

## Comparison of Echocardiographic Abnormalities in Psoriasis Patients with the Control Group

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### ABSTRACT

**Introduction:** Psoriasis is a chronic inflammatory skin disease characterized by plaques covered with silvery scales. Psoriasis is highly prevalent in different countries in the world, including Iran. Several studies have reported a significant association between psoriasis and cardiovascular diseases. This study aimed to evaluate the relationship between psoriasis and cardiac disease using echocardiography.

**Materials and Methods:** This cross-sectional study was conducted in Imam Reza Hospital of Mashhad, Iran during 2013-2014 on patients with clinical diagnosis of psoriasis confirmed via biopsy. In addition, healthy volunteers homogenous in terms of age and gender were selected as the control group. Echocardiography was performed on patients and control subjects. Size of the left and right ventricles, left ventricle ejection fraction, diastolic function, and pulmonary artery pressure were recorded. In addition, patients were assessed in terms of the presence of valve regurgitation and disease severity.

**Results:** In total, 23 patients with psoriasis and 23 control subjects were enrolled in this study. Mean duration of psoriasis was  $7.0 \pm 9.1$  years (range: 1-25 years), and disease severity ranged between moderate and severe. Left ventricular end-diastolic and systolic diameters were significantly higher in patients with psoriasis ( $P=0.030$  and  $P=0.016$ , respectively). Moreover, left ventricular diastolic dysfunction was observed in 14 psoriasis patients (60.8%) and 3 control subjects (13.4%) ( $P<0.001$ ), all of whom were presented with grade I diastolic dysfunction. No significant difference was observed in the left atrial volume, mid-right-ventricular diameter, and pulmonary artery pressure. If present, valvular regurgitation was reported to be mild, while the prevalence of mild aortic regurgitation was significantly higher in psoriatic patients compared to control subjects ( $P=0.032$ ). In addition, no statistically significant difference was observed in mitral or tricuspid valve abnormalities.

**Conclusion:** According to the results of this study, patients with psoriasis commonly present with echocardiographic abnormalities, even in the absence of cardiovascular symptoms.

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## Introduction

Psoriasis is an inflammatory skin disease clinically diagnosed by inflammatory plaques covered with silvery scales on extensor areas of the body (e.g. elbow, knee), scalp, umbilicus, and lumbar area (1-2). With a global prevalence of 1.5-3% among the general population, psoriasis is known to be a common disorder, worldwide. Its prevalence has been reported to be over 2% in the United States (3).

The etiology of psoriasis is unknown, but several factors such as genetics, immune system, environmental factors, microvascular and macrovascular disorders have been suggested to be involved in the pathogenesis of this systemic disease (4-5).

Patients with psoriasis are at increased risk for developing other serious chronic conditions. For instance, it is estimated that up to 30% of these patients are suffering from psoriatic arthritis (6).

Recently the relationship between psoriasis and increased risk of cardiovascular diseases, particularly in patients with severe psoriasis has been observed. These patients are more likely to develop a major cardiac event or have a stroke. Many studies have reported a relationship between psoriasis and cardiovascular diseases, including myocardial infarction, heart failure, arrhythmias and valvular diseases (7-8).

There are many diagnostic modalities for cardiovascular disorders, including electrocardiography, echocardiography and angiography (9). These methods can be used for the early detection of cardiovascular abnormalities in patients with psoriasis to help reducing its severity (8). The purpose of this study was to evaluate the echocardiographic changes in patients with psoriasis and compare them with that of control group.

## Materials and Methods

This cross-sectional study was conducted in Imam Reza hospital, Mashhad, Iran between the years 2013-2014. Clinically diagnosed patients with psoriasis whose diagnoses were confirmed by biopsy were included in the study. The inclusion criteria were confirmed definite diagnosis of psoriasis, age of 20 or above, and giving informed consent. The exclusion criteria were history of ischemic or structural heart disorder, history of COPD or other related disorders, history of atrial fibrillation (AF), and history of known valvular disease.

The patients were informed and consented before the study. Clinical type of the disease and psoriasis area severity index (PASI) was determined for each patient. Electrocardiography (ECG) was performed and fasting blood glucose (FBG), body mass index (BMI) and waist

circumference were measured and then the patients were referred to echocardiography center of the hospital. The subjects underwent echocardiography with Vivid 7 (GE-Medical Healthcare) and transthoracic probe (3 MHz) by a trained echocardiologist. The following parameters were measured:

Left ventricle end diastolic and end systolic diameters (LVEDD, LVESD) were measured in M-Mode study. Left ventricle (LV) ejection fraction was calculated by Simpson's method.

LA volume was measured in the apical four chamber view. E and A waves' velocities and deceleration time were detected in the Doppler study of mitral inflow. The early diastolic (E') velocity of the mitral annulus at septal side was measured by pulsed Doppler tissue imaging. E to e' ratio was determined. LV diastolic function was assessed, defined as normal versus diastolic dysfunction (grade I-III)

Right ventricle size (mid diameter in apical four chamber, RV focused view) and Pulmonary artery pressure (using tricuspid regurgitate flow) were measured.

This study was carried out in accordance to the ethical codes of the World Medical Association (Declaration of Helsinki) for experiments involving humans. A written informed consent was obtained from each participant prior to study entrance.

The control group included healthy volunteers with similar age and sex who did not have psoriasis, Atherosclerotic complaints or conventional atherosclerosis risk factors (eg, smoking, hypertension, diabetes mellitus, family history). They underwent echocardiography and the same parameters were measured in both groups. Regarding to the PAP, the sample size was calculated 23 subjects in each group, keeping a 95% confidence interval and 90% study power.

## Statistical Analysis

The data were evaluated and analyzed using SPSS version 11.5. Chi-square test, independent samples T-test or its non-parametric equal were used and a P value of 0.05 or below was considered as statistically significant.

## Results

Twenty-three patients with psoriasis and 23 sex- and age-matched controls were included in this cross sectional study. Table 1 presents the demographic characteristics of the psoriasis patients and control subjects. The prevalence of metabolic diseases such as hypertension and diabetes mellitus was higher in psoriatic patients compare with control group. However, these differences did not reach statistical significance (P=0.48 and >0.99, respectively). Disease severity

**Table 1.** Demographic Characteristics of Participants

	Psoriatic patient (n=23)	Controls (n=23)	P-value
Age	47.26 ± 2.9	46.17 ± 2.17	0.54
Male	12 (52.2%)	12 (52.2%)	>0.99
Hypertension	2 (8.7%)	0	0.48
Diabetes Mellitus	1 (4.3%)	0	>0.99

**Table 2.** Two-dimensional and Doppler Echocardiographic Measurements in Patients and Control Subjects

	*LVESD	**LVEDD	***LVEF	E/E'
Patients	2.7±0.46	4.06±0.35	60.65±2.28	0.07±0.01
Controls	2.5±0.24	4.04±0.32	60.86±0.193	0.07±0.001
P-value	0.016	0.03	0.73	0.85

\*LVESD: Left ventricular end-systolic diameter

\*\*LVEDD: Left ventricular end-diastolic diameter

\*\*\*LVEF: Left ventricular ejection-fraction

**Table 3.** Comparison of Valvular Regurgitation in Participants

Involved Valve	Patients		Controls		P-value*
	N	%	N	%	
MR	19	82.6	15	65.2	0.17
TR	23	100	23	100	1.00
AR	5	26	0	0	0.032

MR: Mitral Regurgitation, TR: Tricuspid Regurgitation, AR: Aortic Regurgitation

\*Chi-square test

was moderate or severe (according to PASI score). Patients with psoriasis had a mean duration of disease of  $7.0 \pm 9.1$  years (range 1-25 years). Table 2 shows the two-dimensional and Doppler echocardiographic measurements for patients and control subjects. Left ventricular diastolic dysfunction was found in 14 psoriasis patients (60.8%) and 3 controls [(13.4%) ( $P < 0.001$ )], whom all of them was in grade I diastolic dysfunction. However, ventricular size in individuals with mild MR and mild TR was normal and the difference was not statistically significant between two groups.

Mild valvular regurgitation was observed in both groups (Table 3). Two patients and no controls had mitral prolapse but the difference was not significant.

Small pericardial effusions were seen in two psoriasis patients (0.9%) and none of the controls; the difference was not significant ( $P=0.48$ ). As shown in table 3, the prevalence of mild AR was significant higher in psoriatic patients than controls ( $P=0.032$ ).

## Discussion

This study was conducted to compare the echocardiographic features between psoriatic patients and healthy individuals. There is a large body of evidence suggests the association between cardiac pathologies and psoriasis (10-12). In those patients with psoriasis and psoriatic arthritis, some studies reported cardiovascular abnormalities such as aortic regurgitation and mitral valve prolapse, dilated cardiomyopathy, heart failure, aortitis, sudden death and acute myocardial infarction (13-16). In this study, left ventricular diastolic dysfunction and aortic regurgitation were significantly more common in

patients with psoriasis than control subjects. It should be noted that impaired LV systolic function can occur in psoriatic patients without traditional cardiovascular risk factors, probably related to the underlying inflammation (11).

A 28-year study showed that the prevalence of cardiomyopathies, especially dilated cardiomyopathy is more in patients with psoriasis. The study also suggests common genetic risk factors for dilated cardiomyopathy and psoriasis. We found that left ventricular end systolic volume was higher in psoriatic patients, compared with control group (17).

In agreement with Saricaoglu, *et al* (12) study, we show increased LVESD and LVEDD in psoriatic patients who had normal ejection fraction compared with controls. Besides, He observed that other indicators of LV remodeling, such as LV wall thickness, LV mass, and LV hypertrophy, were significantly abnormal in patients with psoriasis even in absence of cardiovascular risk factors compared with the healthy individuals matched for age, sex, BMI, and blood pressure. These findings suggested that psoriasis play a key role in LV function. However, the exact underlying mechanism remained unclear.

Shang *et al.* (11) also investigated the possible impact of psoriasis on subclinical LV dysfunction in 95 patients with no clinical evidence of cardiovascular disease and 63 healthy subjects. He observed that patients who suffered from psoriasis and subclinical LV dysfunction were older, had a higher age at diagnosis of psoriatic arthritis and of psoriasis, a higher prevalence of hypertension than those with normal LV function. He also pointed that age at diagnosis of psoriatic arthritis > 40 years and hypertension were independent predictors of subclinical LV dysfunction.

The results of a study by Gunes et al. on 47 psoriatic patients revealed that pulmonary hypertension is more prevalent in patients with psoriasis. However, in our study, PAP was in normal limits (range 25-30mmHg) in all patients (18).

In a 18-year study on psoriatic patients, it was found that these patients, especially those with severe forms, are at a high risk of cardiovascular events. In the present study, only 6 (26.1%) of patients had severe psoriasis. Therefore, we cannot draw a firm conclusion in this regard (7). This study had several limitations, including a relatively small sample size. In addition, various factors such as environment, genetic and ethnicity play an important role in the onset of skin disorders such as psoriasis. So, further studies in other areas is needed to prove the possible relationship between echocardiographic features and psoriasis.

The mechanisms leading to accelerated atherosclerosis and increased risk of cardiovascular events in psoriasis are not completely defined and seem to be multifactorial (19). Systemic chronic inflammation has been known as a risk factor for coronary artery disease due to the prolonged detrimental effect exerted on the vasculature (20). In our study, the prevalence of metabolic diseases such as hypertension and diabetes mellitus was higher in psoriatic patients compared to the control group.

## Conclusion

Echocardiographic abnormalities could be found in psoriasis compare with normal population, even in the absence of cardiovascular symptoms. Further surveillance and close follow up is needed to define the prognostic implication of these findings.

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## Conflict of Interest

The authors declare no conflict of interest.

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