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ORIGINAL ARTICLE – OPEN ACCESS

Cardiovascular Risk Factors and Metabolic Syndrome in Rheumatoid Arthritis and Spondyloarthritis: Correlation With Uric Acid Levels

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ABSTRACT

Objective: We aimed to investigate cardiovascular disease (CVD) risk and risk factors and evaluate the relationship among disease activity, inflammation markers, and uric acid levels in patients with rheumatoid arthritis (RA) and spondyloarthritis (SpA).

Materials and Methods: In this study, 98 patients with RA, 41 patients with SpA, and 95 controls were included. Participants' demographic features, levels of body mass index (BMI), blood pressure (BP), waist circumference, glucose, cholesterol, uric acid, disease activity, and metabolic syndrome (MetS) prevalence were recorded. The 10-year CVD risk and heart age were calculated by using the Framingham risk score.

Results: The mean BMI, systolic BP, diastolic BP, and waist circumference were higher in RA patients. There was no difference among patients with RA, those with SpA, and controls in terms of MetS prevalence (43.9%, 41.5%, and 35.8%, respectively, p=0.510) and 10-year CVD risk (12.7±10.2, 9.2±8.7, and 11.4±10.8, respectively, p=0.174). Higher uric acid levels were indicated in patients with MetS in both RA and SpA groups. Uric acid levels were associated with the Framingham score in RA patients.

Conclusion: In patients with RA and SpA, CVD risk was determined to be similar to that of the general population. On the other hand, the uric acid level was found to be correlated with the risk of MetS, and uric acid is associated with CVD risk, especially in patients with RA.

Keywords: Metabolic syndrome, rheumatoid arthritis, spondyloarthritis, uric acid

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INTRODUCTION

Spondyloarthritis (SpA) and rheumatoid arthritis (RA) are chronic inflammatory damaging diseases with specific characteristics. Several studies have indicated higher cardiovascular disease (CVD) risk and mortality rates among these patients compared to the general population (1, 2). Cardiovascular involvement has been demonstrated as the most important cause of mortality in both of the diseases (3, 4). It is considered that systemic inflammation, circulating proinflammatory cytokines, and traditional risk factors may be effective on accelerated atherosclerosis, hypertension, dyslipidemia, obesity, and insulin resistance (2, 5).

Low high-density lipoprotein cholesterol (HDL-C), high triglycerides (TG), hypertension, abdominal obesity, and insulin resistance describe a group of risk factors for CVD and comprise the metabolic syndrome (MetS). Higher MetS frequency has been reported in patients with RA and ankylosing spondylitis (AS) compared to the general population (2, 5).

In recent years, while examining the new biomarkers pointing to the CVD risk, it has been argued that serum uric acid levels can be a potent component for vascular events in RA; likewise, hyperuricemia may be correlated to MetS in general population (6–9). There are a limited number of studies that investigated the association between uric acid and cardiovascular risk in patients with RA (8, 9). On the other hand, to the best of our knowledge, the relationship among uric acid, cardiovascular risk, and inflammatory markers has not been reported in patients with SpA.

The aims of this report are to examine MetS existence and CVD risk in healthy individuals, patients with RA, and those with SpA and evaluate the association among disease activity, inflammation markers, uric acid levels, and CVD risk.

MATERIALS and METHODS

This study was planned in rheumatology and family medicine outpatient clinics of a tertiary hospital. Ninety-eight patients with RA achieving the 2010 American College of Rheumatology (ACR) RA classification criteria, 41 pa-

tients with SpA fulfilling the 2010 Assessment of SpondyloArthritis international Society axial spondyloarthritis classification criteria, and 95 healthy controls without any inflammatory disease were included. Written informed consents of all participants were received. The ethics committee of Ankara Numune Training and Research Hospital approved this protocol (Approval date/number: 02/19/2015/E-15-420). Exclusion criteria were (a) <18 years old, (b) patients with an active infection, cancer, or thyroid dysfunction, and (c) pregnant patients.

Demographic features, disease diagnosis, and medications of individuals (steroids, nonsteroidal anti-inflammatory drugs [NSAIDs], synthetic and biological disease-modifying antirheumatic drugs [DMARDs], and drugs for diabetes, hypertension, and hyperlipidemia) were recorded. History of smoking, habitual drinking, and comorbid diseases including diabetes mellitus, hypertension, and dyslipidemia were assessed. Body weight and height, waist circumference, and blood pressure of the participants were determined by the same physician. The laboratory measures including values of plasma glucose, serum lipids (total cholesterol, low-density lipoprotein [LDL], HDL, TG), uric acid, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) were obtained. Rheumatoid factor (RF) and anti-cyclic citrullinated peptide (aCCP) were also noted for patients with RA. Body mass indexes (BMI) of the individuals were calculated in kg/m^2. Individuals whose BMI values are >30 kg/m^2 were specified as obese.

Tender and swollen joint count, morning stiffness, pain, and patients' global assessments using a visual analog scale (VAS, 0–10 cm) were recorded in patients with RA and SpA. Disease activity score 28 (DAS 28), Ankylosing Spondylitis Disease Activity Score (ASDAS), and Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) were calculated. Remission, low, moderate, and high disease activities were identified according to DAS 28 results for patients with RA (≤2.6, 2.7–3.2, 3.3–5.1, and >5.1, respectively). Scores of BASDAI and ASDAS are calculated in patients with SpA. A BASDAI value of >4 is considered active disease. Inactive, low, high, and very high disease activities were specified according to the ASDAS score (<1.3, 1.3–2.1, 2.2–3.5, and >3.5, respectively) (10–12).

National Cholesterol Education Program Adult Treatment Panel III (NCEP/ATP III) criteria were used for identifying MetS. These criteria require at least three of the under-mentioned components for diagnosis:

- high waist circumference >102 cm and >88 cm (for men and women, respectively),
- elevated triglyceride levels (≥150 mg/dl),
- low HDL cholesterol levels (<40 mg/dl in men/<50 mg/dl in women),
- BP ≥130/85 mmHg, and
- fasting plasma glucose ≥110 mg/dl (13).

Heart age and 10-year CVD risk were evaluated with the Framingham risk score available at "www.framinghamheartstudy.org." Data on age, gender, smoking status, systolic BP, hypertension treatment, diabetes history, HDL, and total cholesterol levels were used to assess risk of developing CVD in the following ten years (14).

SPSS (Statistical Package for Social Sciences) for Windows 18 package program was used for statistical analyzes. Normality analysis was studied with the Shapiro–Wilk test. General descriptive statistics are summarized as mean, standard deviation, median (1st–3rd percentile), number, and percentage. Chi-square test, one-way analysis of variance (ANOVA), independent samples T test, Mann–Whitney U tests (according to normality test results, parametric and non-parametric tests were used) were used to compare variables between groups. Post-hoc multiple comparisons were performed by the Bonferroni test for unequal samples. The Spearman correlation analysis was used to examine the relationship among CVD risk, clinical variables, and laboratory variables. The association among the Framingham score, clinical properties, and laboratory markers was analyzed with multiple linear regressions. Variable selection was started with univariate analyzes and at least moderately related factors were selected for multivariate analyzes. Assumptions of regression including linearity, homoscedasticity, multicollinearity, independent errors, and normally distributed errors were checked. The Durbin Watson statistics shows whether the correlation between the error terms was 2.04 for an RA regression model and 2.22 for an AS regression model. The F-values were 10.84 and 20.83, and the p-values were found to be <0.001 and <0.001 in the ANOVA table, which showed that the final regression model was significant (regression model for patients with RA and those with AS, respectively). A value of $p<0.05$ was acceded to be statistically significant.

RESULTS

Two hundred and thirty-four individuals (41.8% patients with RA, 17.6% patients with SpA, and 40.6% controls) were included in this study. The mean age of patients with SpA was 44.9±11.2 and this group was younger than RA and control groups. The rates of male participants were 33.7%, 61%, and 33.7% in RA, SpA, and control groups, respectively.

Thirty-seven patients with RA (37.1%) were in remission, 19 patients (19.4%) had low disease activity, 31 patients (31.6%) had moderate disease activity, and 11 patients (11.2%) had severe disease activity according to DAS 28 results. Fourteen of 41 patients with SpA (34.1%) had very high disease activity, 16 patients (39%) had high disease activity, 7 patients (17.1%) had low disease activity, and only four patients with SpA were inactive according to the ASDAS scores. Treatment with biologic DMARDs (bDMARDs) was frequent in patients with SpA, whereas corticosteroid and synthetic DMARDs (sDMARDs) were more common in patients with RA.

The number of obese patients, BMI ≥30 kg/cm^2, were 43.9%, 29.3%, and 20.0% in RA, SpA, and control groups (p=0.002). In the RA group, the mean BMI, systolic and diastolic BP, and waist circumference were higher than in the controls. HDL cholesterol was lower in the SpA group than in the other groups. MetS existence (fulfilling NCEPT/ATP III criteria) was 43.9%, 41.5%, and 35.8% in RA, SpA, and control groups. The 10-year CVD risk rate was 12.7%, 9.2%, and 11.4%; moreover, the heart age was 66.6±17.7, 53.8±16.2, and 59.7±21.7 in RA, SpA, and control groups, respectively. Table 1 summarizes the clinical and laboratory characteristics of the patients and controls.

Clinical and laboratory characteristics, including age, gender, smok-

Table 1. Baseline characteristics of the study population and comparisons between controls and patient groups

	RA (n=98)	SpA (n=41)	Controls (n=95)	p*
Age (mean, SD)	56 (49–64.3)	44 (38.5–53)	55 (42–64)	<0.001[b,c]
Gender				
Female (n, %)	78 (66.3)	16 (39)	63 (66.3)	<0.001
Male (n, %)	20 (33.7)	25 (61)	32 (33.7)	
Smokers (n, %)	9 (9.2)	18 (43.9)	10 (10.5)	<0.001
Waist (cm) (Median, 1st–3rd quartile)	104 (93–110)	98 (93–103.8)	96 (84.5–106.5)	<0.001[a]
BMI (kg/m^2) (Median, 1st–3rd quartile)	29.4 (25.9–33.1)	27.8 (25.5–30.9)	26.4 (23.5–30.5)	0.007[a]
SBP (mm-Hg) (Median, 1st–3rd quartile)	137.5 (120–150)	127.5 (11.3–140)	120 (110–130)	<0.001[a,c]
DBP (mm-Hg) (Median, 1st–3rd quartile)	90 (80–100)	80 (75–95)	80 (70–90)	<0.001[a]
Laboratory measures[v]				
Glucose (mg/dl)	95 (85.8–113)	102 (93– 110.5)	97 (88–107)	0.901
HDL cholesterol (mg/dl)	54.5 (46–67.3)	47.5 (39.3–51.8)	51 (42–62.5)	<0.001[a,c]
LDL cholesterol (mg/dl)	133.5 (107.7–155.3)	117 (96.5–139)	123.5 (103.5–155)	0.137
Total cholesterol (mg/dl)	215.3±39.6	196.5±36.1	211.3±46.3	0.055
Triglycerides (mg/dl)	115.5 (91–167.5)	138.5 (96.2–85.7)	128 (82.5–189.5)	0.188
Uric acid (mg/dl)	4.9 (3.9–5.7)	5.2 (4.1–5.9)	4.8 (3.9–5.9)	0.164
ESR (mm/h)	21.5 (12.7–33)	16.5 (8.3–34.5)	7 (3–13)	<0.001[a,b]
CRP (mg/dl)	7 (4–15.3)	9 (5–25)	2 (1–4)	<0.001[a,b]
RF + (n, %)	73 (74.4)	–	–	–
aCCP+ (n, %)	85 (86.7)	–	–	–
Comorbidities				
Hypertension (n, %)	39 (39.8)	8 (19.5)	25 (26.3)	0.029
Type II DM (n, %)	11 (11.2)	3 (7.3)	18 (18.9)	0.126
BMI>30 kg/m^2 (n, %)	43 (43.9)	12 (29.3)	19 (20.2)	0.002
MetS existence (n, %)	43 (43.9)	18 (41.5)	34 (35.8)	0.510
Framingham risk score (Risk %)	10.6 (5.8–15.2)	6.8 (3.4–10.4)	8.6 (3–17.8)	0.174
Heart age	68.5 (54.5–83.3)	53 (40–68)	63.0 (43–76)	0.001[a,c]
Disease duration (year)	14 (8.8–20)	10 (4–19.5)	–	0.179
DAS28 ESH	2.9 (2.3– 4.2)	–	–	–
ASDAS ESH	–	2.4 (1.9–3.3)	–	–
BASDAI	–	3 (1.8–6)	–	–
Medication				
NSAIDs (n, %)	50 (51)	21 (51.2)	–	0.595
Corticosteroids (n, %)	53 (54.1)	2 (4.9)	–	<0.001
sDMARDs (n, %)	83 (84.7)	15 (36.6)	–	<0.001
bDMARDs (n,%)	12 (12.2)	11 (26.8)	–	<0.001

VRA: Rheumatoid arthritis; SpA: SpondyloArthritis; BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; HDL: High-density lipoprotein; LDL: Low-density lipoprotein; DM: Diabetes mellitus; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; RF: Rheumatoid factor; aCCP: Anti-cyclic citrullinated peptide; MetS: Metabolic syndrome; DAS 28: Disease activity score 28; ASDAS: Ankylosing spondylitis disease activity score; BASDAI: Bath ankylosing spondylitis disease activity index; NSAIDs: Nonsteroidal anti-inflammatory drugs; sDMARDs: Synthetic disease-modifying antirheumatic drugs; bDMARDs: Biological disease-modifying antirheumatic drugs; *One-way analysis of variance-post-hoc analyzes, Mann–Whitney U, and chi-square tests were used; [v]Normally distributed values: mean, SD/nonnormally distributed values: median 1st–3rd quartile; [a]: Difference between RA and control groups; [b]: Difference between SpA and control groups; [c]: Difference between RA and SpA groups

ing habits, BMI, waist circumference, values of ESR, CRP, and uric acid, use of corticosteroids and DMARDs, pain, disease duration, RF titers, DAS 28, ASDAS, and BASDAI scores, were analyzed between groups with and without MetS in RA and SpA groups.

The mean age was 55.3±9.5 and 56.7±11.5, disease duration was 15.3±9.1 and 13.1±7.4, RF titer was 61.2±56.1 and 55.8±64.2, ESR was 23.6±13.7 and 23.5±17.6, CRP was 13.9±26.1 and 19.4±48.4, and DAS 28 score was 3.4±1.4 and 3.2±1.3 in pa-

Table 2. Comparison of clinical and laboratory characteristics in patients with and without metabolic syndrome

	Patients with RA			Patients with SpA		
	With MetS	Without MetS	p*	With MetS	Without MetS	p*
Waist circumference** (cm)	105 (98–115)	102 (88–110)	0.043	103 (98–109)	97 (85–102)	0.012
Body mass index** (kg/m^2)	30.5 (28.6–33.3)	27.7 (23.4–31.6)	0.004	29.4 (27.4–32.4)	26.2 (23.8–30.6)	0.025
Uric acid** (mg/dl)	5.1 (4.1–6.0)	4.5 (3.6–5.3)	0.039	5.4 (4.8–6.9)	4.6 (3.4–5.7)	0.040
Corticosteroid use (n, %)	16 (37.2)	37 (67.3)	0.003	–	–	–

RA: Rheumatoid arthritis; SpA: SpondyloArthritis; *Mann–Whitney U and chi-square tests were used; **: Median (1st–3rd quartile) values were used

Table 3. The correlation among Framingham risk scores, clinical features, and laboratory measures

	Framingham risk score					
	Patients with RA		Patients with SpA		Control group	
	r	p	r	p	r	p
Age	0.670	<0.001	0.738	<0.001	0.620	<0.001
Disease duration (year)	0.149	0.144	0.259	0.102	–	–
BMI (kg/m^2)	0.086	0.400	0.149	0.353	0.309	0.002
Waist circumference (cm)	0.278	0.006	0.346	0.027	0.457	<0.001
DAS28-ESH	0.146	0.152	–	–	–	–
ASDAS-ESH	–	–	-0.266	0.092	–	–
BASDAI	–	–	-0.353	0.063	–	–
LDL (mg/dl)	0.234	0.020	0.178	0.268	0.013	0.903
Triglycerides (mg/dl)	0.139	0.173	0.279	0.078	0.076	0.465
Plasma glucose (mg/dl)	0.187	0.065	0.373	0.016	0.540	0.001
ESH (mm/h)	0.208	0.040	0.018	0.911	-0.73	0.487
CRP (mg/dl)	0.120	0.238	0.042	0.793	-0.37	0.730
Uric acid (mg/dl)	0.385	<0.001	0.197	0.222	0.098	0.398
RF (IU/ml)	0.218	0.033	–	–	–	–
aCCP (U/ml)	0.204	0.054	–	–	–	–

RA: Rheumatoid arthritis; SpA: SpondyloArthritis; BMI: Body mass index; LDL: Low-density lipoprotein; ESR: Erythrocyte sedimentation rate; CRP: C-reactive protein; RF: Rheumatoid factor; aCCP: Anti-cyclic citrullinated peptide; DAS 28: Disease activity score 28; ASDAS: Ankylosing spondylitis disease activity score; BASDAI: Bath ankylosing spondylitis disease activity index

tients with RA with and without MetS, respectively. The rate of male patients was 18.6% and 21.8% in patients with and without MetS (p>0.05). The mean age was 46.8±9.9 and 44.2±11.0, disease duration was 11.9±10.4 and 12.0±7.8, ESR was 21.1±17.9 and 21.0±15.4, CRP was 20.1±26.5 and 18.2±20.2, BASDAI was 3.8±2.4 and 3.7±2.3, ASDAS was 2.6±1.1 and 2.4±0.8, and the male patient rate was 52.9% and 66.7% in patients with SpA with and without MetS (p>0.05). The points with significant difference between the groups with and without the MetS are summarized in Table 2.

Correlations among the Framingham risk scores, clinical features (age, disease duration, BMI, waist circumference, and disease activity scores), and laboratory measures (uric acid, ESR, CRP, RF, and aCCP) were analyzed. Age was correlated with the Framingham score in all groups with a moderate association (r=0.67, 0.73, and 0.67 in RA, SpA, and control groups, respectively). Waist circumference, ESR, LDL, uric acid, and RF levels showed a poor association with the Framingham score in the RA group. Two variables, plasma glucose and waist circumference, indicated a poor correlation with the Framingham score in patients with SpA (Table 3).

Factors in relation to the Framingham risk score such as age, waist circumference, LDL, ESR, uric acid, and RF were investigated by univariate regression analyzes. The results indicated that age (p=0.001, B=0.55), LDL (p=0.030, B=0.47), uric acid (p=0.005, B=2.26), and RF (p=0.016, B=0.43) values are associated with the Framingham risk score, whereas there was no association among the Framingham score, waist circumference, and ESR in patients with RA. These four variables were included in multivariate linear regression analyzes and significant relationship was determined between Framingham risk score and age, LDL and uric acid. (Regression analyzes met the assumptions including lin-

Table 4. Multiple linear regression analyzes indicating the association between Framingham risk score and variables

	B	SE	p*	95%CI	
Patients with RA Framingham risk score					
Constant	-24.48	4.76	<0.001	-33.94	-15.02
Age	0.52	0.06	<0.001*	0.39	0.65
LDL	0.51	0.02	0.031*	0.005	0.09
Uric acid	1.22	0.66	0.040*	0.68	1.24
Rheumatoid factor	0.019	0.01	0.108	0.01	0.04
Patients with SpA Framingham risk score					
Constant	-28.53	8.07	0.001	-44.88	-12.17
Age	0.50	0.10	<0.001*	0.29	0.70
Glucose	0.17	0.07	0.060	-0.01	0.30

B: Regression coefficient; SE: Standard error; Cl: Confidence interval; RA: Rheumatoid arthritis; SpA: SpondyloArthritis; LDL: Low-density lipoprotein. *p<0.05

ear relationship between the Framingham score and the independent variables; homoscedasticity; independence of observations; appropriate sample size that provided N>50+8 m). Age, plasma glucose, and waist circumference were correlated with the Framingham score in patients with SpA and univariate regression analyzes showed that age (p<0.001, B=0.545) and plasma glucose (p=0.016, B=0.235) were related with the Framingham score. In multivariate linear regression analyzes, only age was found to be associated with the Framingham score. Multivariate regression analyzes are summarized in Table 4.

Patients with RA were divided into two groups according to the Framingham risk score <10% (n=46) and ≥10% (n=52). Uric acid levels were higher in those patients with a Framingham score ≥10% (4.44±1.28, 5.15±1.14 in patients with risk score <10% and ≥10% respectively, p=0.005). A receiver operating characteristic (ROC) curve was drawn for uric acid to detect an increase in cardiovascular risk by more than 10% (Fig. 1). ROC was performed for uric acid (n=46 and n=52 patients with Framingham risk <10% and ≥10%, respectively). The area under the curve for uric acid was 0.693±0.05 (0.58–0.80 CI 95%, p=0.001). The sensitivity (probability that a patient with >10% Framingham risk score had UA level over a determined cutoff) and specificity (probability that a patient with <10% Framingham risk score had UA level below that cutoff) of UA were calculated for a cutoff level. The best Youden index was 0.38 and a cutoff value of UA 5.05 mg/dL proved 58% sensitivity and 80% specificity.

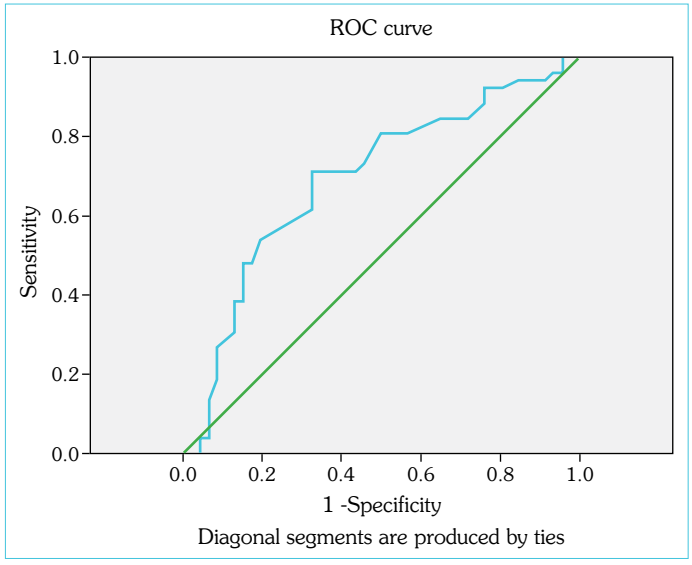

Figure 1. Receiver operating characteristic (ROC) curve for uric acid to detect an increase in cardiovascular risk by more than 10%. ROC was performed for uric acid (n=46 and n=52 patients with Framingham risk <10% and ≥10%, respectively). Area under the curve for uric acid is 0.693 with p=0.001

DISCUSSION

In the current study, the aim was to explore CVD risk factors and MetS existence in patients with RA and SpA and to appraise the relationship among CVD risk, laboratory markers, and disease activity. Our findings suggest that cardiovascular risk was similar in control and patient groups; however, the Framingham risk score was associated with uric acid and RF levels in patients with RA.

Studies reported increased CVD risk and mortality in patients with RA and AS (15, 16). For CVD risk management, European League Against Rheumatism endorses that CVD risk should be assessed every 5 years in patients with RA, AS, and psoriatic arthritis (17). Agarwal et al. (15) indicated that various CVD risk factors were worse in RA although a 10-year CVD risk with Framingham score was similar between the patients with RA and control groups. In the same way, in a study with patients with AS, the CVD risk score was found to be similar to the control group (2). In this study, similar CVD risk percentages were obtained in patient and control groups as in other studies. On the other hand, when individual cardiovascular risk factors were analyzed, it was noted that BMI, waist circumference, and BP patterns were higher in patients with RA. Previous studies showed that a great number of patients with RA with low or moderate cardiovascular risk scores had carotid atherosclerosis on ultrasound (18–20). Therefore, patients who do not have high CVD risk scores may have greater risk than we predict and they may benefit from different methods of evaluation for CVD risk.

Metabolic syndrome is framed by classical cardiovascular risk factors. The prevalence of MetS in the literature ranges between 10.5% and 53.8% in the general population, between 20% and 50% in patients with RA, and between 11% and 45.8% in patients with AS. MetS prevalence is reported to be higher in groups with the inflammatory disease, whereas there are studies presenting similar prevalence with the normal population (1–5, 21–26). MetS frequency in this study was 35.8% in healthy controls; 43.9% in the RA group, and 41.5% in patients with SpA, and there was no difference between the groups. It has been reported that the frequency of MetS may vary according to geographical and ethnic characteristics, and it is higher in the United States than in Asian countries (5). Although it was argued that inflammatory arthritis may increase the risk of MetS with various pathways, conflicting results can be obtained due to the inhibition of the cytokine pathway by the DMARDs' therapies and heterogeneous parameters, such as demographic variables (age and gender distribution), disease activity, and duration in different studies.

Outcomes from studies investigating the relationship among disease activity, CVD risk, and MetS in patients with RA and AS are variable. There are studies that found higher DAS 28 values in patients with RA with MetS (4, 23, 25, 27) while there are also studies advocating that there is no difference between the two groups (24, 26). Similarly, studies in patients with AS suggest that disease activity can be higher in patients with MetS or there can be no association between disease activity and MetS (1, 2). Although the relationship between disease activity scores and MetS may be varied, blood inflammation signs (ESR and CRP) were found to be unrelated to MetS in many studies (1, 2, 4, 23–26). In our patient groups, DAS 28, ASDAS, BASDAI, ESR, CRP, and VAS pain values were not found to be associated with MetS. Only ESR value from these variables was found to be correlated with the Framingham risk score, but it was observed that ESR had no significant effect on the increase of CVD risk in the regression analysis.

There is developing evidence that uric acid levels can have a role in CVD risk. In several studies, hyperuricemia was associated with insulin resistance, hypertension, coronary artery disease risk, and obesity (6, 8, 9, 28, 29). Authors advocated that uric acid might promote endothelial dysfunction and increase platelet adhesiveness. Hannavi et al. (30) showed a significant association between carotid intima-media thickness and uric acid levels; they suggest that systemic inflammation and hyperuricemia may interact synergistically to stimulate increased atherogenesis. Uric acid, associated with traditional cardiovascular risk factors, was examined with a limited number of studies in patients with RA. Although Kuo et al. (8) determined no difference in the rate of hyperuricemia among patients with RA and control group, hyperuricemia seemed to be more strongly associated with peripheral arterial events among the patients with RA. Chavan et al. (9) studied various biochemical parameters as CVD risk components in RA and they observed that increased uric acid levels may play a part for CVD. Uric acid is thought to be a functionally active molecule that can support proatherogenic processes including oxidative stress extensive inflammation, and endothelial dysfunction (8). In our study, uric acid levels were not different in RA, SpA, and control groups; however, we found a significant correlation between Framingham risk score and uric acid only in patients with RA. We detected that CVD risk was associated with uric acid and age in patients with RA, whereas CVD risk was only associated with age in patients with SpA. The ROC curve indicated that uric acid might be a predictor for increase in cardiovascular risk by more than 10%. On the other hand, low sensitivity and low Youden index result have also shown that the cutoff value of UA (5.05) is not useful enough to detect the patients with more than 10% risk of CVD. Outcomes of this study corroborate that the serum uric acid level may increase cardiovascular risk with a different pathway and may be an independent marker of cardiovascular risk in RA. Widespread inflammation and vascular damage in RA are well known and it is possible that uric acid will worsen and accelerate this progression. On the other hand, SpA seems to be more innocent than RA in terms of cardiovascular risk.

Relatively small and younger patient population in the SpA group was thought to be the limitation of our study. Additionally, longitudinal studies in larger samples are required to support our preliminary results and understand the impact of uric acid on cardiovascular risk in patients with SpA.

CONCLUSION

In the present study, CVD risk scores of patients with RA and SpA were similar to those of the general population. The uric acid level was found to be associated with the 10-year CVD risk in patients with RA and this parameter may play a role with a different pathway as a predictor for increase in cardiovascular risk by more than 10% in patients with RA.

Ethics Committee Approval: The ethics committee of Ankara Numune Training and Research Hospital approved this protocol (Approval date/number: 02/19/2015/E-15-420).

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

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – FGY, EA; Design – FGY, EA, AÖ, HB, RK; Supervision – HB, RK, AÖ; Resource – FGY, EA, SA; Materials – FGY, EA; Data Collection and/or Processing – EA, FGY, SA; Analysis and/or Interpretation – FGY, EA; Literature Search – FGY, EA, SA; Writing – FGY, EA; Critical Reviews – HB, RK, AÖ.

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