



An in Vivo Evaluation of Changing Blood Platelet Levels in Institutionalized Patients Suffering from Chronic Periodontal Disorders: An Original Research Study

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KEYWORDS

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ABSTRACT:

Background and Aim: Literature has well evidenced that blood platelet count is not incredibly constant especially in known cases of chronic Periodontitis. Its changing levels could be significant markers for other interrelated disorders. Consequently, the sole aim of this study was to evaluate the fluctuating blood platelet count in patients with chronic periodontal diseases.

Materials & Methods: All patients were selected from the department of Periodontology of the institute. Total 100 patients were intended to be studied wherein 50 were non-diseased (control) while rest 50 patients were suffering from chronic Periodontitis. Periodontal health parameters like plaque index, pocket depth, attachments levels etc. were evaluated and compared to draw final inference.

Statistical Analysis & Results: Statistical analysis was completed by statistical software 'Statistical Package for the Social Sciences (SPSS)'. Authors have ascertained the maximum precision of results by using suitable statistical tests that have provided p values, mean, standard deviation, standard error and 95% CI. $P \leq 0.05$ was considered as statistically significant. Out of 100 studied patients, males were 58 and females were 42. P value was significant for the age range 34-37 years.

Conclusion: Within the limitations of the study authors concluded that platelet count was considerably elevated in patients with chronic periodontitis as compared to control group. These findings may be rationally correlated with the underlying inflammatory processes and responses those happening in the patients with chronic Periodontitis.

Introduction

Periodontitis is the sixth most common disease worldwide. Periodontitis affects a considerable proportion of adults aged 32 and older in the United States, with an estimated incidence of approximately 48%. Periodontitis arises from a local inflammatory reaction which may also put forth a larger range of

systemic consequences.¹⁻⁴ Temporary bacteremia in patients with periodontitis causes augmented levels of pro-inflammatory mediators. The systemic inflammation causes increase in platelet number and activation of platelet. Literature has also evidenced that periodontitis is a chronic infectious disease of the surrounding tissues of the teeth.⁵⁻⁸ By the year 2025, non communicable disorders are acquiring an epidemic



outline and will be apparently a major cause of life loss in developing countries.⁹ Furthermore, studies performed in India have illustrated that every second individual above 35 years of age has periodontal pockets and 34% of total teeth extracted after 35 years of age are due to periodontal dilemmas. Conversely, periodontal pocket is pathologically depended gingival sulcus due to miscellaneous reasons. Periodontitis is one of the most common infections reported in humans, distressing in its most brutal form, roughly 13% of the populace.¹⁰⁻¹³ Additionally, few pioneer researchers have done studies and shown that blood platelet counts usually decrease after periodontal therapy. Therefore, it is now becoming clearer that a simultaneous reverse association also exists, i.e., periodontal disease negatively affects systemic health too. This actually potentially led us to think that there could be imperative effect of periodontal diseases on a wide range of organ systems including hematological and lymphatic systems.¹⁴⁻¹⁵ The definitive aim of this study was to significantly evaluate the fluctuating blood platelet count in patients with chronic periodontal diseases.

Materials & Methods

The present study was designed, abstracted and executed in the department of Periodontology of the institute. Total 100 patients were finalized to be studied wherein 50 were healthy (control) while rest 50 patients were suffering from chronic periodontitis. Informed consents were obtained from patients prior to the real execution of the study. Patients suffering from any physical or psychological diseases, pregnant women, smokers and those who received any periodontal treatment within 6 months, were excluded from the study. Patients with any congenital/acquired gross anomaly related to maxillofacial structure were also excluded from the study. The methodology and planned way of study's conduction were explained to the patients. All patients were also informed about the importance and clinical relevance of the study. We had selected total 100 patients inclusive of both sexes, aged between 30 and 50 years. Patient selection process was completed using randomized controlled sampling procedure. Comprehensive periodontal screening was performed for all selected patients. Patients were studied into two groups (of 50 each) based on the

periodontal examination results. Group I were healthy patients (control) while Group II patients were known case of chronic periodontitis. Periodontal screening procedure has included estimation of Plaque Index, Gingival Index, Pocket Depth and Clinical Attachment Level. Group I patients showed periodontal pocket depth less than 3 mm, Clinical attachment loss less than 3 mm, with no clinical sign of gingivitis. Group II patients showed more than 3 mm of pocket depth and clinical attachment loss more than 3 mm. Minimum 2 ml of venous blood sample were drawn by venipuncture method in the antecubital fossa and stored in vials containing Ethylene Diamine Tetraacetic Acid [EDTA]. Furthermore, the platelet counts were completed by using an automated cell counter within 24 hours after sample collection, at the hematology laboratory of the institute. Results thus obtained was tabulated and subjected to basic statistical analysis. P value less than 0.05 was considered significant ($p < 0.05$).

Statistical Analysis and Results

All gathered data were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 22 (New York, USA). The data was accurately subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi-square test, standard error and 95% CI. Table 1 and Graph 1 shows that out of 100 studied patients, males were 58 and females were 42. Total 11 patients were in the last age group. Total 23 patients were belonging to the age range of 30-33 years. 19 studied patients were falling in the age range of 38-41 years. P value was significant for the age range 34-37 years [0.01]. Table 2 illustrates the basic statistical evaluation of measured platelet count between groups including level of significance evaluation using 'Pearson Chi-Square Test'. The overall level of significance was 'non significant' [0.06]. Table 2 also shows that the mean platelet count in the patients with chronic periodontitis (Group II: 278.87 cells/L) is higher as compared to the control group (Group I: 213.98 cells/L). Graph 2 illustrates about the detailed representation of Mean, SD. Table 3 illustrates about the estimation amongst all studied Groups using one-way ANOVA. Highly significant inferences were drawn for one-way ANOVA assessments (Between Groups, $p=0.001$).

Table 1: Age & Gender Wise Distribution of Patients

| Age Group (Yrs) | Male | Female | Total % | P value |
|-----------------|------|--------|-----------|---------|
| 30-33 | 12 | 11 | 23 [23 %] | 0.08 |
| 34-37 | 16 | 8 | 24 [24 %] | 0.01* |
| 38-41 | 8 | 11 | 19 [19 %] | 0.60 |
| 42-45 | 13 | 10 | 23 [23 %] | 0.48 |
| 46-50 | 9 | 2 | 11 [11 %] | 0.29 |

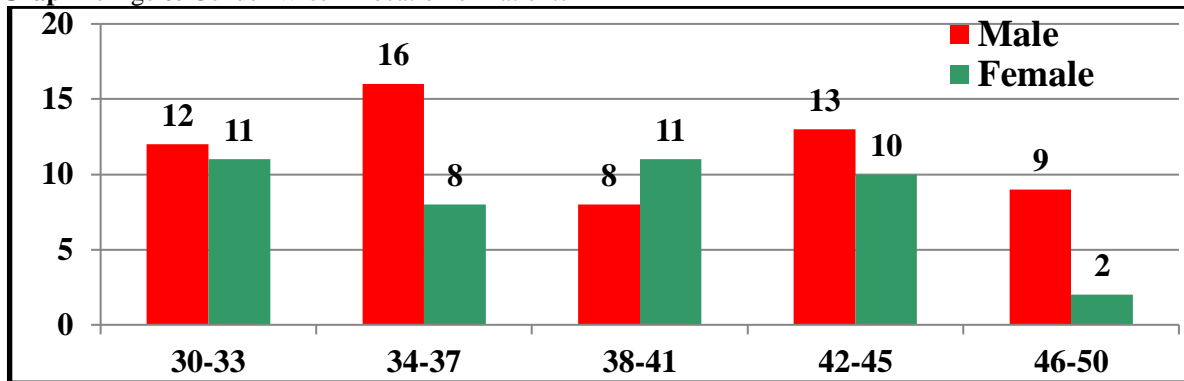


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|-------------------------------|----|----|------------|---------------------|
| Total | 58 | 42 | 100 [100%] | *Significant |
| *p<0.05 significant | | | | |

Table 2: Statistical Assessment of Measured Platelet Count Between Groups

| Group | N | Platelet count (X10 ⁹ /L) | | | | Pearson Chi-Square Value | P value |
|--------------------------|-----|--------------------------------------|--------------------|------------|--------|--------------------------|-----------------|
| | | Mean | Standard Deviation | Std. Error | 95% CI | | |
| Group I (Control) | 50 | 213.98 | 22.04 | 0.043 | 1.96 | 1.0 | 0.06 |
| Group II (Periodontitis) | 50 | 278.87 | 21.91 | 0.012 | 1.98 | 1.0 | |
| Total | 100 | - | - | - | - | - | Non Significant |

Graph 1: Age & Gender Wise Allocation of Patients



Graph 2: Detailed representation of Mean, SD

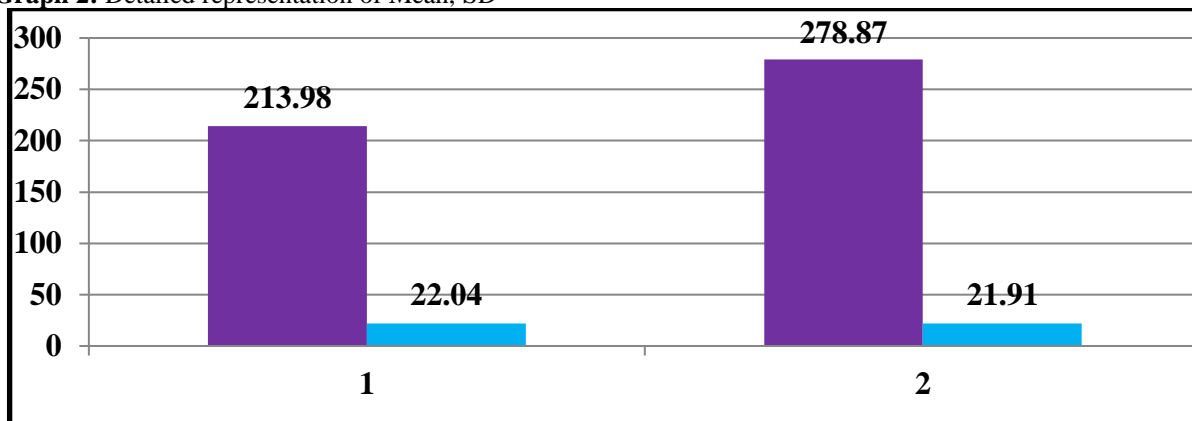


Table 3: Estimation amongst all studied Groups using one-way ANOVA

| Variables | Degree of Freedom | Sum of Squares Σ | Mean Sum of Squares $m\Sigma$ | F | Level of Sig. (p) |
|----------------|-------------------|-------------------------|-------------------------------|-----|-------------------------------|
| Between Groups | 2 | 1.530 | 1.937 | 1.1 | 0.001* |
| Within Groups | 15 | 2.504 | 0.237 | | - |
| Cumulative | 101.13 | 07.234 | | | *p<0.05 significant |



Discussion

Periodontitis is a multifactorial inflammatory sickness created by particular microorganisms that damages the supporting tissues of the teeth. Patients with periodontitis when compared to healthy controls, cross-sectional studies have exposed that the former have elevated levels of systemic inflammatory markers, like lymphocytes, leukocytes, erythrocyte distribution width, mean corpuscular volume.¹⁶⁻¹⁷ Numerous blood inflammatory indicators like neutrophil-to-lymphocyte ratio (NLR), lymphocyte to monocyte ratio (LMR), are possible upcoming bio-markers. They can be used to see inflammation in blood. They are clinically used as prognostic markers in periodontitis. Accurate recognition of pathologic microorganisms is the exclusive key to competent innate immunity. Chronic periodontitis is a common infection that manifests as local inflammation affecting the supporting tissues of the teeth. Literature has well evidenced that periodontitis, apart from creating a local inflammatory process, can also put forth a wide range of systemic effects.¹⁸⁻¹⁹ Smoking is considered as the strongest predictor of attachment loss and bone loss. Several studies showed that the nicotine found in tobacco products initiates the overproduction of cytokines in the body due to lowered oxygen levels.²⁰ Cytokines are chief chemicals mediators those involved in the process of periodontal inflammation. Apart from the cytokine action, several changes in the blood occur including increased leukocyte count and reactive oxidants. Reactive oxidants appear to be induced not only by smoking but also by periodontitis. So in present study we had excluded patients who were smokers. A total hematological analysis is frequently used to assess the presence of systemic infection or inflammation, and the question arises whether periodontal infections can also affect the hematological parameters such as the differential counts of white blood cells, red blood cells, and platelets count.²¹⁻²² Some of the studies have demonstrated differences in the hematological parameters in subjects with chronic periodontitis as compared to healthy subjects. Additionally, we noticed few studies those were in agreement with our result outcomes.

Conclusion

Within the limitations of the study authors concluded that platelet count was reported to be elevated in patients with chronic periodontitis as seen over control group. Hence, it could probably be inferred that there is a definite effect of periodontal disease and its behavior on blood platelet count. These findings can be understandably correlated with the underlying inflammatory processes and actions those happening in the patients with chronic periodontitis.

Nevertheless, authors anticipate few other long term studies to be executed that could further set some genuine guidelines in these perspectives.

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