



## EFFECT OF CHRONIC GENERALIZED PERIODONTITIS AND NON SURGICAL THERAPY ON VARIOUS HAEMATOLOGICAL PARAMETERS - A CLINICAL STUDY

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### ABSTRACT

**Introduction;** Periodontitis, one of the most common diseases in humans is a chronic inflammatory disease of periodontium arising from a complex interplay of pathogenic plaque bacteria predominantly gram-negative anaerobes and host. Various systemic diseases like diabetes mellitus, cardiovascular diseases, low birth weight and pre-term infants, various hematologic abnormalities have been associated with it. Periodontitis has been known to effect the number of Rbc's, Wbc's and various platelets in peripheral blood as a result of various inflammatory products. The aim of the present study is to investigate and compare various hematologic parameters in patients with chronic generalised periodontitis and healthy periodontium/ chronic marginal gingivitis and to see the effect of scaling and root planing on them.

**Methodology:** A total of 40 subjects were taken. 20 Subjects in chronic generalized moderate to severe periodontitis Group (Group A) with pocket depth 4-7mm. 20 subjects with Chronic marginal gingivitis/healthy periodontium (Group B). Base line values of various hematological parameters were measured. Scaling and root planning was performed on them and after 3 months, they were again assessed for the above mentioned parameters.

**Results;** Subjects of Group A had a higher value of all the parameters except for hemoglobin and SRP resulted in a statistically significant improvement in all the parameters towards normalcy.

**Conclusion;** Chronic periodontitis is an inflammatory state of periodontium characterized by raised levels of Wbc's and decreased Platelet and HB levels.

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### INTRODUCTION

Periodontitis a chronic inflammatory disease of periodontium is a complex interplay of pathogenic plaque bacteria predominantly gram-negative anaerobes and host. The influence of systemic diseases on periodontium and effect of periodontal diseases on systemic health is well known. Various systemic diseases like diabetes mellitus, cardiovascular diseases, low birth weight and pre-term infants, various hematologic abnormalities have been associated with periodontitis. Periodontitis is so common in patients with diabetes mellitus that it is considered as the 6<sup>th</sup> complication of diabetes.<sup>[1]</sup>

Because of the pathogenic bacterial products, protective barrier system of sulcular epithelium and junctional epithelium is lost allowing the periodontal pathogens to disseminate through the blood and result in systemic inflammatory response.

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This process occurs either by endothelial injury or direct mechanism or indirectly through lipopolysaccharide (LPS) activated cytokines.<sup>[2]</sup> Various pro-inflammatory cytokines, macrophage-derived most notably tumor necrosis factor -alpha (TNF- $\alpha$ ), transforming growth factor-beta (TGF- $\beta$ ), interleukin-1 alpha (IL-1 $\alpha$ ), interleukin-beta (IL- $\beta$ ) and interleukin-6 (IL-6) are known to decrease the response of bone marrow to erythropoietin which in turn reduces erythropoiesis and contributes to anemia.<sup>[3,4]</sup> Elevated numbers of total white blood cell count (WBCs) have been reported.<sup>[5,6]</sup> Effective control of plaque by periodontal instrumentation (scaling and root planing) restores gingival health by completely removing elements such as biofilm, calculus and endotoxins that provoke gingival inflammation. A dramatic decrease in pathologic microbial load<sup>[7,8]</sup> occurs, thereby decreasing serum inflammatory markers. With this background knowledge, this clinical study is sought to compare the changes in various hematologic parameters in patients with chronic generalized moderate to severe periodontitis following scaling and root planning.

**MATERIALS AND METHODS**

40 subjects visiting outpatient Department of Periodontology, Govt. Dental College and Hospital Srinagar, were considered for the present clinical study after meeting inclusion and exclusion criteria. Subjects were assigned into two groups :- 20 Subjects in chronic generalized moderate to severe periodontitis Group (Group A) with pocket depth 4-7mm. 20 subjects with chronic marginal gingivitis or healthy periodontium.(Group B ).

**Inclusion criteria**

The criteria for inclusion in the study were:-

No history of chronic disease or episode of illness at least 8 weeks before the start of this study,

Subjects age between 30-60 years.

Periodontal pockets with depths ranging from 4-7mm in group A.

Subjects should not have received periodontal treatment for the past 6 months.

**Exclusion criteria**

Smokers

Only the subjects who gave written consent and fulfilled all the qualifying criteria were taken up for the study. The selected patients were assessed for their Erythrocyte sedimentation rate (ESR) by Westergren method, Total white blood cell(WBC) count, Polymorpho nuclear (PMN) count, haemoglobin (HB) estimation and bleeding time( BT) and their periodontal condition at baseline that is before the start of the study. The measurements were done in the same local laboratory of clinical chemistry using routine enzymatic methods. Full mouth scaling and root planning (SRP) was carried out in both groups. Patients were then reassessed for the clinical and haematological parameters after 21 days and 3 months. For statistical analysis, the recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Data was expressed as Mean±SD. Student's independent t-test was employed for intergroup comparison and for intra-group analysis of data; Paired t-test was applied. A P-value of less than 0.05 was considered statistically significant. All P-values were two tailed.

**RESULTS**

According to the results of present study, baseline comparison of haematological parameters between Group A and B shows that there is a statistically significant difference in mean value

**Table 1** Intergroup comparison of hematologic parameters at baseline

Hematologic parameters	Group A		Group B		P-value#
	Mean	SD	Mean	SD	
TLC /mm3	6500.35	72.31	6000	63.72	<0.001*
PMN's/mm3	4200.52	56.43	3500.5	58.45	<0.001*
Lymphocytes/mm3	2255.1	37.82	2000.4	47.82	0.007*
ESR mm/hg	14.05	3.95	12.01	3.62	0.014*
Hb gm%	11.5	2.18	14.1	2.25	<0.001*
BT m	2.7	1.82	1.9	1.73	0.005*

\*Statistically Significant Difference (P-value<0.05); #P-value by Student's Independent t-test.

of haematological parameters at baseline. The values being higher in Group A compared to Group B except for HB level which is greater in Group B compared to Group A (Table 1). On intra group comparison in Group A, a statistically significant decrease in the mean value of TLC from baseline to 3<sup>rd</sup> month was observed (p value <0.001). At baseline, the value was 6500.35 which decreased to 6080.5 after 3 months of scaling and root planning. Similarly a statistically significant decrease was found in the levels of polymorpho nuclear (PMN) count (at baseline 4200.52 at 3<sup>rd</sup> month 3700.26; p value<0.001), the value of lymphocytes although statistically insignificant (p value =0.672) also decreased from baseline to 3<sup>rd</sup> month (at baseline 2255.1 at 3<sup>rd</sup> month 2250.3). ESR (at baseline 14.05 at 3<sup>rd</sup> month 9.7; p value <0.001), haemoglobin levels significantly increased (at baseline 11.5 at 3<sup>rd</sup> month 14.2; p value=0.002), and bleeding time (BT) significantly decreased (at baseline 2.7 at 3<sup>rd</sup> month 1.5; p value <0.017) Table 2. In Group B, a statistically in-significant change in all the parameters after phase I therapy was observed (Table 3).

**DISCUSSION**

Periodontitis is a chronic inflammatory disease of supporting tissues of teeth caused predominantly by anaerobic Gram negative bacteria that lead to gingival inflammation, destruction of periodontal tissues, loss of alveolar bone, and eventual exfoliation of teeth in severe cases. Monocyte-derived cytokines such as TNF α, IL-1β or interferon-γ are produced in response to infection with gram-ve bacteria and result in a catabolic state which contributes to anemia. [3,4] Elevated numbers of total white blood cell count (WBCs) has also been reported. [5,6]

**Table 2** Intra-group comparison of hematologic parameters in Group A

Hematologic parameters	Baseline		3 months		P-value#
	Mean	SD	Mean	SD	
TLC /mm3	6500.35	72.31	6080.5	59.82	<0.001*
PMN's/mm3	4200.52	56.43	3700.26	62.71	<0.001*
Lymphocytes/mm3	2255.1	37.82	2250.3	41.42	0.672
ESR mm/hg	14.05	3.95	9.7	3.28	<0.001*
Hb gm%	11.5	2.18	14.2	1.93	0.002*
BT m	2.7	1.82	1.5	2.03	0.017*

Statistically Significant Difference (P-value<0.05); #P-value by Paired t-test

**Table 3** Intra-group comparison of hematologic parameters in Group B

Hematologic parameters	Baseline		3 months		P-value#
	Mean	SD	Mean	SD	
TLC /mm3	6000	63.72	6030.5	82.73	0.891
PMN's/mm3	3500.5	58.45	3550.2	63.82	0.652
Lymphocytes/mm3	2000.4	47.82	1995.3	42.09	0.725
ESR mm/hg	12.01	3.62	12.0	2.93	0.953
Hb gm%	14.1	2.25	14.2	2.16	0.854
BT m	1.9	1.73	2.2	1.88	0.775

Statistically Significant Difference (P-value<0.05); #P-value by Paired t-test

Periodontal instrumentation (scaling and root planning) results in a dramatic decrease in pathologic microbial load thus decreasing serum inflammatory markers. With this background knowledge, this clinical study is sought to compare the changes in hematologic parameters in chronic generalized moderate to severe periodontitis following scaling and root planning. According to the results of present study, intergroup comparison of baseline parameters shows that all values are

higher in Group A compared to Group B ( $p < 0.05$ ) except for HB concentration. The results of our study are in accordance with the study of Loos BG *et al*<sup>6</sup> and Weiss G.<sup>[3]</sup> Thus chronic periodontitis induces an inflammatory state in the body characterised by anemia and increase in the values of white blood cell (WBC) count. In Group A, value of TLC decreases from baseline value of 6500.35 to a value of 6080.5 at 3<sup>rd</sup> month with a p value  $< 0.001$  which is statistically significant. Similarly the mean value of PMN'S decreased from baseline value of 4200.52 to a value of 3700.26 at 3<sup>rd</sup> month with a p value  $< 0.001$  which is statistically significant. The results of our study are in accordance with the study of Wakai K *et al*.<sup>[9]</sup> and is the result of reduction in the pathogenic bacterial load in the plaque thus reduction in infection induced inflammation.

Lymphocytes the cells of chronic inflammation range normally, from 1700 to 3500/mm<sup>3</sup> of blood. , mean value of lymphocytes decreases from baseline value of 2255.1 to a value of 2250.3 at 3<sup>rd</sup> month although statistically non significant.(p value= 0.67) The results of our study are in accordance with the study of Kalsi.*et al*<sup>[10]</sup> and is the result of reduction in the pathogenic bacterial load in the plaque thus reduction in infection-induced inflammation.

The ESR is the rate at which the red blood cells sediment in a period of 1 h is a method of monitoring the progress of treatment of diseases, thus in our case progress in severity of periodontitis. The normal range of ESR by Westergren method is 0–22 mm/h for men and 0–29 mm/h for women. A higher ESR indicates a greater inflammatory process. A statistically significant decrease in the value of ESR is seen in our study (baseline 14.05 at 3<sup>rd</sup> month 9.7; p value $< 0.001$ ) and is in accordance with study conducted by Agarwal N<sup>[11]</sup> thus proving the fact that SRP reduces infection-induced inflammation.

According to Lainson<sup>[12]</sup> anemia is a cause of periodontitis. A statistically significant increase in the value of HB is seen in our study (baseline 11.5 and 3<sup>rd</sup> month 14.2 p value= 0.002) and is in accordance with study conducted by Rai and Kharb<sup>[13]</sup>, which also found an increase in Hb after SRP in patients with periodontitis. But is in contrast to the study conducted by Havemose<sup>[14]</sup> who failed to show any association between Hb and periodontitis patients. BT assess platelet function. According to Duke's method,<sup>[15]</sup> the normal BT ranges from 1 to 3 min. BT is evaluated before any surgical procedure. A significant reduction in our study is seen in BT (baseline 2.7 and 3<sup>rd</sup> month 1.5; p value= 0.017) and is in accordance to study conducted by Kalsi.*et al*<sup>[10]</sup>

In Group B, a statistically insignificant change in all the parameters after phase I therapy was observed (Table 3) and is in accordance with the study of Ranjan Malhotra *et al*<sup>[16]</sup> according to which, patients with chronic marginal gingivitis had normal values of various haematological parameters which were maintained even after Scaling and root planning.

## CONCLUSION

Generalised moderate to severe periodontitis is associated with elevated levels of various inflammatory markers which manifest in the blood as raised wbc count and anemia. phase I therapy that is scaling and root planning results in decreased levels of pathogenic bacteria, thus decreased levels of various

inflammatory markers and improvement in various haematological parameters.

## References

1. Harald Loe. *Diabetes Care* 1993 Jan; 16(1): 329-334.
2. Kim J, Amar S. Periodontal disease and systemic conditions: A bidirectional relationship. *Odontology* 2006; 94(1):10-21.
3. Weiss G, Goodnough LT. Anemia of chronic disease. *Engl J Med* 2005; 352(10):1011-23.
4. Faquin WC, Schneider TJ, Goldberg MA. Effect of inflammatory cytokines on hypoxia-induced erythropoietin production. *Blood* 1992; 79(8):1987-94.
5. Wakai K, Kawamura T, Umemura O, Hara Y, Machida JI, Anno T *et al*. Associations of medical status and physical fitness with periodontal disease. *J Clin Periodontol* 1999; 26(10):664-72.
6. Loos BG, Craandijk J, Hoek FJ, Dillen PM, Velden UV. Elevation of systemic markers related to cardiovascular diseases in the peripheral blood of periodontitis patients. *J Periodontol* 2000; 71(10):1528-34.
7. Listgarten MA, Lindhe J, Hellden L: Effect of tetracycline and / or scaling on periodontal disease clinical, microbiologic and histological observations. *J clinial periodontal* 1978; 5:246.
8. Magnusson I, Lindhe J, Yoneyama T, *et al*: Recolonisation of a subgingival microbiota following scaling in deep pockets, *J Clinical periodontal* 1984; 11:193.
9. Wakai K, Kawamura T, Umemura O, Hara Y, Machida J, Anno T, *et al*. Associations of medical status and physical fitness with periodontal disease. *J Clin Periodontol* 1999; 26:664-72.
10. Kalsi DS, Sood A, Mundi S, Sharma V. Effect of scaling and root planing on blood counts in patients with chronic generalized periodontitis. *Indian J Dent Sci* 2017; 9:109-13.
11. Agarwal N, Kumar VS, Gujjari SA. Effect of periodontal therapy on hemoglobin and erythrocyte levels in chronic generalized periodontitis patients: An interventional study. *J Indian Soc Periodontol* 2009; 13:6-11.
12. Lainson PA, Brady PP, Fraleigh CM. Anemia, a systemic cause of periodontal disease? *J Periodontol* 1968; 39:35-8.
13. Rai B, Kharb S. Effect of scaling and root planning in periodontitis on peripheral blood. *Internet J Dent Sci* 2007; 6:1.
14. Havemose-Poulsen A, Westergaard J, Stoltze K, Skjødt H, Danneskiold-Samsøe B, Loch H, *et al*. Periodontal and haematological characteristics associated with aggressive periodontitis, juvenile idiopathic arthritis, and rheumatoid arthritis. *J Periodontol* 2006; 77:280-8.
15. Duke WW. The relation of blood platelets to hemorrhagic disease. Description of a method for determining the bleeding time and the coagulation time and report of three cases of hemorrhagic disease relieved by blood transfusion. *J Am Med Assoc* 1910; 55:1185-92.
16. Ranjan Malhotra, Anoop Kapoor, Vishakha Grover, Deepak Grover, Aaswin Kaur. *The Journal of Dental Hygiene* 2012; 86; 3:195-203.