

Comparison of hematological parameters among chronic periodontitis patients and healthy individuals

Chris Noel Timothy,
Arvina Rajasekar

Departments of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

J. Adv. Pharm. Technol. Res.

ABSTRACT

Some of the most common oral disorders are periodontal disease. Variation in hematological parameters in chronic periodontitis patients could affect the type of treatment and its overall outcomes. Comparing and evaluating the hematological parameters in people with chronic periodontitis and the general population was the aim of this study. 100 individuals with chronic periodontitis (Group I) and 100 individuals in clinically good health participated in the study (Group II). Hemoglobin (Hb), random blood sugar (RBS), bleeding time (BT), and clotting time (CT) were evaluated and compared between the two groups. In contrast to patients with chronic periodontitis (8.934 ± 2.0), in healthy patients, the mean Hb concentrations were found to be higher (13.435 ± 1.8). In comparison to healthy individuals (98.98 ± 25.42), patients with chronic periodontitis had a higher mean value for RBS (112.14 ± 47.5). In contrast to the healthy population ($BT = 2.654 \pm 13.36$, $CT = 6.057 \pm 0.267$), patients with chronic periodontitis had shorter mean BT and CT ($BT = 0.301 \pm 0.07$, $CT = 2.84 \pm 0.6058$). Hematological factors and the population's periodontal health were discovered to be significantly associated ($P = 0.001$). Within the constraints of the continuing investigation, it was shown that among people with chronic periodontitis, Hb levels, BT, and CT were reduced, while blood glucose levels were increased.

Key words: Blood glucose, chronic periodontitis, hematology, hemoglobin, innovative technique

INTRODUCTION

The most frequent disorders of the oral cavity are periodontal diseases.^[1-3] Inflammation of the gingiva without a loss of clinical attachment or bone surrounding the teeth is known as gingivitis. Along with deepening pockets, pathologic

migration, tooth movement, gingival recession, bone loss, involvement of the furcation in multiprocessor teeth, and clinical attachment loss (CAL), untreated gingivitis can also cause an increase in the severity of the condition.^[4-9] The earlier the periodontal disorders are treated, the better the outcome. Although there are many different factors that might contribute to periodontal disease, including age, gender, systemic disorders, hereditary factors, and medications, bacterial plaque is the primary cause of the condition.^[3,10-14]

Periodontal disorders, following dental caries, are the second most common orofacial pathology, affecting both industrialized and developing countries.^[15-17] Diagnosis

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Timothy CN, Rajasekar A. Comparison of hematological parameters among chronic periodontitis patients and healthy individuals. *J Adv Pharm Technol Res* 2022;13:S545-8.

Address for correspondence:

Dr. Arvina Rajasekar,
Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600 077, Tamil Nadu, India.
E-mail: arvinar.sdc@saveetha.com

Submitted: 20-Apr-2022

Revised: 25-Aug-2022

Accepted: 29-Aug-2022

Published: 30-Dec-2022

Access this article online

Quick Response Code:



Website:

www.japtr.org

DOI:

10.4103/japtr.japtr_170_22

of periodontal disease is relatively simple and involves the use of probes to measure attachment loss.^[18,19] The most prevalent kinds of periodontitis are chronic and aggressive, but there are other more complex classifications, including early-onset periodontitis, periodontitis in adulthood, necrotizing ulcerative periodontitis, refractory periodontitis, and periodontitis associated with underlying illnesses (AAP, 1989).^[20-22] Hematological indicators, such as hemoglobin (Hb), bleeding time (BT), clotting time (CT), and random blood glucose, are the main focus of the current study.

Previous research on this subject includes studies where Hb, plaque index, gingival index, probing pocket depth (PPD), CAL, red blood cells, packed cell volume, and erythrocyte sedimentation rate were some of the variables that have been studied.^[23] A similar study compared the complete blood count of chronic periodontitis patients with the healthy population to determine the prevalence of anemia.^[24]

Variation in the various hematological parameters in chronic periodontitis patients could affect the type of treatment to be administered and its overall outcomes. Therefore, this study required to comprehend things better. Our team has produced articles of the highest caliber as a consequence of our research and expertise.^[25-33] Literature has revealed that there are few studies that examine the differences in hematological parameters between populations with and without chronic periodontitis. Therefore, the rationale behind this research was to assess and compare the hematological parameters including Hb, random blood sugar (RBS), BT, and CT between periodontally healthy and periodontally compromised patients.

MATERIALS AND METHODS

Outpatients who visited the Department of Periodontics at the Saveetha Dental College and Hospitals in Chennai, India, from March 2020 to March 2021 took part in a comparative, descriptive study. The study involved 200 patients in total. Clinically healthy patients and patients with chronic periodontitis were divided into two groups based on their periodontal health. Clinical measures such as CAL and PPD were used to assess the periodontal health. Patients were categorized as having chronic periodontitis if their PPD was greater than 5 mm and they also had attachment loss, as well as opposed to clinically healthy patients if their PPD was less than 3 mm and they also had no attachment loss. All of the patients recruited had their hematological parameters, including Hb, RBS, BT, and CT, measured and compared between the two groups. The study was performed after getting approved by the Institutional Ethical committee of Saveetha Dental College and Hospitals, Chennai (IHEC/SDC/UG-1712/22/PERIO/516). Informed consent was obtained from all the participants before the start of the study.

The patient's age, gender, Hb, RBS, BT, and CT were the six factors based on which the data were organized and tabulated in a systematic manner using Microsoft Excel software. The data was analysed using the Statistical Package for Social Sciences (SPSS Software, Version 23.0; IBM Corp., Armonk, NY, USA). Descriptive and inferential statistics were employed in the study of the data.

RESULTS

The data were gathered and sorted using the six factors described before. Patients with chronic periodontitis had a mean age that was similar to that of healthy individuals, with a mean age of 38.02 ± 11.16 years and 38.01 ± 12.41 years, respectively. In contrast to patients with chronic periodontitis (8.934 ± 2.0), in healthy patients, the mean Hb values were found to be higher (13.435 ± 1.8). A significant association ($P=0.001$) between Hb and the study population was found using the Chi-square test.[Table 1].

Patients with persistent periodontitis had a higher mean RBS value (112.14 ± 47.5) compared to healthy patients (98.98 ± 25.42) [Table 1]. The Chi-square test indicated a substantial correlation between RBS and the study population ($P = 0.001$).

Mean CT and BT were observed to be decreased in people with chronic periodontitis ($BT = 0.301 \pm 0.07$, $CT = 2.84 \pm 0.6058$) compared to healthy population ($BT = 2.654 \pm 13.36$, $CT = 6.057 \pm 0.267$). The association between BT and the study population was insignificant ($P = 0.05$), and after running a Chi-square test, it was demonstrated that CT and the study population had a statistically significant association ($P = 0.001$) [Table 1].

DISCUSSION

This study's objective was to compare and contrast the hematological parameters found in adults with chronic periodontitis and clinically healthy individuals.

In the current study, it was discovered that the mean Hb values in those with chronic periodontitis were lower than those in the healthy group. In a recent study, Anumolu *et al.* discovered that individuals with chronic periodontitis had

Table 1: Hematological parameters of clinically healthy and chronic periodontitis patients

Parameters	Healthy population	Chronic periodontitis patients	P
Hb	13.435 ± 1.8	8.934 ± 2.0	0.001
RBS	98.98 ± 25.42	112.14 ± 47.5	0.001
BT	2.654 ± 13.36	0.301 ± 0.07	0.001
CT	6.057 ± 0.267	2.84 ± 0.6058	0.001

Hb: Hemoglobin, RBS: Random blood sugar, BT: Bleeding time, CT: Clotting time

lower Hb levels and erythrocyte counts as well as higher amounts of white blood cells.^[34] Patients with periodontitis showed lower concentrations of Hb and RBC than the general population, according to a separate study by Wu *et al.*^[35] Similar findings were made by Patel *et al.* who discovered that patients with chronic periodontitis who experienced significant improvement after 6 months of nonsurgical periodontal therapy had reduced Hb levels.^[36] This may mean that the current study's findings are consistent with those that have been reported in the literature. It was also discovered that periodontitis suppresses erythrocyte proliferation and differentiation, thereby lowering Hb levels in chronic periodontitis patients.^[37]

In the current study, patients with periodontitis had higher RBS levels. According to the studies by Pihlstrom *et al.* and Soskolne and Klinger, people with chronic periodontitis had higher blood glucose levels.^[38,39] According to Maboudi *et al.*, patients with chronic periodontitis had higher mean fasting blood sugar, glucose tolerance test, and Hb A1C values.^[40] This demonstrates that the findings of the literature are consistent with the findings of the current investigation. This could be attributable to the fact that diabetes and chronic periodontitis have a two-way association. Diabetes patients are more likely to have periodontal problems, while periodontitis patients tend to have higher blood sugar levels. The gingival crevicular fluid of patients with chronic periodontitis may include increased glucose levels, which can change the nature of microorganisms from aerobic to anaerobic and motile, increasing the amount of damage they can inflict. Impaired neutrophil function allows bacteria to continue destroying them unimpeded. Attachment loss can also be caused by a failure of collagen replacement in diabetic patients.^[41-43]

In the current study, it was also found that BT and CT were shortened in chronic periodontitis patients compared to a clinically healthy population, indicating a hypercoagulability state in these individuals. According to a study by Sanz *et al.*, there is a correlation between the severity of periodontitis and the production of thrombin, which increases coagulability.^[44] In a related investigation, Mathews *et al.* found that patients with chronic periodontitis had elevated platelet activity and hypercoagulability indicators in their blood.^[45] Another study by Banthia *et al.* revealed that BT and CT significantly increased during phase 1 periodontal therapy.^[46] The findings of this investigation corroborated previous findings. The results of the current investigation corresponded with those of the other studies. This may be connected to bacterial activity and compounds produced by bacteria, particularly in the case of *Porphyromonas gingivalis*, which encourages clotting by increasing the production of cytokines.^[47]

Hematological indicators were shown to differ between patients with chronic periodontitis and the general

population of healthy people. However, more interventional research is needed to corroborate these findings.

CONCLUSION

Within the current study's restrictions, it was revealed that people with chronic periodontitis had higher blood glucose levels, lower Hb levels, and slower BT and CT. It is hoped that this study will give enough understanding of the hematological parameters in chronic periodontitis patients and open the door to a customized approach to the treatment of periodontitis patients.

Financial support and sponsorship

The present study is supported by Saveetha Institute of Medical and Technical Sciences, Saveetha Dental College and Hospitals, Saveetha University.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Radafshar G, Mahboob F, Kazemnejad E. A study to assess the plaque inhibitory action of herbal-based toothpaste: A double blind controlled clinical trial. *J Med Plants Res* 2010;4:1182-6.
2. Sweta RG, Rahul AG. Comparison of effectiveness of two herbal mouthrinses on plaque and gingival scores among 12-15 years old school children in Belgaum City: A randomized controlled field trial. *Pat Off J* 2014;33:29.
3. Ahamed TS, Rajasekar A, Mathew MG. Prevalence of periodontal disease among individuals between 18-30 years of age: A retrospective study. *Ann Med Health Sci Res* 2021;11:198-204.
4. Murthykumar K, Rajasekar A, Kaarthikeyan G. Prevalence of tooth loss among chronic periodontitis patients-A retrospective study. *Int J Pharm Res* 2020;12:2399-406.
5. Murthykumar K, Rajasekar A, Kaarthikeyan G. Assessment of various treatment modalities for isolated gingival recession defect – A retrospective study. *Int J Res Pharm Sci* 2020;11 Suppl 3:3-7.
6. Sabarathinam J, Rajasekar A, Madhulaxmi M. Prevalence of furcation involvement among patients with periodontitis: A cross sectional study. *Int J Res Pharm Sci* 2020;11 Suppl 3:1483-7.
7. Rajeshwaran N, Rajasekar A. Prevalence of angular bone defects in chronic periodontitis patients with and without systemic diseases. *Indian J Forensic Med Toxicol* 2020;14:5570-6.
8. Thanish AS, Rajasekar A, Mathew MG. Assessment of tooth loss in chronic periodontitis patients with and without diabetes mellitus: A cross-sectional study. *Int J Res Pharm Sci* 2020;11:1927-31.
9. Rajeshwaran N, Rajasekar A, Kaarthikeyan G. Prevalence of pathologic migration in patients with periodontitis: A retrospective analysis. *J Complement Med Res* 2020;11:172.
10. Geethika B, Rajasekar A, Chaudary M. Comparison of periodontal status among pregnant and non-pregnant women. *Int J Res Pharm Sci* 2020;11 Suppl 3:1923-6.
11. Rajan T, Rajasekar A. Assessment of periodontal status among post menopausal women: A retrospective study. *Int J Dentistry Oral Sci* 2020;7:1063-6.
12. Kandhan T, Rajasekar A. Prevalence of periodontal diseases among patients with and without systemic diseases – A retrospective study. *J Complement Med Res* 2020;11:155.

13. Fathima T, Rajasekar A. Association between socioeconomic status and oral health among selected south Indian population. *Int J Dentistry Oral Sci* 2021;8:4602-5.
14. Aathira CM, Rajasekar A. Association between oral health status and quality of life among selected south Indian population. *Int J Dentistry Oral Sci* 2021;8:4579-82.
15. Genco RJ, Borgnakke WS. Risk factors for periodontal disease. *Periodontol* 2000 2013;62:59-94.
16. Timothy CN, Leelavathi L. Association of dental plaque and periodontal diseases among outpatients – A record based study. *Eur J Mol Clin Med* 2020;7:3037-109.
17. Pilot T. The periodontal disease problem. A comparison between industrialised and developing countries. *Int Dent J* 1998;48:221-32.
18. Kumar RP, Vijayalakshmi B. Assessment of fluoride concentration in ground water in Madurai district, Tamil Nadu, India. *Res J Pharm Technol* 2017;10:309-10.
19. Preshaw PM. Detection and diagnosis of periodontal conditions amenable to prevention. *BMC Oral Health* 2015;15 Suppl 1:S5.
20. Deepa R, Prakash S. Accuracy of probing attachment levels using a new computerized cemento-enamel junction probe. *J Indian Soc Periodontol* 2012;16:74-9.
21. Panneerselvam S, Theyagarajan R, Sekhar V, Mani E, Krishnamurthi I, Saketharaman P. Evaluation of systemic markers related to anemia in aggressive periodontitis patients before and after Phase I periodontal therapy: An interventional study. *J Contemp Dent Pract* 2021;22:1413-6.
22. Zhang Q, Xu S, Xu W, Zhou Y, Luan H, Wang D. Resveratrol decreases local inflammatory markers and systemic endotoxin in patients with aggressive periodontitis. *Medicine (Baltimore)* 2022;101:e29393.
23. Musalaiah SV, Anupama M, Nagasree M, Krishna CH, Kumar A, Kumar PM. Evaluation of nonsurgical periodontal therapy in chronic periodontitis patients with anemia by estimating hematological parameters and high-sensitivity C-reactive protein levels. *J Pharm Bioallied Sci* 2014;6:S64-9.
24. Kolte RA, Kolte AP, Deshpande NM. Assessment and comparison of anemia of chronic disease in healthy subjects and chronic periodontitis patients: A clinical and hematological study. *J Indian Soc Periodontol* 2014;18:183-6.
25. Nambi G, Kamal W, Es S, Joshi S, Trivedi P. Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: A randomized controlled study. *Eur J Phys Rehabil Med* 2018;54:880-9.
26. Mohanavel V, Ashraff Ali KS, Prasath S, Sathish T, Ravichandran M. Microstructural and tribological characteristics of AA6351/Si3N4 composites manufactured by stir casting. *J Mater Res Technol* 2020;9:14662-72.
27. Rajakumari R, Volova T, Oluwafemi OS, Rajesh Kumar S, Thomas S, Kalarikkal N. Grape seed extract-soluplus dispersion and its antioxidant activity. *Drug Dev Ind Pharm* 2020;46:1219-29.
28. Ramamoorthi S, Nivedhitha MS, Divyanand MJ. Comparative evaluation of postoperative pain after using endodontic needle and EndoActivator during root canal irrigation: A randomised controlled trial. *Aust Endod J* 2015;41:78-87.
29. Iswarya Jaisankar A, Smiline Girija AS, Gunasekaran S, Vijayashree Priyadharsini J. Molecular characterisation of *csgA* gene among ESBL strains of *A. Baumannii* and targeting with essential oil compounds from *Azadirachta Indica*. *J King Saud Univ Sci* 2020;32:3380-7.
30. Mudigonda SK, Murugan S, Velavan K, Thulasiraman S, Krishna Kumar Raja VB. Non-suturing microvascular anastomosis in maxillofacial reconstruction – A comparative study. *J Craniomaxillofac Surg* 2020;48:599-606.
31. Paramasivam A, Priyadharsini JV, Raghunandhakumar S. Implications of m6A modification in autoimmune disorders. *Cell Mol Immunol* 2020;17:550-1.
32. Barabadi H, Mojab F, Vahidi H, Marashi B, Talank N, Hosseini O, *et al.* Green synthesis, characterization, antibacterial and biofilm inhibitory activity of silver nanoparticles compared to commercial silver nanoparticles. *Inorg Chem Commun* 2021;129:108647.
33. Tahmasebi S, Qasim MT, Krivenkova MV, Zekiy AO, Thangavelu L, Aravindhan S, *et al.* The effects of oxygen-ozone therapy on regulatory T-cell responses in multiple sclerosis patients. *Cell Biol Int* 2021;45:1498-509.
34. Anumolu VN, Srikanth A, Paidi K. Evaluation of the relation between anemia and periodontitis by estimation of blood parameters: A cross-sectional study. *J Indian Soc Periodontol* 2016;20:265-72.
35. Wu D, Lin Z, Zhang S, Cao F, Liang D, Zhou X. Decreased hemoglobin concentration and iron metabolism disorder in periodontitis: Systematic review and meta-analysis. *Front Physiol* 2019;10:1620.
36. Patel MD, Shakir QJ, Shetty A. Interrelationship between chronic periodontitis and Anemia: A 6-month follow-up study. *J Indian Soc Periodontol* 2014;18:19-25.
37. Weiss G, Ganz T, Goodnough LT. Anemia of inflammation. *Blood* 2019;133:40-50.
38. Pihlstrom BL, Michalowicz BS, Johnson NW. Periodontal diseases. *Lancet* 2005;366:1809-20.
39. Soskolne WA, Klinger A. The relationship between periodontal diseases and diabetes: An overview. *Ann Periodontol* 2001;6:91-8.
40. Maboudi A, Akha O, Heidari M, Mohammadpour RA, Gheblenama P, Shiva A. Relation between periodontitis and prediabetic condition. *J Dent (Shiraz)* 2019;20:83-9.
41. Anand PS, Sagar DK, Ashok S, Kamath KP. Association of aggressive periodontitis with reduced erythrocyte counts and reduced hemoglobin levels. *J Periodontal Res* 2014;49:719-28.
42. Bascones-Martínez A, González-Febles J, Sanz-Esporrín J. Diabetes and periodontal disease. Review of the literature. *Am J Dent* 2014;27:63-7.
43. Bobetsis YA, Barros SP, Offenbacher S. Exploring the relationship between periodontal disease and pregnancy complications. *J Am Dent Assoc* 2006;137 Suppl: 7S-13S.
44. Sanz M, Marco Del Castillo A, Jepsen S, Gonzalez-Juanatey JR, D'Aiuto F, Bouchard P, *et al.* Periodontitis and cardiovascular diseases: Consensus report. *J Clin Periodontol* 2020;47:268-88.
45. Mathews MJ, Mathews EH, Mathews GE. Oral health and coronary heart disease. *BMC Oral Health* 2016;16:122.
46. Banthia R, Jain P, Banthia P, Belludi S, Parwani S, Jain A. Effect of phase I periodontal therapy on pro-coagulant state in chronic periodontitis patients – A clinical and haematological study. *J Ir Dent Assoc* 2013;59:183-8.
47. Casanova L, Hughes FJ, Preshaw PM. Diabetes and periodontal disease: A two-way relationship. *Br Dent J* 2014;217:433-7.