

## Association between Rheumatoid Arthritis and Moderate to Severe Periodontitis in Iranian Adults

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### Abstract:

**Objective:** Periodontal diseases are common in the society and some researchers suggested an association between rheumatoid arthritis (RA) and periodontal diseases. The present study was carried out to evaluate the so-called association in Iranian adults.

**Materials and Methods:** In this case-control study, the samples were recruited from patients referred to Loghman Hospital, Tehran, during 2004-2005. Fifty patients with RA aging 27-50 with no other systemic diseases were matched for sex, age, smoking, and oral hygiene status with healthy control samples. The drugs affecting periodontium status were excluded from the study. Clinical attachment loss (CAL) index was measured by a scaled Williams periodontal probe in both groups at four surfaces, and the type of periodontitis was determined. Chi-square, Mann-Whitney U, and t-student tests served for statistical analyses.

**Results:** In RA group, 30 patients (60%) had moderate to severe periodontitis while in control group the condition was detected among eight patients (16%). Significant difference existed between the two groups in terms of periodontitis stage ( $P < 0.001$ ). Median of the CAL scores was 4.5 mm and 0 mm in RA and control patients, respectively, with significant difference ( $P < 0.001$ ).

**Conclusion:** The results suggest higher potentiality for moderate to severe periodontitis involvement among RA patients, possibly due to similar nature of the two diseases. Periodontal assessment of RA patients is necessary for early diagnosis and consequent treatment.

**Key Words:** Periodontal Diseases; Arthritis, Rheumatoid; Periodontal Attachment Loss

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### INTRODUCTION

Periodontitis is an infection initiated by microbial plaque and the condition is characterized by both connective tissue and alveolar bone destruction due to a chronic inflammation. Rheumatoid arthritis (RA), a chronic multi-system disease, is also associated with joint connective tissue and bone destruction [1]. It seems that a similar immunological response

exists in periodontal disease (PD) and RA since the increase of some cytokines' level in both the diseases has been observed in some reports [2], although some others have denied the so-called increase [3].

Exacerbation of PD, alveolar bone loss and tooth loss has been shown in RA patients in some investigations [4]. Kässer et al [5] in a study on 50 patients to determine the associa-

tion between RA and PD reported the patients with long-term RA involvement to demonstrate apparent PD and tooth loss. RA patients had higher stages of gingival inflammation when compared to controls: probing depth increased 26%, CAL 173%, and number of lost teeth 29% in RA samples. A significant difference was found between RA patients and control ones in terms of plaque index (PI) and gingival inflammation index [5]. These results were considered as a result of hands deficiency to achieve good oral hygiene among RA patients, as well as the possible intervention of anti-inflammatory drugs used for RA treatment [5]. In a study by Mercado et al [6] on 65 patients, a health assessment questionnaire was completed and radiographic and periodontal examinations were done for both RA and control patients. The results suggested similarity of two groups in terms of plaque covered and bleeding areas. Swelled muscles and HAQ showed significant associations with PD infection. Mercado et al [7] in a cohort study on 1412 patients reported that 62.5% of the RA patients demonstrated progressive destructions in periodontal tissues while the rate was 43.8% in non-RA patients [7]. Prevalence of moderate to severe bone loss was found to be 44.5% in RA group and 0.1% in general group. The higher possibility of moderate to severe form of bone loss in RA patients was concluded [7]. Miranda et al [2] showed significant increase in IL-1 beta and IL-18 serum levels which was measured by ELISA technique in RA group. No significant difference existed between the two diseases in terms of elastase enzyme and IL-1 beta level of gingival fluid. Attachment

loss in RA patients might be due to systemic inflammatory responses and immunological mechanisms that induce the infection of PDs [2]. The use of corticosteroids and NSAIDs in RA patients possibly reduces gingival inflammation severity.

In the study of Miranda et al [8], the mean areas with a 4 mm probing depth and higher was 4.7 in juvenile idiopathic arthritis patients (JIA) and 1.7 in control group ( $P=0.01$ ), and the mean areas with clinical attachment loss (CAL)  $\geq 2$  mm was 1.4 and 0.2 respectively ( $P=0.02$ ). JIA patients had higher stages of periodontal attachment loss while plaque scores were similar in the two groups [8]. On the other hand, some studies have reported no significant correlation between RA and adult periodontitis [3,9].

The present study was carried out to investigate the association between RA and moderate to severe PD in Iranian adults.

## MATERIALS AND METHODS

In this case-control study, RA patients referred to or hospitalized in Rheumatology Clinic of Loghman Hospital, Tehran during February 2004 to May 2005 were considered as case group. Control group samples were selected from ENT clinic in Loghman hospital. The patients were selected by simple non-randomized sampling method. With regard to previous studies reporting that 90% of RA patients demonstrated moderate to severe periodontitis [7], and that 55% of 35-44 years old Iranian people had pocket depth of 4 mm or higher [10], and with considering  $\alpha=0.05$ , sample size was estimated to be 50 cases in

**Table 1.** Different stages of periodontitis in RA patients (n=50) and control group (n=50)

Group	No periodontitis		Stage of Periodontitis					
			Slight		Moderate		Severe	
	n	%	n	%	n	%	n	%
<b>RA group</b>	18	36	2	4	20	40	10	20
<b>Control group</b>	30	60	12	24	7	14	1	2

RA=Rheumatoid arthritis

each group. William's periodontal probe, dental mirror, and disclosing tablet were used to do the examinations.

The case samples were diagnosed as RA patients according to American College for Rheumatology (ACR) criteria [4]. Those with less than 20 teeth, systemic diseases like diabetes, heart diseases especially bacterial endocarditis, blood diseases, history of chemotherapy or radiotherapy, as well as pregnant women, users of drugs influencing periodontal tissue (Phenytoin, Cyclosporine, Nifedipine, and oral anti-pregnancy tablets) or antibiotics during the last two weeks were excluded from the study. The patients in two groups were matched for age, gender, smoking, and oral hygiene index. As no smoking case was found in RA patients, no smoking case entered the control group.

The participants were informed completely about the study aspects, and agreed to participate. PI was calculated by using disclosing tablets. CAL index was measured by a scaled Williams periodontal probe in both groups at four surfaces of mesial, mid-buccal, distal and palatal/lingual. The highest score of CAL index in each sextant was recorded. The type of periodontitis was determined based on the mean of highest CAL index. CAL between 3-5 mm was moderate periodontitis and 5 mm or more was severe. The overall CAL scores of all sextants also were calculated.

The obtained data was analyzed with SPSS version 13.0 software. Chi-square and Mann-Whitney U tests served for qualitative and ranked variables analyses. Age and PI were compared using student t-test due to normal distribution of these variables in both groups.

Mann-Whitney U test was used to compare CAL index in the two groups because the index was not normally distributed. The type I error of 0.05 was employed for the study.

## RESULTS

Case group comprised 23 males (46%) and 27 females (54%) and control group comprised 24 males (48%) and 26 females (56%). Chi-square test revealed no significant difference in terms of gender between the two groups. The difference in mean age of the subjects between the two groups was also insignificant according to Student t test (mean of 38.7 in RA and 37.7 in control patients). The mean PI was 38.0% (median: 36.0%, range: 0%-76%) in RA patients and 37.7% (median: 38.0%, range: 0%-72%) in controls. The slight existing difference was not significant as Student t test showed.

Table 1 presents the data on periodontitis among the samples. The recorded frequency of the disease was significantly different between the two groups according to Chi-square test ( $P < 0.001$ ): in RA group, 30 patients (60%) had moderate to severe periodontitis while in control group, eight patients (16%) had moderate to severe periodontitis.

As it can be seen in Table 2, Mann-Whitney U test showed higher scores of periodontitis in RA patients compared to control group. In addition, the CAL index median was 4.5 mm (range: 0-19 mm) and 0 mm (range: 0-6 mm) in RA and control patients, respectively. This difference was also significant. The unadjusted odds ratio for moderate to severe PD involvement was 7.9 in RA patients as achieved by the present study.

**Table 2.** Periodontitis and clinical attachment loss (CAL) scores in RA patients (n=50) and control group (n=50).

Score	Mean rank		Z	P value*
	in RA Patients	in Control Group		
Periodontitis Score	60.44	40.56	3.682	0.001
CAL Score	61.14	39.86	3.894	0.001

\* Mann-Whitney U test served for statistical analysis, RA=Rheumatoid arthritis

## DISCUSSION

The present study compared periodontal status of RA patients with control group. The results showed RA patients demonstrated higher scores of periodontitis than control group as measured by CAL index.

The frequency of moderate to severe periodontitis in control group was 16% in the present study. This finding is similar to the reports of American Academy of Periodontology reporting 5%-15% prevalence for advanced PD in general population [7].

The unadjusted odds ratio for moderate to severe PD involvement was 7.9 in RA patients as achieved by the present study. Other studies have reported different risk ratios as different methods and techniques have been used [6].

In the present study, PI, which was measured as a reflection of overall oral hygiene status of the patients, was similar in the two groups. This finding shows that the difference observed in terms of PD between the two groups was not due to oral hygiene. Moreover, none of the participants was a smoker. All these information suggest possible roles for other influencing factors. Similar nature of PD and RA has been mentioned by Pischon et al [11] and Scardina and Messina [12]. They suggested an association between RA and progressive periodontitis. Moreover, Mercado et al [6] reported the increase of ESR in both diseases and there was an association between ESR level and PD severity. Some studies have stressed the correlation between CRP and the mentioned diseases [13,14], while others have reported correlation between CRP and alveolar bone loss [15,16]. However, it must be mentioned that ESR and CRP are nonspecific indicators of acute stage and cannot be used to justify the results. However, the increase in the pre-inflammatory cytokines and inflammatory media like PGE<sub>2</sub>, IL-1, IL-6, and TNF- $\alpha$  has shown in the two diseases [6].

Drugs influencing periodontal tissue as used by RA patients may have a role in the relation-

ship and even its severity. In the present study, no case was entered using drugs such as Phenytoin, Cyclosporine, Nifedipine, and oral contraceptive pills, estrogen or prosthrogen derivations. The use of NSAIDs or corticosteroids (sometime for a long time), however, was not controlled. Long-term use of NSAIDs is correlated to alveolar bone loss control [17]. Thus, it is expected that the use of similar drugs decrease the severity of the association although the odds ratio of 7.9 in the present study renounce the role of uncontrolled NSAIDs. It is better to consider CAL to evaluate PD and not periodontal bone loss. Increase in gingival acute inflammation in the form of gingival bleeding increase relevant to tissue breakdown following long-term use of corticosteroids has been reported by Kässer et al [5]. In their study correlation between sulcus bleeding index and the drug dosage has been found [5].

The changes occurring in the life style of RA patients, as hands muscle function reduces and leads to improper oral hygiene mechanism, have been considered as another reason for association between RA and periodontitis [5]. However, this cannot be the case for the present study, as no significant difference existed between the two groups in terms of PI.

## CONCLUSION

The results of the present study suggest higher potentiality for moderate to severe periodontitis involvement among RA patients, possibly due to similar nature of the two diseases. Periodontal assessment of RA patients can lead to on time diagnosis and treatment of periodontitis, and can prevent related complexities such as tooth loss and the need for dental prostheses.

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