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Correlation of Platelet Count and Periodontal Condition in Patients with Thrombocytopenia

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ABSTRACT

Background: Periodontitis is an infectious disease of the supporting structures of the teeth and is triggered by complex, anaerobic, gram-negative specific periodontal bacteria. Thrombocytopenia is a hematological disease associated with decrease in the platelet count in the peripheral blood. Aims and objective: To evaluate the relation between the platelet count and periodontal condition in patients with thrombocytopenia. **Methods:** A case control study was carried out in the Department of Oral Pathology, Govt. Dental College and Hospital, Srinagar. The study was divided into two groups, Group 1 and Group 2 comprising of 15 cases with thrombocytopenia and 15 cases without thrombocytopenia respectively. Both groups were examined for periodontal condition as well as blood tests was done to determine the platelet count. **Results:** In the present study, mean platelet count was higher in Group II as compared to Group I but the difference between the two groups was found to be statistically significant. The severity of periodontitis was greater in Group 1 than that of Group 2 and majority of the patients in Group 1 revealed severe periodontitis. **Conclusion:** Plaque control and motivation are of prime importance in thrombocytopenic subjects so as to prevent gingival hemorrhage and periodontal disease.

Keywords: Thrombocytopenia, Platelet count, Periodontitis.

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INTRODUCTION

Periodontal disease constitutes a substantial challenge to the patients as well as oral healthcare professionals. In periodontal infection, biofilm formation, inflammation and attachment loss occur. Periodontitis is an extensive infectious disease of the periodontium which leads to gingival inflammation and bleeding.[1,2] The main cause of periodontal diseases include a group of specific periodontal pathogens, the host's immunologic and inflammatory response to the bacteria which result in periodontal destruction.[3]

Thrombocytopenia is a hematological disease associated with decrease in the platelet count in the peripheral blood and this occur due to reduced production of platelets by megakaryocytes in the bone marrow, increased destruction of platelets in the circulation and by abnormal sequestration of platelets in the spleen, frequently leads to episodes of hemorrhages. The normal count of the platelets varies from 150,000 to 450,000/mm^3 whereas in thrombocytopenia, platelet count falls below 150,000/mm^3.[4,5] Thrombocytopenia manifests clinically as mucocutaneous petechiae, ecchymosis, and hemorrhagic blisters with spontaneous bleeding.[6]

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Platelets are small, anucleate cells that travel as resting discoid fragments in the circulation. Platelets are formed and released into the blood stream from megakaryocytes that reside in the bone marrow. They play an important role in primary hemostasis by the formation of platelet plug as they adhere, spread and aggregate at the site of vessel injury which in turn prevents the hemorrhage. Apart from these, platelets also possess non-hemostatic properties like angiogenesis, tissue repair, inflammation and metastasis of cancer.[7] Various studies have suggested that reduced platelet count might considered as a risk factor for bleeding.[8-10] For patients with thrombocytopenia, decreased platelet activation, platelet aggregation and thrombopoiesis which are reflected by the reduced presence of reticulated platelets and thus associated with bleeding phenotype.[11] The aim of the present study was to evaluate the relation between the platelet count and periodontal condition in patients with thrombocytopenia.

MATERIALS & METHODS

A case control study was carried out in the Department of Oral Pathology, Govt. Dental College and Hospital, Srinagar and the study was approved by the ethical committee. The study was divided into two groups, Group 1 and Group 2 comprising of 15 cases with thrombocytopenia and 15 cases without thrombocytopenia respectively. In Group 1, all the patients with platelet count less than 150 × 103/µl on peripheral blood film were included in our study. On the basis of platelet count, the cases were divided into four grades:[12]

Grade I- 75-150 $\times 10^3/\mu l$
Grade II- 50-75$\times 10^3/\mu l$
Grade III- 25-50 $\times 10^3/\mu l$
Grade IV- <25 $\times 10^3/\mu l$

In Group 2, all the patients with platelet count in the range of 150 × 103/µl -450 × $10^3/\mu l$ were taken in this study. Individuals with a known history of jaundice, blood/blood component transfusions or major surgery, medication, systemic diseases, any other hematological disorders were excluded from the study. Both the groups were examined for periodontal condition for all the teeth except third molars through plaque index (PI), gingival index (GI), pocket depth (PD) and clinical attachment level (CAL). PD is the distance from the gingival margin to the base of the gingival sulcus or periodontal pocket. CAL is the distance from the cementoenamel junction to the base of the sulcus or periodontal pocket. Healthy subjects displayed periodontal pocket depth <3 mm, clinical attachment loss <3 mm, with no clinical sign of gingivitis but periodontitis patients exhibited ≥ 4 mm of pocket depth and clinical attachment loss ≥3 mm in more than 30% sites assessed in the oral cavity. On the basis of severity, periodontitis were classified as mild, moderate and severe.[13]

In the present study, 3 ml of venous blood sample were collected by venipuncture method in the antecubital fossa and stored in vials containing EDTA. The platelet counts were determined by using an automated cell counter after sample collection at the hematology laboratory of this institution. The data was analysed by using statistical software (SPSS version 19.0). Mean, standard deviation and percentage were calculated for each group. A probability value (p) of ≤0.05 was considered to be statistically significance.

RESULTS

In the present study, the mean age of the patients in Group 1 and Group 2 were 51.28 years and 47.32 years respectively. Majority of the patients in Group 1 and Group 2 were males and females respectively. The mean platelet count in Group 1 and Group 2 were 58.62±5.37 ×103/µl and 236.82 ±54.32 ×103/µl respectively. The p-value was found to be statistically significant between the two groups [Table 1].

The percentage of mild, moderate and severe periodontitis in Group 1 were 6.66%, 26.66% and 66.66% respectively. In Group 2, 6.66% and 93.33% of the subjects showed mild and moderate periodontitis respectively. The severity of periodontitis was higher in Group 1 as compared to Group 2 [Table 2].

In the present study, most of the patients in Group 1 presented with Grade I (33.33%) and Grade III (33.33%) followed by Grade II (26.67%) and Grade IV (6.66%) thrombocytopenia [Table 3].

Table 1: Comparison of platelet count between two groups

Group	N	Platelet count (×103/µl) Mean ± SD	P-value
Group 1	15	58.62± 5.39	0.002
Group 2	15	236.82±54.32	

Group 1- Subjects with thrombocytopenia, Group 2- Subjects without thrombocytopenia, SD- Standard deviation.

Table 2: Severity of periodontitis in both the groups

Group	N	Severity of periodontitis		
		Mild periodontitis	Moderate Periodontitis	Severe periodontitis
Group 1	15	01 (6.66%)	04 (26.66%)	10 (66.66%)
Group 2	15	01 (6.66%)	14 (93.33%)	00 (00.00%)

Group 1- Subjects with thrombocytopenia, Group 2- Subjects without thrombocytopenia

Table 3: Severity of thrombocytopenia in Group 1

Grade	Number of cases	Percentage
Grade I (75-150 $\times 10^3/\mu l$)	05	33.33%
Grade II (50-75$\times 10^3/\mu l$)	04	26.67%
Grade III (25-50 $\times 10^3/\mu l$)	05	33.33%
Grade IV (<25 $\times 10^3/\mu l$)	01	6.67%
Total	15	100%

DISCUSSION

Periodontitis is an infectious disease of the supporting structures of the teeth and is triggered by complex, anaerobic, gram-negative specific periodontal bacteria. Periodontal destruction may occur due to the action of toxic products released from the specific pathogenic bacteria along with the host responses initiated against the periodontal bacteria and their products.[14] Thrombocytopenia occur due to either a decreased production of platelets or suppression of the normal blood cells, frequently leads to episodes of hemorrhages.[15] The present study determined the relation between the platelet count and periodontal condition in patients with thrombocytopenia.

In the present study, mean platelet count was higher in Group II as compared to Group I but the difference between the two groups was found to be statistically significant. These results were similar to the case report done by Sangwan et al in 2013. The severity of periodontitis was greater in Group 1 than that of Group 2 and majority of the patients in Group 1 revealed severe periodontitis. In the current study, majority of the patients in Group 1 presented with Grade I and Grade III followed by Grade II and Grade IV thrombocytopenia.

Various studies have revealed that the mean platelet count in subjects with chronic periodontitis was higher as compared to the healthy group but the difference between the two groups was found to be

statistically non-significant.[16,17] However, a study carried out by Gomes et al in 2015 determined that platelet count did not have direct influence on the gingivitis and degree of immune thrombocytopenic purpura, as well as did not have direct relation to the severity of periodontal attachment loss.[18]

Platelets are essential for primary hemostasis and endothelial repair, but also play a key role in atherogenesis and thrombus formation. In thrombocytopenia, reduced platelet count, platelet activation and platelet aggregation are associated with bleeding risk. Patients with thrombocytopenia lack effective oral hygiene due to increased risk of bleeding as these subjects might have higher incidence of periodontal condition.

CONCLUSION

The present study showed that the decrease in the platelet was related to the severe periodontitis in patients with thrombocytopenia. Gingival health is of great importance in these patients as they are more prone to gingival bleeding. Plaque control and motivation are of prime importance in thrombocytopenic subjects so as to prevent gingival hemorrhage and periodontal disease.

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