IDR International Dental Research

Original Article

Evaluation of dental caries and periodontal status of individuals with rheumatic disease

Sinem Özdemir[1], Nimet Ünlü[1]

[1] Selçuk University, Faculty of Dentistry, Department of Restorative Dentistry, Konya, Turkey

Abstract

Aim: This study aims to compare the prevalence of dental caries and the incidence of periodontally alveolar bone loss in individuals with rheumatic diseases (e.g., rheumatoid arthritis, ankylosing spondylitis, systemic lupus erythematosus and familial Mediterranean fever) with those of healthy individuals.

Methodology: The study included 324 healthy individuals and 324 individuals with rheumatic diseases between the ages of 16 and 80 who were examined at Selçuk University, Faculty of Dentistry between 2017 and 2022. The intraoral examination and radiographic results of all patients recorded in the Patient Information Management System were analyzed and data were recorded by a single researcher. According to the intraoral visual examination and radiographic results of the patients, periodontal alveolar bone loss was evaluated as present or absent. DMF-T, DF-T, and D-T values were calculated by evaluating the number of decayed (D), missing (M), and filled (F) teeth of all patients on the radiographic records. Statistical analyses of the obtained data were performed with Chi-square test, Fisher exact test, and Mann-Whitney U tests, all of which are non-parametric tests.

Results: From the results of statistical analysis of all data of rheumatic-diseased and healthy individuals, statistically significant differences were observed between the two groups in DF-T, D-T, M-T, and periodontal bone loss values (p = 0.022, p = 0.000, p = 0.006, and p = 0.000, respectively).

Conclusion: Our study showed that the risk of caries and periodontal disease in individuals with rheumatic diseases is higher than that in healthy individuals. To confirm the results of this study, more detailed interventional studies are needed to evaluate microbiologically and biochemically the relationship between periodontitis and caries risk with rheumatoid diseases.

Keywords: Alveolar bone loss, dental caries, rheumatic disease, DMFT index, missing teeth

Correspondence:

Dr. Sinem ÖZDEMİR
Selçuk University, Faculty of Dentistry, Department of Restorative Dentistry, Konya, Turkey
E-mail: sinemzdmir@gmail.com

Received: 19 October 2022
Accepted: 15 December 2022

Access Online

DOI:
https://doi.org/10.5577/intdentres.454

How to cite this article: Özdemir S, Ünlü N. Evaluation of dental caries and periodontal status of individuals with rheumatic disease. Int Dent Res 2022;12(Suppl.1):74-8. https://doi.org/10.5577/intdentres.454

Introduction

Rheumatic diseases are autoimmune and multisystemic diseases that can be associated with significant morbidity and mortality (1). Autoimmunity in rheumatic diseases occurs when genetic, environmental, and stochastic factors affect organs and systems. Although there is no clinically significant tissue damage at the beginning, autoimmunity may be present, and the presence of this disease-related autoimmunity can be detected by the analysis of some biomarkers (e.g., antibodies such as ANAs, ACPAs, RF,

and autoreactive B and T cells) in the blood. Over time, more pathogenic changes occur, with autoimmune responses being mediated by ongoing genetic, environmental, and stochastic factors. Eventually, clinically significant tissue damage occurs, and the affected person then seeks medical attention (2).

To begin this paper, some general principles regarding rheumatic diseases will be outlined:

1. Although rheumatic diseases are frequently defined as autoimmune diseases and show immunological features, their cause and pathophysiology are not yet fully understood. Infections, toxins, and drugs have also been implicated, but there is no consensus on causation. The standard textbook explanation is that the interaction between genetic, hormonal, environmental, and immunological factors produce these diseases.

2. It is necessary to define these diseases more accurately as syndromes because each category does not represent a disease with a single cause. We are dealing with clinical syndromes that have similar phenotypes resulting from many distinct problems.

3. These syndromes are more common in female patients than in male patients and usually appear at a relatively early age in adulthood. The hormonal or reproductive factors responsible for this in women are not known.

4. For unclear reasons, rheumatic diseases tend to damage an organ system (rheumatoid arthritis [RA], synovial joints; Sjögren's syndrome (SS), exocrine glands; scleroderma (Scl), skin; and polymyositis/dermatomyositis (PM/DM), muscle). Although the autoantibody profile facilitates disease classification, it does not tell us why the skin is the main target in patients with Scl or why synovial-based joints are the main targets in patients with RA. Multiorgan involvement is particularly characteristic of systemic lupus erythematosus (SLE), probably due to the immune complex deposition in vascular structures.

5. With the exception of Scl, these diseases usually respond to anti-inflammatory and immunosuppressive drugs. Such a response, of course, does not mean that the immune system was faulty initially, but it does imply that immunologically mediated inflammation has a role in producing tissue damage. A persistent stimulus or overactive inflammatory response mediated by the innate or adaptive arms of the immune system may be the responsible process (3).

The term rheumatic disease has no clear boundaries, and more than 100 different conditions have been identified as rheumatic diseases, including RA, OA, autoimmune diseases such as systemic lupus erythematosus and scleroderma, osteoporosis, back pain, gout, fibromyalgia, and tendinitis (4).

Different results were found in terms of caries risk in rheumatic diseases. In a study by Simonova et al., the risks of caries in patients with RA, SLE and Systemic Scleroderma were found to be higher (5). In studies conducted only on RA disease, different results emerged in terms of caries risk and DMF-T index (6-10). However, it has been proven in the direction of studies that rheumatic diseases pose a risk in terms of periodontitis (11-14).

In line with this information, the aim of our study is to compare the control group with those with rheumatic disease in terms of caries and periodontal health.

Moreover, it aims to determine whether the null hypothesis, which is the proposition that there is no difference between rheumatic-diseased and healthy individuals in terms of caries risk and periodontal loss, will be accepted according to the results of the study.

Materials and Methods

Ethics committee approval was received for this study from Selçuk University, Faculty of Dentistry Scientific Research Ethics Committee, in accordance with the World Medical Association Declaration of Helsinki, with the approval number: 2022/38).

Study Population

In the study, 324 healthy individuals and 324 individuals with rheumatic diseases between the ages of 16 and 80, who were examined at Selçuk University, Faculty of Dentistry between 2017 and 2022, were included. In the healthy control group (control group), those without any systemic disease and who did not use regular medication were included.

In the patient group (RD group), any systemic disease other than rheumatic diseases were excluded from the study. The intraoral examination and radiographic results of all patients recorded in the Patient Information Management System were analyzed and data were recorded by a single researcher.

Evaluation of the Indexes

Based on the intraoral visual examination and radiographic results of the patients, periodontal alveolar bone loss was evaluated as present or absent. The number of decayed (D), missing (M) and filled (F) teeth of all patients on radiographic records was used to calculate the DMF-T, DF-T and D-T indices.

Statistical analysis

The obtained data were analyzed using the SPSS V22.0 statistical program (IBM SPSS Inc., Armonk, NY, USA).

The data were checked for normal distribution with the Shapiro–Wilk and Kolmogorov–Smirnov tests. As a result of the calculations, normal distribution was not shown.

The statistics were analyzed with the Mann–Whitney U test from non-parametric tests and Fisher's exact test from chi-square analysis.

Results

The age ranges of the participants and their distribution within the groups are shown in Table 1. For the RD group, the mean±SD range was 38.17±14.03 and the distribution was 68.5% females and 31.5% males. For the control group, the mean±SD range was 38.35±14.28 and the distribution was 69.1% females and 30.9% males. When both groups were evaluated, there were statistically significant differences in all indexes (Table 2).

For the DF-T and healthy teeth indices in males and females in both groups, statistical differences were reported ($p < 0.05$, Table 3). Since we do not know whether missing teeth were due to periodontal reasons, caries or trauma, the DMF-T index is not included in these tables. However, the M-T index is incorporated in the tables separately for review and evaluation.

Table 1. Age ranges and distribution of the participants.

Age range	RD group (n=324)		Control group (n=324)	
	Female (n=222)	Male (n=102)	Female (n=224)	Male (n=100)
16-29 years	72	36	72	36
30-44 years	79	31	80	31
45-64 years	64	29	65	27
65 and over	7	6	7	6

Table 2. Distribution of all the assessed indexes.

Indexes regarding teeth	RD group (n=324)		Control group (n=324)		*p*-value	Test
	mean±SD (range)					
Healthy	16.7±6.4		18.23±6.48		0.004	U test
DF-T	8.08±4.64		7.25±4.59		0.022	U test
D-T	3.13±3.15		2.18±2.23		0.000	U test
M-T	3.09±4.03		2.51±3.71		0.006	U test
Alveolar bone loss	Positive	Negative	Positive	Negative	0.000	Fisher's exact test, two-sided
	193	131	147	177		

Table 3. Comparison of indexes in males and females in both groups.

Indexes regarding teeth	RD group (n=324)					Control group (n=324)					Test
	Female (n=222)		Male (n=102)		*p*-value	Female (n=224)		Male (n=100)		*p*-value	
	mean					mean					
Healthy	16.26		17.94		0.02	17.66		19.51		0.03	U test
DF-T	8.48		7.21		0.02	7.64		6.4		0.03	U test
D-T	2.97		3.48		0.08	2.2		2.14		0.9	U test
M-T	3.22		2.83		0.66	2.7		2.09		0.7	U test
Alveolar bone loss	Pos.	Neg.	Pos.	Neg.	0.5	Pos.	Neg.	Pos.	Neg.	0.4	Fisher's exact test, two-sided
	135	87	58	44		98	126	49	51		

When the women and men were examined separately, it was seen that there was a statistically significant difference in all values except the DF-T index in women, while the only statistically significant difference was found for the D-T index for men (Tables 4 and 5). However, when looking at indices other than healthy teeth, the RD group had a higher average in the two tables.

Table 4. Overview of the indexes of females in both groups.

Indexes regarding teeth	RD group Female (n=222) mean±SD (range)		Control group Female (n=224) mean±SD (range)		*p*-value	Test
Healthy	16.26±6.64		17.66±6.78		0.027	U test
DF-T	8.48±4.8		7.64±4.77		0.068	U test
D-T	2.97±3.09		2.2±2.29		0.016	U test
M-T	3.22±4.11		2.7±3.89		0.03	U test
Alveolar bone loss	Positive 135	Negative 87	Positive 98	Negative 126	0.000	Fisher's exact test, two-sided

Table 5. Overview of the indexes of males in both groups.

Indexes regarding teeth	RD group Male (n=102) mean±SD (range)		Control group Male (n=100) mean±SD (range)		*p*-value	Test
Healthy	17.94±5.95		19.51±5.58		0.059	U test
DF-T	7.21±4.16		6.4±4.07		0.16	U test
D-T	3.48±3.26		2.14±2.12		0.001	U test
M-T	2.83±3.85		2.09±3.24		0.08	U test
Alveolar bone loss	Positive 58	Negative 44	Positive 49	Negative 51	0.324	Fisher's exact test, two-sided

Discussion

Our research has shown that the risk of caries and periodontal disease is higher in individuals with rheumatic diseases compared to healthy individuals. Therefore, the null hypothesis of the study was rejected. In both groups, the DF-T index was found to be statistically significant and higher in women than in men.

When the men of the two groups were compared, D-T values were significantly higher in the RD group, while in the comparison between women, both D-T and M-T values were found to be significantly higher in the RD group.

Considering similar studies on caries risk determination in patients with rheumatoid arthritis, patients with a minimum of 8 teeth were included in our study (6). In a healthy periodontium, the position of the bone border follows the enamel-cementum junction and is 1–2 mm apical (12, 14). In our study, alveolar bone loss was also evaluated according to these measurements and determined as present or absent.

While this study improved our knowledge of the connection between rheumatic diseases and the risk of periodontal disease and caries, our research has some limitations:

1. We were unable to conduct a visual examination of the patients. Instead, they were evaluated according to the diagnosis and x-rays registered in the system.
2. The severity of the rheumatic disease of the patients was unknown.
3. Smoking affects both periodontal health and caries risk; however, we did not have information on whether the patients were smokers or non-smokers.
4. The socio-economic status, tooth brushing habits and diets of the patients were also unknown.

Conclusions

Within the limits of this study, it can be concluded that patients with rheumatic diseases are at risk for dental caries and periodontal diseases. To verify the results of this study, more detailed interventional studies are needed to evaluate the microbiological and biochemical relationship between periodontitis and caries risk and rheumatoid diseases.

Acknowledgments: This study has been presented at the Necmettin Erbakan University 2nd International Dentistry Congress in Konya, Turkey held between October 1-3, 2022.

Ethical Approval: Ethics committee approval was received for this study from Selçuk University, Faculty of Dentistry Scientific Research Ethics Committee, in accordance with the World Medical Association Declaration of Helsinki, with the approval number: 2022/38).

Peer-review: Externally peer-reviewed.

Author Contributions: Conception – S.Ö.; Design – S.Ö., N.Ü.; Supervision – N.Ü.; Materials – S.Ö.; Data Collection and/or Processing – S.Ö., N.Ü.; Analysis and/or Interpretation – S.Ö.; Literature Review – S.Ö., N.Ü.; Writer – S.Ö.; Critical Review – N.Ü.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

References

1. Goldblatt F, O'Neill SG. Clinical aspects of autoimmune rheumatic diseases. Lancet 2013;382:797-808. https://doi.org/10.1016/S0140-6736(13)61499-3
2. Deane KD, El-Gabalawy H. Nature Reviews Rheumatology. 2014;10:212-228. https://doi.org/10.1038/nrrheum.2014.6
3. Joseph A, Brasington R, Kahl L, Ranganathan P, Cheng TP, Atkinson JJ. Allergy Clin Immunol. 2010;125:204-215. https://doi.org/10.1016/j.jaci.2009.10.067
4. Sangha O. Epidemiology of rheumatic diseases. Rheumatology 2000;39(2):3-12. https://doi.org/10.1093/rheumatology/39.suppl_2.3
5. Simonova MV, Grinin VM, Nasonova VA, Robustova TG. Clinical factors essential for dental caries intensity in rheumatic patients. Stomatologiia 2002;81(2):15-19.
6. Martinez-Martinez RE, Domínguez-Pérez RA, Sancho-Mata J, Abud-Mendoza C, Ayala-Herrera JL, Popoca-Hernandez EA. The frequency and severity of dental caries, and counts of cariogenic bacteria in rheumatoid arthritis patients. Dent Med Probl. 2019;56(2):137-142. https://doi.org/10.17219/dmp/105340
7. Chamani G, Shakibi MR, Zarei MR et al. Assessment of relationship between xerostomia and oral health-related quality of life in patients with rheumatoid arthritis. Oral Diseases. 2017;23:1162-1167. https://doi.org/10.1111/odi.12721
8. Sánchez-Medrano AG, Martínez-Gutiérrez F, Martínez-Martínez MU, Salas-Orozco MF, Villa-García LD, Patiño-Marín N. Association Between Subjects with Newly Diagnosed Rheumatoid Arthritis and Dental Caries. Int. J. Dental Sc. 2021;24(2):186-196. https://doi.org/10.15517/ijds.2022.49148
9. Silvestre-Rangil J, Bagán L, Silvestre FJ, Bagán JV. Oral manifestations of rheumatoid arthritis. A cross-sectional study of 73 patients. Clin Oral Invest 2016;20:2575-2580. https://doi.org/10.1007/s00784-016-1745-z
10. Van der Weijden GA, Timmerman MF. A systematic review on the clinical efficacy of subgingival debridement in the treatment of chronic periodontitis. J. Clin. Periodontol. 2002;29(3):55-71. https://doi.org/10.1034/j.1600-051X.29.s3.3.x
11. Heitz-Mayfield LJ, Trombelli L, Heitz F, Needleman I, Moles D. A systematic review of the effect of surgical debridement vs nonsurgical debridement for the treatment of chronic periodontitis. J. Clin. Periodontol. 2002;29(3):92-102. https://doi.org/10.1034/j.1600-051X.29.s3.5.x
12. Carranza FA, Newman MG, Takei HH, Klokkevold PR. Carranza's Clinical Periodontology. 12th ed. St.Louis: Missouri; 2012. 9-39.
13. Özkan Y, Alpaycı M, Özkan M, Hız Ö, Bozan N. The severity of periodontal disease in patients with rheumatoid arthritis: a comparative study. Nobel Med 2015;11(2):54-58.
14. Mühlberg S, Jäger J, Krohn-Grimberghe B et al. Oral health-related quality of life depending on oral health in patients with rheumatoid arthritis. Clin Oral Invest 2017;21:2661-2670. https://doi.org/10.1007/s00784-017-2068-4