

Section **Dentistry**

**Original** Article

# Association Between Rheumatoid Arthritis and Chronic Periodontitis in Adults: A Hospital Based Study

**Rakesh Garg**

Senior Resident, Department of Dentistry, S. P. Medical College, Bikaner, Rajasthan, India.

## ABSTRACT

**Background:** The chronic inflammation of periodontal disease (PD) with the constant release of inflammatory mediators may be a risk factor for the development of systemic inflammatory disease. Hence, development of both diseases brings considerable consequences for public health and for the quality of life of affected individuals. To test whether a relationship exist between Periodontitis and RA, this study is being conducted.

**Methods:** This is hospital based case control study, a total of 100 subjects between the ages 20-70 years were included in the study. Group A: includes selection of 50 patients diagnosed RA by the Rheumatologist, Group B: 50 general patients without rheumatoid arthritis. All participants underwent a full-mouth periodontal examination on six sites per tooth assessing probing depth (PD) and clinical attachment loss (AL). **Results:** The prevalence of periodontitis was 78% and 42% for RA and control group. Thus, the present study reported that more severe form of periodontitis existed in rheumatoid arthritis patients. These results indicated

that the prevalence of mild to moderate periodontitis was seen in control group. **Conclusions:** persons who are suffering from RA are also very likely to suffer from moderate to severe periodontitis. Our finding suggests large population-based studies will be needed to define the role of periodontitis in RA disease susceptibility. However, our findings suggest greater attention to periodontal care among the RA patients.

**Key words:** Rheumatoid Arthritis, Periodontitis, Clinical Attachment Loss, Inflammation.

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### Corresponding Author

**Dr. Rakesh Garg**, Senior Resident, Department of Dentistry, S. P. Medical College, Bikaner, Rajasthan, India.

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## INTRODUCTION

Periodontitis and rheumatoid arthritis (RA) are two common chronic inflammatory diseases sharing a similar host-mediated pathogenesis.<sup>[1]</sup> Periodontitis is characterized by soft and hard tissue destruction around teeth, ultimately leading to tooth loss<sup>[2]</sup>, while RA is characterized by destruction of cartilage and bone in the joints, mediated by similar bone-resorptive cytokines and proteinases.<sup>[1,3]</sup> Both diseases lead to significant morbidity, with periodontitis ultimately leading to tooth loss and loss of masticatory

function, and RA leading to loss of joint function and loss of mobility.

Growth of scientific evidence suggests an exquisite association between oral infection and systemic diseases. Thought etiologies of periodontitis and rheumatoid arthritis (RA) are separate, their underlying pathological processes are sufficient to warrant consideration of hypothesis that individual at risk of developing RA may also be at the risk of developing periodontitis and vice versa.<sup>[4]</sup>

The chronic inflammation of periodontal disease (PD) with the constant release of inflammatory mediators may be a risk factor for the development of systemic inflammatory disease.<sup>[5]</sup> It is well known, backed up by a considerable body of evidence, that there are associations between PD and diabetes mellitus, cardiovascular disease, respiratory

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disease, obesity and some alterations during pregnancy.<sup>[6]</sup> Furthermore, there is considered to be a relationship between PD and Rheumatoid Arthritis.

The human mouth is the second largest bacterial community of the body, after the lower gastrointestinal tract. Scientists have identified over 700 oral cavity bacterial species.<sup>[7]</sup> The oral microbiota is involved in the etiology of PD, and it may be a contributory factor in the etiopathogenesis of some chronic inflammatory diseases, such as RA.<sup>[6]</sup> Periodontal pathogens can enter the systematic circulation as a result of bacteremia after brushing the teeth, chewing, and after dental treatment.<sup>[8]</sup> Several studies suggested that a higher prevalence of severe periodontitis and tooth loss caused by PD correlates with RA activity. Is it now generally accepted that chronic periodontitis is initiated by the colonisation of dental plaque by several pathogenic bacteria: *Porphyromonas gingivalis*, *Prevotella intermedia*, *Treponema denticola* and *Tannerella forsythia*.<sup>[9]</sup> The DNA of these bacteria has been detected in the synovial fluid of patients with RA.<sup>[10]</sup> The *Porphyromonas gingivalis*, the most common pathogen of PD, is of particular interest in RA because it has the capacity to produce and secrete peptidylarginine deiminase (PAD), an enzyme responsible for the citrullination of endogenous peptides, human  $\alpha$ -enolase peptides and fibrinogen.<sup>[11]</sup> Therefore, PAD is the major candidate for explaining the possibility that PD is an etiogenic factor for AR.<sup>[12]</sup> In light of these reports, there is a need for further investigations to determine whether the severity of RA and the severity of periodontitis are interrelated. Hence, development of both diseases brings considerable consequences for public health and for the quality of life of affected individuals. To test whether a relationship exist between Periodontitis and RA, this study is being conducted.

## METHODS

This is hospital based case control study, a total of 100 subjects between the ages 20-70 years were included in the study.

### Inclusion criteria

1. Patients (20-70 years old) diagnosed with RA with consideration of the disease duration
2. Willingness of the patient to participate in the study
3. Only partially (at least 8 teeth excluding third molar) or fully dentate patients were included in the study.

### Exclusion criteria

1. Subjects having no other systemic disease.
2. Subjects taking no medications (Antihypertensive, Anticonvulsants, Immunosuppressants, Hormonal replacement Therapy, NSAIDs) to affect the periodontium
3. No tobacco habit (heavy smoker)
4. No dental treatment during last 3 months prior to examination
5. Pregnancy
6. Lactating mothers

## Study Design

Group A: includes selection of 50 patients diagnosed RA by the Rheumatologist.

Group B: 50 general patients without rheumatoid arthritis.

### Oral examination

All participants underwent a full-mouth periodontal examination on six sites per tooth assessing probing depth (PD) and clinical attachment loss (AL). All permanent fully erupted teeth were examined with a manual periodontal color-coded standard probe with Williams markings. Measurements were made in millimeters and were rounded to the nearest whole millimeter. Based on clinical examination the patients were put under three categories that is slight, moderate and severe periodontitis. The disease severity was assessed on the basis of clinical attachment loss as following slight: 1 to 2mm, moderate: 3 to 4mm or severe:  $\geq 5$ mm.<sup>[13]</sup>

## RESULTS

Out of 50 patients enrolled for rheumatoid arthritis group, 32 were female and 18 were males whereas in control group 36 females and 14 males were present. The prevalence of periodontitis was 78% and 42% for RA and control group respectively shown in Table 1. The difference found in the prevalence in both groups was statistically significant indicating that patients with rheumatoid arthritis were more likely ( $p < 0.05$ ) to have periodontitis than the control group.

Out of 39 patients with chronic periodontitis in rheumatoid arthritis group, 27 patients had severe periodontitis, 10 patients had moderate periodontitis and only 2 patients had slight periodontitis. Therefore, the percentage of prevalence of slight moderate and severe periodontitis in rheumatoid arthritis was 5.12%, 25.64% and 69.23% respectively (Graph 2). Thus, the present study reported that more severe form of periodontitis existed in rheumatoid arthritis patients. Out of 21 chronic periodontitis patients in the control group, 5 patients had slight periodontitis, 14 patients had moderate periodontitis and 2 patients had severe form of periodontitis. The percentage of prevalence of slight, moderate and severe periodontitis was 23.80%, 66.66% and 9.52% respectively (Table 2). These results indicated that the prevalence of mild to moderate periodontitis was seen in control group.

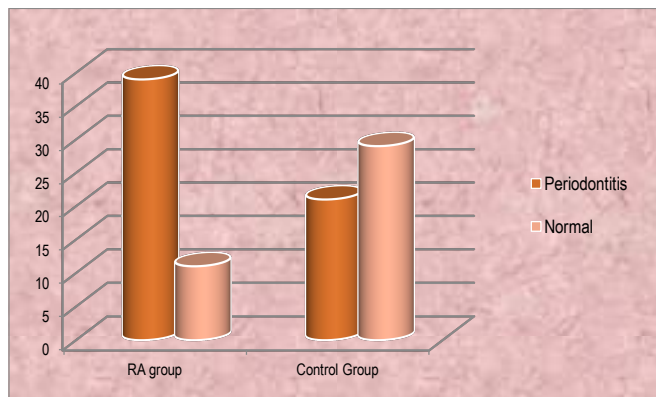
## DISCUSSION

It is generally accepted that the prevalence of advanced periodontitis in human populations ranges between 5–15%.<sup>[14]</sup> The present study highlights the prevalence of periodontitis is significantly elevated in individuals suffering from rheumatoid arthritis compared to general population (control group). These findings are based on the data obtained through clinical examination reliable enough to be used in epidemiological and clinical studies.<sup>[15-17]</sup> Such an approach is valid for a pilot study before moving to more elaborate and larger scale studies. The study reported that 78% of rheumatoid arthritis patients suffered from periodontitis whereas only 42% of the general population (control group) suffered from periodontitis. In rheumatoid

arthritis group 27 patients had severe form of periodontitis. In control group slight to moderate periodontitis was much more prevalent with 5 patients of slight and 14 patients of moderate periodontitis.

**Table 1: Shows number of patients with periodontitis between the rheumatoid arthritis (RA) and control group.**

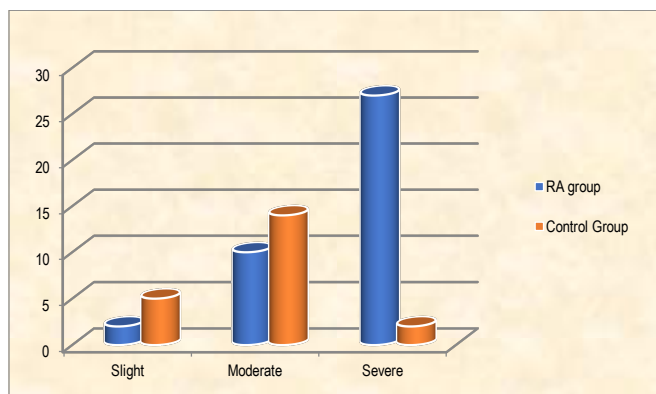
Disease	RA group	Control Group	P-value
Periodontitis	39	21	<0.05**
Normal	11	29	
Total	50	50	



**Graph 1: Shows number of patients with periodontitis between the rheumatoid arthritis (RA) and control group.**

**Table 2: Shows number of patients with different form of periodontitis between the rheumatoid arthritis (RA) and control group.**

Periodontitis	RA group	Control Group	Total
Slight	2	5	7
Moderate	10	14	24
Severe	27	2	29



**Graph 2: Shows number of patients with different form of periodontitis between the rheumatoid arthritis (RA) and control group.**

The present study showed high prevalence of severe form of periodontitis in rheumatoid arthritis patients which is in accordance with the various studies reported by Mercado FR et al (2000, 2001, 2003); Bartold PM (2005), Pischon N et al

(2008), Dissick A (2010) and Susanto H (2013).<sup>[18-22]</sup> Indeed, there are remarkable similarities in the pathogenesis of these two conditions at both the cellular and molecular level despite of their differing aetiology.<sup>[22-24]</sup>

Oral hygiene may be impaired in these patients, making them susceptible to plaque accumulation and, consequently, inflammatory periodontal disease.<sup>[25]</sup> In both diseases progression consists of continuing presence of high levels of proinflammatory cytokines. Furthermore, low level of tissue inhibitor of matrix metalloproteinases (TIMP) and high levels of matrix metalloproteinases (MMP) and PGE2 secreted by macrophages, fibroblast and other resident and migrating inflammatory cells characterize the active stage of both diseases. Previous studies have reported contradicting findings on the relationship between rheumatoid arthritis and periodontitis.<sup>[26]</sup> However in light of variability in both RA and periodontitis classification, it is difficult to compare these results. More recently it has been reported that patients with periodontitis are 4 times more likely to have self-reported history of rheumatoid arthritis. The relationship between rheumatoid arthritis (RA) and the progression of inflammatory conditions elsewhere in the body, such as periodontitis, is controversial. While a number of studies have presented conflicting results regarding a relationship between periodontitis and RA, there has been recent reports, suggesting a significant association between these two-common chronic inflammatory conditions.<sup>[18]</sup>

## CONCLUSION

Persons who are suffering from RA are also very likely to suffer from moderate to severe periodontitis. Our finding suggests large population-based studies will be needed to define the role of periodontitis in RA disease susceptibility. However, our findings suggest greater attention to periodontal care among the RA patients.

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