

## ORIGINAL RESEARCH

### Evaluation of Salivary Levels of IL-6 levels in chronic periodontitis patients

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#### ABSTRACT:

**Background:** Periodontal disease is a chronic inflammatory disease of periodontium and its advanced form is characterized by periodontal ligament loss and destruction of surrounding alveolar bone. IL-6 is known to increase the hepatic expression of CRP (C reactive proteins), which is now considered to have direct effects on the vascular wall, contributing to atherogenesis. Hence; the present study was undertaken for assessing the salivary Levels of IL-6 levels in chronic periodontitis patients. **Materials & methods:** A total of 50 patients with chronic periodontitis and 50 healthy controls were enrolled in the present study. Radiographic data of all the patients was obtained and was analysed. Patients with history of any other systemic illness or any presence of any metabolic disorder were excluded from the present study. All the patients were called in the morning and Unstimulated salivary samples were obtained in a test tube. The samples were sent to central laboratory where auto-analyser and ELISA technique was used for evaluation of salivary IL-6 levels. **Results:** Mean salivary IL-6 levels among the patients of the periodontitis group and the control group was 69.75 ng/L and 14.28 ng/L respectively. While analyzing statistically, it was observed that mean IL-6 levels of the saliva among the periodontitis patients was significantly higher in comparison to the healthy controls. **Conclusion:** Chronic periodontitis patients are associated with significantly higher salivary levels of IL-6, highlighting their role in pathogenesis of the disease.

**Key words:** IL-6, Periodontitis, Salivary.

Received: 4 April, 2020

Accepted: 28 April, 2020

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**This article may be cited as:** Kour P, Oswal P, Nainee N, Pawashe Y. Evaluation of Salivary Levels of IL-6 levels in chronic periodontitis patients. Int J Res Health Allied Sci 2020; 6(3):87-89.

#### INTRODUCTION

Periodontal disease is a chronic inflammatory disease of periodontium and its advanced form is characterized by periodontal ligament loss and destruction of surrounding alveolar bone. It is the main cause of tooth loss and is considered one of the two biggest threats to the oral health. There are approximately 800 species of bacteria identified in the oral cavity and it is hypothesized that complex interaction of bacterial infection and host response, modified by behavioral factors such as smoking, can result in periodontal disease.<sup>1,2</sup>

In chronic infectious states, several immunologic and enzymatic factors recognized as mediators and/or biomarkers, of both bacterial and host origin, have been and are being studied to elaborate on the disease activity in addition to striving to establish their

diagnostic and prognostic importance. Monitoring the response to treatment can be another application of such biomarkers. It is also desirable to determine whether non-surgical periodontal therapy can decrease the levels of these markers, so that a novel link between periodontal disease and other systemic inflammatory diseases can be explored.<sup>3,4</sup>

IL-6 is known to increase the hepatic expression of CRP, which is now considered to have direct effects on the vascular wall, contributing to atherogenesis. Among other actions, CRP upregulates CD40 ligand and MCP-1 expression which in turn increases the expression of cellular adhesion molecules. Some adhesion molecules, such as sVCAM-1 and sP-selectin, have shown to contribute to leukocyte recruitment in sites of atheroma initiation in atherosclerosis-susceptible mice.<sup>5,6</sup> Hence; under the

light of above mentioned data, the present study was undertaken for assessing the salivary Levels of IL-6 levels in chronic periodontitis patients.

**MATERIALS & METHODS**

The present study was undertaken for assessing the salivary Levels of IL-6 levels in chronic periodontitis patients. A total of 50 patients with chronic periodontitis and 50 healthy controls were enrolled in the present study. Criteria described by American association of periodontology were used for confirming the diagnosis of periodontitis. Thorough clinical examination of all the patients was carried out. Radiographic data of all the patients was obtained and was analysed. Patients with history of any other systemic illness or any presence of any metabolic disorder were excluded from the present study. All the patients were called in the morning and Unstimulated salivary samples were obtained in a test tube. The samples were sent to central laboratory where auto-analyser and ELISA technique was used for evaluation of salivary IL-6 levels. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Mann-Whitney U test was used for evaluation of level of significance.

**RESULTS**

In the present study, a total of 50 chronic periodontitis patients and 50 chronic healthy controls were enrolled. Mean age of the patients of the chronic periodontitis group and the healthy control group was 48.5 years and 46.2 years respectively. 29 patients of the periodontitis group and 32 patients of the control group were males while the remaining were females. In the present study, Mean salivary IL-6 levels among the patients of the periodontitis group and the control group was 69.75 ng/L and 14.28 ng/L respectively. While analyzing statistically, it was observed that mean IL-6 levels of the saliva among the periodontitis patients was significantly higher in comparison to the healthy controls.

**Table 1:** Demographic data

Parameter		Periodontitis group	Control group
Age group (years)	Less than 25	2	3
	25 to 40	12	10
	More than 40	30	37
Gender	Males	29	32
	Females	21	18

**Table 2:** Comparison of salivary IL-6 levels

Salivary IL-6 levels	Periodontitis group	Control group	U value	p-value
Mean (ng/L)	69.75	14.28	1.885	0.000 (Sig.)
SD	41.88	5.94		

**DISCUSSION**

Periodontal diseases are among the most common dental conditions. Chronic periodontitis (CP) is an oral disease that leaves sequels, impairing buccal esthetics and function. Periodontal health is a key element to a harmonious smile, esthetics, and systemic balance. From the psychological point of view, CP generates insecurity, emotional liability, exacerbation of defense mechanisms, which can worsen preexisting diseases, including infectious ones. The microbial challenge provokes an inflammatory response in the periodontal tissue that involves a network of cytokines functioning in synergy. Interleukin-6 (IL-6) is secreted by macrophages in response to inflammation and is involved in recruitment and apoptosis of leukocyte and T-cell activation. IL-6 and its soluble receptor induce bone resorption, either by increasing the receptor activator of nuclear factor κ ligand (RANKL) or by directly inducing the formation of osteoclast.<sup>7-9</sup> Hence; under the light of above mentioned data, the present study was undertaken for assessing the salivary Levels of IL-6 levels in chronic periodontitis patients.

In the present study, a total of 50 chronic periodontitis patients and 50 chronic healthy controls were enrolled. Mean age of the patients of the chronic periodontitis group and the healthy control group was 48.5 years and 46.2 years respectively. 29 patients of the periodontitis group and 32 patients of the control group were males while the remaining were females. Batool H et al determine levels of salivary IL-6 and IL-17 in patients with calculus associated chronic periodontitis. 41 healthy controls and 41 calculus associated chronic periodontitis patients (CP patients) were enrolled. According to the degree of attachment loss, CP patients were subcategorized as mild (CAL 1-2 mm), moderate (CAL 3-4 mm), and severe (CAL > 5 mm) forms of periodontitis. Salivary levels of IL-6 and IL-17 were determined using enzyme-linked immunosorbent assay (ELISA) technique. Between healthy controls and CP patients (moderate and severe disease), a statistically significant difference was observed in the concentrations of IL-6 and IL-17. In CP patients, the highest mean ± SD of salivary IL-6 and IL-17 was observed in severe CP, followed by moderate and mild CP. Regarding level of IL-6, a statistically significant difference was observed between mild and severe disease and between moderate and severe subcategories of CP patients. Similarly, statistically significant difference was observed in the level of IL-17 between mild and moderate, mild and severe disease, and moderate and severe disease. The levels of salivary IL-6 and IL-17 were increased significantly in calculus associated CP patients as compared to healthy controls and these levels increased with the progression of CP.<sup>9</sup> In the present study, Mean salivary IL-6 levels among the patients of the periodontitis group and the control group was 69.75 ng/L and 14.28 ng/L respectively.

While analyzing statistically, it was observed that mean IL-6 levels of the saliva among the periodontitis patients was significantly higher in comparison to the healthy controls. Machado V et al characterized the salivary levels of two inflammatory biomarkers associated with periodontitis, interleukin-6 (IL-6) and tumour necrosis factor-alpha (TNF- $\alpha$ ), in order for assessing whether these cytokines salivary levels could potentially be used to complement periodontitis pregnant women diagnose. Forty-four pregnant women were distributed into three groups, according to their periodontal status: healthy, mild/moderate periodontitis and severe periodontitis. Women with periodontitis exhibited significantly higher levels ( $p = 0.001$ ) of salivary IL-6 and TNF- $\alpha$  compared with the healthy group: 25.1 ( $\pm 11.2$ ) pg/mL vs. 16.3 ( $\pm 5.0$ ) pg/mL and 29.7 ( $\pm 17.2$ ) pg/mL vs. 16.2 ( $\pm 7.6$ ) pg/mL, approximately 1.5 and 1.8 times more, respectively. Additionally, cytokines were significantly increased ( $p < 0.05$ ) in severe periodontitis compared to periodontal healthy pregnant women. These results revealed that IL-6 and TNF- $\alpha$  salivary biomarkers provide high discriminatory capacity for distinguishing periodontal disease from periodontal health in pregnant women.<sup>10</sup> Lim et al. 2007 that showed a positive association between poor metabolic control and periodontitis.<sup>11</sup>

## CONCLUSION

From the above results, the authors conclude that chronic periodontitis patients are associated with significantly higher salivary levels of IL-6, highlighting their role in pathogenesis of the disease.

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