

# Evaluation of Cardiovascular Risk Factors in Psoriasis Patients

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## Research Article

**Abstract: Background and Objective:** Psoriasis is a common chronic and recurrent inflammatory skin disorder that has been associated with oxidative stress, abnormal plasma lipid metabolism and with high frequency of cardiovascular events. The aim of our work was to evaluate the cardiovascular risk factors such as oxidative stress and dyslipidemia in psoriatic patients.

**Methodology:** Fifty psoriasis patients and fifty control subjects were included for the study. We estimated lipid profile by using auto analyser EM 200 and MDA (malondialdehyde) levels by thiobarbituric acid method. Statistical analysis was done by student 't' test. **Results and Conclusion:** Patients presented cardiovascular disease risk changes in lipid profile (increase in triglycerides ( $p=0.002$ ), low density lipoprotein cholesterol ( $p=0.002$ ), very low density levels ( $p=0.002$ ) and a reduction in high density lipoprotein cholesterol ( $p<0.001$ )) which were highly significant when compared to controls, and increase in MDA levels which were statistically highly significant ( $p<0.001$ ) when compared to controls. Our data suggest that psoriasis patients must be considered as a group at risk for cardiovascular disease.

**Keywords:** Dyslipidemia, Malondialdehyde, Oxidative stress, Psoriasis.

## Introduction

Psoriasis is a chronic recurrent inflammatory disease, genetically determined and environmental factors affecting its outcome [1]. It is characterized by chronic inflammatory, sharply demarcated, dull red scaly plaques, particularly seen on extensor surfaces and scalp [2] affecting 2-3% of the population [3,4]. Psoriasis is considered as a systemic disease associated with increased cardiovascular abnormalities, hypertension, dyslipidemia, atherosclerosis, diabetes mellitus, obesity, stroke, osteoporosis, cancer and depression [4]. The disease has been associated with oxidative stress, abnormal lipid metabolism and high frequency of cardiovascular events resulting in increased morbidity and mortality [5]. Skin, the largest body organ is the biological interface with the external environment and is continuously exposed to UV radiations and other environmental stress, resulting in oxidative injury [6,7]. There are several studies investigating the oxidant/antioxidant status in psoriasis and it has been suggested that increased reactive oxygen species (ROS)

and deficient antioxidant system is responsible for the pathogenesis of psoriasis [8]. Increased oxidative stress in psoriasis also increases the risk of atherosclerosis leading to cardiovascular events [9]. Abnormalities in lipid metabolism may be another important contributory factor in the pathogenesis of psoriasis. There are several reports showing increased proatherogenic lipid profile resulting in increased cardiovascular events [2,5]. Both chronic inflammation, the hallmark of psoriasis and treatment of psoriasis may result in Dyslipidemias. However there are certain studies showing normal lipid profile. Hence the present study was undertaken to assess the cardiovascular risk factors in psoriasis patients by measuring the oxidative stress marker, malondialdehyde (MDA) levels and lipid profile in blood.

## Material and Methods

A case control cross sectional study was undertaken with 50 patients of clinically diagnosed cases of psoriasis who attended outpatient of skin and VD department and 50 age and sex matched healthy persons as controls. Informed consent was taken from all subjects and the study was approved by the ethical committee of the institution. Patients with other inflammatory skin disorders, diabetes mellitus, hypothyroidism, nephrotic syndrome, chronic renal insufficiency, obstructive liver disease as well as smokers, alcoholics and patients receiving drugs which lower the lipid profile were excluded from the study. The severity of psoriasis was assessed by PASI score. 5ml of fasting blood samples was drawn from all subjects under aseptic precaution and was analyzed for routine blood parameters, MDA levels and serum lipid profile. Serum MDA, a marker of lipid peroxidation and hence oxidative stress was measured by Thiobarbituric Acid method [10]. Serum total cholesterol (TC), High density lipoprotein (HDL) and Triglycerides (TG) were measured by using standard kits from ERBA diagnostics on EM-200 autoanalyzer. Very low density lipoprotein (VLDL) was calculated by dividing TG with five (TG/5). Low density lipoprotein

(LDL) level were calculated using Friedwald's formula,  $LDL = TC - (VLDL+HDL)$ .

### Statistical Analysis

The results were tabulated as  $mean \pm SD$  (Standard Deviation). Statistical analysis was done using unpaired student 't' test and probability value (p) of  $<0.05$  was considered as statistically significant.

### Results

A total of 100 subjects were investigated of which 50 were clinically diagnosed psoriasis patients taken as cases and another 50 were age and sex matched healthy persons considered as controls. Of the 50 cases 34 were males and 16 were females with a mean age of  $46.64 \pm 13.98$ . Among controls 31 were males and 19 were females with mean age of  $44.52 \pm 13.05$ . Majority of psoriatic cases were of chronic plaque type (84%) and all cases had PASI score of  $\geq 10$ . Table 1 shows the number of patients in different types of psoriasis.

**Table 1:** Distribution of number of patient in different types of psoriasis

Diagnosis	No of patients	%
Chronic plaque psoriasis	42	84
Palm Plantar psoriasis	2	4
Plantar psoriasis	3	6
Psoriasis vulgaris	1	2
Psoriasis Erythroderma	1	2
Scalp psoriasis	1	2
Total	50	100

In the present study psoriatic cases had highly significantly increased MDA levels compared to controls ( $p<0.001$ ) as shown in table 2.

**Table 2:** Comparison of MDA levels between cases and controls

MDA nmol/ml	Controls	Cases
Mean $\pm$ SD	$1.86 \pm 0.59$	$4.56 \pm 1.13^{**}$

\*\*  $p<0.001$

Psoriatic patients showed risk changes in lipid profile as shown in table 3. There was slight increase in total cholesterol levels in psoriasis when compared to control but this increase was not statistically significant ( $p=0.210$ ). A significant increase was found in LDL levels ( $p=0.002$ ) and triglyceride levels ( $p=0.002$ ) and VLDL levels ( $p=0.002$ ) in psoriatic cases when compared to controls. There was highly significant decrease in HDL levels ( $p<0.001$ ) in psoriatic cases compared to controls.

**Table 3:** Comparing lipid profile between cases and controls

	Controls	Cases	p value
Total Cholesterol mg/dl	$190.18 \pm 23.08$	$197.84 \pm 36.19$	0.210
Triglycerides mg/dl	$123.14 \pm 22.73$	$141.1 \pm 32.75$	$0.002^{**}$
HDL mg/dl	$45.9 \pm 4.79$	$32.52 \pm 7.07$	$<0.001^{**}$
LDL mg/dl	$119.65 \pm 20.13$	$137.1 \pm 33.84$	$0.002^{**}$
VLDL mg/dl	$24.628 \pm 4.54$	$28.22 \pm 6.55$	$0.002^{**}$

### Discussion

Psoriasis is a chronic recurrent inflammatory skin disorder characterized by hyperproliferation and abnormal differentiation of epidermal keratinocytes, prominent endothelial vascular changes in dermis and infiltration by T lymphocytes and neutrophils [1]. The etiopathogenesis depends on genetic, environmental factors, viral infections, immunological, biochemical, endocrinological, psychological factors as well as drugs and alcoholism [4,11]. ROS have been shown to mediate inflammatory process in psoriasis and worsening of the conditioned is linked with oxidative stress [5,12]. Increased chemotaxis, adhesion and increased ROS production from neutrophils [13], keratinocytes [14] and fibroblasts [15] may result in neutrophil activation which plays an important role in psoriasis. Plasma membranes of the skin in psoriasis lesions have a significant increase in arachidonic acid which is the natural substrate for lipid peroxidation resulting in increased MDA production [16]. ROS activates phospholipase -A<sub>2</sub> and causes peroxidation of many mediators of arachidonic acid [8]. Kiyomet Baz *et al.* hypothesized that oxidative damage resulting from increased oxidative stress and deficient antioxidant status may be involved in pathogenesis of psoriasis [8]. A study by Vineet Rehan *et al.*, showing lower plasma MDA levels in psoriasis patients in remission than during acute phase also supports the view that oxidative damage plays an important role in etiopathogenesis of psoriasis [6]. In the present study, serum MDA levels were significantly increased in psoriasis patients when compared to controls ( $p<0.001$ ). The findings are in correlation with observations of Rocha-Pereira P *et al.* [5], Dipali P Kadam *et al.* [17], Jyothi R.S *et al.* [18], Madhur Gupta *et al.* [19], and T Vivian Samuel *et al.* [20]. Oxidative stress has been implicated in pathogenesis of a variety of vascular disease including atherosclerosis, hypertension, coronary artery disease and it has been shown that oxidative modification of low density lipoprotein (oxLDL) is key element in development of atherosclerotic plaques [9]. In psoriasis there is increased oxidative stress as well as increased proatherogenic lipids resulting in cardiovascular risk factors [5]. Potential role of abnormal lipids affecting the immune system in psoriasis has been studied. In this regard autoantibodies against oxLDL have been recognized in psoriasis and are reported to correlate with disease severity [21]. It has been postulated that macrophages activated by engulfing LDL immune complex releases large amounts of tumour necrosis factor- $\alpha$  (TNF-  $\alpha$ ) and interleukin-1 $\beta$  (IL-  $\beta$ ) causing inflammation and tissue damage which is common pathogenesis in both psoriasis and atherosclerosis [22]. In addition hypertriglyceridemia secondary to increased

VLDL elevation is associated with procoagulant and prothrombotic factors in blood and VLDL mediated platelet adhesion may also play an important role in atherosclerosis [23]. A number of studies has investigated the serum lipid abnormalities in psoriasis with conflicting results showing from normal, low to high values [2,3,5,24]. Rocha-Pereira P *et al.* reported increased serum cholesterol, triglycerides, LDL and VLDL, apo B and Lp(a) levels and a reduction in HDL levels with a rise in lipid peroxidation products and reduction in total antioxidant capacity [5]. Another study by Pietrzak A *et al.* demonstrated significant decrease in HDL and increase in triglyceride levels in male psoriatic patients whereas female psoriatic patients showed additionally decrease in HDL phospholipid levels [25]. Whereas Uyanik B.S *et al.* noted no difference in total cholesterol, HDL-C, LDL-C and apoA levels between controls and cases, however Lp(a) and triglyceride levels were significantly higher with a slight increase in apoB [24]. Piskin S *et al.* in their study found higher levels of cholesterol and LDL with no change in other lipid parameters [26]. Whereas in another study by Mallbris L *et al.* on 200 psoriatic patients' abnormalities of lipid profile was found but only VLDL had statistically significant increase [27]. M Akhyani *et al.* reported significantly higher level in cholesterol, triglycerides and LDL levels but found no change in HDL levels [3]. A similar report was given by Zari Javidi *et al.* [23], and Priya H.D *et al.* [28] who also proved TC/HDL ratio to be significantly higher in psoriasis patients. In another study by Madhur Gupta *et al.*, dyslipidemia, oxidative stress and reduction in antioxidant enzymes was demonstrated [19]. In the present study the serum total cholesterol levels in psoriasis patients were increased but were not significantly when compared to controls ( $p=0.210$ ). However there was significant increase in triglycerides, LDL and VLDL levels ( $p=0.002$ ,  $p=0.002$  and  $p=0.002$  respectively). Also there was highly significant decrease in HDL levels ( $p<0.001$ ) in psoriasis patients denoting the risk changes for cardiovascular events. It is not clear whether these changes in lipid profile are primary events resulting in the disease pathogenesis or secondary to psoriasis or treatment of psoriasis [29]. These changes in lipid metabolism in psoriasis may be due to alterations in gastrointestinal system [30]. Whether the dyslipidemia is primary or secondary event, psoriasis patients are at increased risk for development of cardiovascular disease. Vanizor Kural B *et al.* concluded that psoriasis patients to be considered as high risk group for atherosclerosis because of increased oxidative stress, decreased antioxidant status and susceptibility in lipids and lipoproteins [2]. The present study echoes similar findings. However in the present study, majority of the

cases were of chronic plaque type (84%). A further larger study with all the different types and freshly diagnosed cases of psoriasis should be evaluated to establish the etiopathogenesis of the disease.

## Conclusion

Psoriasis patients should be considered as high risk group for development of cardiovascular disease. Treatment of Dyslipidemias and supplementation of dietary antioxidants should be considered in the management of psoriasis to reduce the morbidity and mortality from cardiovascular events.

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