How to Cite:
Khan, M. A., Asghar, H., Kashir, M., Malik, A. A., Baig, H. W., & Khurshid, H. M. S. (2023). The prevalence of periodontitis in patients with rheumatoid arthritis: A cross-sectional analytical study in population of Pakistan. *International Journal of Health Sciences*, *7*(S1), 468–474. https://doi.org/10.53730/ijhs.v7nS1.14226

The prevalence of periodontitis in patients with rheumatoid arthritis: A cross-sectional analytical study in population of Pakistan

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Abstract---Background and Aim: Rheumatoid arthritis (RA) patients are more susceptible to the initiation of severe periodontitis which can ultimately intensify their systemic inflammation associated with RA. The present study aimed to determine the incidence of periodontitis in rheumatoid arthritis patients. Materials and Methodology: A cross-sectional analytical study was carried out on 168 rheumatoid arthritis patients in the Department of Dentistry and Internal Medicine of a Tertiary Care Hospital of Lahore, Pakistan from January 2022 to December 2022. All the patients were inquired about their

demographic details, medical history and smoking habits. A detailed periodontal examination of full mouth was done and plaque index, clinical attachment level (CAL) and probing pocket depth (PPD) was measured. Rheumatoid factor (RF)'s presence, number of tender and swollen joints, erythrocyte sedimentation rate (ESR); Disease Activity Index (DAS) and hand radiographs were the different RA parameters which were recorded. Periodontal conditions were then associated and correlated with RA parameters. Results: Out of the total 168 RA patients, there were 142 (84.5%) females and 26 (15.5%) male patients. The overall mean age was 48.6 ± 8.64 years. The overall mean DAS score and disease duration was 4.58 ± 1.32 and 9.58 ± 6.8 years respectively. Out of all the cases, there were 134 (79.8%) RF positive cases. The incidence of severe and moderate periodontitis was 58% and 41% respectively. The severity of periodontal disease was considerably related with a higher plaque score, male gender, current smoking status to be positive and a higher age. Conclusion: The present study found that a higher prevalence of periodontitis was found in RA patients. Increased age, smoking history, male gender and a higher plaque score were significantly related to the severity of the periodontal disease.

Keywords---rheumatoid arthritis, periodontitis, prevalence, inflammation, plaque score.

Introduction

Periodontal disease is an asymptomatic infectious condition caused by bacteria, primarily Gram-negative anaerobic bacteria found in the dental biofilm which is present on the tooth root's surface. The chronic inflammation caused by accumulation of long-term plaque can result in the destruction of periodontal ligament attachment and that of the adjacent alveolar bone as well [1]. Various systemic diseases and conditions such as rheumatoid arthritis, stroke, pre-term low birth weight, myocardial infarction, diabetes and coronary heart disease have been associated with the periodontal disease [2-6]. Rheumatoid arthritis (RA) is an inflammatory disease affecting various organs and is related to bone, joints and connective tissue destruction primarily. Additionally, it has been shown that RA and periodontitis demonstrate the critical imbalance between anti-inflammatory and pro-inflammatory cytokines that ultimately leads to tissue damage [7].

RA's bi-directional association with periodontitis might affect the pathogenesis of RA itself as well [8, 9]. The heredity associated characteristics are responsible for both diseases' occurrence due to inflammatory processes' dysregulation involved in them. RA's pathogenesis might be affected by periodontitis, bacterial antigens, serum immunoglobulins, inflammatory mediator's presence and bacteremia [10]. Any motor disability in an individual may render achieving their appropriate oral hygiene more difficult or troublesome. In some patients, a decreased salivary flow owing to any medication or as a consequence of any auto immune disorder such as Sjögren syndrome may enhance supra-gingival plaque accumulation [11].

Psychological changes seen in RA patients have been proposed to be a potent risk factor for periodontitis' initiation in them [12]. Another pilot study linked periodontitis to RA as well [13]. It has been observed that periodontitis' treatment leads to a reduction in RA disease activity, which might be attributed to the periodontitis-associated inflammatory load reduction. Periodontitis causes systemic inflammation as indicated by elevated levels of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) in RA patients with periodontitis [14]. The severity of RA disease is significantly affected by the systemic inflammation caused by periodontitis [15].

Methodology

A cross-sectional analytical study was carried out on 168 rheumatoid arthritis patients in the Department of Dentistry and Internal Medicine of a Tertiary Care Hospital of Lahore, Pakistan from January 2022 to December 2022. The sample size was calculated based on the following criteria: 95% confidence interval and 5% margin of error and it ultimately came out to be 168. All the patients were provided with an informed consent Performa which they read thoroughly and gave its approval in written form. Pregnant women and individuals with a prior history of any systemic disorder which causes periodontitis such as any malignancy, diabetes, renal disease and hypertension were excluded from the study. Furthermore, patients who had taken antibiotics in the prior three months were eliminated from the selection criteria as well. All the patients were inquired about their demographic details, medical history, oral hygiene maintenance routine and smoking habits. A detailed periodontal examination of full mouth was done and plaque index, clinical attachment level (CAL) and probing pocket depth (PPD) was measured. Rheumatoid factor (RF)'s presence, number of tender and swollen joints, erythrocyte sedimentation rate (ESR); Disease Activity Index (DAS) and hand radiographs were the different RA parameters which were recorded. Periodontal conditions were then associated and correlated with RA parameters. Statistical Package for Social Sciences (SPSS) version 27.0 was used for the statistical analysis. The statistical significance threshold was set at 0.05. The continuous variables were described as means and standard deviations (SD) and the categorical variables as frequency distributions or percentages.

Results

Out of the total 168 RA patients, there were 142 (84.5%) females and 26 (15.5%) male patients. The overall mean age was 48.6 ± 8.64 years. The overall mean DAS score and disease duration was 4.58 ± 1.32 and 9.58 ± 6.8 years respectively. Out of all the cases, there were 134 (79.8%) RF positive cases. The incidence of severe and moderate periodontitis was 58% and 41% respectively. The severity of periodontal disease was considerably related with a higher plaque score, male gender, current smoking status to be positive and a higher age. Table-I represents the demographic details of all the study participants. Periodontal parameters' status of all the cases is shown in Table-II. Table-III represents the RA status of the patients. Usage of medications such as Methotrexate, Diclofenac and disease-modifying anti-rheumatic drugs (DMARDs) is shown in Table-IV.

Table I
Demographic details of the study participants

Parameters	Variables (mean ± SD)
Age (years)	48.6 ± 8.64
Gender (n) (%) Male Female	 26 (15.5) 142 (84.5)
RF Positive cases (n) (%)	134 (79.8)
Smoking status (n) (%) Non-smokers Smokers	 133 (79.2) 35 (20.8)

Table II
Periodontal parameters' status of all the cases

Parameters	Value (mean ± SD)
Remaining teeth	24.92 ± 2.32
Probing pocket depth (mm)	2.69 ± 0.54
Clinical attachment level (mm)	3.42 ± 0.89
Plaque Index	1.19 ± 0.49

Table III
RA status of the patients

Parameters	Value (mean ± SD)
Duration (years)	9.58 ± 6.8
DAS score	4.58 ± 1.32
ESR (mm/h)	44.82 ± 22.72
Upper extremity HAQ score	0.72 ± 0.69
Mean joint erosion score	35.42 ± 9.39
Mean joint space narrowing score	38.88 ± 22.86
Total joint erosion and joint space narrowing	75.32 ± 50.72
Xerostomia (n) (%)	22 (13.1)

Table IV
Usage of medications for RA

Medications	(n) (%)
Methotrexate	136 (80.9)
Prednisolone	94 (56)
Diclofenac	72 (42.9)
Mono-DMARDs	86 (51.2)
Combined DMARDs	64 (38.1)

Discussion

The present study mainly focused on the incidence of periodontitis in rheumatoid arthritis patients and found that a higher age, smoking history, male gender and

a higher plaque score were significantly related with the periodontal disease severity. Diabetes mellitus and a chronic smoking habit were readily considered as viable risk factors for periodontitis. This is comparable to a previous study as well [16]. It is critical to emphasize that some confounding variables cannot be avoided while evaluating the periodontal status of RA patients due to the fact that RA and its medical therapy have an impact on several organ systems. The higher incidence of periodontitis is observed in RA disease and this is supported by numerous studies as per the literature search [17, 18].

Aagaard et al. discovered that a higher level of DAS leads to severe periodontitis initiation in patients with an already existing minimum to moderate periodontitis [19]. The criterion used to define the periodontal disease is an essential aspect that might influence the prevalence of periodontitis. Ao M et al. revealed that active RA patients had a 173% overall rise in their CAL [20]. In another study, it was found that oral hygiene was a substantial risk factor for periodontitis occurrence [21]. In this regard, Xiao et al reported that periodontitis development is partially caused by a bad oral hygiene among RA patients [22]. DMARDs and NSAIDs are the pharmacological agents which might interfere with the progression of periodontitis [23, 24]. The majority of RA patients had taken these medications and was considered as the main reason for periodontitis and RA association. The current information indicates that the severity of the periodontal disease varies greatly across ethnic varieties of patients as well as between different tooth types and also locations within each tooth [25]. It has been shown in research that the periodontal disease and dental caries are the two prime tooth loss leading causes in the general population [26].

Conclusion

The present study found that a higher incidence of periodontitis was found in RA patients. Higher age, smoking history, male gender and a higher plaque score were significantly associated with the periodontal disease severity.

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