C-Reactive Protein and Cholesterol level In Male Type 2 Diabetic Patients.

Samal H. Kareem* ***Majid A. Naseif AL-Bayati****
Noor A. Abood**

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Abstract:

Elevated C-Reactive Protein (CRP) level in serum is a risk factor for type 2 diabetes ,this relationship is likely to be the cause it means elevated CRP leads to T2D in future .

Our objective was to examine CRP in male Type 2 Diabetes(T2D) patients in different age ,we studied 120 male subjects divided to two groups according to their age. First group **A** age (31 - 40) year old ,60 person (30 control & 30 T2D patients),3 person for each same age: second group **B** age (41 – 50) years old ,60 person (30 control & 30 T2D patients),3 person for each same age.

We examined blood sugar ,cholesterol and CRP in each group. and we toke the mean of samples in the same age in each data in all the 4 groups.

Our data shows that CRP raised significantly $P \leq 0.05$ in group A(T2D) and in group B(T2D) comparing with control group of each .And cholesterol levels, and sugar levels raised significantly $P \leq 0.05$ in group A(T2D) and in group B(T2D) comparing with control group of each. CRP ,Cholesterol and sugar are higher in group B(T2D) than in group A(T2D),and in group B (control) than in group A (control).

CRP level can predict diabetes but not causal, diabetes may cause a kind of inflammation (showed by high CRP) by its effect on body and this effect (inflammation) may cause rising CRP level.

Key words: C-Reactive Protein , Cholesterol ,T2D , Inflamation , IL.

Introduction:

Elevated blood sugar levels can cause a variety of health problems , including damage to the eyes , kidneys , nerves , blood vessels and atherosclerosis **[**fatty deposits build up in the inner lining of arteries**]** [1].

It has been suggested that testing CRP level in blood may be additional way to assess cardiovascular system and predicted Diabetes [2].

A growing number of studies have examined whether CRP can predict recurrent cardiovascular diseases , stroke and death in different setting .High levels of CRP predict recurrent coronary event in patient with unstable angina and acute myocardial infarction **[** Heart Attack **]**. High CRP also associated with lower survival rates in these patients .High CRP may increase the risk that an artery will reclose after it's been opened by balloon angioplasty [2].

CRP and Diabetes : CRP is a non specific marker of systemic inflammation that predicts incident Type 2 Diabetes (T2D)[3,4].Several population based observation studies suggest an independent role for CRP in development of Insulin Resistance **(**IR) **[** problem in target-cell

*Department of Biology ,College of Science , AL- Mustansireah University.
**Biotechnology ,College of science, AL- Mustansireah University.

hyporesponsivness to insulin ,a factor that combine to cause T2D] [5,6] .

A growing body of data [7,8] reinforced the concept that inflammation also play an important role in the prior linkage of Insulin Resistance (IR) [9],and CRP one of the acute phase protein that increase during inflammation [2],evidence exists for the prior linkage of IR as a proinflammatory state that may have existed for years before occurrence of T2D [9].

Much evidence exists that inflammatory mechanisms play a major role in the cascade of events that results in rupture of atherosclerotic plaque. Up regulation of receptors for advanced glycation end products has been associated with enhanced inflammatory reactions. Increased expression of these receptors has been found to be associated with impaired glycemic control and may be a contributory factor in the complex array of mechanisms that leads to accelerated atherosclerosis in patients with diabetes [10].

In the nearly 6,000 participants in the Cardiovascular Health Study whose circulating levels of inflammatory markers were determined both at baseline and after 3-4 years of follow-up, those who developed diabetes had higher measured levels of CRP than those who remained Euglycemic. In addition, those with elevated levels of CRP were found more likely to develop diabetes over the course of the study [11].

In a nested case-control study carried out as part of the Women's Health Study among initially non diabetic participants who developed diabetes over the course of the study, median baseline levels of IL6 and CRP were significantly higher among case than among control subjects ($P < 0.001$), and increasing levels of both markers were associated with a higher risk of developing diabetes[12] .Increased CRP levels predicted the new onset of diabetes [13].

The Monitoring of Trends and Determinants in Cardiovascular Disease Augsburg project involved 2,052 men who were non diabetic at baseline. During an average follow-up of 7.2 years, 101 cases of diabetes occurred. Participants with CRP levels in the highest quartile had a 2.7-fold greater risk of development of diabetes than those in the lowest quartile[14]. The results of this study suggest the potential involvement of inflammatory mechanisms in the development of diabetes.

Interestingly, the findings of the Strong Heart Study, carried out in an American Indian population with a high prevalence of diabetes, showed that CRP elevations were strongly related to the presence of cardiovascular disease among non diabetic women but not among diabetic women or among men, irrespective of glycemic status. Thus, the predictive value of CRP elevations may vary among subsets of populations [15].

Also patients with low testosterone and T2D have high concentration of CRP which increase their risk of developing atherosclerosis and heart diseases above the risk associated with diabetes [16].

Because of the relationship between CRP & cholesterol with {heart disease and atherosclerosis} we decided to study the level of CRP and cholesterol in patient with T2D in men and to determine the future incidence of Heart Attack in those patients by taking CRP level as a detector.

Materials and methods :

Blood samples were collected from 120 male person ,those 120 were divided to two groups.

1- Group A :- Contain 60 person aged from 31 to 40 years old {30 control

normal, 3 person for each same age & 30 person T2D previously diagnosed, 3 person for each same age}.

2- Group B :- Contain 60 person aged from 41 to 50 years old {30 control normal ,3 persons for each same age & 30 person T2D previously diagnosed , 3 persons for each same age}.

Serum was taken from these samples then we tested sugar ,cholesterol and C-Reactive Protein according to the methods in each kit.

- Sugar and Cholesterol :-By using special kite By (Biomegrib)® to measure the blood sugar, (spinreact) ® kite used to measure cholesterol in blood.
- C-Reactive Protein :By (plasatec)® Kite, Plasmatec Laboratory Products LTD. U.K.

Statistical Analysis:

T. Test was emplaced to study the significance of differences between data in the present work by Least Significant Differences (LSD) P≤0.05 using (SAS 2001) program [17].

Results:

In group A: Table (1) and Fig. (1) there is a significant increase P≤0.05 in sugar and cholesterol between (control and T2D) .CRP in group A shows no significant difference between control and T2D in group A.

Table (2) and Fig. (2) our data shows significant differences P≤0.05 in group B between (control & T2D) in sugar , level ,cholesterol and CRP which is higher in T2D group than in control group .

Table (1) and table(2) shows also differences between group A and group B :all data {sugar , cholesterol and CRP} in group B (T2D) are more than group A(T2D) and all data in group B (control) are more than group A (control).

Table (1): Group A: Age {31-40} years: Sugar ,Cholesterol & CRP in both (control and T2D) *.

Age	Sugar. mg/dl		Cholesterol. mg/dl		CRP	
	control	T2D	control	T2D	control	T2D
31	180	321	150	249	-	+
32	170	243	160	218	-	+
33	100	245	175	228	-	+
34	120	198	133	205	-	-
35	80	334	130	235	-	+
36	185	260	180	245	-	-
37	125	327	170	266	+	-
38	130	280	180	205	+	-
39	200	387	200	271	+	+
40	100	271	200	173	+	+
Mean ± SE	139.00 ± 13.18	286.60 ± 17.51	167.80 ± 7.77	222.90 ± 9.02	0.40 ± 0.16	0.60 ± 0.16
**	AB		AB		AA	
LSD	46.06		25.03		0.48	

**control contain 30 persons (3 persons for each age) & T2D contain 30 persons (3 persons for each age)*

*** : Means with the different letters are significantly different P≤0.05 , between control and T2D.*

Table (2): Group B: Age {41 - 50} years: Sugar ,Cholesterol & CRP in both (control and T2D) *.

Age	Sugar. mg/dl		Cholesterol. mg/dl		CRP	
	control	T2D	control	T2D	control	T2D
41	95	346	170	260	-	+
42	210	385	190	271	+	+
43	100	371	160	280	-	+
44	210	445	210	310	-	+
45	120	439	159	277	-	+
46	170	385	160	210	-	-
47	110	480	176	333	-	+
48	180	510	200	250	-	+
49	195	320	200	246	+	+
50	200	435	300	254	+	+
Mean ± SE	159.00 ± 14.99	411.60 ± 19.01	191.90 ± 13.42	269.10 ± 10.87	0.30 ± 0.15	0.90 ±0.10
**	AB		AB		AB	
LSD	50.87		36.30		0.38	

**control contain 30 persons (3 persons for each age) & T2D contain 30 persons (3 persons for each age)*

*** : Means with the different letters are significantly different P≤0.05 , between control and T2D.*

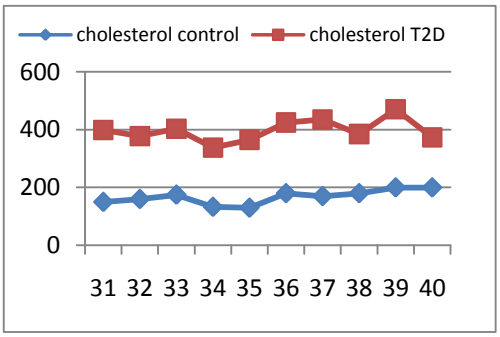

Fig. (1):Cholesterol level in Group A:Showing levels of Cholesterol with age in control group {under} and in T2D group {above}.

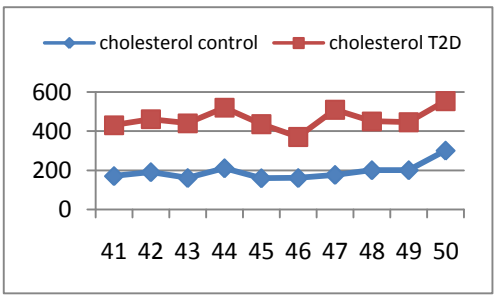

Fig. (2):Cholesterol level in Group B:Showing levels of Cholesterol with age in control group {under} and in T2D group {above}.

Discussion:

Many researches and studies show that elevated CRP is associated with IR and T2D [3,4,16,18]. Others mentions that systemic CRP levels are not related / or responsible for development of IR , hyperglycemia or diabetes [2,18],that: [3,4,16,18] goes with our results (table 1 and 2) , to clear the pathophysiological side of this result we have to discuss .

The Relation between CRP and diabetes .

The meager inglorious Factors such as cigarette smooching , hypertension , Atherogenic lipoprotein , alcohol , with an healthy diet and obesity .All these factors with aging gives rise to a variety of noxious stimuli that cause the release of chemicals that activation cells involved in the inflammation process [2].

Systemic CRP levels are not responsible for development of IR , this finding predict the possibility that inflammation signals contribute to causal processes leading to diabetes [19], so the association between systemic CRP and diabetes risk is not causal . If glucose intolerance and IR have inflammation mediators there should be sough among cytokines and chemicals factors secreted to control inflammation such as interleukins **[** IL6 & IL1**]** and Tumor Necrotic Factors **[**TNFά**]** [20].The gene expression of CRP accrue mainly in hepatocytes regulated by IL6 originated from adiposities and immune tissues . This cytokines and TNFά are candidate mediators for proposed link between inflammation , IL6 and CRP [21]. Other inflammation mechanisms such

as complement pathway may also be important [22].

So inflammation caused by bad habits with aging and obesity lead to diabetes , and elevated CRP levels under the effect of cytokines especially (IL6) & (TNFά) which express CRP gene. that is why CRP in (table 1 & in table 2) is significantly higher in group A (T2D)than control group and in group B (T2D) CRP is also higher than control group.

We are aware that technique used in our research to determine CRP rather than hs-CRP used in other research may explain the differences data between researches with respect to genital variation . other reason that CRP are much higher in women than in men since sex-CRP interaction .Life style with some endemic diseases in population can effect CRP levels[23].by all the above we can understand the differences between our data and other researches[2,18]how mentions that systemic CRP levels are not related ⁄ or responsible for development of IR , hyperglycemia or diabetes.

The significant increase in cholesterol in table 1 & table 2 between control and T2D is because: when the IR or diabetes accrue, the body will use adipose tissue as source of energy instead of sugar ,that will increase cholesterol , fatty acids **[**hyperlipidemia**]** in blood. on the other hand it may be due to inflammation caused by diabetes. Elevation of cholesterol is due to inflammation and high LDL cholesterol in T2D patients [18].

The differences between group A (control) and group B (control) is may be due to aging and life style .and differences between group A (T2D) and group B (T2D) is due to chronic inflammation lead to high IL6 & TNFά lead to high CRP [20]& high cholesterol due to chronic diabetes with respect to age factor.

In conclusion CRP level can predict diabetes but not the causal ,by the effect of inflammation accompanied the T2D cases: this is important because research have to focus on inflammation not on CRP to treat future diabetes. Genital variation between population **,**different technique and sex may give interfere with CRP data in T2D , T2D have high cholesterol level respectively with high sugar level. which increased with aging.

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مستوى C-Reactive Protein والكولسترول في المرضى الذكور المصابين بداء السكري نوع 2

سامال حكيم كريم* ***ماجد احمد نصيف البياتي****

نور عادل عبود**

*قسم علوم الحياة، كلية العلوم ،الجامعة المستنصرية

**كلية العلوم، كلية العلوم ،الجامعة المستنصرية

الخلاصة :

ارتفاع مستوى C-Reactive Protein (CRP) هو احد العوامل التي ترافق مرضى السكري نوع 2 ,هذا الترابط بين مستوى CRP ومرض السكري نوع 2 يمكن أن يفسر كعلاقة سببية أي أن ارتفاع CRP يؤدي بالنهاية إلى الإصابة بمرض السكري نوع 2 مع الأخذ بالاعتبار الاختلافات الجينية وأسلوب المعيشة اللذان يؤثران على مستوى CRPهذه تؤدي مجتمعة إلى أعراض مرض السكري .كان الهدف من الدراسة تقييم مستوىCRP والكولسترول في دم المرضى الذكور المصابين بداء السكري نوع2 ,تمت هذه الدراسة على 120 ذكر قسموا على مجموعتين عمريتين الأولى مجموعة **A** (60 شخص) من عمر (31-40)سنة وتشمل سيطرة 30 شخص غير مصابين ،3 أشخاص لكل عمر (3 تكرارات) ومجموعة مصابين Type 2 Diabetes (T2D) عدد 30 شخص ،3 أشخاص لكل عمر (3 تكرارات):ومجموعة ثانية مجموعة **B** من عمر (41 -50)سنة وتشمل أيضا مجموعة سيطرة غير مصابين 30 شخص بواقع 3 أشخاص لكل عمر (3 تكرارات) ،ومجموعة مصابين من 30 شخص بواقع 3 أشخاص لكل عمر (3 تكرارات). أعطت النتائج ارتفاع معنويا $P\leq0.05$ بمستوى CRP في مرضى السكري نوع 2 في مجموعةِA ومجموعة B بالمقارنة مع مجموعة السيطرة لكلا المجموعتين وكان هذا الارتفاع موازيا للارتفاع المعنوي $P\leq0.05$ بمستوى سكر الدم والكولسترول في كلا المجموعتين A وB المصابتين (T2D) بالمقارنة مع مجموعة السيطرة لكلا المجموعتين . إن مستوى CRP في الدم يمكن إن يعتبر كمؤشر لحدوث مرض السكري نوع 2 كما إن ارتفاع CRP لا يسبب مرض السكري نوع 2 وهذا يوضح من خلال، إن مرض السكري نوع 2 يشبه من حيث طبيعة تأثيره على الجسم تأثير الالتهاب إي يعتبر كنوع من أنواع الالتهاب وهذا الأخير يسبب ارتفاع مستوى CRP في هؤلاء المرضى كما وان حدة المرض ومستوى السكر في الدم وCRP والكولسترول يزداد مع تقدم العمر.