

Original Article Cardiovascular

## Cardiovascular Risk Assessment in Women with Psoriasis

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### ABSTRACT

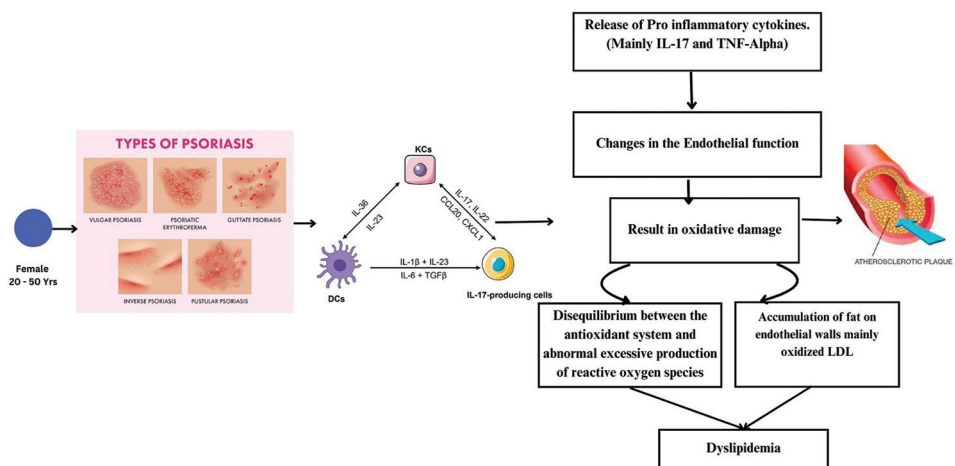
**Objectives:** Psoriasis is a chronic inflammatory skin disease. The exact cause of psoriasis is unclear; nevertheless, it is thought to be complex including several key components such as genetic predisposition, triggers from the environment, skin barrier disruption, and immunological dysfunction. About 85–90% of all psoriatic patients present with plaque type of psoriasis. The systemic nature of psoriasis makes an independent risk factor for cardiac disease. The main objective is to find the association between lipid profile, arterial stiffness, and psoriasis among female patients.

**Materials and Methods:** Female patients with psoriasis in the age group of 20–50 years were selected. The duration of the study was 1 year. For lipid profile, after 12 h of fasting, 5 mL of blood was taken and analyzed by kit method using Transasia RX 1000. Low-density lipoprotein (LDL) cholesterol concentrations were estimated using the Friedewald formula. Arterial stiffness was measured using an oscillometric noninvasive arteriography. Right brachial ankle pulse wave velocity (RbaPWV), left brachial ankle pulse wave velocity (LbaPWV), and carotid femoral pulse wave velocity were measured in cm/s.

**Results:** In the present study, 28% of the females were <38 years and 44% of females were in the range of 39–46 years. The mean value of cholesterol was (263.66 ± 47.74), Triglyceride (188.38 ± 27.56), high-density lipoprotein (HDL) (50.06 ± 18.05) LDL (171.60 ± 33.98), and very LDL (89.74 ± 13.361) mg/dL, respectively. Significant correlation was found between LbaPWV and Psoriasis (0.03), HDL and psoriasis (0.04), and psoriasis and RbaPWV (0.01).

**Conclusion:** We conclude that psoriasis patients have hyperlipidemia, which will increase arterial stiffness and may lead to cardiovascular disorders (CVDs). Variables such as lipid profiles and arterial stiffness may be used as screening tools for the early detection of CVDs.

**Keywords:** Psoriasis, Lipid profile, Arterial stiffness



DCs: Dendritic cells, KCs: Keratinocytes, IL: Interleukin, TNF: Tumor Necrosis Factor, LDL: Low Density Lipoprotein, CCL20: Chemokine Ligand 20, CXCL 1: Chemokine Ligand 1

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## INTRODUCTION

Psoriasis is a chronic inflammatory skin disease. It has a bimodal representation, one at the age of 20–30 years and the other peak at 50–60 years.<sup>[1]</sup> Erythematous, scaling lesions can form anywhere on the body, but they are most typically observed on the knees, elbows, scalp, and genitals.<sup>[2]</sup> The exact cause of psoriasis is unclear; nevertheless, it is thought to be complex including several key components such as genetic predisposition, triggers from the environment, skin barrier disruption, and immunological dysfunction.<sup>[3,4]</sup> About 85–90% of all psoriatic patients present with plaque type of psoriasis.<sup>[5]</sup> The systemic nature of psoriasis makes an independent risk factor for cardiac disease.<sup>[6]</sup> Dyslipidemia is 5 times higher in those psoriatic patients with severe cutaneous manifestations.<sup>[7]</sup> Psoriatic patients have lower high-density lipoprotein (HDL) levels, less HDL export capacity, and higher low-density lipoprotein (LDL) particle concentrations.<sup>[8]</sup> Psoriasis is characterized by neutrophil-derived myeloperoxidase, which drives lipoprotein oxidation and promotes damage both locally and systemically.<sup>[9,10]</sup> Supporting this idea, psoriasis patients have up to 30% more oxidized lipoprotein(a) and 15% more oxidized HDL than non-psoriasis patients. Several studies have shown that circulating lipids and lipid oxidation may play an important role to potentiate cardiovascular (CV) risk in psoriasis.<sup>[11]</sup> Clinically, these changes lead to a higher incidence of metabolic dysfunction, such as diabetes, as well as an increased risk of CV disease (CVD). Many studies have sought to identify the underlying processes that connect chronic inflammation and CV problems. Psoriasis causes complicated pathogenic interactions between the innate and adaptive immune systems. Risk of vascular disease was 2.2 times higher in 300 hospitalized patients with psoriasis than in controls with other dermatologic lesions. The estimated frequency of coronary heart disease in North American individuals with psoriasis is 14.3%, which is higher (11.3%) than in the overall population.<sup>[12,13]</sup> A cross-sectional study in Argentina found a significant connection between coronary artery disease and psoriasis, regardless of age, diabetes, hypertension, or smoking (odds ratio [OR] 1.48, 95% confidence interval [CI] 1.04–2.11,  $P = 0.03$ ).<sup>[14]</sup> We hypothesize that despite lower CVD risk in women in general, women with psoriasis have a higher rate of cardiac stiffness and abnormal lipid profile which are predictors of CVD risk.

## METHODOLOGY

This study was conducted at All India Institute of Medical Sciences (AIIMS) Bibinagar, Hyderabad, for a duration of 1 year. The study participants were recruited from the dermatology outpatient department. The female patients with psoriasis in the age group of 20–50 years were selected. The duration of the study was for 1 year. The study was approved by the Institute Ethics Committee (IEC Ref No: AIIMS/BBN/IEC/SEPT/2023/307 dated September 20, 2023). Written

informed consent was obtained from all the study subjects. The consent was taken in local language. The subjects were explained about the purpose of the study and procedure of the study and were also explained about the risk involved in the study. For lipid profile, after 12 h of fasting, 5 mL of blood was taken and analyzed by kit method using Transasia RX 1000. LDL cholesterol concentrations were estimated using the Friedewald formula. Arterial stiffness was measured using an oscillometric noninvasive arteriography. This device uses 2 simple upper arm cuffs and 2 lower limb cuffs as a sensor with cuff pressurized to at least 35 mm of Hg over actual systolic pressure. The device determines the right brachial ankle pulse wave velocity (RbaPWV), left brachial ankle pulse wave velocity (LbaPWV), and carotid femoral pulse wave velocity (PWV). Considering 14.3%, the prevalence of CVD in psoriasis, with 95% CI and 8% margin of error, sample size was estimated as 50.<sup>[12]</sup> All types of psoriasis (chronic plaque, palmoplantar, and erythrodermic) were included in the study. Diabetes mellitus, hypertension, menopause, thyroid disorders, obesity, women on oral contraceptive pills, and polycystic ovarian disease were excluded from the study.

## Statistical analysis

Results on continuous measurements are presented as mean  $\pm$  standard deviation and categorical measurements were presented as numbers or percentages. Data were analyzed using the Statistical Package for the Social Sciences version 25.0 (Statistical Package for the Social Sciences Inc., Chicago, IL, USA). Significance was assessed at 5% level of significance. Data were entered into Microsoft Excel versus 2019 and statistical analyses were performed using Chi-square test.  $P \leq 0.05$  was considered statistically significant.

## RESULTS

In the present study, 28% ( $n = 14$ ) of the females were <38 years and 44% ( $n = 22$ ) in the age group of 39–46 years and above 28% ( $n = 14$ ) of females were in the range of 47 years [Figure 1]. Among psoriasis arthropathy, palmoplantar psoriasis, and scalp psoriasis, the frequency of palmoplantar psoriasis was 44% ( $n = 22$ ) [Figure 2]. The mean value of RbaPWV was 1739.32 cm/s. The mean value of LbaPWV was 1958.72 cm/s. The mean value of cholesterol was ( $263.66 \pm 47.74$ ), triglyceride ( $188.38 \pm 27.56$ ), HDL ( $50.06 \pm 18.05$ ) LDL ( $171.60 \pm 33.98$ ), and very LDL ( $89.74 \pm 13.361$ ) mg/dL [Table 1]. Significant correlation was found between LbaPWV and psoriasis (0.03), HDL and psoriasis (0.04), and psoriasis and RbaPWV (0.01) [Table 2].

## DISCUSSION

In this present study, we were able to correlate between lipid profile and arterial stiffness among psoriatic female patients.

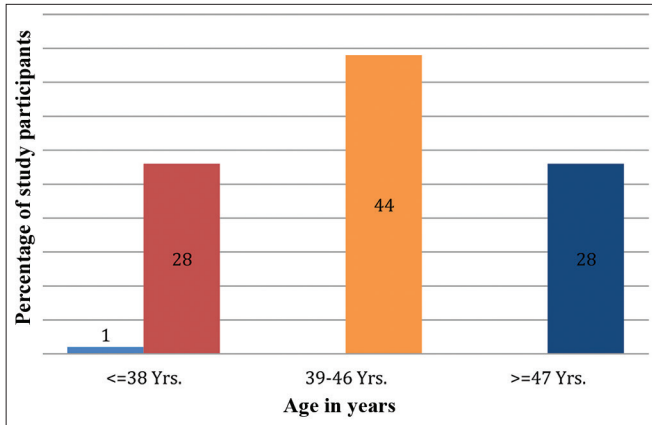


Figure 1: Age-wise distribution of study population.

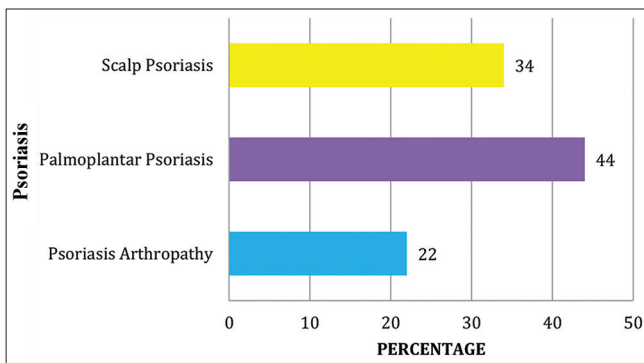


Figure 2: Distribution of study population based on type of psoriasis.

Psoriasis is a chronic skin disease that manifests as elevated, erythematous, and scaly plaques.<sup>[15]</sup> Inflammation caused by psoriasis may extend beyond the skin.<sup>[16]</sup> In this present study, we were able to correlate between lipid profile and arterial stiffness among psoriatic female patients. Psoriasis is a chronic skin disease that manifests as elevated, erythematous, and scaly plaques.<sup>[15]</sup> Inflammation caused by psoriasis may extend beyond the skin.<sup>[16]</sup> In this inflammatory skin lesion, many cytokines and chemokines are produced which has the systemic involvement which mainly targets the CV system. Psoriatic march was the terminology coined for this type of involvement. Boechat explained the link between psoriasis and CV system by his two plaques for one syndrome theory.<sup>[17]</sup>

Patients with psoriasis are more likely to develop CVD, a leading cause of morbidity and death in psoriasis patients.<sup>[18-20]</sup> Notably, increased ischemic CV risk in psoriasis patients appears to correlate with increased psoriasis activity. Indeed, severe psoriasis is linked with the highest CV risk (as compared to controls), including a thrice increased risk of myocardial infarction, and a 40% increased risk of CV-related mortality.<sup>[21,22]</sup> According to the literature, psoriasis has genetic and molecular linkages to atherosclerosis and other CV risk factors. The nonlinear and complex interaction of

Table 1: Mean and standard deviation.

Category	N	Mean	Standard Deviation
Age	50	43.46	8.029
Height	50	160.58	7.248
Weight	50	66.62	13.013
RbaPWV	50	1739.32	258.554
LbaPWV	50	1958.72	100.661
CFPWV	50	1373.22	305.731
Cholesterol	50	263.66	47.741
Triglyceride	50	188.38	27.564
HDL	50	50.06	18.055
LDL	50	171.60	33.987
VLDL	50	89.74	13.361

RabaPWV: Right brachial ankle pulse wave velocity, LbaPWV: Left brachial ankle pulse wave velocity, CFPWV: Carotid femoral pulse wave velocity, HDL: High-density lipoprotein, LDL: Low-density lipoprotein, VLDL: Very low-density lipoprotein

Table 2: Correlation of psoriasis with following variables.

S. No	Variables	R-value	P-value
1.	RbaPWV cm/s	0.359	0.01*
2.	LbaPWV cm/s	0.304	0.03*
3.	HDL mg/dL	-0.291	0.04*
4.	Cholesterol mg/dL	0.302	0.03*
5.	CFPWV cm/s	0.302	0.03*

\*Correlation is significant at the 0.05 level. RabaPWV: Right brachial ankle pulse wave velocity, LbaPWV: Left brachial ankle pulse wave velocity, CFPWV: Carotid femoral pulse wave velocity, HDL: High-density lipoprotein

numerous stimuli regulating molecular pathways in various cell types is believed to contribute to the development of psoriasis and cardiovascular diseases (CVD). The study found that patients with psoriasis are prone to specific common genetic variants (HLA, FUT2, UBE2L3, and SH2B3) that increase the risk of dyslipidemia, hypertension, and CAD.<sup>[23]</sup> In our study, we found similar results in terms of lipid profile, primarily triglycerides, LDL, and very LDL. Dregan employed the stiffness index (SI) as a proxy diagnostic for subclinical atherosclerosis.<sup>[24]</sup> A photo plethysmograph transducer was attached to the participant's dominant hand's index finger and used to compute arterial SI. The SI was computed by dividing the participants' height by the time between the first (systolic) and second (diastolic) wave peaks and was expressed in meters per second. SI is a clinical indicator of increased artery stiffness and has been shown to have a moderate connection with PWV, the gold standard measure of arterial stiffness.<sup>[25]</sup> A higher SI is supposed to signify stiffer arteries. Patients with psoriasis had higher mean SI values (9.49, 95% CI 9.36–9.61). Similar results were found in our study. This study concludes that patients with psoriasis have hyperlipidemia, which can increase arterial stiffness and contribute to CVD.

## CONCLUSION

Early monitoring of the lipid profile and the arterial stiffness in the patients with psoriasis will act as a monitoring tool and prevent CVD in future.

### Ethical approval

The study was approved by the Institute Ethics Committee (IEC Ref No: AIIMS/BBN/ IEC/SEPT/2023/307 dated September 20, 2023).

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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### Conflicts of interest

There are no conflicts of interest.

### Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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