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*Journal homepage: <http://www.journalijar.com>***INTERNATIONAL JOURNAL  
OF ADVANCED RESEARCH****RESEARCH ARTICLE****Association between C-Reactive Protein and Type 2 Diabetes in Basra city/ Iraq****Dr Khairallah A S Mohammed**

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Mohammed***Copy Right, IJAR, 2015.. All rights reserved***Abstract**

The association between C- reactive protein and type 2 diabetes was investigated in Basra city/Iraq. The results of 100 diabetes patients showed that 32% had a significant high level of CRP. There was no correlation between the high level of C-reactive protein and age, sex and the period of diabetes. These results suggest that elevated CRP levels are independently associated with T2D.

**INTRODUCTION**

Diabetes mellitus more commonly known as diabetes, is a group of metabolic disease characterised by high blood sugar, which is caused by defects in insulin secretion, insulin action, or both (1). Based on the etiology and the pathophysiology caused by the deficiency of insulin, diabetes mellitus is classified into three different types (2). Type 1, results from the body failure to produce insulin which can be caused by destructive lesions of pancreatic beta cells either by an autoimmune mechanism or of unknown cause (2, 3). Type 2 is caused by a decrease in insulin secretion and sensitivity (insulin resistance). Type 3 is caused either by specific genetic mutation or associated with other pathogenic conditions or diseases.

Metabolism of glucose is classified into normal, borderline and diabetic stage. Furthermore, diabetic stage is classified into non-insulin requiring, insulin-requiring for glycemic control, and insulin-dependent (ID) for survival (2, 3).

Type 2 diabetes (T2D) is an important public health problem because of its complications and high prevalence. It causes metabolic alteration, which may lead to severe complications such as coronary heart disease, peripheral vascular disease, impairment in vision and renal dysfunction (4, 5). Despite the mortality and socioeconomic effects, the etiology of type 2 diabetes is not yet fully understood (6). It has been assumed that T2D is associated with alteration of acute-phase proteins, such C-reactive protein (7). Several studies showed that patients with an elevated CRP have up to 8.5-fold increase in morbidity and mortality (8, 9, 10). In prospective case-control studies, elevated levels of CRP predict the development of type 2 diabetes, supporting a possible role for inflammation in diabetes disease (10, 11, 12). Several studies demonstrated that high level of glucose stimulates the release of the inflammatory cytokine interleukin-6 (IL-6) and tumour necrosis factor- $\alpha$  (TNF- $\alpha$ ) from various cell types and results in the induction and secretion of acute-phase reactants by adipocytes (13). On other hand, other studies indicated that CRP had little or no predictive value for the development of diabetes after further adjustment for adiposity and

insulin resistance (14). To date, there is no report available concerning the relation of CRP with diabetic mellitus in Iraq. Therefore, the aim of the present study is to investigate the association of CRP with T2D in Basrah city/Iraq.

## Materials and Methods

### Study population

The study was carried out on 100 subjects with T2D and 20 control subjects without T2D, aged 22 – 83 years from January to May 2015. A questionnaire was used to collect information including age, sex and starting date of type 2 diabetes if available. The participants were subjected to random plasma sugar (RPS). All diabetic subjects with  $\geq 7.0$  mmol/L were, already diagnosed as diabetic and on either dietary, oral or insulin treatment. Non – diabetic subjects were healthy and with random plasma sugar  $< 7.0$  mmol/L.

### Biochemical Analyses

Venous blood samples were collected from each subject and random plasma glucose (RPS) was measured using glucose oxidase method (15). CRP was measured using qualitative latex immunoassay method. The titers of CRP in the positive samples were determined by using quantitative latex immunoassay method considering less than 6 mg/L as normal value levels (16).

### Results

A total of 120 (44 females and 76 males) of the studied population were investigated for association of type 2 diabetes and serum levels of CRP. CRP values in diabetic and non-diabetic persons were shown in Table 1. The results were divided into 12 groups based on the level of CRP in relation to sex. The levels of CRP were significantly high in 32% of type 2 diabetes patients.

Table 1. The range of Random plasma sugar (RPS) and C-reactive protein (CRP) levels.

NO of Participants	Sex	Age	RPS level mmol/L	CRP (Qualitative results)	CRP mg/L
Normal					
14	Male	22- 57	< 6	Negative	--
6	female	35 -45	< 6	Negative	--
Diabetes					
45	Male	24 - 83	8.6 – 28	Negative	--
23	female	22 - 69	8 – 24	Negative	--
3	Male	44 - 68	7.9 – 19.3	Positive	12
1	female	70	8	Positive	12
4	Male	37 - 67	8.4 – 14.3	Positive	24
6	female	24 - 69	9.6 – 20.5	Positive	24
6	Male	35 - 78	9.1 – 81.2	Positive	48
10	female	39 - 66	10.2– 19.9	Positive	48
1	Male	61	9.5	Positive	96
1	female	65	10.6	Positive	96

### Discussion

In the present study, we attempted to evaluate the association of CRP, the most common inflammatory marker, with T2D. Our finding revealed that 32% of subjects with T2D had significant high levels of CRP with no relation to sex, age and the period of having diabetes. Such finding is compatible with the hypothesis that subclinical inflammatory reaction may have a role in the pathogenesis of T2D. These results are similar with findings from other investigations, which showed a positive association between CRP and T2D (3, 7, 17).

The mechanism behind the association between the T2D and elevated level of CRP is not fully understood. It has been postulated that T2D may be an appearance of activated innate immunity (18). Inflammatory cytokines can reduce insulin-induced suppression of hepatic glucose production, decrease lipoprotein lipase activity and stimulate lipolysis in adipose tissue (19). Further studies are needed to find out more a reliable explanation.

Several limitations of this study must be considered. First is the small sample size of the investigated subjects. Second, using only CRP as a marker of inflammation. Third, no detailed inquiry was made regarding medical history such as hypertension, hyperlipidemia, other medication as well as obesity, which may affect the level of CRP. In conclusion, we report a positive independent association between elevated CRP levels and diabetes.

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