ORIGINAL ARTICLE

C-reactive protein and ferritin levels associated with chronic periodontits

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ABSTRACT

Aim: This study aims to determine relationship between level of serum C-reactive protein and serum ferritin in chronic periodontitis disease.
Materials and Methods: Blood samples were collected from (125) patients of chronic periodontitis disease and (125) participants as healthy indivdulas , ranging in age frozzm 25 to 60 year. serum ferritin and C-reactive protein levels was measured using enzyme-linked immunosorbent assay (ELISA) kits.
Results: The results indicate that the expression of CRP and serum ferritin level was remarkably increased in patients as in contrast to healthy control ($P < 0.001$). The results showed that hypertension, diabetic and chest pain had a significant correlation with the CRP patients in contrast with healthy individuals.
Conclusions: This study concluded that serum ferritin and C-reactive protein level can be used as a biomarker in evaluating the effectiveness of periodontitis patients.

KEY WORDS: periodontitis , CRP, serum ferritin

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INTRODUCTION

The illness of inflammation known as periodontitis is complex. An historical idea that is now coming to light claims that various systemic illnesses may be caused by periodontitis or that it may act as a modulator of those diseases. One of the explaining theories centers on the idea that mediators like interleukin-6, C-reactive protein and tumor necrosis factor spread as a result of periodontists [1]. This type of reaction is stimulated by bacteria that its either systemically diffusion of it or its toxin or locally infection lead to inflammatory harm to periodontal tissue. Several biopsy techniques to liver or bone marrow biopsy can detected the iron stores in addition to serum ferritin level to discovered the iron load and inflammation [2]. The expression of (periodontal diseases) include a broad expansion conditions of chronic inflammatory to gingiva, bone and ligament that supporting the teeth. Periodontal disease starts from gingivitis which known as legalized gingival inflammation that is begins from bacteria in dental plaque, (pockets) occurred when gingivitis progress and without treating led to loss of gingiva, ligament and bone which is a hallmark of chronic gingivitis that may lead to loss of tooth. periodontal disease could be participated to total body inflammation burden like atherosclerosis and diabetes mellitus [2]. Between all the possible explanations, one is centered on the idea as the consequence of the proliferation of mediators such C-reactive protein, interleukin-6, and tumor necrosis factor-alpha, periodontists may have an effect [1]. This kind of reaction is induced by bacteria that it's may be diffused systemically itself or by its toxin or may be locally infection lead to inflammatory damage to periodontal tissue [2]. Different types of inflammatory cytokines led to secretion of CRP from liver [1]. The CRP level is rapidly increased as a replay to inflammation, infection and trauma while its decreased rapidly when these conditions are removed. So the CRP measurements is used widely to control of deferent state of inflammation [2, 3]. In spite the deficiency singular diagnostic specificity, the CRP is very useful clinically because the changes in their plasma or serum levels inverted its strength in different inflammatory process. The assessment could be help to distinguished between the inflammatory

and non-inflammatory conditions .so many of immunosuppressive and anti-inflammatory drugs are not affect directly on CRP unless it effect on disease activity [4]. Recent research has demonstrated that periodontal disease causes an increase in their levels. These papers might demonstrate variations in the development of destructive periodontal disease or severity in various study populations [5, 6]. Patients with some types of inflammatory oral illness have elevated CRP levels in their serum. Evidence suggests that as compared to the general population who are not afflicted, people with severe periodontitis have higher serum levels of CRP However, they are insufficient to prove that the observed serum CRP levels were brought on by periodontitis because CRP levels fluctuate due to multiple complicating factors like increase blood pressure, aging, alcohol use, low level of physical activity, smoking , chronic fatigue, also Triglycerides are increased when you drink coffee, diabetes type II due to insulin resistance, use of estrogen, consuming a diet high in protein, depression and exhibiting sleep disturbances [5]. Due to mediators of inflammation, several investigations have discovered a connection among chronic periodontists and increased CRP levels in the blood. C-reactive protein, interleukin-6, and tumor necrosis factor-alpha are biologically plausible to be secreted during periodontitis and have the ability to activate hepatocytes to create CRP [7]. A ferritin is a substitution dietary iron source" and stressed the critical role it will most likely play in the global control and treatment of IDA. Ferritin is an iron protein storage and mineralization carrier. Iron is kept inside the protein cage in the form of reversible hydrated iron oxide. in plants, animals, and prokaryotes Iron release and regulation are maintained by ferritins (which are storage proteins). The previously documented hazardous consequence of an imbalance in iron levels in both plants and mammals, submit that cellular iron concentrations must be tightly managed to minimize cellular harm, as optimal labile iron levels [8] are important to preserved iron homeostasis. It also underlines the importance of maintaining a precise iron balance, as well as the critical control and moderating functions of iron storage. Biomarkers, either created by normal people in good health or by people suffering from particular systemic diseases, are molecules that could potentially be utilized for tracking a person's health, start of disease, responses to treatment, and prognosis. Periodontal disease oral fluid indicators can be linked to inflammation of soft tissue, bacterial products, and proteins of antibacterial. Acute phase reactive ferritin is high in inflammatory conditions, persistent infections, autoimmune disease and liver disease. It is widely known that many chronic inflammatory illnesses including rheumatoid arthritis and multiple sclerosis are accompanied by elevated blood ferritin levels. Ferritin is crucial for the recycling and storage of iron. A non-toxic, soluble form of iron is stored in ferritin, which then discharges it gradually over time. Apoferritin is the name given to ferritin with no corresponding iron [1]. A 450 kDa soluble protein, ferritin. Although it is present in every cell of the body, it is particularly abundant in the liver, spleen, and marrow macrophages. In a secure and convenient form, it offers intracellular storage of bioavailable iron. The body's cells and tissue fluids contain ferritin in various amounts. Iron and cytokines that cause inflammation are two important factors that are capable of regulating the production of ferritin. The discharge which are indicators of systemic inflammatory reactions, is significantly increased by oral infections. CP is an inflammatory disease, and an increase in serum ferritin levels is correlated with the intensity or duration of the inflammation. The main result of a large number of studies indicates that CP patients' ferritin levels in their blood significantly decreased 1 month following non-surgical treatment for periodontal disease [8, 9]. we came to the conclusion that serum ferritin levels might have a significant role in the etiology of the disease [10]. Therefore, this study is among the first to look into variations of the level of serum ferritin between patients with periodontal disease and patients without this disease.

AIM

This study aims to determine relationship between level of serum C-reactive protein and serum ferritin in chronic periodontitis disease.

MATERIALS AND METHODS

SAMPLES COLLOCATION

The 250 patients in this study, aged 25-60 years of both genders reoprting to department of periodontics, Faculty of Dentistry College,University of kufa from March 2021 to October 2022. This study was classifed into groups: Group1 as healthy indivdulas(No. 125) and Group 2 as chronic periodontal patients (No. 125). Detailed medical and dental case history were performed by dentist . Plaque Index (Tureskey et al. modification of Quigley Hein Index 1970), Gingival Index (Loe and Silness 1963), Modified Sulcular Bleeding Index, Probing Pocket Depth, and CALs were recorded. All information about this study of the population's statistical characteristics, which included age, sex, socioeconomic status, smoking, hemodialysis induration. Hypertension, diabetes mellitus and chest pain disease that recorded

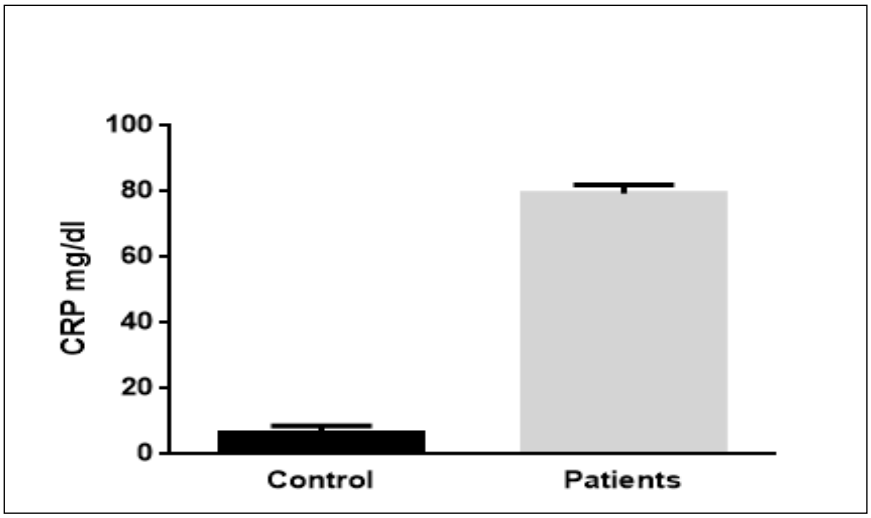

Fig. 1. CRP expression in periodontitis and gingivitis patients
The values plotted one-way ANOVA test among these groups. Non-significant is (ns), (*) is p< 0.05, (**) is p< 0.01, (***) is p< 0.001 and (****) p< 0.0001vs Control.
Source: Own material

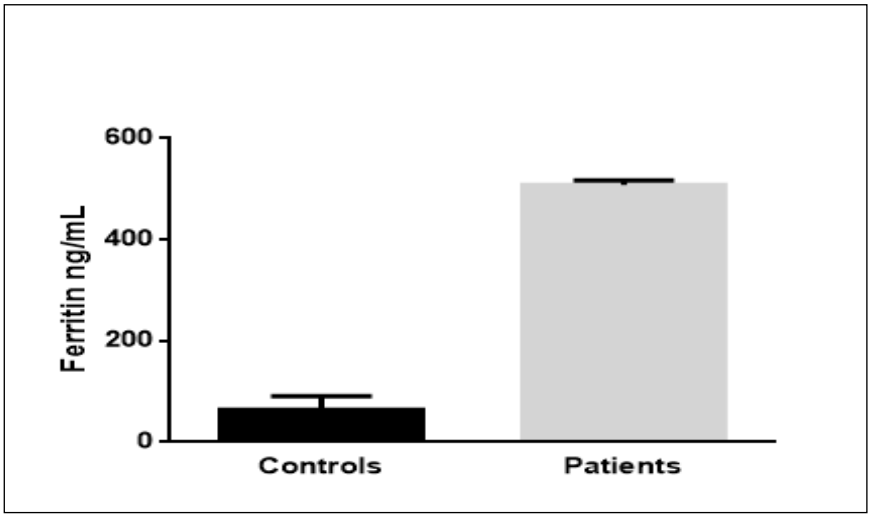

Fig. 2. Ferritin expression in periodontitis and gingivitis patients
The values plotted one-way ANOVA test between these groups. Non-significant which is (ns), (*) is p< 0.05, (**) is p< 0.01, (***) is p< 0.001, (****) is p< 0.0001vs Control.
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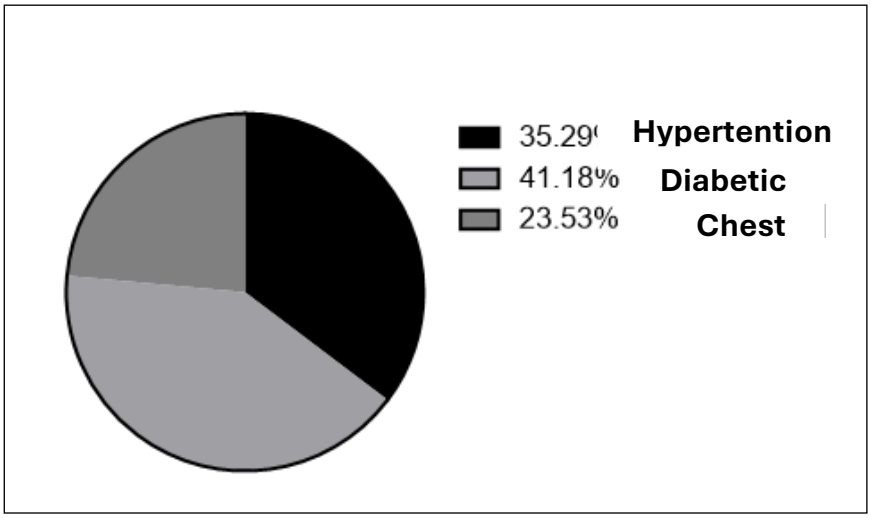

Fig. 3. Associated some disease with periodontitis patients
The pie chart showed the diabetic patients recorded high percentage compare with other disease. The values plotted one-way ANOVA test among two groups. Non-significant which is (ns), (*) is p< 0.05, (**) is p< 0.01, (***) is p< 0.001, (****) is p< 0.0001vs Control.
Source: Own material

from history periodontitis patients , participants signed informed consent forms. Additionally, patients with a history of using steroids or bisphosphonates as well as women who had recently used antibiotics, contraceptives, or anti-inflammatories were all excluded. Blood samples were taken from the patients and the control group. For the purpose of measuring ferritin and CRP, it was gathered. Patients' 3 ml of blood was drawn into a gel tube, and the serum was then extracted using a centrifuge. The serum will be kept for analysis at -20C.

DETECTION OF CRP

CRP-Turbilatex is a quantitative turbidimetric test for the

detection of C- reactive protein (CRP) in human plasma or serum. The examine was approved out in agreement with the producer's instructions (Mindray BC-2800VET Auto Hematology Analyzer).

DETECTION OF FERRITIN LEVEL

The assay was conducted in agreement with guidelines provided via the manufacturer as outlined in the assay approach. It called for a two-step immunoassay. Antiferritin-coated microparticles bind to ferritin that is present in the sample. Antiferritin acridinium conjugate was added after washing. Relative light units (RLUs) were used to measure the chemiluminescent reaction after Pre-Trigger and Trigger Solutions were added to the reaction mixture.

STATISTICAL ANALYSIS

The statistical application Prizm was used for data analysis (Prism version is 9.3.1 (Windows and Mac)). We compared characteristics of participants in each group, by using analysis of variance (ANOVA on way), Non-significant (ns), * $p< 0.05$, ** $p< 0.01$, *** $p< 0.001$, **** $p< 0.0001$ vs Control.

RESULTS

EXPRESSION OF CRP PARAMETER IN PERIODONTITIS

To test the CRP level in patients of chronic periodontitis, the CRP assay was performed. These outcomes show that the appearance of CRP level was remarkably increased in patients as in contrast to healthy control ($P < 0.001$), as illustrated in Figure 1.

EXPRESSION OF FERRITIN PARAMETER IN PERIODONTITIS

There are greater concentrations in serum ferritin in the patients than that of healthy controls ($P <0.001$). significant correlation and positive was detected between the levels of serum ferritin and number of the sites with periodontal disease (PD) ≥ 6 mm at baseline ($P <0.001$) compared to healthy control (Fig. 2).

CORRELATION BETWEEN SYSTEMIC DISEASE AND PERIODONTITIS PATIENTS

This data was evaluated the correlation of hypertension, diabetic and chest pain disease with periodontitis patients. The results showed that hypertension, diabetic and chest pain had a significant correlation with the CRP patients in contrast with healthy individuals. However, the diabetic patients were recorded high percentage compare with hypertension and chest pain, these data may be the increased CRP and ferritin levels in patients related with these diseases. As illustrated in Figure 3.

DISCUSSION

It has been generally accepted that periodontitis could be an important risk factor for some disease depend on the two points: (1) periodontal inflammation have effect on systemic inflammation and (2) periodontal bacteria with their outcome may accede the bloodstream. also, the poor condition of patients led to insufficient oral hygiene that made them to subjected to dialysis therapy [10]. This study will have estimated the attachment in the periodontal disease and the factors serum such as ferritin and CRP. The effects appeared that serum levels of ferritin with CRP had a strongly attachment with the Periodontitis. In addition, hypertension, diabetic and chest pain were significantly correlated with periodontitis and gingivitis patients especially diabetic disease [10, 11]. Multiple studies have a try to confirm a relation between renal disease and periodontal disease, but still understood until now. It has noted that the significant inflammatory marker and most sensitive markers is C reactive protein (CRP), which is used to estimate the individual inflammatory status [9]. Few studies have notified higher levels CRP in the patients that have Chronic Periodontitis than in the healthy persons [11]. However, one study mentioned that there was no considerable difference in serum CRP levels between chronic periodontitis and healthy, our study suggested that the response to inflammatory processes was only local but worsen within seven days because IFN-γ levels were increased .On other hand, in this project, estimated the interconnection of the periodontal disease and the serum factor ferritin in those patients, it's showed that level of serum ferritin was significantly related with gingivitis and periodontitis. In this project, periodontal disease features were obviously greater in those periodontitis patients in contrast toward healthy individual. In these two studies [12, 13] the iron insufficiency is a common finding in patients that subjected to haemodialysis, also in those patients the serum ferritin correlated significantly with iron content in bone marrow. So, the serum ferritin is the common indicator for estimation the patients of iron deficiency that undergo to haemodialysis [9, 14] Furthermore, serum level raise at systemic inflammation. However, the reports of some studies on patients who undergoing haemodialysis showmen the influence of the inflammation on the

ferritin serum level based on iron contented in the body besides that effect of inflammation effect on ferritin serum exclusively when there is sufficient content of iron. This means that the serum ferritin level could be affected by non-surgical treatment of periodontal disease. Hence, it can be concluded that these serum ferritin levels may be an essential factor in the pathogenesis of the illness [14-15].

Though causal association between serum ferritin and enlarged susceptibility to periodontitis is not recognised, it is possible that a failure of adequate host defence to plaque bacteria may be a predisposing factor and may end in periodontal disease, like the acquisition of infection, in general, is dependent on host-related issues of where serum ferritin levels are, but one of the many contributing factors [4]. Hence, evaluating serum ferritin levels is a valuable adjunct to the clinical and radiographically diagnosis of periodontal lesion and predicts the future disease progression and evaluates response to periodontal therapy [6].

CONCLUSIONS

From the current confirmation it be able to be concluded that periodontitis effects in higher levels of CRP and ferritin. The elevated inflammatory factors and some disease may increase periodontitis compared with healthy individual. Although, causal relationship between serum ferritin and CRP increased susceptibility to periodontitis, is not established until now.

RECOMMENDATIONS

Use PCR process for detection genes related with periodontal disease for present work.

Detection of CRP and Ferritin will be evaluated for value as a histological markers of the periodontitis disease.

Should consider larger and more heterogeneous samples of metacentric populations with different severities of periodontal disease, a greater number of assorted risk and confounding factors, and increased control over them.

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