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Original Investigation

Prevalence of metabolic syndrome and degree of cardiovascular disease risk in patients with Psoriatic Arthritis

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Abstract

Objective: The aim of this study was to identify the prevalence of metabolic syndrome (MetS) and degree of cardiovascular disease (CVD) risk in patients with psoriatic arthritis (PsA).

Material and Methods: We performed a cross-sectional study on 102 adult patients with PsA and a control group of 102 patients with rheumatoid arthritis (RA). MetS was diagnosed according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) and International Diabetes Federation (IDF) criteria. The Framingham risk scores of 10-year risk of CVDs and coronary heart disease (CHD) were also calculated.

Results: The prevalence of MetS was higher in patients with PsA than in those with RA, according to the NCEP-ATP III (40.6% vs. 24.7%, respectively; p=0.019) and IDF (46.8% vs. 27.9%, respectively; p=0.05) criteria. The prevalence of MetS was higher in female patients with PsA (p=0.009) than in male patients. A significantly increased prevalence of hypertriglyceridemia was determined in patients with PsA (p=0.019). No significant difference existed between the two groups with respect to 10-year CVD (p=0.333) and CHD (p=0.798) risks. Additionally, there were no significant differences between the clinical subtypes of PsA with regard to MetS (p=0.229).

Conclusion: MetS prevalence increased in patients with PsA compared with those with RA, whereas the risks were similar for CVDs and CHD. For this reason, optimal protection measures should be taken and guidelines should be applied to achieve adequate metabolic control in patients with PsA.

Keywords: Psoriatic arthritis, metabolic syndrome, cardiovascular disease, coronary heart disease, rheumatoid arthritis

Introduction

Psoriatic arthritis (PsA) is a type of chronic inflammatory arthritis that affects 7% to 40% of patients with psoriasis (1-3). PsA is classified as a spondyloarthropathy and can have diverse clinical manifestations, such as oligoarticular arthritis, rheumatoid arthritis (RA)-like symmetric-polyarticular arthritis, distal interphalangeal joint-dominant arthritis, and spondylitis-predominant arthritis or arthritis mutilans (4). Worldwide, the prevalence of PsA is approximately 0.1% to 1.0% (4). A study has reported that 0.05% of adults in Havza, in western Turkey, have PsA (5).

Metabolic syndrome (MetS) is a systemic proinflammatory state that includes a constellation of cardiovascular risk factors, such as dyslipidemia, obesity, increased fasting glucose levels, and hypertension; its prevalence is increasing worldwide. Studies on the prevalence of MetS in Turkey ranges from 26.5% to 42.6% (6-8). Recent studies have shown that the prevalence of MetS and cardiovascular diseases (CVDs) increases in patients with PsA and that CVDs are the most common cause of death in patients with PsA (9-14). The aim of this study was to identify the prevalence of MetS and the degree of CVD risk in patients with PsA compared to patients with RA in a Turkish population.

Material and Methods

We performed a cross-sectional study in 102 adult patients with PsA (72 women and 30 men, mean age: 44±11.6 years) who fulfilled the classification criteria for psoriatic arthritis (CASPAR) (15). The control group consisted of 102 patients with RA (76 women and 26 men, mean age: 47±11.6 years) who fulfilled the European League against Rheumatism and the American College of Rheumatology criteria (16). The CASPAR criteria have been validated in a Turkish cohort of patients with PsA (17). The study was approved by the Ethics Committee of the the Şişli Etfal Training and Research Hospital and conforms to the provisions of the Declaration of Helsinki developed by the World Medical Association. Written informed consent was obtained from all patients who participated in this study.

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In this investigation, 102 consecutive PsA and 102 consecutive patients with RA were studied from May 2011 to September 2012 at the Şişli Etfal Hospital, İstanbul. The clinical characteristics of the patients and the medications used for the treatment and control of these diseases are shown in Table 1. Serologic tests, including fasting glucose, triglyceride, cholesterol, insulin, C-peptide, and C-reactive protein (CRP) levels; erythrocyte sedimantation rate (ESR); and anthropometric measurements, such as body height, weight, and blood pressure, were evaluated at the time of the study. Some data, such as rheumatoid factor, anti-cyclic citrullinated peptide, and drug history, were also obtained from patient records in patients previously admitted to our clinic. Some patients were newly diagnosed with RA or PsA and had not received any treatment.

The homeostatic model assessment of insulin resistance (HOMA-IR) is a method used to quantify insulin resistance. It is calculated by the following formula: fasting plasma glucose (g/dL)×fasting plasma insulin (IU/mL)/405. The C-peptide level (normal level: 1.1 to 5 ng/mL) was measured using IMM2000/2006 (Siemens), and the insulin level (normal level: 3 to 25 uIU/mL) was tested using COBAS e602.

MetS was diagnosed using the criteria of the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) (18) and the International Diabetes Federation (IDF) (19). According to the NCEP-ATP III report, participants who have three or more of the following five criteria are defined as having MetS: 1) abdominal obesity: waist circumference of >102 cm in men and >88 cm in women, 2) hypertriglyceridemia: ≥150 mg/dL (≥1.695 mmol/L), 3) low High-Density Lipoprotein) (HDL) cholesterol levels: <40 mg/dL (<1.036 mmol/L) in men and <50 mg/dL (<1.295 mmol/L) in women, 4) high blood pressure: ≥130/85 mmHg or receiving medication for hypertension at the time of the study, and 5) high fasting glucose levels: ≥100 mg/dl (≥6.1 mmol/L). According to the IDF criteria, for a person to be defined as having MetS, he or she must have central obesity (defined as waist circumference of >94 cm for men and >80 cm for women) and any two of the following four factors: 1) increased triglyceride levels (≥150 mg/dL), 2) low HDL-C level (<40 mg/dl for men and <50 mg/dL for women), 3) raised systolic blood pressure (>130 mm Hg) or diastolic blood pressure of >85 mm Hg or treatment of previously diagnosed hypertension, and 4) elevated fasting plasma glucose level of ≥100 mg/dl or previously diagnosed type 2 diabetes. The 10-year risk scores for CVDs and coronary heart disease (CHD) were calculated using the Framingham risk score model (http://www.framinghamheartstudy. org/risk) (20).

Table 1. Clinical characteristics of the study groups

	PsA (n=102)	RA (n=102)	p
Female (n, %)	72 (70.6)	76 (74.5)	0.530
Age (mean±SD, years)	44.7±11.6	47.0±11.6	0.149
Age at disease onset (mean±SD, years)	38.9±12.2	40.8±12.5	0.260
Disease duration (mean±SD, years)	6.5±3.2	6.7±5.3	0.680
Medication for hypertension (%)	19.8	33.3	0.029
Medication for diabetes mellitus (%)	14.7	10.9	0.401
Medication for hyperlipidemia (%)	5.9	6.7	0.788
History of coronary heart disease (%)	1.9	0.9	0.561
Exposure to smoking (%)	38.3	33.3	0.469
Family history of heart disease (%)	20.4	17.6	0.621
ESR (mean±SD, mm/h)	16.8±17.1	22.0±20.4	0.029
CRP (mean±SD, mg/L)	12.5±19.8	14.9±23.8	0.671
Drugs used for the disease			
Corticosteroids	20/93	69/102	<0.001
Methotrexate	56/93	58/102	0.549
Sulfasalazine	15/93	23/101	0.244
Hydroxychloroquine	7/93	51/102	<0.001
Leflunomide	7/93	24/102	0.002
Cyclosporine	1/93	1/102	0.948
Biological agents	11/93	10/102	0.241
NSAIDs	13/93	8/102	0.167
Family history of psoriasis (n, %)	39 (38.2)	-	
Enthesopathy (n, %)	32 (31.4)	-	
Nail involvement (n, %)	51 (50.0)	-	
Dactylitis (n, %)	18 (17.6)	-	
Subtype of psoriatic arthritis (n, %)		-	
Olygoarticular type	45 (44.1)	-	
Distal interphalangeal joint dominant	9 (8.8)	-	
RA-like symmetric-polyarticular	29 (28.4)	-	
Spondylitis-predominant arthritis	18 (17.6)	-	
Arthritis mutilans	1 (1.0)	-	

RA: rheumatoid arthritis; PsA: psoriatic arthritis; ESR: erythrocyte sedimantation rate; CRP: C-reactive protein; NSIAD: nonsteroidal anti-inflammatory drugs

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS Inc.; Chicago, IL, USA) 16.0 for Windows was used for statistical analysis. Relationships between the different groups were analyzed with the chi-square (χ^2) and Fisher's exact tests. Descriptive statistics are presented as means±standard deviations, and categorical variables are given as percentages. Student's t-test and the Mann-Whitney U test were used to compare means and test for significant differences in anthropometric and metabolic indices between the groups. Analysis of variance (ANOVA) was used when the analysis of more than two subgroups was required. A p value of <0.05 was considered statistically significant.

Results

Our study included 102 adult patients with PsA; 102 adult patients with RA served as a control group. The demographic characteris-

tics of the patients, such as age, gender, ethnicity, disease duration, and age at disease onset, were similar in both groups. MetS prevalence in patients with PsA was 40.6%, compared to 24.7% in the RA control group, according to the NCEP-ATP III criteria. When the IDF criteria were used for this comparison, these ratios changed to 46.8% and 27.9%, respectively. The prevalence of MetS was higher in patients with PsA than in the control group according to both NCEP-ATP III (χ^2 test, p=0.01) and IDF criteria (χ^2 test, p=0.05). The prevalence of MetS was higher in female patients with PsA (χ^2 test, p=0.009); however, no difference existed between men and women in the control group (χ^2 test, p=0.240). No statistically significant differences emerged between the two groups with respect to the 10-year risk of CVDs (χ^2 test, p=0.33) or CHD (χ^2 test, p=0.78) (Table 2).

Cardiovascular disease risk factors, such as waist circumference and fasting glucose, and mean triglyceride levels were similar in both groups. However, the frequency of hypertriglyceridemia was higher in patients with PsA than in the control group (Student's t-test, p=0.019). The mean HDL-C level was lower in patients with PsA than in the control group (Mann-Whitney U test, p=0.04); this difference was not significant according to the MetS diagnostic criteria (Table 2).

With respect to the impact of PsA on blood pressure, the frequency of hypertension was similar in the two groups; however, mean diastolic blood pressure was significantly higher in the control group (mean 76±11.9 mm Hg in patients with PsA versus 80.2±13.3 in patients with RA; Student's t-test, p=0.033). Mean triglyceride level, fasting glucose, insulin level, HOMA-IR, and uric acid level were similar in both groups. Risk factors associated with MetS that are comparable in patients with PsA with and without MetS include ESR and CRP; there was no significant difference in these factors between the two groups (Table 1).

In our study, the oligoarticular subtype of PsA was the most common type (44%). The prevalence of MetS was similar among the different subtypes of PsA (the prevalence for olygoarticular was 34%, distal interphalangeal joint dominant was 33.3%, RA-like symmetric-polyarticular was 57.6%, and spondylitis-predominant arthritis was 35.2%; χ^2 test, p=0.229). No significant differences existed between the groups for triglyceride level, fasting glucose, insulin level, HOMA-IR, uric acid, and ESR and CRP levels (ANOVA, p>0.05). Conversely, the prevalence of hypertension according to the MetS criteria was higher among patients with

Table 2. Prevalence of metabolic syndrome and CVD-CHD in patients with PsA and RA

	PsA (n=102)	RA (n=102)	p
Metabolic syndrome (%)			
-NCEP ATP III	40.6	24.7	0.019
-IDF	46.8	27.9	0.050
Framingham CVD risk score (mean±SD)	9.2±10.5	10.6±12.3	0.333
10-year CVD risk (%)			
<10	70.4	64.4	0.460
10 to 20	15.9	23.3	
>20	13.6	12.2	
Framingham CHD risk score (mean±SD)	7.3±8.1	6.9±6.9	0.798
10-year CHD risk (%)			
<10	74.7	75.5	0.815
10 to 20	14.9	16.6	
>20	10.3	7.7	
Abdominal obesity (%)			
Women>88 cm	66	63.7	0.739
Men>102 cm			
Fasting glucose ≥100 mg/dL or under treatment			
Type II DM (%)	30.7	20.8	0.108
Hypertension ≥130/85mmHg or under treatment (%)	47.5	52	0.525
Triglyceride levels ≥150 mg/dL (%)	34	19.2	0.019
HDL cholesterol (%)	39.6	30	0.171
Men<40 mg/dL	(mean±SD)	(mean±SD)	
Women<50 mg/dL			
Body height (cm)	164.4±7.7	162.0±8.2	0.034
Body weight (kg)	77.3±13.7	74.4±15.6	0.232
Body mass index (kg/m²)	28.7±5.2	28.7±6.2	0.960
Waist circumference (cm)	99.0±13.5	99.0±15.2	0.984
Blood pressure (mm/Hg)			
Systolic	124.2±17.3	126.3±21.9	0.445
Diastolic	76.4±11.9	80.2±13.3	0.033
Triglycerides level (mg/dL)	127.7±57.0	117.1±64.1	0.063
Total cholesterol level (mg/dL)	197.7±36.5	200.1±41.4	0.560
LDL cholesterol level (mg/dL)	120.6±33.9	121.7±33.5	0.833
HDL cholesterol level (mg/dL)	50.1±12.6	55.2±17.3	0.047
Fasting glucose (mg/dL)	100.9±32.8	93.6±17.7	0.053
Insulin level (UI/mL)	13.1±9.3	11.1±9.7	0.072
C-peptide (ng/mL)	2.6±1.3	2.6±2.0	0.250
HOMA-IR	3.1±2.3	2.6±2.9	0.053
Uric acid (mg/dL)	4.4±1.2	4.6±5.4	0.136

RA: rheumatoid arthritis; PsA: psoriatic arthritis; CHD: coronary heart disease; CVDs: cardiovascular diseases; DM: diabetes mellitus; NCEP-ATPIII: National Cholesterol Education Program Adult Treatment Panel III; IDF: International Diabetes Federation; LDL: low-density lipoprotein; HDL: high-density lipoprotein; HOMA-IR: homeostatic model assessment of insulin resistance

Table 3. Prevalence of metabolic syndrome in patients with RA compared with control groups, including PsA

	RA (n)	PsA (n)	General population (n)	Age (mean)	Gender (Female, %)	Criteria	MetS (%) RA	MetS (%) PsA	MetS (%) General population
Our study	102	102	-	47.0	74.5	NCEP ATP III	24.7	40.6	-
						IDF	27.9	46.8	-
Labitigan et al. (24)	1162	294	-	61.6	46	NCEP ATP III	19	27	-
Mok et al. (21)	699	109	-	53.3	81	NCEP ATP III	20	38	10-12
Da Cunha et al. (26)	283	-	226	-	-	NCEP ATP III	39	-	19
Dao et al. (27)	105	-	105	56.3	100	NCEP ATP III	40.9	-	16.2
Crowson et al. (28)	232	-	1241	58.8	75	NCEP ATP III	33	-	25
Toms et al. (29)	387	-	-	63.1	72	NCEP ATP III	40.1	-	-
Sahebari et al. (31)	120	-	500	45.5	88	NCEP ATP III	45.2	-	53.8
Akbal et al. (32)	71	-	67	51.4	85	NCEP ATP III	28.4	-	16
Özmen et al. (33)	52	-	30	51.0	71	NCEP ATP III	17.3	-	6.5
						WHO	28.8	-	9.7
Chung et al. (25)	Early=88	-	85	-	-	NCEP ATP III	30/42	-	22
	Long term=66					WHO	31/42		11

RA: rheumatoid arthritis; PsA: psoriatic arthritis; NCEP-ATPIII: National Cholesterol Education Program Adult Treatment Panel III; IDF: International Diabetes Federation; WHO: World Health Organization; MetS: metabolic syndrome

the symmetric polyarticular subtype of PsA (which is RA-like) than among those with other subtypes (χ^2 test, p=0.01).

Discussion

In this study, we found an increased MetS prevalence in patients with PsA compared with the RA control group; however, the two groups had similar risks of CVDs and CHD. Regardless of the applied criteria for MetS, significant between-group differences existed. A limited number of previous studies have indicated that the prevalence of MetS in patients with PsA is between 23.5% and 58.1% (21-24). There is one study that investigated the prevalance of MetS in a small number of patients with PsA in Turkey (9). The authors of that study reported that the prevalance of MetS in patients with PsA using NCEP criteria was 40.6%, which was similar to our results. Our study results are comparable with those in the literature and confirm the results of previous studies showing a strong association of PsA with MetS.

In a study by Kozan et al. (6), 33.9% of 4,259 individuals in Turkey were identified as having MetS, according to NCEP-ATP III criteria. Sarı et al. (8) also reported that the prevalence of metabolic syndrome was 26.5% in a Turkish urban population. Another study reported a MetS prevalence of 42.6%, according to IDF criteria, in addition to a higher ratio of abdominal obesity and MetS in female patients in the overall population (7). In our study, individuals representing the general population could not be taken in the control group for various reasons, including the study design and available budget. Therefore, a statistical comparison of MetS prevalence was not possible; however, according to previous large-scale, population-based studies, MetS prevalence is known to be higher in patients with PsA than in the overall population.

In contrast to studies related to PsA, a number of other studies have been published that investigate MetS prevalence in patients with RA (Table 3). In most of these studies, MetS prevalence was found to be higher in patients with RA than in control groups (21, 24-30). Other, smaller studies have reported either higher MetS prevalence in the control group (31) or no difference between the RA and control groups (32). The frequency of MetS in patients with RA and control groups may vary depending on the selected diagnostic methods (33).

In the literature, currently, there are only two studies in which MetS was identically compared in patients with PsA and those with RA, as in our current study (21, 24). In the study by Mok et al. (21) on 699 individuals with RA and 109 with PsA, they determined MetS prevalences to be 20% and 38%, respectively. Taking into consideration that the MetS prevalence in their research population was between 10% and 12%, the researchers concluded that MetS prevalence is higher in patients with PsA than in both the general population and patients with RA (21). In another study published by Labitigan et al. (24), a larger population was studied; results were obtained from 1,162 patients with RA and 294 patients with PsA. Patients with PsA were found to have a significantly higher MetS prevalence than those with RA (27% vs. 19%, respectively), in spite of the younger age of the patients with PsA in this study.

Another article investigated the prevalence of MetS in patients with RA in Turkey; however, the study included a limited number of patients (n=71). MetS prevalence was found to be 28.4% in this study (32). In Turkey, large-scale studies investigating the general population for MetS prevalence have given results within the range of 26.5% to 42.6% (6-8). The MetS prevalence of 24.7% in patients with RA in our study is similar to that shown by Akbal et al. (32), Their results support our findigs about-MetS prevalence in patients with RA.

However, these results were incompatible with the results of studies conducted in other ethnic societies. In most of these studies, MetS prevalence was higher in patients with RA than in control groups (21, 24-27) The reason for the difference may be differences in patient selection. The RA group included in our study had an average age of 47.0±11.6 years, and the

disease duration was 6.7 years. In other studies focusing on MetS prevalence in patients with RA, the average patient age and disease duration are much greater. Many studies have demonstrated a correlation between an increased MetS frequency and advancing age in patients with RA (27, 30). Therefore, we suggest that the MetS prevalence identified in our RA control group is not generally applicable for all patients with RA.

In one study, for example, a higher MetS prevalence in patients with PsA was associated with higher triglyceride levels, obesity, and diabetes mellitus (24). Our study shows that MetS is more frequent in patients with PsA than in those with RA; however, obesity and diabetes mellitus did not vary in prevalence between these groups. Average triglyceride levels were comparable; however, the diagnosis of hypertriglyceridemia, according to NCEP-ATP III criteria, was more common in patients with PsA. One of the decisive factors affecting MetS prevalence in patients with PsA might be a decreased level of HDL cholesterol. The average HDL cholesterol level was 50 mg/dL in patients with PsA and 55 mg/dL in patients with RA. Other studies have demonstrated a lower HDL level in patients with PsA (34, 35).

From further subgroup analysis we performed to identify factors that aggravate MetS development in patients with PsA, we conclude that factors, such as disease duration, age at disease onset, PsA type, dactylitis, enthesitis, nail involvement, and medications, do not have any effect. In the PsA group, the prevalence of MetS was significantly higher in women. MetS was also more prevalent in women in the RA control group; however, the difference was not significant. The higher prevalence of MetS in women (regardless of whether they have PsA or RA) highlights gender as an important factor in MetS development. Additional studies are required in order to determine the risk factors that make women more prone to MetS.

The main limitation of this study is that we could not include individuals from the general population in the control group. To determine whether PsA is an independent risk factor for MetS and CVDs, MetS and CVD risks should be researched in a population that is demographically matched to the PsA population. A second limitation of our study is that we did not obtain PsA and psoriasis severity scores. Another limitation is that we considered ESR and CRP levels as the sole indicators of inflammation. Other essential inflammation indicators, such as TNF-α, IL-6, and adipokines, were not included in the study.

In this study, a higher MetS prevalence, especially in women, was found in patients with PsA than in those with RA; however, the risks of CVD and CHD were similar between the two groups. Our findings and results published in the literature indicate that the risk associated with MetS and CVDs is not lower in patients with PsA than in those with RA. For this reason, prevention and control guidelines recommended for RA should also be provided to patients with PsA until recommendations for prevention and treatment in patients with PsA are developed.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Şişli Etfal Training and Research Hospital.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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