

## Original Research Article

# Association of psoriasis with metabolic disorders and their assessment using epicardial fat thickness, serum lipid profile and homocysteine level

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### ABSTRACT

**Background:** Psoriasis is a chronic immune-mediated inflammatory disease with worldwide prevalence of 2-4%. It is characterized by sharply demarcated erythematous plaque lesions with silvery white scales. A number of literatures have been published concerning that psoriasis is associated with several cardio-metabolic co-morbidities thus increasing the risk of cardiovascular disease and cardiovascular mortality.

**Methods:** A prospective observational study was done on patients attending Department of DVL, BRD Medical College, Gorakhpur with psoriasis. A total of 150 patients were enrolled for a study period of 1 year from 15<sup>th</sup> December 2017 to 31<sup>st</sup> December 2018. Statistical analysis was done using Statistical package for the social sciences (SPSS version 16.0).

**Results:** According to our study mean basal metabolic index in psoriatic patients was  $27.4 \pm 3.9$ . The mean cholesterol was  $198 \pm 38$  mg/dl, mean low density lipoproteins  $129.5 \pm 34$  mg/dl, mean triglycerides  $140 \pm 75$  mg/dl which is towards higher side, mean homocysteine being  $19.5 \pm 1.5$   $\mu$ mol/l while the normal range is 4-15  $\mu$ mol/l. Epicardial fat thickness on ultrasonography was found to be  $7.4 \pm 0.5$  mm in psoriatic patient.

**Conclusions:** Psoriasis may elevate the risk of atherosclerosis, particularly cardiovascular disorders. Therefore, from the epidemiological point of view screening of psoriatic patients, particularly those with severe psoriasis should be recommended.

**Keywords:** Psoriasis, Metabolic disorders, Epicardial fat thickness, Serum lipid profile, Homocysteine level

### INTRODUCTION

Psoriasis is a papulo-squamous disorder which is characterized by exaggerated and disordered epidermal cell proliferation and keratinisation with prevalence range from 2-4%.<sup>1</sup> The underlying pathology causing psoriasis includes increased levels of cyclic-adenosine monophosphate, epidermal growth factor receptor binding,

protein kinase-C and transforming growth factor- $\alpha$ , collectively point to a disturbance in T cell function.<sup>2</sup>

One of the most accepted hypothesis that regarding the cause of psoriasis is that it is an immune-mediated inflammatory skin disease that manifests in a genetically predisposed person exposed to certain environmental agents or triggers.<sup>3</sup>

Moderate to severe psoriasis is frequently associated with metabolic disorders, including obesity, diabetes, dyslipidemia, non-alcoholic fatty liver disease and the metabolic syndrome.<sup>4</sup>

The objective of the present study was to assess the correlation between psoriasis and development of metabolic syndromes in these psoriasis patient's by using several parameters like serum lipid profile, serum homocysteine level, and epicardial fat thickness.

**METHODS**

This is a prospective observational study and done on patients attending Department of DVL, BRD Medical College, Gorakhpur with psoriasis.

A total of 150 patients were enrolled for a study period of 1 year from 15<sup>th</sup> December 2017 to 31<sup>st</sup> December 2018.

**Inclusion criteria**

Patients with psoriasis more than 18 years of age and those with psoriasis of at least 6 months duration and patients willing to undergo procedure and follow up were included in the study.

**Exclusion criteria**

Patients with psoriasis <18 years of age and those who have received cyclosporine or/and systemic retinoids therapy during the preceding one month were excluded from the study.

After obtaining informed consent from the patients, relevant data such as age, sex, occupation, age at the onset of psoriasis, percentage body surface area of involvement, body mass index (BMI), waist circumference, psoriasis area severity index (PASI), presence and distribution of psoriatic arthropathy and concomitant medications were collected in a proforma.

PASI was calculated as given below:

Four sites of affection, the head 10% (h), upper limb 20% (u), trunk 30% (t) and lower limbs 40% (l), were separately scored by using three parameters, erythema (E), induration (I) and desquamation (D), each of which was graded on a severity scale of 0-4, where 0= nil, 1= mild, 2= moderate, 3= severe and 4= very severe. The area-wise percentage involvement of the involved sites was calculated as: 1= ≤10% area; 2= 10-29%; 3= 30-49%; 4= 50-69%; 5= 70-89%; and 6= more than 90%.

The final formula for PASI score:

$$PASI = 0.1 (Eh + Ih + Dh) Ah + 0.2 (Eu + Iu + Du) Au + 0.3 (Et + It + Dt) At + 0.4 (El + Il + Dl) Al.$$

For serum lipid profile and serum homocysteine, venous blood samples were collected from the patients after they fasted overnight (at least 8 hours). Triglycerides and serum cholesterol were measured using standard enzymatic procedure.

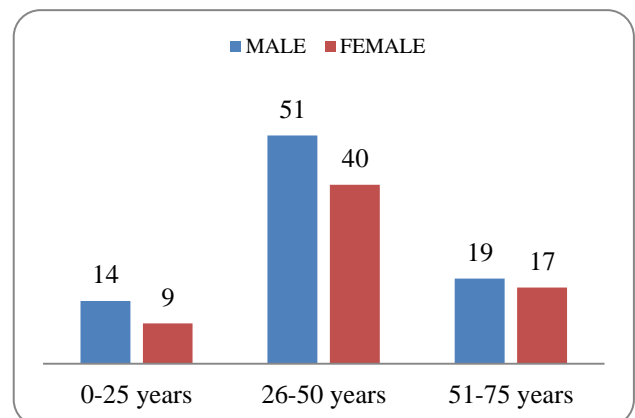
Epicardial fat (EFT) is the thickness, area or volume of EFT can be measured and evaluated by two-dimensional echocardiography, computed tomography (CT) or magnetic resonance imaging (MRI), the gold standard in measuring EFT is MRI. Echocardiography is less accurate than CT or MRI, but echocardiography is a non-invasive, less costly and convenient method.

EFT was calculated on the free wall of the right ventricle in the still images obtained at end diastole on both parasternal long-axis and short-axis views. The anterior echo-lucent space between the right ventricle outer wall and the linear echo-dense pericardium was considered to be EFT.<sup>5</sup>

Statistical analysis was done using statistical package for the social sciences (SPSS version 16.0).

**RESULTS**

The study was conducted on 150 patients for a total period of 1 year. According to our study the mean age group was 45.8±6.5 years and duration of psoriasis was 12.2±8.4 years. Mean PASI being 10.8±4.2. Mean BMI in psoriatic patients was 27.4±3.9. The normal range for total cholesterol is less than 200 mg/dl, low density lipoprotein (LDL) <100 mg/dl, high density lipoprotein (HDL) >40 mg/dl. Triglycerides (TG) <150 mg/dl while in our study the mean cholesterol was 198±38 mg/dl, mean LDL 129.5±34 mg/dl, mean TG 140±75 mg/dl which is towards higher side. Mean homocysteine being 19.5±1.5 μmol/l, while the normal range was 4-15 μmol/l. EFT thickness on USG was found to be 7.4±0.5 mm in psoriatic patient. The median EFT for male is 7 mm and 6.5 mm in female (Iacobelis et al criteria) in general population.



**Figure 1: Age and sex distribution of patients.**

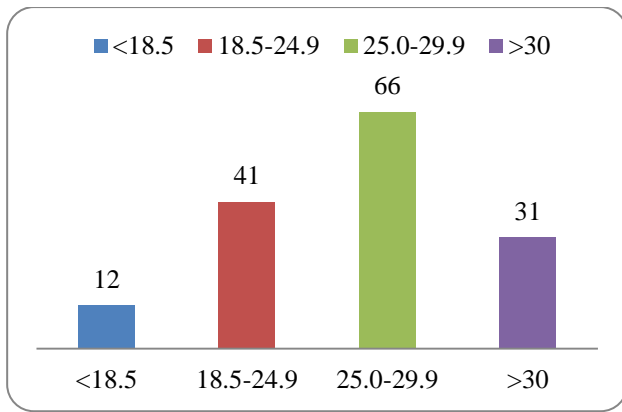


Figure 2: Distribution of patient according to BMI.

Table 1: The mean of various parameters measured in the study.

Profiles	Mean values
Duration of psoriasis	12.2±8.4 years
PASI	10.8±4.2
Cholesterol	198±38 mg/dl
TG	140±75 mg/dl
LDL	129.5±34 mg/dl
Homocystiene	19.5±1.5 µmol/l
EFT (on USG)	7.4±0.5 mm

DISCUSSION

In our study we found that there were increased chances of metabolic syndrome in patient suffering from psoriasis. The EFT is visceral fat around the heart and coronary vessels measured between outer wall of myocardium and visceral layer of pericardium. Recent studies on EFT have suggested that it plays an important part in pathogenesis of development of cardiovascular diseases through secreting several inflammatory adipo-cytokines (TNF-alpha, IL-6, adipo-cytokines, and leptin) in potential paracrine or endocrine mechanism which leads to mononuclear cells infiltration into the vascular intima. Thus increasing the chance of cardiovascular disease.<sup>6,7</sup>

Homocysteine is a non-proteinogenic α-amino acid, a homologue of amino acid cysteine, differing by an additional methylene bridge (-CH2-). A high level of homocysteine (more than 15 µmol/l) in the blood (hyperhomocysteinemia) makes a person more prone to endothelial cell injury causing inflammation in the blood vessels leading to atherogenesis, which can result in ischemic injury. Hyperhomocysteinemia is therefore a possible risk factor for coronary artery disease.<sup>8,9</sup>

The importance of lipid metabolism in psoriasis has been discussed since 20th century. The quantitative analysis of serum cholesterol in psoriatic patients and The abnormal fat metabolism was considered to be an important factor in the etiopathogenesis of psoriasis.<sup>10,11</sup>

In the present study, approximately 120 patient out of 150 shows a significant increased value in parameters of metabolic syndrome, whereas 30 patients shows near normal values. Thus 80% patients of psoriasis showed a significant co-relation with metabolic syndromes.

The mean cholesterol was 198±38 mg/dl, mean LDL 129.5±34 mg/dl, mean TG 140±75 mg/dl which is towards higher side. In a recent study conducted by Taheri et al, it was revealed that certain parameters, including serum triglyceride, cholesterol, LDL, and very low density lipoprotein, were significantly higher in the case group compared to the controls (p<0.001), while HDL was significantly lower in the former (p<0.001).<sup>12</sup> In addition, there was a significant relationship between severity of psoriasis and serum lipid profile. This may elevate the risk of atherosclerosis, particularly cardiovascular disorders.

While the mean homocysteine being 19.5±1.5 µmol/L, while the normal range is 4-15 micromoles/l. In a study conducted by Giannoni et al, a significant difference between the homocysteinemia of psoriasis patients (mean 19.71±11.16) and control group (13.90±11.18), p<0.05.<sup>13</sup> The mean plasma levels of homocysteine were directly correlated with disease severity .

We found that the EFT thickness on USG was found to be 7.4±0.5 mm in psoriatic patient. The median EFT for male is 7 mm and 6.5 mm in female (Iacobelis et al criteria.) in general population. Bulbul et al demonstrated that EFT and CIMT are increased in patients with psoriasis, and that echocardiographic EFT is closely correlated with CIMT in patients with psoriasis.<sup>14</sup> The echocardiographic assessment of EFT may have the potential to be a simple marker of subclinical atherosclerosis and increased cardiovascular risk in patients with psoriasis.

CONCLUSION

Psoriasis may elevate the risk of atherosclerosis, particularly cardiovascular disorders. Therefore, from the epidemiological point of view screening psoriatic patients, particularly those with severe psoriasis should be recommended. The results of the majority of the studies are coherent and indicate that the increased total cholesterol, LDL cholesterol and/or triglycerides, increased epicardial fat thickness and decreased HDL cholesterol in psoriatic patients serum. The composition of apo-lipoproteins, and increased production of oxygen metabolites are features of the metabolic syndrome.

These factors have also a great impact on some co-morbidity observed in psoriatic patients especially on cardiovascular diseases. These lipid disturbances are also connected with immunological abnormalities; this is why psoriasis could be classified as an immuno-metabolic disease. In many papers the importance of reduction of animal fat, introduction of fish and plant oil, preparations

with the omega-6 and omega-3 fatty acids as well as BMI reduction, prevention of obesity and quitting addictions were suggested.

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