a "common soil"[9,10,11] and that inflammation may be an important antecedent factor for both diseases,[12,13,14] it assumed that CRP, the classic acute-phase protein, might be related to newly diagnosed diabetes mellitus[15,16,17].
CRP is thought to be produced in the liver [18] and stimulated by tumor necrosis factor α, which is itself derived from adipose tissue [19] and predominantly induced by interleukin-6 [20]. The mechanisms of correlation between CRP and the development of diabetes are unclear. However, there are several possible explanations. One of them is the oxidative stress generated hyperglycemia [21,22]. Oxidative stress might be implicated in promoting a state of low-grade inflammation indicated by markers such as CRP with elderly type 2 diabetes [23]. On the other hand, oxidative stress was thought to impair insulin endocytosis in endothelial cell lines [24] and it could precede the development of the endothelial dysfunction and insulin resistance. This points to the possibility that CRP may be act as a biomarker in the development of diabetes[25].

Patient and Methods

Study subjects were include 65 patients in diabetic clinic of medical department conducted from 1st march to 1st October 2008 in Al-sadder teaching hospital, the study population consisted of 40 men and 25 women who did have diabetes, defined as known cases with type 2 diabetes when they had symptoms of diabetes plus random blood glucose concentration≥11.1mmol/l (200 mg/dl) or fasting plasma glucose ≥7.0 mmol/l (126mg/dl).

The CRP was measured for all of them and compared with 65 normal subject without DM matched age and sex to the patient . BMI is calculated as persons weight in kilograms divided by sequare of his or her height in metres (kg/m^2).

In our study we exclude the condition that raise CRP like (infection, inflammation, vascular disease etc.)by :

1-History: of coronary heart disease(e.g. angina, myocardial infraction)

no cerebrovascular disease(e.g. stroke and transient ischemic attack)

no peripheral vascular disease(e.g.claudication and critical limb ischemia)

2-Thorough physical examination.

3-Labarotory investigation : (e. g .white blood count, erythrocyte sedimentation rate, platelet count, blood hemoglobin ,general urine examination.

Measurement of CRP

1- Specimen collection

we obtained a sample of venous blood from the patient and allow a clot to form and retract. Centrifuge clotted blood and collect clear fresh serum sample..

don' t use haemolysed ,contaminated or lipaemic serum for testing as this adversely affect the result.

2. Reagent preparation

all reagent should be brought to room temperature (20^oc to25^0 c)and mixed gently to re suspend latex prior to use .do not induce foaming

3-Assay procedure

Semi Quantitative Method

a-using isotonic saline prepare serial dilution of the patient serum (1/2 ,1/4 ,1/8 ,1/16 ,1/32 ,1/64 and so on)

b-transfer one drop(50 micro litre)of each serum dilution to the test circle on the slide .

c-shake the latex reagent, then using the dropper provided, add one drop of suspension to the test circle.
d- mix the drops using a disposable stirrer ensuring coverage of the test circle with the mixture.
e-gently and evenly, rock and rotate the test slide for 2 minutes whilst examining the test slide for agglutination.

Result and interpretation

A vitex CRP has a detection limit of 6mg /l of CRP in the patient serum. positive result at a CRP serum concentration above 6mg/l and negative result at 6 mg/l and below.
The serum CRP concentration can then be calculated approximately by multiplying the dilution factor(i.e 2,4.8,16) by detection limit ,i.e 6
.to give the number of mg/l concentration e.g. the agglutination titre appeare at1/8 the approximate serum CRP concentration is8*6=48 mg/l
The data were analyzed by using the statistical software, SPSS version. The data with quantitative variables were expressed by median and range while the qualitative variables were estimated by frequency and percentage. Statistical analysis was estimated using chi-square test.
A p-value of <0.05 was regarded as statistically significant.

Results

In our study there are 40 males and 25 females with type 2 DM with mean age 60.7 ±8.9 years , and control group mean age 62.8±8.5 years with out DM as in table -1
The increase in CRP was significant (p value < 0.05) in type 2 DM patients who are male with high BMI and increased age (Table 2), while not significant (p value > 0.05) increase in CRP in the control group with out DM who (Table 3).

Table (1) Demographic and Clinical Characteristics of patients in the study.

Patients Characteristic		Patients with type 2 DM	Control group
mean age		60.7 yr	62.8 yr
Sex	Male	40(61.5%)	39 (60%)
	Female	25(38.46%)	26(40%)
Mean BMI		29.9	26.7

Table (2) Baseline characteristics of participants who are diabetic in different categories of serum CRP.

Risk factor	Serum CRP			*P* value
	<6 mg/l	6–12 mg/l	>12 mg/l	
Men (%)	40.5	64.5	57.2	<0.001
BMI (kg/m^2)	24.9 ± 3.2	26.5 ± 3.4	29.9 ± 3.6	<0.001
Age (years)	67.3 ± 8.5	68.5 ± 8.8	72.9 ± 9.9	<0.001

Table (3) Baseline characteristics of control group in different categories of serum CRP.

Control group	Serum CRP			*P* value
	<6 mg/l	6–12 mg/l	>12 mg/l	
Men (%)	39(60%)	0	0	>0.05
BMI (kg/m^2)	26.7	0	0	>0.05
Age (years)	62.8 yr	0	0	>0.05

Discussion

In this study, we found that high serum CRP is a major biomarker to the risk of type 2 diabetes, independent of the other established risk factors. Our study underscores chronic inflammation as a major contributor to the risk of diabetes by showing that one-third of the cases with diabetes are attributed to high serum CRP. Serum CRP, a marker of chronic low-grade inflammation, is a novel risk factor for diabetes.

High serum CRP predicts type 2 diabetes, and a growing body of evidence supports the causal role of CRP[3,13] Hence ,It is logical to attribute a part of the risk of diabetes to chronic low-grade inflammation.

Serum CRP is a marker of inflammation but is also closely related to adiposity. This may raise doubt about whether CRP is a marker of inflammation or adiposity. We believe that even the variation of serum CRP, correlated with obesity, indicates an inflammatory state. The increased level of serum CRP in obese individuals is due to increased secretion of interleukin-6 and tumor necrosis factor-α in adipocytes, which regulate CRP production in hepatocytes and induce a chronic inflammatory state [12-14]. According to the literature on Japanese populations [9-10], Japanese subjects are skewed to lower CRP concentrations than westerners. Therefore, the acute-phase response may vary due to racial differences. However, there have been no published reports investigating the relationship between CRP and the development of type 2 diabetes among Japanese.

We also have to consider the genetic factors of CRP. FsH is thought to be associated with increased plasma CRP levels[24] although in this study, there was no relationship between FH and CRP in either sex. It is hypothesized that there may be a genetic relationship between CRP and diabetes, even though it is unclear whether a common genetic factor really exists. To understand the relationship between CRP and type 2 diabetes, further study is suggested.

Conclusion

These result suggest ,there was association between CRP and type 2DM.

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