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Research Paper

Comparing Bone Mineral Density in Rheumatoid Arthritis and Psoriatic Arthritis

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ABSTRACT

Background: Changes in patients' Bone Mineral Density (BMD) is one of the problems in patients with rheumatoid arthritis, which can be due to the use of corticosteroid drugs to reduce patients' symptoms or the aging process in patients.

Objective: In this study, we decided to compare BMD in patients with psoriatic arthritis and rheumatoid arthritis.

Methods: This study as a cross-sectional descriptive-analytical study was performed to evaluate BMD in patients with psoriatic arthritis (n=59) and rheumatoid arthritis (n=41) who were referred to Rasoul Akram Hospital in Tehran between 2016 and 2020. All patients were assessed by bone density scan (Dual-Energy X-ray Absorptiometry or DEXA scan) to determine T-score at the two spine and femur sites.

Results: In rheumatoid arthritis and psoriatic arthritis groups, the Mean±SD spine T-score was -1.11±0.18 and -1.38±0.48, respectively, which did not show a significant difference between the two groups (P=0.556). Similarly, in the two groups with rheumatoid arthritis and psoriatic arthritis, the Mean±SD femur T-score was -1.36±0.17 and -1.78±0.61, respectively, which did not show a significant difference between the two groups (P=0.451). Considering the underlying parameters, including age, sex, and duration of the disease, the lack of differences in the values of spine and femur T-scores between the two groups was still evident.

Conclusion: The change in BMD was equal in both rheumatoid arthritis and psoriatic arthritis that is not affected by gender, age, or duration of disease.

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1. Introduction

Rheumatoid arthritis is one of the most common types of rheumatic diseases that are caused by autoimmune processes and general inflammation, especially joint inflammation [1]. The prevalence of this disorder is 0.5 to 1 case per 100,000 people in the general population and its incidence varies from 12 to 1200 cases per 100 thousand people in different parts of the world [2]. However, the incidence has decreased in recent years in some countries, such as the United States [3]. In general, the dimensions of the disease are still widespread in most parts of the world. In chronic and severe cases, this disease even causes the death of patients so that the resulting mortality rate is reported to be 14.7 cases per 1000 people [4]. Patients with this disorder experience a reduced quality of life compared to the general population due to the complications and chronic course of the disease [5]. For this reason, recognizing the factors related to it and affecting the worsening prognosis of patients, such as co-morbidities, involvement of extra-particular parts of the body, etc. can play an important role in improving the condition of patients with rheumatoid arthritis.

Psoriasis is also a common skin disease of immune origin (due to the function of T lymphocytes) that occurs as a chronic recurrent scaling disorder and its classic appearance includes the involvement of extensor surfaces, which alternately recur and subside. The disease occurs in 1 to 2% of all communities and causes arthritis in a number of patients. However, in some areas, such as the Scandinavian countries, the prevalence is as high as 6%, and in some countries, such as West Africa and Japan, it is a relatively rare disease [6].

Symptoms of this disease, which are associated with keratinocyte hyperproliferation, include squamous erythematous lesions (scaling in an erythematous background) in the form of acute and chronic inflammatory lesions that manifest as red papules or plaques with silver scales [7]. Genetic factors, infections, geographical location and climate, stress and stressors, hormonal factors, drugs, viruses, foods, sex, and age are among the most important factors involved in the etiology of the disease. Rather than having a high mortality rate, this disease causes disabilities and disorders, and a significant reduction in the patients' quality of life. The prognosis of the disease depends on the factors of location and severity of the involvement as well as the presence of non-skin manifestations, such as involvement of the joints and nails [8]. Given the impact of psoriasis on the patients' quality of life, identifying the factors associated with it will be very important [9].

One of the problems seen in patients with rheumatoid arthritis and psoriatic arthritis is changes in patients' Bone Mineral Density (BMD), which can be due to the use of corticosteroid drugs to reduce patients' symptoms or the aging process in patients. In general, it should be borne in mind that any process that leads to inflammation (such as frequent falls, low BMI, smoking, or alcohol consumption) can increase the risk of BMD and osteoporosis, and fractures [10]. Also, the relationship between the occurrence of chronic inflammation for any reason and the immune system with bone metabolism is quite obvious so that there is a close relationship between C-Reactive Protein (CRP) levels and the risk of osteoporosis in these patients [11]. In this regard, the relationship between the process of destruction of joint tissue and reduced bone density in patients has been confirmed to have common pathophysiology, i.e. chronic inflammation [12, 13].

According to studies, the prevalence of decreased BMD and the incidence of osteoporosis in men and women with rheumatoid arthritis as well as psoriatic arthritis have been reported to be more than twice that of healthy controls [14]. Therefore, apart from direct bone involvement due to the activity of inflammatory factors, these diseases are associated with decreased bone density and BMD. These two reasons can clarify the difference in BMD in rheumatoid arthritis and psoriatic arthritis patients. However, whether changes in bone mineral density are the same in both diseases, or whether the nature of these diseases actually affects the severity of bone mineral density, is still in doubt. Accordingly, we decided to compare BMD in patients with psoriatic arthritis and rheumatoid arthritis.

2. Materials and Methods

This study as a cross-sectional descriptive-analytical study was performed to evaluate BMD in patients with psoriatic arthritis (n=59) and rheumatoid arthritis (n=41) who were referred to Rasoul Akram Hospital in Tehran between 2016 and 2020. In this regard, people having other chronic debilitating diseases at the same time or concomitantly users of several drugs affecting bone metabolism were excluded from our analysis. All patients were assessed by bone density scan (Dual-energy X-ray Absorptiometry or DEXA scan) to determine T- scores at the two spine and femur sites. Baseline characteristics, including gender, age, medical history, history of smoking, and disease duration were also collected by reviewing their recorded files.

The study endpoint was to compare spinal and femoral T- scores between the two groups suffering from psoriatic arthritis and rheumatoid arthritis in total and adjusted for gender, age, and disease duration.

Statistical analysis

For statistical analysis, results were presented as Mean±SD for quantitative variables and were summarized by frequency (percentage) for categorical variables. Continuous variables were compared using the t-test or Mann-Whitney U test whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the study groups. Categorical variables were, on the other hand, compared using the Chi-square test. P≤0.05 were considered statistically significant. For the data analysis, the statistical SPSS software v. 23 was used.

3. Results

As summarized in Table 1, the two study groups with psoriatic arthritis and rheumatoid arthritis were similar in gender, mean age, mean disease duration, age at menopause, history of hypertension, diabetes mellitus, thyroid disorders, and smoking. In the two groups with rheumatoid arthritis and psoriatic arthritis, the frequency of joint pain and morning stiffness was 92.7% and 71.2%, respectively, which was significantly higher in the group with rheumatoid arthritis. (P=0.008). In the two pointed groups, the mean spine T-score was -1.11±0.18 and -1.38±0.48, respectively, which did not show a significant difference between the two groups (P=0.556). Similarly, in the two groups with rheumatoid arthritis and psoriatic arthritis, the mean femur T-score was -1.36±0.17 and -1.78±0.61, respectively, which did not show a significant difference between the two groups (P=0.451). As indicated in Table 2, considering the underlying parameters, including age, sex, and duration of the disease, the lack of differences in the values of spine and femur T-scores between the two groups was still evident.

4. Discussion

One of the problems seen in patients with rheumatoid arthritis and psoriatic arthritis is changes in patients' BMD [15], which can be due to the use of corticosteroid drugs to reduce patients' symptoms or the aging process in patients [16]. Accordingly, we decided to compare BMD in patients with psoriatic arthritis and rheumatoid arthritis. To evaluate the BMD change index in these patients, we evaluated the two parameters, including spine T-score and femur T-score, and compared these parameters in the two groups of patients. Also, in order to analyze the effect of underlying characteristics, including gender, age, and duration of the disease, a comparison between the two groups of patients with the mentioned characteristics was also examined. As significant findings of the study, we first found that the mean values of the two parameters spine T- score and femur T- score

Table 1. Baseline characteristics of the study groups

Characteristics	Mean±SD/No.(%)		
	Rheumatoid Arthritis	Psoriatic Arthritis	P
Male gender	10(24.4)	19(32.2)	0.397
Age, year	46.93±11.45	47.63±12.38	0.771
History of hypertension	2(4.9)	11(18.6)	0.044
History of diabetes	0(0.0)	6(10.2)	0.035
History of hyperthyroidism	1(4.2)	2(3.4)	0.764
History of hypothyroidism	0(0.0)	4(6.8)	0.142
History of brain stroke	0(0.0)	1(1.7)	0.402
Mean disease duration	4.23±2.09	4.48±1.67	0.526
Mean age at menopause	50.80±2.38	50.00±2.56	0.775
History of smoking	25(61.0)	18(30.5)	0.002

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Table 2. The value of spine and femur T-scores in the study groups

Characteristics		Spine T-Score Mean±SD RA	Spine T-Score Mean±SD PA	P	Femur T-Score Mean±SD RA	Femur T-Score Mean±SD PA	P
Gender	Male	-1.11±0.31	-0.88±0.56	0.709	-0.92±0.41	-0.92±0.33	0.991
	Female	-1.11±0.23	-1.55±0.61	0.476	-2.05±0.79	-1.57±0.18	0.516
Age group	≤50 years	-0.65±0.25	-0.80±0.25	0.678	-2.53±1.14	-1.67±0.23	0.405
	>50 years	-0.79±0.38	-1.30±0.21	0.224	-3.31±1.38	-1.47±0.26	0.148
Disease duration	≤5 years	-0.77±0.26	-1.15±0.20	0.255	-2.70±1.38	-1.01±0.43	0.206
	>5 years	-1.30±0.30	-1.48±0.21	0.614	-2.80±1.83	-1.06±0.24	0.292

PA: Psoriatic Arthritis; RA: Rheumatoid Arthritis

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did not show a significant difference between the two groups of patients with psoriatic arthritis and rheumatoid arthritis. Despite a significant decrease in BMD based on the two parameters studied in both diseases, the decrease in BMD is not affected by the nature of these two diseases. In both diseases, we witnessed a similar decrease in bone density. Second, the difference in BMD changes between the two diseases was not affected by underlying variables, such as sex, age, and disease duration. However, it should be noted that the effect of gender, age at menopause, and also the duration of rheumatic disease has obviously been confirmed in reducing bone density in several studies [17-19], which was not one of the objectives of this study. Our aim was only to compare the changes in BMD in the two diseases of psoriatic arthritis and rheumatoid arthritis in terms of underlying variables. In conclusion, it can be said that both diseases will be equally and severely associated with a decrease in BMD and bone density.

In most studies, only BMD changes in each of the diseases of psoriatic arthritis and rheumatoid arthritis have been evaluated and less comparison has been made between the two diseases regarding the effect on bone density, and therefore, this study has an obvious advantage. In a similar vein, Harrison et al. assessed patients with rheumatoid arthritis and psoriatic arthritis. Contrary to our study, patients with rheumatoid arthritis had significantly lower BMDs than patients with psoriatic arthritis. However, this difference was not observed if the participants were matched for gender and age. Also, in their study, no relationship was observed between the severities of joint involvement in patients with psoriatic arthritis with BMD [20]. In Kocijan et al.'s study, two groups of patients with rheumatoid arthritis and psoriatic arthritis were evaluated with high-resolution CT of the distal radius. There was no difference between the two groups in terms of total BMD, trabecular BMD, and cortical BMD [21]. In the study by Szentpetery et al., a comparison was made between patients with rheumatoid arthritis and psoriatic arthritis in terms of bone densitometry. In their study, changes in BMD during the 12-month evaluation period were different between the two groups of patients [22]. In the study by Reddy et al., BMD levels in the two positions of the spine and femur were compared between the two groups of patients [23]. Also, similar to our study, there was no difference in the mean BMD of the spine and femur between th two groups. It seems that in most similar studies, there is no overall difference between the two diseases in terms of BMD changes. But it can be influenced by other variables, such as the severity of the disease at the time of the study, the genetic characteristics of the study population, and even how bone density is assessed and interpreted. To achieve a more comprehensive and reliable result, it is recommended to study a larger community and take into account the mentioned underlying features.

5. Conclusion

As a final conclusion, we will see changes in BMD equally in both rheumatoid arthritis and psoriatic arthritis. This similarity of changes in bone density is not affected by gender, age, or duration of disease. This result was observed in an example of Iranian society and cannot be generalized to all human societies with different genetic, racial, and natural characteristics.

Ethical Considerations

Compliance with ethical guidelines

The approval of the ethics committee for this study was obtained from the Research Ethics Committee of Iran University of Medical Sciences (IR.IUMS.FMD.REC.13987.385).

Conflict of interest

The authors declared no conflict of interest.

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Authors' contributions

All authors contributed equally to preparing this paper.

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