Original Research

Prevalence of Periodontitis among Rheumatoid Arthritis Patients: An Epidemiological Study

Roopa DA, Agrawal N, Johari S, Tripathi A, Gopal S

Abstract: Emerging evidence suggests that individual with RA are more likely to develop severe form of periodontitis then non RA counterparts and vice versa. Hence, the aim of study is to assess the prevalence of periodontitis among RA patients. **Materials and methods**: 100 patients were selected from multi centers diagnosed with RA for more than 4 years and periodontal recordings were made. 100 individuals from the general population were included in the control group attending the OPD of Department of Periodontics. Specific measures for periodontitis including probing depth (PD) and clinical attachment loss (CAL) were considered and based on these parameters periodontitis was classified into slight, moderate and severe in both groups. **Result**: the prevalence of periodontitis amongst the RA group reported to be 72% whereas 38% patients reported periodontitis in general/ control group. Higher percentage of severe form of periodontits was observed in the RA group when compared with control group which had more of mild to moderate periodontitis. **Conclusion**: Based on the data derived it can be concluded that there is significant association is present between periodontitis and rheumatoid arthritis in compared to the general population. This association may be a reflection of common underlying dysregulation of inflammatory responses in these individuals.

Key words: CAL; Inflammation; Matrix Matelloproteinases; TNF-A; Bone Metabolism; Etiology.

INTRODUCTION

Periodontitis is a common disease worldwide that has a primarily bacterial etiology and is characterized by a dysregulation of the host inflammatory response, eventually resulting in soft and hard tissue destruction.[1,2] The total population of India (1.22 billion approximately) is spread over more than 6.4 lakhs villages, 5661 towns and cities, 5564 tehesils/talukas, 7 union territories and 28 states. Out of this around 72% is predominantly rural population. According to various epidemiological studies, periodontal diseases are one of the most prevalent oral diseases affecting more than 50% of total Indian population.[3]

Recent studies have correlated periodontal disease to various systemic conditions including pre-term low birth weight, coronary heart disease, thromboembolic phenomenon such as myocardial infarction, stroke and type I diabetes mellitus.[4-8] Periodontitis has remarkably similar pathobiology to rheumatoid arthritis (RA). Rheumatoid arthritis (RA) is a systemic inflammatory disorder with a prevalence of 0.5% to 1.0% in Western populations; it affects women about three times more often than men.[9,10] In addition to alterations in systemic immune function, RA is characterized by the accumulation of proinflammatory cell infiltrates in the synovial membrane, which leads to synovitis, destruction of cartilage and bone tissue of the joints, and, ultimately, to physical impairment and disabilities.[10,11] In addition, RA often affects the proximal interphalangeal and metacarpophalangeal joints, which may lead to substantial manual disability. Oral hygiene may be impaired in these patients, making them susceptible to plaque accumulation and, consequently, inflammatory periodontal disease.[10]

In both diseases progression consists of continuing presence of high levels of pro-inflammatory cytokines. Furthermore, low level of tissue inhibitor of matrix matelloproteinases (TIMP) and high levels of matrix matelloproteinases (MMP) and PGE_2 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.[12-16] 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.[17]

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.[18-22] 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, the study was conducted with an aim of testing the hypothesis that those individuals with rheumatoid arthritis would have a higher prevalence of advanced forms of periodontal destruction, than patients with periodontal disease but without rheumatoid arthritis.

MATERIALS AND METHODS

Study period and population

The study was conducted over a period of 10 months that December 2013 to September 2014. Patients were assigned in two groups that were patients with rheumatoid arthritis and general patients without rheumatoid arthritis. Hundred patients who were diagnosed with rheumatoid arthritis for more than 4 years were recruited from multi-centers including Orthopedic department of Rama Medical College Kanpur, Orthopedic department of Era Medical college Lucknow, and regional medical clinics in Kanpur. All patients with RA had been diagnosed by orthopedicians according to revised American College of Rheumatology 1987 criteria and were on a regular recall schedule for RA. The diagnoses for rheumatoid arthritis was confirmed by using the anti-cyclic citrullinated peptide antibodies (anti CCP) test done by the orthopedicians.[23,24]

The inclusion criteria for patients with RA and controls were: 1) 30y ears to 60years years old and 2) >8 remaining teeth. The criterion of eight remaining teeth was chosen because there should at least be a minimum periodontitis- associated inflammatory burden, given that this inflammatory burden decreases with decreasing number of teeth (e.g., edentulous patients do not have any periodontitis-associated inflammatory burden).

Exclusion criteria were: 1) presence of other systemic diseases or conditions (e.g., diabetes) that are known as risk factors for periodontitis, 2) a history of treatment for periodontal disease and 3) smoking and tobacco chewing. With regard to controls, additional exclusion criteria were the use of medication or consuming drugs that are known to be risk factors for periodontitis.

During the same period, age, sex, ethinicity matched controls were recruited. Hundred patients were selected for the general group from the Department of Periodontics and Oral Implantology, Rama Dental College, Kanpur. The patients were informed about the nature of the study and and consent form was signed. Ethical clearance was obtained.

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: ≥5mm (**table 1**). [25]

TABLE 1: Shows scale of periodontal clinical attachment.

Type of Periodontitis	CAL
Slight	1-2mm
Moderate	3-4mm
Severe	≥5mm

Statistical analysis

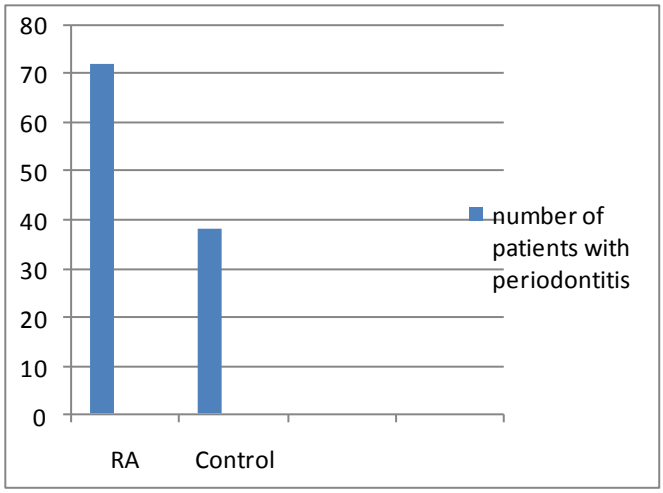
Following collection of data the percentage of moderate to severe periodontitis was calculated in each group and t- test analysis were used to determine the prevalence of periodontitis in both groups.

RESULT

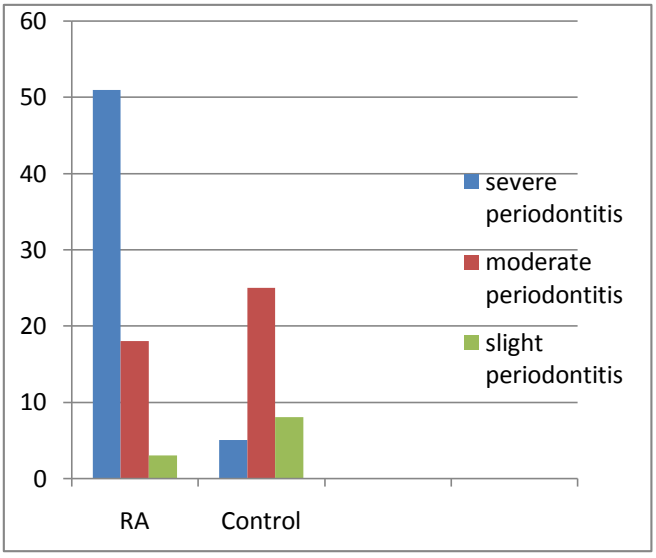
Out of 100 patients enrolled for rheumatoid arthritis group, 68 were female and 32 were males where as in control group 52 females and 48 males were present. The prevalence of periodontitis was 72% and 38% for RA and control group respectively shown in graph 1. The difference found in the prevalence 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 72 patients with chronic periodontitis in rheumatoid arthritis group, 51 patients had severe periodontitis, 18 patients had moderate periodontitis and only 3 patients had slight periodontitis. Therefore the percentage of prevalence of slight moderate and severe periodontitis in rheumatoid arthritis was 4%, 25% and 71% respectively (graph 2). Thus the present study reported that more severe form of periodontitis existed in rheumatoid arthritis patients.

Out of 38 chronic periodontitis patients in the control group, 8 patients had slight periodontitis, 25 patients had moderate periodontitis and 5 patients had severe form of periodontitis. The percentage of prevalence of slight, moderate and severe periodontitis was 21%, 66% and 13% respectively (graph 2). These results indicated that the prevalence of mild to moderate periodontitis was seen in control group.



GRAPH 1: Graph 1: Shows number of patients with periodontitis between the rheumatoid arthritis (RA) and control group. Number of patients with periodontitis was more in RA group.



GRAPH 2: Depicts the no. of patients with mild, moderate and severe periodontitis among the RA and control groups. The no. of severe periodontits is more in RA group and moderate periodontitis in control group.

DISCUSSION

It is generally accepted that the prevalence of advanced periodontitis in human populations ranges between 5–15%.[26] 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. [27,28,29] Such an approach is valid for a pilot study before moving to more elaborate and larger scale studies. The study reported that 72% of rheumatoid arthritis patients suffered from periodontitis whereas only 38% of the general population (control group) suffered from periodontitis. In rheumatoid arthritis group 51 patients had severe form of periodontitis. In control group slight to moderate periodontitis was much more prevalent with 8 patients of slight and 25 patients of moderate periodontitis.

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). [22, 30-33] Indeed, there are remarkable similarities in the pathogenesis of these two conditions at both the cellular and molecular level (Fig 1) despite of their differing aetiology. [34-36]

In humans, many of genes which regulate monocytic cytokine response have been mapped to the HLA –DR region of chromosome 5 in the area of the TNF- β genes.[37,38] Both RA and progressive periodontitis are associated with this HLA complex.[39] It is proposed that this provides common genetic basis for the observed monocyte trait, linking RA, progressive periodontitis, and other systemic diseases. It is reasonable to suggest, therefore, that inter individual differences in the severity of RA and periodontal disease are partly due to intrinsic differences in the monocyte/ Tcell response rates. In both diseases inflammatory challenge to the monocytic/lymphocytic access may result in the secretion of excessive pro-inflammatory cytokines and inflammatory mediators of which PGE_2, IL- 1 TNF-α and IL- 6 would appear to dominate and low levels of tissue inhibitor of matrix matelloproteinases (TIMP). Microbial enzymes and host matrix metalloproteinases (MMP-8 and -9)[40] appear to play important roles in both conditions. Bone metabolism is integral in both diseases, and the roles of the receptor activator of nuclear factor-kappa B ligand (RANKL) and its inhibitor osteoprotegerin (OPG) in bone/ jaw resorption and joint erosions, respectively, were established.[41,42,43] In addition, the two conditions share common genetic and environmental epidemiologic risk factors.[44,45] Thus, underlying both periodontitis and rheumatoid arthritis is the apparent dysregulation of molecular pathways in the inflammatory response.

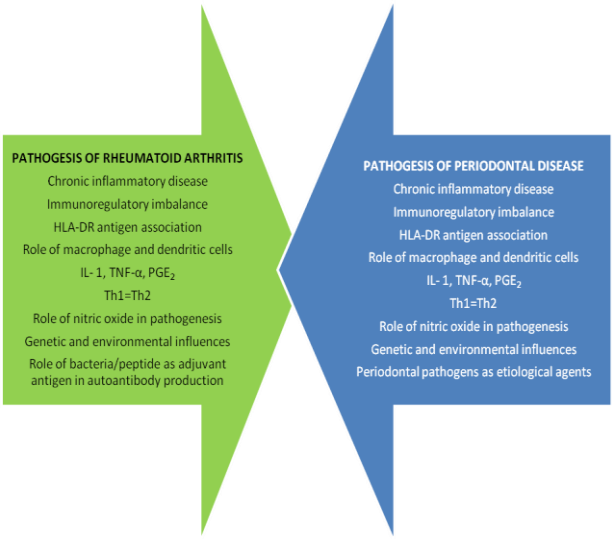


FIGURE 1: Shows the similarities in the pathogenesis of rheumatoid arthritis and periodontitis

CONCLUSION: Individuals 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. The prevention, treatment and maintenance of periodontitis patients need to be advocated by periodontists. Hence, it is suggested to develop new host modifying medications that can reduce the inflammatory component of the disease.

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How to cite this article: Roopa DA, Agrawal N, Johari S, Tripathi A, Gopal S Prevalence of Periodontitis among Rheumatoid Arthritis Patients: An Epidemiological Study. . Rama Univ J Dent Sci 2015 June;2(2):2-8.

Sources of support: Nil **Conflict of Interest**: None declared