Original Article

Association between Anemia and Periodontitis- A Case Control Study

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ABSTRACT

Objective: The purpose of this study was to compare frequency of anemia and blood indices in patients with and without chronic periodontitis.

Study Design: Case control study

Place and Duration of Study: This study was conducted at the department of periodontology Khyber college of Dentistry Peshawar Pakistan from January 2020 to October 2020 from a period of 10 months.

Materials and Methods: This case control study was done on 100 participants (50 cases and 50 controls). The inclusion criteria were Pakistani nationals, both genders, age range from 30 to 60 years, having more 16 teeth in the mouth and systemically healthy subjects. The participants were categorized into two groups; cases and controls. Cases were those who had periodontitis while controls were healthy subjects. The collected data were age, gender, presence of chronic periodontitis, and blood parameters. Data analysis was done in STATA 14. Chi-square test and Independent t test was used to compare categorical and continuous variables between cases and controls respectively.

Results: The mean age was 42.51±10.314 years. The males were 54(54%) and females were 46(46%). There was positive and statistically significant association between anemia and chronic periodontitis (P=0.009). Among cases the frequency of anemia was higher (n=14, 28%) than control (n=4, 8%). All the blood parameters had lesser mean values in cases than controls statistically (P<0.05).

Conclusion: There is statistically significant and positive association between anemia and chronic periodontitis. The blood parameters are low in patients with chronic periodontitis than healthy subjects.

Key Words: Anemia, chronic periodontitis, Hemoglobin, blood indices, periodontal pocket

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INTRODUCTION

The term periodontitis is used for chronic inflammation of tooth supporting structure and loss of attachment apparatus leading to either increased sulcus depth or root exposure.(1) The common pathogens involved in chronic periodontitis are gram-negative anaerobic bacteria. Although periodontitis is localized infection but it have enormous systemic effects on human beings.(2, 3)

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The epithelium presents in periodontal sulcus play the role of protective barrier and inhibits the entrance of bacteria and other sort of irritants to the circulatory system.(4) The adverse interaction between host and pathogen in the presence of periodontitis results in ulceration of junctional epithelium.(5) This ulcerated epithelium provides a portal for bacterial entrance into blood resulting in bacteremia. Bacteremia has direct relation with severity of periodontitis.(6) In turn the host response culminates in the activation of tumor necrosis factor-α, interleukin-6 and C-reactive proteins. These activated mediators depress the process of erythropoietin production and ultimately lead to anemia.(1) Chronic anemia is most common type of anemia and has association with many diseases.(7),(8)

In literature many studies have been reported on association of anemia and chronic periodontitis. No association was found between anemia and periodontitis by Gayatri et al.(9) On other hand two other studies reported significant association between anemia and chronic periodontitis.(10, 11)

In recent times interest have been raised regarding the two-way relationships of anemia and chronic periodontitis. There is conflict in studies already done on association of chronic periodontitis and anemia.

There is lack of literature on our local population. This case control study will to help to determine whether real positive association exists between these two conditions in our patients or not.

This study was aimed to compare frequency of anemia and blood indices in patients with and without chronic periodontitis.

MATERIALS AND METHODS

This case control study was conducted at department of Periodontology, Khyber College of Dentistry Peshawar from January 2020 to October 2020 on 100 participants (50 cases and 50 controls). The sampling technique was non-probability consecutive. Verbal informed consent was taken from all participants after detailed explanation about the study.

The inclusion criteria were Pakistani nationals (on basis of NIC), both genders, age ranging from 30 to 60 years, having more than 16 teeth in the mouth and systemically healthy subjects. Participants having hypertension, diabetes, malignancy or any sort of chronic pathology except for chronic periodontitis were excluded from this study.

The included participants were categorized into two groups; group I contain cases and group II had controls. Cases were those participants who had chronic periodontitis while controls were healthy subjects with no sign of gingivitis or periodontitis. Chronic periodontitis was labeled as positive when the loss of attachment of tooth or teeth manifested as increased pocket depth (>3mm) or gingival recession.

The collected data were age, gender, presence of chronic periodontitis, and blood parameters. Venous blood was obtained from each participant in pathology laboratory of Khyber College of Dentistry by specialized nurse. The recorded blood parameters were hemoglobin (Hb), red blood cell count, mean corpuscular hemoglobin (MCH) mean corpuscular volume (MCV), MCH concentration (MCHC) by automated hematologic analyzer machine. Anemia was labeled as positive as per WHO definition <12.0 g/dL in women and <13.0 g/dL in men.

The data analysis was done in STATA 14. Continuous variables were computed as mean and SD while frequencies were calculated for categorical. Chi-square test was applied for association of anemia between cases and controls. Independent t test was used to compare continuous variables (blood parameter) between cases and controls. P≤0.05 was significant level.

RESULTS

The mean age of the study was 42.51±10.314 years with range from 20 to 58 years. The males were 54(54%) and females were 46(46%). The most common age group was 41 to 50 years (n=35, 35%) followed by 51 to 60 years (n=26, 26%). The details are given in Fig 1.

There was positive and statistically significant association between anemia and chronic periodontitis in overall sample (P=0.009) and in both males (P=0.043) and females (P=0.045). For overall sample among cases (chronic periodontitis) the frequency of anemia was higher (n=14, 28%) than controls (n=4, 8%). Similar results were found for both males and females. The details are given in table 1.

There was no statistically significant difference in age between cases and controls (P=0.321). All the blood parameters had lesser mean values in cases than controls statistically (P<0.05). The mean hemoglobin was 13.26±0.77 g/dl in cases and 13.76±0.77 g/dl in controls and the difference was statistically significant (P=0.002). Rest of detail is shown in table 2.

DISCUSSION

This case control study was conducted to determine the association of anemia and chronic periodontitis. Our findings showed that there was positive and statistically significant association between anemia and chronic periodontitis in overall sample (P=0.009) and in both males (P=0.043) and females (P=0.045).

Anemia is quantitative or qualitative reduction in number of red blood cells. In quantitate the actual numbers of RBCs are reduced while in qualitative the hemoglobin level is reduced.[12] Blood indices like mean corpuscular volume, mean corpuscular hemoglobin (MCH), and MCH concentration are used to further classify anemia.[13]

The real pathogenesis of chronic periodontitis in the causation of anemia is not clear. The chronic periodontitis is though localized infection of the periodontium but it has systemic effects. During periodontitis sulcular epithelial barrier breakdown and bacteria from oral cavity enter the blood stream results in bacteremia. The bacteria released interleukin-1, tumor necrosis factor, and C-reactive protein. These mediators in turn suppress erythropoiesis and cause anemia.[1]

In literature two way relationships between anemia and chronic periodontitis have been reported. One school thought is that anemia is the cause of chronic periodontitis[14] while other have reverse concept.[10]

Our study showed positive association between anemia and chronic periodontitis. Diversity exist in literature, few studies showed no association between anemia and chronic periodontitis [9] while most of the studies revealed positive association between these two conditions. [10, 11, 15]

Our findings showed that all blood indices like RBC count, mean corpuscular volume, mean corpuscular hemoglobin (MCH), and MCH concentration were low in participants with periodontitis than healthy subjects. Parihar et al.[15] conducted a case control study on

Indian population on 80 patients (40 were cases and 40 were controls) on association of anemia and chronic periodontitis. Their results showed that all these blood indices were low in cases than control statistically. These results are in consistent with our study.

CONCLUSION

There is statistically significant and positive associations exist between anemia and chronic periodontitis. The blood parameters are low in patients with chronic periodontitis than healthy subjects.

Author's Contribution:

Concept & Design of Study:	Muhammad Jamil
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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