Age and gender differences in Framingham risk score and metabolic syndrome in psoriasis patients: A cross-sectional study in the Turkish population

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Abstract

Objective: Psoriasis is associated with an increased frequency of cardiovascular risk factors. Metabolic syndrome (MS) and the Framingham risk score (FRS) are two different algorithms for evaluating cardiovascular risk. They include different features: waist circumference measurement is included in the MS criteria, whereas smoking, age, and gender are questioned in FRS. This study aimed to evaluate the frequency of MS and FRS in psoriasis patients compared with a control group and investigate the differences between MS and FRS.
Methods: This was a cross-sectional study involving 300 psoriasis patients and 177 controls. MS, FRS, and disease severity were evaluated.
Results: The frequency of MS was higher in females with psoriasis than in those in the control group (p=0.019). Females in the psoriasis group were more obese than those in the control group (p=0.036). FRS significantly differed between the patients and controls of age >60 years (p=0.006). The risk of hypertension in current and past smokers was higher in the psoriasis patients (OR=2.07 and 2.32–2.48, respectively) than in the control group. There was no statistically significant relationship among MS, FRS, and psoriasis severity (p>0.05).
Conclusion: The results of this study support the evaluation of cardiovascular risk assessment in female psoriasis patients with MS and in male and elderly psoriasis patients with FRS. *(Anatol J Cardiol 2017; 17: 66-72)*
Keywords: Framingham risk score, metabolic syndrome, psoriasis

Introduction

Psoriasis is a chronic immune-mediated inflammatory disorder associated with increased prevalence of cardiovascular risk factors (1). Metabolic syndrome (MS) is a cluster of conditions that increase the risk of developing cardiovascular diseases (CVDs). The relationship between psoriasis and MS has been investigated in many studies (2–5). The Framingham risk score (FRS), a relatively new algorithm, has been used to predict the 10-year cardiovascular risk of an individual (6–8). MS and FRS include similar factors, yet there are some differences in features. Both include factors such as diabetes mellitus, hypertension, and lipid levels. Although waist circumference measurement is included in MS criteria, smoking, age, and gender are questioned in FRS. Gender-related differences are expected when using these two algorithms for cardiovascular risk assessment in Turkish population because abdominal obesity is more frequent in women and rate of smoking is higher in men (9, 10).

This study aimed to evaluate the frequency of MS and FRS in psoriasis patients compared with a control group and investigate the differences between these two algorithms.

Methods

Patient population

This was a cross-sectional study involving 300 psoriasis patients and 177 controls admitted to the dermatology outpatient clinic. Controls were enrolled from among patients diagnosed with noninflammatory dermatological conditions like verruca or neavus. The source population for cases and controls was the same. Patients of age <20 years and receiving

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any systemic treatment for psoriasis for at least one month before enrolment and subjects with previous stroke or myocardial infarction were excluded. The Eskişehir Osmangazi University Ethics Committee approval was obtained for the study.

Anthropometric measurements and severity assessment

Height, weight, waist circumference, and systolic and diastolic blood pressures of participants were measured by trained nurses as described previously. Blood pressure was measured twice, and the average of the two blood pressure readings was calculated (11).

Patient information (gender and age) and lifestyle (cigarette smoking) was recorded, and the severity of psoriasis according to Psoriasis Severity Index (PASI) was assessed (12).

Fasting blood was obtained for assaying glucose, lipid levels, total cholesterol, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol, and triglyceride levels.

Classification of dyslipidemia and diabetes mellitus

Diagnosis of dyslipidemia was determined when any of the following lipid abnormality was present:

LDL cholesterol ≥140 mg/dL, HDL cholesterol <40 mg/dL, triglycerides ≥150 mg/dL (13).

The patient was classified as diabetes mellitus if two fasting plasma glucose were ≥126 mg/dL or the patient was on therapy for diabetes mellitus and previous diagnosis of diabetes mellitus in medical records (14).

Diagnosis of metabolic syndrome

MS was diagnosed by the presence of any of these five criteria of the National Cholesterol Education Programme's Adult Treatment Panel III, slightly modified by the American Heart Association and National Heart, Lung and Blood Institute (15):

1) Waist circumference of >102 cm in men or >88 cm in women

2) Hypertriglyceridemia >150 mg/dL

3) HDL cholesterol of <40 mg/dL in men or <50 mg/dL in women

4) Blood pressure >130/85 mm Hg

5) Fasting plasma glucose >100 mg/dL

Evaluation of Framingham risk score

FRS was designed to predict the 10-year risk of having major coronary events in general population. In this algorithm, subjects receive a point score based on categorical values of age, total cholesterol, HDL cholesterol, blood pressure, smoking status, and diabetes (16, 17). Participants were categorized into three risk groups: low (<10% risk), intermediate (10%–20%), and high (>20) risk of coronary events.

Statistics

Data were analyzed using the SPSS software package, version 13.0 (SPSS Inc., Chicago, IL, USA). Pearson chi-square was used in the analysis of categorical data. Fisher's exact test was used in 2x2 tables, and Pearson chi-square test with Monte Carlo approximation was used in 2x3 tables when the expected frequency was less than five. In addition, t-test was used to analyze the normally distributed quantitative data. Further, we conducted multivariate logistic regression to identify cardiovascular risk factors related to psoriasis. Multivariate logistic regression models were used to calculate the odds ratio (OR) and 95% confidence interval (CI). A $p<0.05$ was considered significant.

Results

The mean age of psoriasis patients was 44.92±15.13 years and of the controls was 44.29±15.33 years. There was no statistically significant difference between the psoriasis and control groups in terms of age and gender ($p>0.05$). The clinical types of psoriasis were as follows: plaque (n=236) 78.7%, guttate (n=41) 13.7%, palmoplantar (n=14) 4.7%, and pustular (n=9) 3.0%.

The risk of dyslipidemia and diabetes mellitus was not different between the psoriasis and control groups.

The frequency of MS was higher in psoriasis patients (37.7%) than in the control group (32.8%), although the difference was not statistically significant ($p=0.281$).

FRSs of 16.3% of the patients and 11.3% of the control group were in the high-risk group. FRS was not significantly different between patients and controls.

The features of MS and FRS were evaluated according to gender in the psoriasis and control groups (Table 1). Females in the psoriasis group were more obese than those in the control group ($p=0.036$), and female patients with psoriasis had higher rates of dyslipidemia than those in the control group ($p=0.018$). The frequency of FRS was higher in males than in females for both the psoriasis and control groups ($p<0.05$). The frequency of MS was higher in females with psoriasis than in those in the control group ($p=0.019$).

For patients and controls of age >60 years, the high risk FRS frequency was 50.9% and 31.3%, respectively, and the difference was statistically significant ($p<0.05$) (Table 2). Elder psoriasis patients (>60 years) had higher rates of hypertension (72.5%) compared with controls of age >60 years (44.8%) ($p=0.014$).

Risk of hypertension in current and past smokers was higher in the psoriasis group (OR=2.07 and 2.32–2.48, respectively) than in the control group (Table 3).

Of all the patients, 74.9% had mild psoriasis (PASI score <10), and 25.1% had severe psoriasis (PASI score>10). There was no statistically significant difference between disease severity and MS ($p=0.122$) or between disease severity and FRS ($p=0.759$).

Table 1. Gender related features of metabolic syndrome and Framigham risk score of the patient and control group

	Male			Female		
	Control n=81	**Patient n=156**	**Statistical value**	**Control n=96**	**Patient n=144**	***P***
Age, years	43.74±16.42	44.61±15.74	*P*=0.69*	44.75±14.41	45.26±14.49	*P*=0.79*
Smoking status, n (%)						
Never	23 (28.4)	27 (17.3)	*P*=0.12**	67 (69.8)	63 (43.8)	***P*<0.001****
Current	37 (45.7)	77 (49.4)		19 (19.8)	53 (36.8)	
Past	21 (25.9)	52 (33.3)		10 (10.4)	28 (19.4)	
Abdominal obesity, n (%)						
Absent	50 (61.7)	93 (59.6)	*P*=0.75**	30 (31.2)	28 (19.4)	***P*=0.04****
Present	31 (38.3)	63 (40.4)		66 (68.8)	116 (80.6)	
Diabetes mellitus, n (%)						
Absent	61(75.3)	122 (78.2)	*P*=0.61**	74 (77.1)	103 (71.5)	*P*=0.34**
Present	20 (24.7)	34 (21.8)		22 (22.9)	41 (28.5)	
Dyslipidemia, n (%)						
Absent	25 (30.9)	52 (33.3)	*P*=0.70**	57 (59.4)	63 (43.8)	***P*=0.02****
Present	56 (69.1)	104 (66.7)		39 (40.6)	81 (56.2)	
Hypertension, n (%)						
Absent	52 (64.2)	86 (55.1)	*P*=0.18**	63 (65.6)	81 (56.2)	*P*=0.15**
Present	29 (35.8)	70 (44.9)		33 (34.4)	63 (43.8)	
MS, n (%)						
Absent	55 (67.9)	113 (72.4)	*P*=0.47**	64 (66.7)	74 (51.4)	***P*=0.02****
Present	26 (32.1)	43 (27.6)		32 (33.3)	70 (48.6)	
FRS, n (%)						
1	55 (67.9)	99 (63.5)	*P*=0.78**	77 (80.2)	102 (70.8)	*P*=0.21**
2	11 (13.6)	23 (14.7)		14 (14.6)	27 (18.8)	
3	15 (18.5)	34 (21.8)		5 (5.2)	15 (10.4)	

FRS - Framingham risk score; MS - metabolic syndrome; *T test; **Pearson x^2 test

Discussion

In this study, age- and gender-related increase in cardiovascular risk was identified in psoriasis patients. Increased FRS was observed in patients of age >60 years compared with the control group in the same age range. This was related to the increased rate of hypertension in psoriasis patients of age >60 years. In addition, the frequency of MS was higher in females with psoriasis than in those in the control group. This relationship was associated with increased dyslipidemia and obesity in females in the psoriasis group.

The exact factors involved in the predisposition to coronary artery diseases in psoriasis patients are unclear. Th-1 inflammation, which is important in the pathophysiology of psoriasis and CVDs, is suggested to be related. Expression of Th-1-mediated inflammatory cytokine tumor necrosis factor-alpha protein (TNF-α) in subcutaneous and visceral adipose tissue has been demonstrated (18). TNF-α can cause insulin resistance and may predispose an individual to cardiac diseases. Psoriasis patients have elevated TNF-α levels in both tissue and blood, which may lead to insulin resistance and CVDs (19, 20).

Epidemiological studies on the relationship between psoriasis and CVDs are scarce, and their outcomes are conflicting. There is evidence indicating increased risk of CVDs in psoriasis patients (21, 22); in contrast to these studies, the results of different reports demonstrated that the risk of CVD development in psoriasis patients was not different from that in the general population (23–25).

FRS was first developed on the basis of the results of the Framingham Heart Study to estimate the 10-year risk of developing coronary heart disease (16). Myasoedova et al. (26) demonstrated that FRS estimates CVD risk in psoriasis patients and can be used in risk stratification. There was no apparent difference in the observed versus FRS-predicted 10-year CVD

Table 2. Comparation of Framingham risk score of patient and control group by age

Framingham risk score Age, years	Patient	Control	*P*
<40, n (%)	70	110	
1	70 (100.0)	109 (99.1)	*P*=1.00*
2	–	1 (0.9)	
3	–	–	
40–49, n (%)	65	30	
1	53 (81.5)	22 (73.4)	
2	8 (12.3)	7 (23.3)	X^2=2.07**
3	4 (6.2)	1 (3.3)	*P*=0.47
50–59, n (%)	70	45	
1	28 (40.0)	23 (51.1)	X^2: 1.37***
2	25 (35.7)	13 (28.9)	P=0.50
3	17 (24.3)	9 (20.0)	
60-+, n (%)	55	32	
1	11 (20.0)	17 (53.1)	X^2: 10.21***
2	16 (29.1)	5 (15.6)	***P*=0.01**
3	28 (50.9)	10 (31.3)	
Total, n (%)	300	177	
1	201 (67.0)	132 (74.6)	X^2: 3.32***
2	50 (16.7)	25 (14.1)	*P*=0.19
3	49 (16.3)	20 (11.3)	

*Fischer's exact test; **Pearson chi-square test with Monte Carlo approximation; ***Pearson chi-square

Table 3. The variables associated with psoriasis determined by multivariate logistic regression analysis

	OR	(95% CI)	*P*
Age, year			
>40	1		
40–49	1.15	(0.64–2.05)	*P*=0.65
50–59	0.77	(0.43–1.36)	*P*=0.37
>60	0.78	(0.41–1.49)	*P*=0.46
Smoking status			
Current	**2.32**	**(1.49–3.63)**	***P*<0.001**
Past	**2.48**	**(1.47–4.19)**	***P*=0.001**
Never	1		
Abdominal obesity			
Present	1.11	(0.69–1.79)	*P*=0.66
Absent	1		
Diabetes mellitus			
Present	0.92	(0.54–1.59)	*P*=0.78
Absent	1		
Dyslipidemia			
Present	1.23	(0.78–1.93)	*P*=0.38
Absent	1		
Hypertension			
Present	**2.07**	**(1.24–3.47)**	***P*=0.01**
Absent	1		
Hypercholesterolemia			
Present	0.97	(0.63–1.52)	*P*=0.91
Absent	1		
MS			
Present	1.01	(0.56–1.82)	*P*=0.97
Absent	1		

CI - confidence interval; OR - odds ratio; Multivariate logistic regression analysis

risk in this population-based study. There are a limited number of studies estimating FRS in psoriasis patients (21, 27–33). In only four of these studies, FRSs in patients were compared with the control group or general population. Increased risk of CVDs in psoriasis patients was determined in three of these studies (21, 33), and FRSs were not elevated in the study by Gyldenløve et al. (27). This is the first study evaluating FRS in Turkish psoriasis patients, and their FRSs were not higher than that in the control group.

Age relationship with FRS was evaluated by Gisondi et al. (28); similar to the present study, increased cardiovascular risk in psoriasis patients of >50 years compared with the control group was reported. In this study, increased cardiovascular risk was determined in patients of age >60 years compared with the control group.

It is important to consider the cardiovascular risk when evaluating treatment options, particularly in elderly psoriasis patients.

It has been suggested that increased cardiovascular risk in psoriasis may be confined to patients with severe disease. However, in this study there was no relationship between disease severity and FRS. Moreover, in aforementioned studies in which disease severity was assessed by PASI, there was no relationship between disease severity and FRS (27, 28, 32, 33), except for one study, where Fernández-Torres et al. (30) determined relationship with disease severity.

Furthermore, Choi et al. (21) reported that disease severity and FRS were related; however, in this study, psoriasis patients were classified with severe psoriasis if they had a history of systemic treatments consistent with a moderate to severe state of the disease. In this case, side effects induced by systemic treatments may predispose the individual to the development of CVDs. Therefore, it is difficult to discriminate if the relationship is related to disease severity itself or the side effects of systemic treatments.

In the present study as well, there was no relationship between disease severity and MS in line with other studies (32,

34). However, the association between MS and psoriasis severity has also been reported (35).

There are also conflicting results regarding the association between psoriasis and MS. Evidence in support of (35, 36) and against the relationship have been demonstrated (37).

In this study, the there was no statistically significant relationship between MS and psoriasis (p=0.28). Although when MS was evaluated according to gender, it was determined that the frequency of MS was higher in females with psoriasis than those in the control group. This relationship was related to increased dyslipidemia and obesity in females. Dyslipidemia was reported in psoriasis, even at the onset of the disease (38). Obesity and psoriasis were found to be associated in the prospective study by Kumar et al. (39), who demonstrated a relationship between waist circumference, hip circumference, weight gain, and the risk of incident psoriasis. Furthermore, obese patients with psoriasis have an increased response to treatment if a calorie-controlled diet is included in the treatment regimen (40). However, psoriasis is a multifactorial disease, and weight reduction alone may not be sufficient to maintain disease remission (41).

On the other hand, psychophysiological response to stress may influence subsequent eating behavior in women. Over time, these alterations could impact abdominal obesity (42). Eating disorders were identified in patients with psoriasis (43). Overall stress associated with psoriasis may induce alterations in eating habits and lifestyle; more sedentary lifestyle may lead to obesity and dyslipidemia.

Smoking is another well-established risk factor for the development of CVDs such as coronary artery disease, cerebrovascular disease, and myocardial infarction.

In this study, the proportions of current and past smokers were higher in the psoriasis group than the control group (p<0.05). Smoking-induced oxidative damage and alteration of immunological functions implicated in the etiopathogenesis of psoriasis (44, 45). Smoking is associated with an increased risk of developing psoriasis. Both current and past smokers were more likely to develop incident psoriasis compared with nonsmokers. Moreover, after the onset of psoriasis, the psychological burden of the disease itself may have caused an increase in smoking.

The results of this study support evaluation by MS for cardiovascular risk assessment in female patients with psoriasis. Abdominal obesity, which was more frequent in female patients with psoriasis than those in the control group, is not included among the FRS criteria and therefore could not be assessed with FRS.

On the other hand, smoking, which is not included in MS, is evaluated with FRS. Smoking rate is higher in males than females. When cardiovascular risk assessment is evaluated using MS in males, this factor would be ignored. According to the findings of this study, it is appropriate to evaluate the cardiovascular risk in males and also in elderly psoriasis patients using FRS.

Study limitations

This was a cross-sectional study; to determine the causality between cardiovascular risk and psoriasis, well-designed prospective studies are needed.

Conclusion

The results of this study support the evaluation of cardiovascular risk in female psoriasis patients using MS and in male and elderly psoriasis patients using FRS.

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