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Research Article

### A CROSS-SECTIONAL RESEARCH ON THE ASSOCIATION OF DIABETES AND DIABETIC PERIODONTITIS WITH INCREASED LEVELS OF CRP (C-REACTIVE PROTEIN)

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**Abstract:**

**Objective:** Our research aimed to assess the level of plasma “C” reactive protein in the population of Pakistan and its association with diabetes and periodontitis.

**Subjects & Methods:** Our cross-sectional study was carried out at Mayo Hospital, Lahore (Medicine Department) in the timeframe of February 2016 to April 2017 on a total of eighty patients enrolled in the research study. Four groups were made out of the total research population which were named as Group – I, II, III and IV. Group I consisted of normal healthy participants, Group – II had periodontitis cases, Group – III had diabetic patients and Group – IV had both diabetic and periodontitis patients. Every group was given twenty patients having about fifteen teeth and the age was in the age bracket of (30 – 60) years. We did not include all pregnant women, rheumatoid arthritis, chronic cardiac disease, chronic renal failure, smokers, thyroid disease, acute infection and chronic infection cases in this research study. We also measured the periodontal disease status with the help of CPIN (Community Periodontal Index of Treatment Needs). Quantitative determination was made through the Immune Assay Test Kit which is used for the measurement of the concentration of C-Reactive protein in the serum samples of a human. Samples, reference and controls were also calculated for the values of mean absorbance. CRP outcomes were taken by multiplying the obtained values with dilution factor for each patient’s sample and outcomes were shown in (mg/l). Statistical analysis was made through SPSS software.

**Results:** Research sample included a total of eighty patients, further sub-division of the patients was also carried out and patients were divided into four subgroups. These groups included healthy controls, diabetics, periodontitis and a mixture of diabetic and periodontitis cases. Male to the female distribution shown a small dominance of females over males as males were 46% and females were 65% in the total research sample. The range of age started to form 30 years and culminated on 45 years; about thirty-five percent of the total research sample was in the age bracket of 45 – 60 years with a mean age factor of (48.80 ± 6.96) years. Level of serum in diabetic periodontitis and diabetic patients was more than the control group.

**Conclusion:** If diabetes and periodontitis are present in the patients than CRP (C Reactive Protein) levels are increased and further increase as both have their presence in the human body.

**Keywords:** Periodontitis, C-Reactive protein (CRP), Diabetes, Diabetic, Serum and Controls.

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**INTRODUCTION:**

Periodontitis is among well-known and severe oral infection type [1]. It is a multi-factor complex disease which becomes even complex with the host inflammatory response through diverse gram-negative anaerobes types such as *Fusobacterium nucleate*, *Bacteroides forsythus*, *Porphyromonas gingivalis* and *Treponema denticola* [2]. All the patients having a poor oral hygiene state invite the growth of these bacteria which form colonies and also result in dental plaque. This plaque infects periodontium and resultantly it activates the defensive immune cells and inflammation occurs [3, 4]. T2DM is comprised of a dysfunctional array which is caused due to inadequate secretion of insulin and insulin resistant action. Which is also characterized by hyperglycemia and linked with micro, macrovascular and neuropathic disorders [6]. There is a strong association between diabetes mellitus (DM) with the incidence of periodontitis. There both diseases are inflammatory and pro-inflammatory cytokines levels are also increased and worsen the pathology effect with the poor glycemic control and destruction of periodontal tissue destruction [5, 6]. Blood carries the acute-phase protein and C-reactive protein which increases as a result of inflammation and also closely interlinked with periodontal infection and diabetes [7]. CRP levels may also raise in the inflammatory disease or injuries. The increased levels of CRP help in an unfulfilled cell damage and incomplete foreign binding which increase the humoral response against disease [8].

Salzberg and his team also worked on the C-Reaction protein levels in periodontitis [9]. CRP levels are increased with the increase in the levels of inflammatory cytokines which are linked with the destructive disease of periodontitis [10]. During diabetes the immune cells function and neutrophils are decreased; whereas, macrophage/ monocyte cell may respond to hypertensive during contact with bacterial antigen. Which produces more pro-inflammatory cytokines such as IL-6 and tumour necrosis alpha factor and it also increased the levels of CRP [11]. Clinical diagnosis is assisted with diabetes and CRP level measurement in periodontitis. Inflammatory condition monitoring and therapy management are also affected by the measurement of diabetes and CRP levels. Pakistani population is largely affected by both the disease.

**MATERIAL AND METHODS:**

Our cross-sectional study was carried out at Mayo Hospital, Lahore (Medicine Department) in the timeframe of February 2016 to April 2017 on a total of eighty patients enrolled in the research study. Four groups were made out of the total research population which were named as Group – I, II, III and IV. Group I consisted of normal healthy participants, Group – II had periodontitis cases, Group – III had diabetic patients and Group – IV had both diabetic and periodontitis patients. Every group was given twenty patients having about fifteen teeth and the age was in the age bracket of (30 – 60) years. We did not include all pregnant women, rheumatoid arthritis, chronic cardiac disease, chronic renal failure, smokers, thyroid disease, acute infection and chronic infection cases in this research study. We also measured the periodontal disease status with the help of CPIN (Community Periodontal Index of Treatment Needs). Quantitative determination was made through the Immune Assay Test Kit which is used for the measurement of the concentration of C-Reactive protein in the serum samples of a human. Samples, reference and controls were also calculated for the values of mean absorbance. CRP outcomes were taken multiplying the obtained values with dilution factor for each patient's sample and outcomes were shown in (mg/l). Statistical analysis was made through SPSS software.

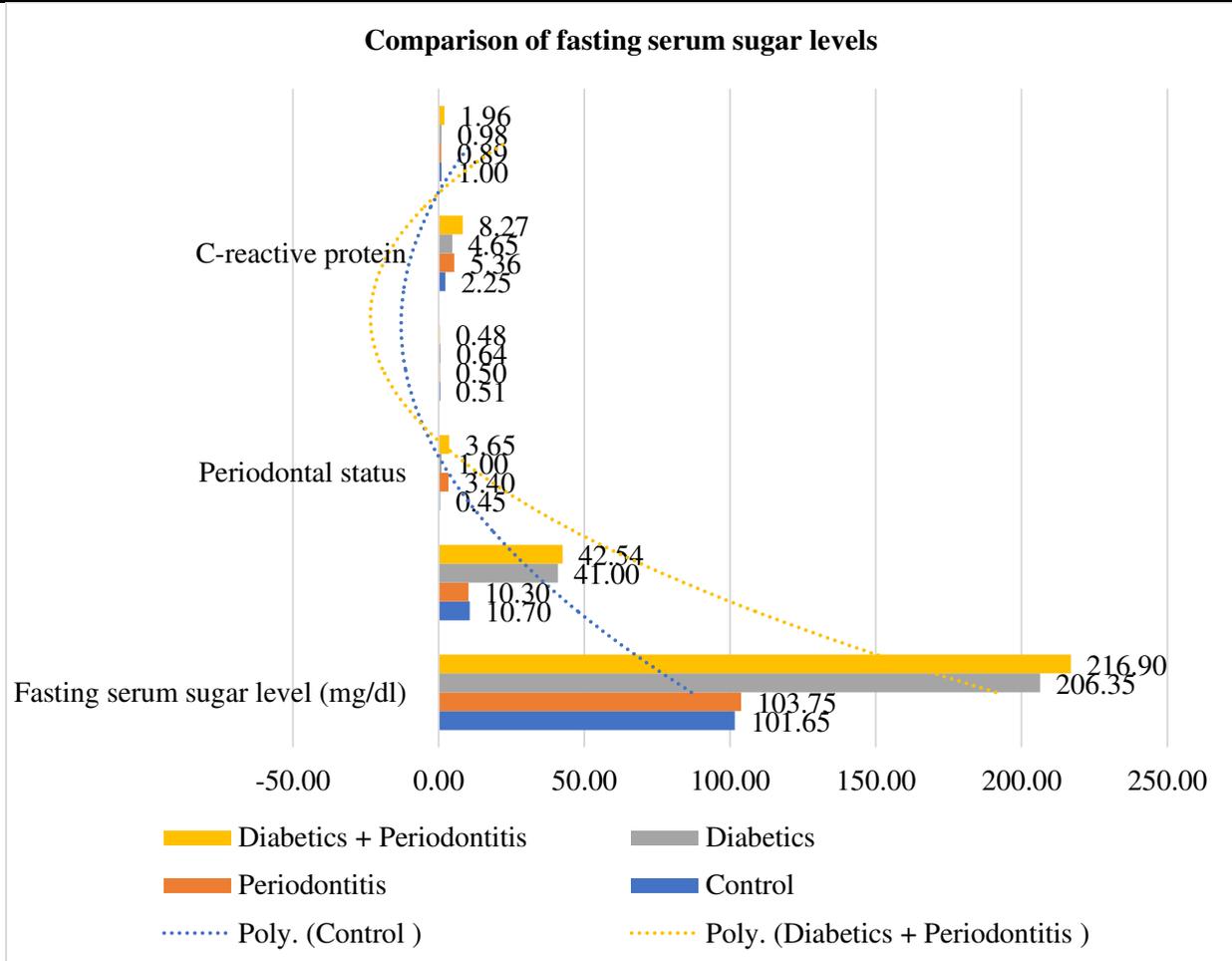
**RESULTS:**

The research sample included a total of eighty patients, further sub-division of the patients was also carried out and patients were divided into four subgroups. These groups included healthy controls, diabetics, periodontitis and a mixture of diabetic and periodontitis cases. Male to the female distribution shown a small dominance of females over males as males were 46% and females were 65% in the total research sample. The range of age started from 30 years and culminated on 45 years; about thirty-five percent of the total research sample was in the age bracket of 45 – 60 years with a mean age factor of (48.80 ± 6.96) years. Level of serum in diabetic periodontitis and diabetic patients was more than the control group.

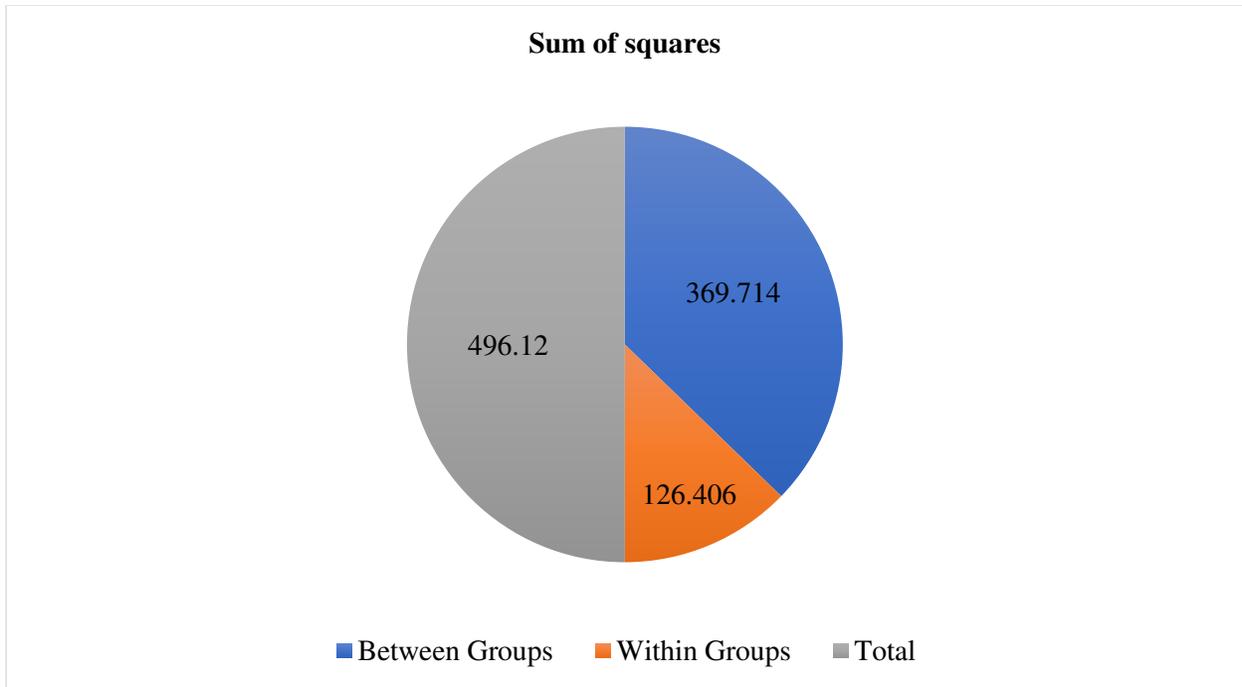
Sugar was high in diabetic & diabetic periodontitis cases than in healthy individuals. There was a significant patient's periodontal status in diabetic periodontitis & diabetic group. Whereas the CRP was low in comparison to other groups as reflected in Table – I. Detailed outcomes analysis is also made in the given tabular data.

**Table – I:** Comparison of fasting serum sugar levels

Group	Fasting serum sugar level (mg/dl)		Periodontal status		C-reactive protein	
	Mean	± SD	Mean	± SD	Mean	± SD
Control	101.65	10.70	0.45	0.51	2.25	1.00
Periodontitis	103.75	10.30	3.40	0.50	5.36	0.89
Diabetics	206.35	41.00	1.00	0.64	4.65	0.98
Diabetics + Periodontitis	216.90	42.54	3.65	0.48	8.27	1.96

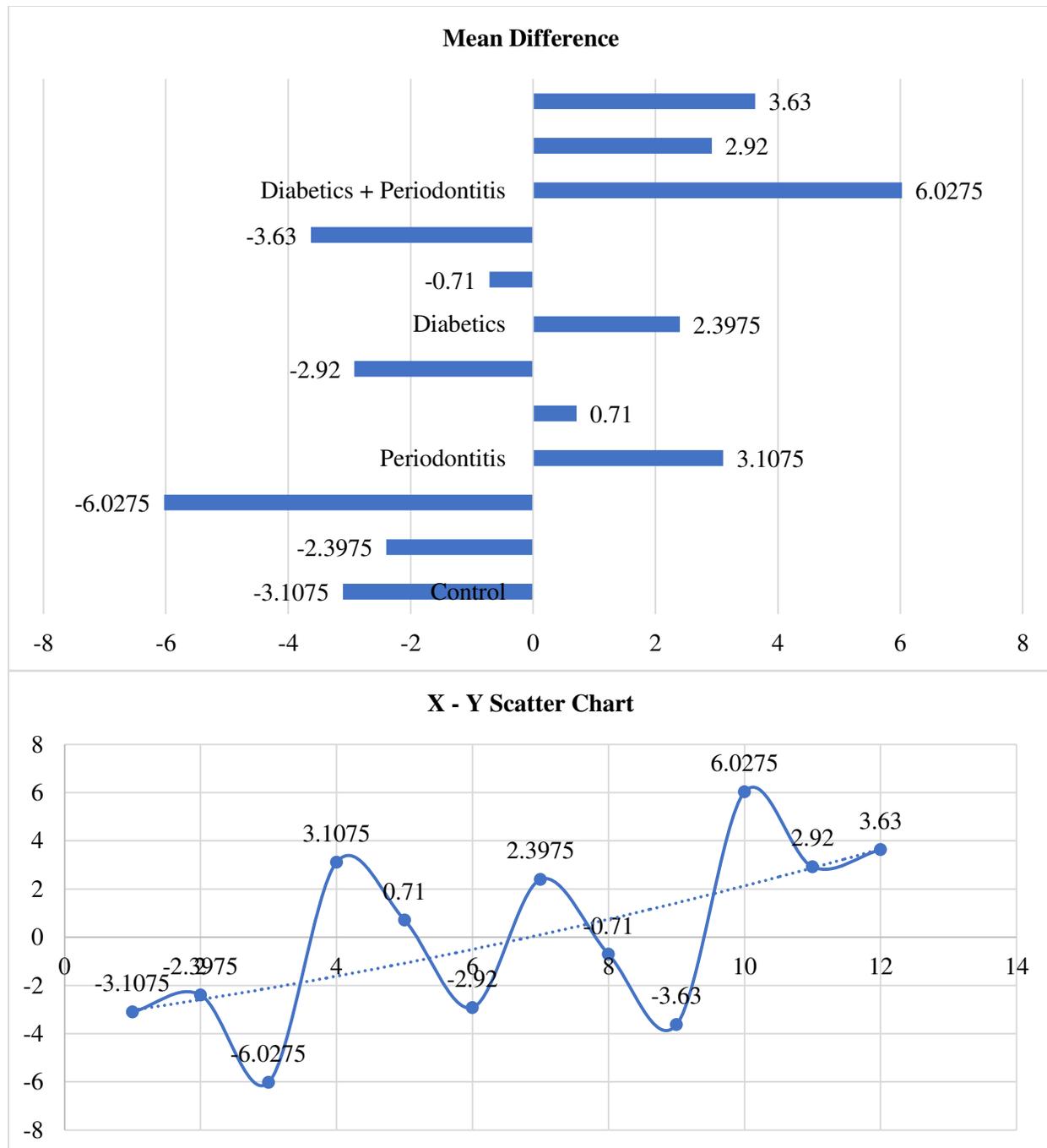
**Table – II:** Significance of plasma C-reactive proteins concentrations among study groups (ANOVA)

Plasma C-reactive proteins concentrations	Sum of squares	Df	Mean square	F	Sig
Between Groups	369.714	3	123.24	74.095	0.000
Within Groups	126.406	76	1.663		
Total	496.12	79	-		



**Table – III:** Pair-wise comparison of plasma C-reactive proteins concentration among study groups (LSD)

Dependent variable	Group		Mean Difference	Std. Error	Sig.
Plasma C-reactive proteins concentration	Control	Periodontitis	-3.1075	0.40783	0.000
		Diabetics	-2.3975	0.40783	0.000
		Diabetics + Periodontitis	-6.0275	0.40783	0.000
	Periodontitis	Control	3.1075	0.40783	0.000
		Diabetics	0.71	0.40783	0.086
		Diabetics + Periodontitis	-2.92	0.40783	0.000
	Diabetics	Control	2.3975	0.40783	0.000
		Periodontitis	-0.71	0.40783	0.086
		Diabetics + Periodontitis	-3.63	0.40783	0.000
	Diabetics + Periodontitis	Control	6.0275	0.40783	0.000
		Periodontitis	2.92	0.40783	0.000
		Diabetics	3.63	0.40783	0.000



### DISCUSSION:

Pakistan faces relatively higher diabetes and periodontitis incidences. We studied and observed in this particular research the CRP levels and its association with the T2DM and periodontitis. Outcomes reflect that the CRP levels are increased in diabetes and periodontitis patients with respective values of  $(4.65 \pm 1.00)$  &  $(5.36 \pm 0.8)$  than the healthy controls group with a value of  $(2.25 \pm 1.00)$ . These levels of CRP were even high in both cases of diabetes and periodontitis with respect to other

groups with a value of  $(8.27 \pm 1.9)$ . According to Slade, there is a significant relation between the increase in the CRP levels and periodontal disease [12].

Diabetes Mellitus cases are also observed with an increased level of CRP. According to Desai and Iyer Fibrinogen and CRP levels in the patients of T2DM were observed with a mean CRP level in diabetic and control group respectively as  $(1.7 \text{ mg/L})$  and  $(1.16 \text{ mg/L})$  [13]. Diabetes and CRP levels are significantly associated with each other. Sari and Coban observed

higher sensitivity levels of CRP in all the study groups [14]. It has been demonstrated through all the literature and research work that there is a strong relation of the inflammatory response in diabetic periodontitis patients with enhanced CRP levels.

### CONCLUSION:

If diabetes and periodontitis are present in the patients than CRP (C Reactive Protein) levels are increased and further increase as both have their presence in the human body. Higher CRP sensitive values can be taken through sensitive immune assay because they indicate low grade and chronic inflammation. In order to avoid any associated complications, we need to consider the proper measurement of diabetes and periodontitis.

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