

Bone densitometry in psoriasis vulgaris: first study in Iran

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Background and Method: Psoriasis is one of the most common skin diseases. For the first time in Iran, we conducted a case-control study to evaluate bone mineral density in patients with psoriasis vulgaris in comparison with a healthy control group (20 individuals in each group). Our study sample included patients referred to the dermatology clinic of Razi Hospital in Ghaemshahr, Iran, between May and October 2019. Densitometry was performed by the DEXA method on the 2nd to 4th lumbar vertebrae and hip bone. Patients' demographic information and Psoriasis Area Severity Index (PASI) scores were recorded and analyzed using SPSS version 22.

Results: The mean T-score in the case and control groups were -0.47 ± 1.04 and -0.19 ± 0.45 , respectively ($P = 0.274$). The mean T-score had a significant inverse correlation with an age of 40 years or above ($r = -0.873$ and $P < 0.001$), disease duration of more than five years ($r = -0.599$, $P = 0.05$), and PASI score ($r = -0.523$, $P = 0.001$), but had a positive correlation with sunlight exposure ($r = 0.581$, $P < 0.001$).

Conclusion: Considering the decrease in bone density in patients with psoriasis and its relationship with the disease severity and duration and the effectiveness of sunlight in increasing bone density, preventive treatment should be provided for all patients to increase bone density and prevent osteoporosis.

Keywords: psoriasis vulgaris, bone mineral density, DEXA

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INTRODUCTION

Psoriasis is one of the most common chronic skin diseases, causing plaques with silver scales in association with many comorbidities ¹. Some studies have found a link between psoriasis and

osteoporosis as a comorbidity ^{2,3}. Various mechanisms may be involved, including increased inflammatory cytokines, such as interferon-gamma, interleukin (IL)-6, and tumor necrosis factors (TNFs) ^{2,3}. Moreover, psoriasis medications could cause

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abnormal bone mineral density (BMD), which is measured using single photon absorptiometry (SPA), quantitative computed tomography (QCT), or dual-energy x-ray absorptiometry (DEXA) ^{4,5}. DEXA is the gold standard and safest method ^{4,5}. Due to the importance of this subject and the presence of conflicting results in previous studies, for the first time in Iran, we conducted a study to assess BMD in psoriasis vulgaris patients compared with a healthy control group and identify related causes to help determine an appropriate strategy for early treatment of psoriasis patients and prevention of related comorbidities.

METHODS

In this case-control study, 40 participants were enrolled from dermatology clinic clients at Razi Hospital in Qaemshahr, Iran, between May and October 2019. The case group consisted of 20 male patients aged 18 to 60. Twenty sex and age-matched healthy subjects referred to Razi Hospital's clinics for routine examination were included as the control group. Psoriasis vulgaris was diagnosed by both a dermatologist and a pathologist based on the related American Association of Dermatology (AAD) criteria ⁶. Patients with psoriatic arthritis, chronic inflammatory diseases, endocrine disorders, a history of treatment with systemic drugs affecting BMD (including corticosteroids, Disease-modifying antirheumatic drugs (DMARDs), and biologic drugs), individuals undergoing phototherapy, and those with a history of smoking and alcohol use were all excluded from the study. This research was reviewed and approved by the research ethics committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC.1397.2188). Written informed consent was taken from the patients to include the clinical details.

A pre-prepared checklist including age, sex, family history, disease duration, and medications captured baseline data. Then, all participants were examined and evaluated for height, weight, BMI, medication history, pelvic fracture history, and chronic diseases. DEXA (Norland, USA) was used to measure BMD at the 2nd and 4th lumbar vertebrae and the pelvis, and the results were categorized by T-score according to the American Association of Clinical Endocrinology (AACE) guidelines and the Psoriasis Area Severity

Index (PASI) score was used to determine the severity of psoriasis ⁵.

SPSS (version 22, IBM, USA) was used to analyze the data. The chi-square test assessed relationships between qualitative variables, and the independent *t*-test assessed relationships between quantitative variables. Quantitative data and qualitative data are shown as mean \pm standard deviation (SD) and frequency (percent), respectively. A *P*-value of less than 0.05 was considered significant.

Ethical consideration

This research was reviewed and approved by the research ethics committee of Mazandaran University of Medical Sciences (IR.MAZUMS.REC.1397.2188). Written informed consent was taken from the patients to include the clinical details.

RESULTS

This study was conducted on 20 patients with a mean age of 40.145 ± 10.02 and 20 healthy controls with a mean age of 45.85 ± 10.91 to assess the relationship between BMD and psoriasis vulgaris. No statistically significant difference was observed between the case and control groups regarding age, height, weight, and BMI ($P = 0.311, 0.683, 0.766,$ and 0.902 , respectively) (Table 1). None of the subjects had osteoporosis. The mean T-score between the two groups was similar ($P = 0.274$). However, in those aged 40 or above, the mean T-score was significantly lower in the case group ($P = 0.002$). The relationship between BMI and T-score in both groups was insignificant.

Among the psoriasis vulgaris patients, the T-score was significantly lower in those with over five years of disease duration compared to those with less than five years of disease duration ($P < 0.001$). Moreover, the mean T-score was significantly lower in cases with a PASI score of more than 5 in comparison to cases with a PASI score of less than 5 ($P = 0.02$). The mean T-score was significantly lower in subjects

Table 1. Demographic characteristics of the subjects

Variable	Mean \pm Standard deviation		P-value
	Psoriasis vulgaris	Control	
Age (years)	40.45 \pm 10.024	43.85 \pm 10.912	0.311
Height (cm)	176.15 \pm 6.115	175.35 \pm 6.192	0.683
Weight (kg)	76.65 \pm 8.443	75.85 \pm 8.412	0.766
BMI (kg/m ²)	24.69 \pm 2.364	24.61 \pm 1.787	0.902

with less than 10 hours of sunlight exposure in a week compared to those with more than 10 hours ($P = 0.0058$) (Table 2). The mean T-score had a significant inverse relationship with age ($r = -0.873$, $P < 0.001$), disease duration ($r = -0.599$, $P = 0.005$), and PASI score ($r = -0.523$, $P < 0.001$), but had a direct relationship with sunlight exposure ($r = 0.581$, $P < 0.001$) (Table 3).

DISCUSSION

This study compared bone densitometry in patients with psoriasis vulgaris against a healthy control group at Razi Hospital clinics in Ghaemshahr, Iran. Our findings revealed that among those aged 40 or above, the mean T-score was significantly lower in psoriasis vulgaris patients than in the control group. Furthermore, the T-score had a significant inverse relationship with age, disease duration, and PASI score, but a direct relationship with sunlight exposure.

Busquets *et al.* conducted a study to evaluate BMD and osteoporosis in patients with psoriatic arthritis by the DEXA method. Of 153 psoriasis arthritis patients, 65 were male. Notably, 64% had oligoarticular involvement, and 54% had polyarticular involvement. Corticosteroids were taken by 66% of the patients. Osteoporosis was found in 16% of

patients, with postmenopausal women having 28%, men having 9%, and premenopausal women having 4%. The rate of clinical fracture was 13%, which was higher in the postmenopausal women group. It was stated that the risk of osteoporosis in patients with mild psoriatic arthritis was insignificant, and there was no significant difference between patients and the general population regarding BMD⁷. In our study, there were no cases of osteoporosis, and only 20% of patients with psoriasis had osteopenia, the same as the control group.

There was no significant difference in BMD between the case and control groups in a study examining BMD in 10 male and 10 female patients (mean age of 47 years) with chronic plaque-type psoriasis. On the other hand, patients with psoriatic arthropathy had a lower Z-score (-1.19) than those without arthropathy (+1.38). Previous or recent retinoid, methotrexate, or steroid treatments did not significantly affect the BMD⁴. Similarly, our study showed no difference in BMD between the control group and the patients. However, we did not administer such drugs to patients and assess their effects on the prevalence of osteoporosis.

Another study found that the disease duration was linked to decreased BMD in people with psoriasis⁸.

Table 2. Mean T-scores in subjects

Variable	Psoriasis vulgaris Frequency (Mean T-score \pm SD)	Control Frequency (Mean T-score \pm SD)	P-value
Age, years			
< 40	10 (0.28 \pm 0.674)	5 (0.16 \pm 0.541)	0.229
\geq 40	10 (1.23 \pm 0.758)	15 (-0.201 \pm 0.441)	0.002
BMI, kg/m ²			
< 25	9 (-0.47 \pm 1.445)	11 (-0.47 \pm 0.629)	0.808
\geq 25	10 (0.35 \pm 0.462)	10 (-0.03 \pm 0.402)	0.073
Disease duration			
< 5 y	12 (0.18 \pm 0.639)	-	< 0.001
\geq 5 y	8 (-1.46 \pm 0.673)	-	
Severity			
PASI < 5	10 (0.05 \pm 0.943)	-	0.02
PASI \geq 5	10 (-1 \pm 0.891)	-	
Sunlight exposure (/week)			
< 10h	14 (0.85 \pm 0.893)	-	0.008
\geq 10h	6 (0.41 \pm 0.835)	-	
T-score			
Normal	16	36	0.274
Osteopenia	4	4	
Osteoporosis	0	0	
total	20 (-0.475 \pm 1.0432)	20 (-0.1910 \pm 0.45345)	

Abbreviations: SD, standard deviation; h, hours

Table 3. Correlation between study variables in patients with psoriasis vulgaris

	Age	Height	Weight	BMI	Disease duration	PASI score	Sunlight exposure	T-score
Age								
Cc	1							
S								
Height								
Cc	-0.248	1						
S	0.291							
Weight								
Cc	0.283	0.515	1					
S	0.227	0.020						
BMI								
Cc	0.489	-0.117	0.790	1				
S	0.029	0.623	0.000					
Disease duration								
Cc	0.645	-0.272	0.092	0.289				
S	0.002	0.245	0.699	0.217	1			
PASI score								
Cc	0.568	-0.386	-0.029	0.238	0.385			
S	0.009	0.092	0.902	0.313	0.094	1		
Sunlight exposure								
Cc	-0.555	0.428	0.047	0.247	-0.623	-0.490		
S	0.011	0.060	0.845	0.293	0.003	0.028	1	
T-score								
Cc	-0.873	0.131	-0.172	0.277	-0.599	-0.523	0.581	1
S	0.000	0.581	0.469	0.238	0.005	0.018	0.007	

Abbreviations: Cc, correlation coefficient; S, significance

Similarly, we discovered that in patients with psoriasis vulgaris, a longer duration of the disease was linked with a significant reduction in BMD, as was greater disease severity. While no difference in BMD was observed between cases and controls overall, this was not true for those aged 40 or above. Another study found that patients with osteopenia or osteoporosis had a longer disease duration, with an average of 8.8 years. It was stated that there is an inverse relationship between the average duration of psoriasis involvement and BMD⁹. The findings of that study are completely consistent with our findings.

Another study was conducted on 47 patients to assess BMD in psoriatic patients with peripheral arthritis (23 males and 24 females). All of the women were premenopausal, and 5% of the patients had osteoporosis. The duration of arthritis in psoriatic patients was not associated with a decrease in pelvic and lumbar spine density but with an increase in demineralization. Finally, it was stated that psoriatic patients with chronic peripheral arthritis are predisposed to osteoporosis¹⁰. Although we did not look at joint involvement and its relationship with BMD, we found that bone density in psoriasis patients was significantly related to disease duration.

CONCLUSION

In general, the findings of our study revealed that the mean T-score in patients with psoriasis vulgaris was significantly lower than the controls among those aged 40 or above. Furthermore, T-score had a significant inverse relationship with age, disease duration, and PASI score, but a significant direct relationship with sunlight exposure. As a result of the decrease in BMD in patients and its relationship with the severity and duration of the disease and the effectiveness of sunlight in increasing BMD, it is suggested that treatments and recommendations to prevent osteoporosis are given to all psoriasis vulgaris patients in addition to routine therapy.

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Authors' contributions

AK, LD, ZH, and AT involved in the clarification and collecting of data. AT, AK, EG, ZH and LD involved in writing of the manuscript draft. AT, AK, MA and LD involved in editing of the manuscript. AT, AK and LD is involved in critically revising the whole manuscript. AT, AK and LD are responsible

for presenting data and submitting the manuscript. All authors reviewed and approved the final version of the manuscript.

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