How to Cite:
Sood, A., Kataria, P., Khichi, A., Kaur, J., Arora, R., & Gautam, J. (2022). Comparison of IL-6 levels among healthy subjects and patients with periodontal disease. *International Journal of Health Sciences*, *6*(7), 154–158. https://doi.org/10.53730/ijhs.v6n7.10797

Comparison of IL-6 levels among healthy subjects and patients with periodontal disease

Dr. Anchal Sood*
Professor and Head
Department of Periodontology and oral implantology, Bjs Dental College hospital and Research institute, Ludhiana
*Corresponding author

Dr. Pavita Kataria
Senior lecturer
Department of periodontology and oral implantology, Bjs dental College hospital and Research institute ludhiana

Dr. Aditya Khichi
Senior lecturer
Department of Periodontology and oral implantology, Bjs dental college hospital and research institute ludhiana

Dr. Jaspinder Kaur
Post graduate student
Department of Periodontology and oral implantology. Bjs dental college hospital and research institute ludhiana

Dr. Rachita Arora
Post graduate student
Department of periodontology and oral implantology, Bjs dental college hospital and research institute ludhiana

Dr. Jannat Gautam
Post graduate student
Department of periodontology and oral implantology, Bjs dental college hospital and research institute ludhiana

***Abstract*---**Background: The present study was conducted for comparing the IL-6 levels among healthy subjects and patients with periodontal diseases. Materials & methods: A total of 30 healthy controls and 30 subjects with presence of generalized periodontitis were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were recalled in the morning and blood samples were obtained. All the samples were sent to the

laboratory where an auto-analyser was used for evaluation of serum IL-6 levels. All the results were recorded and analysed by SPSS software. Results: Mean serum IL-6 levels among the subjects of the periodontitis group and control group was 6.96 pg/mL and 3.1 pg/mL respectively. While analysing statistically, it was seen that mean IL-6 levels among the subjects of the periodontitis group was significantly higher in comparison to the subjects of the control group.Conclusion: IL-6 plays a significant role in immune-modulation and pathogenesis of periodontal diseases.

***Keywords*---**IL-6, Periodontitis

Introduction

Human periodontal diseases are predominantly caused by infections with gram-negative bacteria, such as Porphyromonas gingivalis and Bacteroides forsythus. A complex interaction between these bacteria and the host immune system may induce inflammatory conditions that result in the loss of the collagenous structures that support the teeth. A number of inflammatory mediators, such as interleukin (IL)-1, IL-6, IL-8, tumor necrosis factor-α (TNF-α), prostaglandins and matrix metalloproteinases (MMPs) are involved in periodontal diseases.[1- 3] These mediators may affect the activities of leukocytes, osteoblasts and osteoclasts and promote the tissue remodeling process systemically and locally. The collagenolytic enzymes, including MMPs, are mediated by a variety of inflammatory cytokines, such as IL-1, IL-6, IL-8 and TNF-α.[4- 6]

Cytokines namely interleukin (IL) -6, IL-1 and tumor necrosis factor-α play important role in the immunopathology of periodontal disease. Thus, the genetic regulation of cytokine function may influence the severity of periodontitis. Different types of cells secrete IL-6 and its level of secretion are influenced by the type of cell, type of stimulant, and the underlying genetic mechanism. IL-6 is an important inflammatory mediator and has both pro- and anti-inflammatory properties. Single-nucleotide gene polymorphisms of -572 G/C and -174 G/C which are common polymorphisms in the IL-6 gene promoter affect the expression of IL-6 and increase its serum level causing its higher transcription and consequently greater induced response. Increased IL-6 serum level is correlated with inflammatory diseases like periodontitis.[7- 9] Hence; the present study was conducted for comparing the IL-6 levels among healthy subjects and patients with periodontal diseases.

Method

Materials & methods

The present study was conducted for comparing the IL-6 levels among healthy subjects and patients with periodontal diseases. A total of 30 healthy controls and 30 subjects with presence of generalized periodontitis were enrolled. Complete demographic and clinical details of all the patients was obtained. Clinical and radiographic evaluation of all the subjects was carried out. All the patients were recalled in the morning and blood samples were obtained. All the samples were

sent to the laboratory where an auto-analyser was used for evaluation of serum IL-6 levels. All the results were recorded and analysed by SPSS software. Student t test was used for evaluation of level of significance.

Results

Mean age of the patients of the periodontitis group and control group was 43.8 years and 45.8 years respectively. Majority proportion of the subjects of both the study groups were males while the remaining were females. Mean serum IL-6 levels among the subjects of the periodontitis group and control group was 6.96 pg/mL and 3.1 pg/mL respectively. While analysing statistically, it was seen that mean IL-6 levels among the subjects of the periodontitis group was significantly higher in comparison to the subjects of the control group.

Table 1
Comparison of IL-6 levels in periodontitis patients and healthy controls

IL-6 levels	Periodontitis group	Control group
Mean	6.96 pg/mL	3.1 pg/mL
SD	2.6	1.1
p- value	0.000 (Significant)	

Discussion

Periodontal diseases remain a public health problem because of their high prevalence and burden. Its pathophysiologic mechanisms depict a complex interaction between the host immune system and oral bacteria, leading to inflammation and illness. Moreover, the poor clinical control of periodontal disease causes an increase in serum inflammatory markers with systemic impact. Therefore, it is of the utmost importance to study its systemic impact through inflammatory mechanisms.[8- 10] Cytokines and chemokines mediate the immuno-inflammatory response of periodontitis, are produced locally, and they regulate the amplitude and duration of the response. IL-6 plays a key role in the periodontal pathogenesis pathways, and it has been consistently associated with inflammatory cell migration and extended bone resorption as a result of increased RANK ligand production.[10- 12] Hence; the present study was conducted for comparing the IL-6 levels among healthy subjects and patients with periodontal diseases.

Mean age of the patients of the periodontitis group and control group was 43.8 years and 45.8 years respectively. Majority proportion of the subjects of both the study groups were males while the remaining were females. Mean serum IL-6 levels among the subjects of the periodontitis group and control group was 6.96 pg/mL and 3.1 pg/mL respectively. Batool H et al, in a previous study, determined levels of salivary IL-6 and IL-17 in patients with calculus associated chronic periodontitis. It was a comparative, cross-sectional study that is comprised of 41 healthy controls and 41 calculus associated chronic periodontitis patients (CP patients). 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. 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.[11]

While analysing statistically, it was seen that mean IL-6 levels among the subjects of the periodontitis group was significantly higher in comparison to the subjects of the control group. In another previous study conducted by Ross JH et al, authors assessed the expression of periodontal interleukin-6 protein is increased across patients with neither periodontal disease nor diabetes, patients with periodontal disease alone and patients with both diseases. Periodontal tissue specimens were collected from eight patients without periodontal disease and diabetes (group 1), from 17 patients with periodontal disease alone (group 2) and from 10 patients with both periodontal disease and diabetes (group 3). The nonparametric Kruskal-Wallis test showed that differences in IL-6 protein levels among the three groups were statistically significant ($p = 0.035$). Nonparametric analysis using Jonckheere-Terpstra test showed a tendency of increase in periodontal IL-6 protein levels across group 1 to group 2 to group 3 ($p = 0.006$). Parametric analysis of variance (ANOVA) on IL-6 protein levels showed that neither age nor gender significantly affected the difference of IL-6 levels among the groups. Periodontal IL-6 expression at the protein level is increased across patients with neither periodontal disease nor diabetes, patients with periodontal disease alone, and patients with both diseases.[12]

Conclusion

IL-6 plays a significant role in immune-modulation and pathogenesis of periodontal diseases.

References

1. Yang NY., Zhang Q., JL Li. Progression of periodontal inflammation in adolescents is associated with increased number of Porphyromonasgingivalis, Prevotellaintermedia, Tannerellaforsytensis and Fusobacteriumnucleatum. International Journal of Paediatric Dentistry. 2014:226–233.
2. Da Costa T. A., Silva M. J. B., Alves P. M., et al. Inflammation Biomarkers of Advanced Disease in Nongingival Tissues of Chronic Periodontitis Patients. Mediators of Inflammation. 2015;2015.
3. Gaffen S. L. An overview of IL-17 function and signaling. Cytokine. 2008;43(3):402–407.
4. Yu J. J., Ruddy M. J., Wong G. C., et al. An essential role for IL-17 in preventing pathogen-initiated bone destruction: recruitment of neutrophils to inflamed bone requires IL-17 receptor-dependent signals. Blood. 2007;109(9):3794–3802.
5. Hienz S. A., Paliwal S., Ivanovski S. Mechanisms of bone resorption in periodontitis. Journal of Immunology Research. 2015;2015:10.

6. Isaza-Guzmán D. M., Cardona-Vélez N., Gaviria-Correa D. E., Martínez-Pabón M. C., Castaño-Granada M. C., Tobón-Arroyave S. I. Association study between salivary levels of interferon (IFN)-gamma, interleukin (IL)-17, IL-21, and IL-22 with chronic periodontitis. Archives of Oral Biolog. 2015;60(1):91–99
7. Takashiba S, Naruishi K, Murayama Y. Perspective of cytokine regulation for periodontal treatment: fibroblast biology. J Periodontol. 2003;74:103–110. [PubMed] [Google Scholar]
8. McCarty MF. Interleukin-6 as a central mediator of cardiovascular risk associated with chronic inflammation, smoking, diabetes, and visceral obesity: down-regulation with essential fatty acids, ethanol and pentoxifylline. Med Hypotheses. 1999;52:465–477.
9. Moutsopoulos NM, Madianos PN. Low-grade inflammation in chronic infectious diseases: paradigm of periodontal infections. Ann N Y Acad Sci. 2006;1088:251–264.
10. Cekici A., Kantarci A., Hasturk H., Van Dyke T. E. Inflammatory and immune pathways in the pathogenesis of periodontal disease. Periodontology 2000. 2014;64(1):57–80.
11. Batool H, Nadeem A, Kashif M, Shahzad F, Tahir R, Afzal N. Salivary Levels of IL-6 and IL-17 Could Be an Indicator of Disease Severity in Patients with Calculus Associated Chronic Periodontitis. Biomed Res Int. 2018 Feb 18;2018:8531961.
12. Ross JH, Hardy DC, Schuyler CA, Slate EH, Mize TW, Huang Y. Expression of periodontal interleukin-6 protein is increased across patients with neither periodontal disease nor diabetes, patients with periodontal disease alone and patients with both diseases. J Periodontal Res. 2010 Oct;45(5):688-94.
13. Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Get vaccinated when it is your turn and follow the local guidelines. *International Journal of Health Sciences*, *5*(3), x-xv. https://doi.org/10.53730/ijhs.v5n3.2938