

**Research Article**

**Lipid profile and its relationship to Oxidant and Antioxidant status in Psoriatic Arthritis**

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**Abstract**

Oxidative stress is involved in many diseases, very little has been done to find out the relationship between lipid profile, oxidant and antioxidant status in Psoriatic arthritis. It is a chronic inflammatory skin disorder with joint involvement, stiffness and pain. It is an inherited skin condition with a grayish-white scaling over a pink or dull-red skin rash.

**Objectives:** The aim of this present study was to evaluate the oxidative stress and dyslipidemia in patients with psoriatic arthritis.

**Methods:** A 50 known psoriatic arthritis cases and 50 age and sex matched healthy controls were included in this study. In all the subjects, lipid profile and levels of lipid peroxidation as malondialdehyde, antioxidant enzymes like glutathione peroxidase, superoxide dismutase, Vitamin A, E & C were estimated.

**Results:** The levels of lipid profile were found to be significantly altered in the patient group. Levels of malondialdehyde were significantly increased ( $p < 0.001$ ), whereas the glutathione peroxidase, superoxide dismutase, Vitamin A, C & E were significantly decreased ( $p < 0.001$ ) in patients with psoriatic arthritis when compared to the controls.

**Conclusions:** These results provide some evidence regarding the role of increased reactive oxygen species with decreased antioxidant activity in psoriatic arthritis.

**Keywords:** Psoriasis, oxidative stress, lipid profile, antioxidant enzymes.

**1. Introduction**

Approximately 5% to 10% of the 3 million people who have psoriasis develop psoriatic arthritis. Psoriatic arthritis affects men and women equally and usually begins between ages 30 and 50. Psoriasis can develop before or after the arthritis, but psoriasis develops first in about 75% of cases. A person may begin to get morning joint stiffness before the arthritis is recognized. People who have psoriasis that involves the nails, especially nail pitting, are much more likely to develop arthritis than those without this problem (50% versus 10%). The cause of psoriatic arthritis is unknown. There is some evidence that infection or trauma can play a role in the development of the disease up to 40% of people with psoriatic arthritis have a family history of skin or joint disease. Certain genes seem to be involved in certain types of psoriatic arthritis; the gene HLA-B27 has been associated with psoriatic spondylitis.

Increased or prolonged free radical action can overwhelm ROS defense mechanisms, contributing to the development of cutaneous diseases and disorders.<sup>1</sup> Psoriatic arthritis is a common chronic and recurrent inflammatory skin and joint disorder<sup>2</sup> that has been associated with abnormal plasma lipid metabolism and high frequency of cardiovascular events.<sup>3</sup> This prevalence seems to be related to the severity of psoriatic arthritis, as it occurs more frequently in patients presenting large areas of the body affected with psoriasis lesions. Though dyslipidemia is known to occur, less is known about its status and association with oxidative stress in patients of psoriatic arthritis. Malondialdehyde (MDA), is a marker of oxidative stress, glutathione peroxidase (GPX), superoxide dismutase (SOD), Vitamin C, A & E play an important role in the protection of cell membranes against oxidative damage and may be used as indicators of anti-oxidative status. Hence, this study was carried out to evaluate the oxidative stress and dyslipidemia in patients with psoriatic arthritis.

**2. Material and Methods**

A case control study was carried out in Department of Biochemistry and Medicine at DSMCH, Perambalur. Fifty patients of psoriatic arthritis with a mean age of  $40 \pm 10$  were included in the study. Fifty age and sex matched normal healthy controls with a mean age of  $41 \pm 09$  were selected as controls. The patients were diagnosed by Auspitz sign, clinical features of psoriatic erythema, itching, thickening and scaling of the skin. All the patients being treated only with topical agents, Vitamin D analogues, Dithanol have been included in the study. Patients with any chronic inflammatory disease, diabetes mellitus, renal disorders, ischemic heart disease (IHD), hypothyroidism, obstructive liver disease, any other skin disorder were excluded from the study. All the patients of systemic drug therapy of beta blockers, thiazides, retinoids and lipid lowering agents were also excluded from the study.

A 5 ml of venous blood samples was collected in EDTA bottle and plain bulb from patients with psoriatic arthritis and normal healthy individuals and were estimated for lipid profile, lipid peroxidation and antioxidant enzymes-glutathione peroxidase, superoxide dismutase, Vitamin A, C and E. Serum total cholesterol, triglyceride and HDL-cholesterol were measured by an enzymatic kit. LDL cholesterol was calculated using Friedwalds formula. MDA levels were estimated by Burge and Aust 1978. Erythrocytic Glutathione peroxidase assay was by Paglia Method U/gm of Hb. Antioxidant superoxide dismutase assay by Mark lund S, Mark lund G, 1974 modified by Nandi *et al* 1988. Estimation of Vitamin A by Sing *et al*, 1978:14(4)b. Estimation of Vitamin E by Baker and Fran (1968:172). Estimation of Vitamin C by Dichlorophenolindophenol method.

**2.1 Statistical methods**

Statistical analysis was done using Salstat statistical software. Descriptive statistics like mean and standard deviation were calculated using the software. The results are shown as Mean  $\pm$  SD in table-1 and table-2. The non-parametric equivalent to parametric unpaired t-test, Mann-Whitney U test was used to compare the mean between case and control at 95% level of confidence interval.

### 3. Results

Total cholesterol, VLDL, HDL, LDL-cholesterol and triglycerides levels were statistically significantly increased in patients of psoriatic arthritis than controls ( $p < 0.001$ ) as shown in our table one.

**Table 1. Comparison of lipid profile in patients with psoriatic arthritis and controls**

Variables	Controls (n=50)	Cases (n=50)	p-value
Total cholesterol (mg %)	142.40 ± 14.2	212.06 ± 13.6	<0.001
Triglyceride (mg %)	133.6 ± 14.22	221.16 ± 12.54	<0.001
VLDL (mg %)	26.42 ± 2.84	42.25 ± 3.32	<0.001
LDL (mg %)	65.58 ± 11.06	132.21 ± 8.72	<0.001
HDL (mg %)	45.42 ± 3.41	35.63 ± 3.36	<0.001

(Values are shown in mean ± SD)

Table 2 depicts the levels of MDA ( $p < 0.001$ ) which were significantly elevated in psoriatic patients as compared to normal healthy controls. The levels of GPx and SOD antioxidants were significantly decreased ( $p < 0.001$ ) in psoriatic patients as compared to normal healthy controls (Table 2).

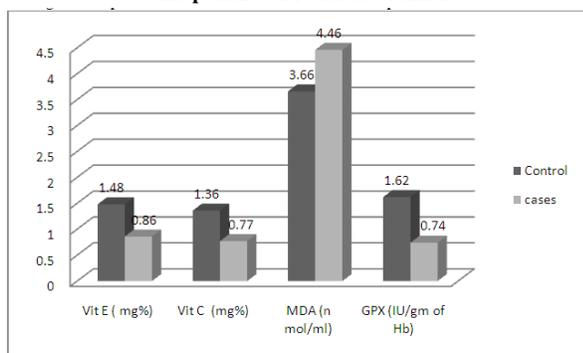
**Table 2. Comparison of oxidant and antioxidants parameters between case and controls**

Variables	Control	Cases	p-value
MDA (n mol/ml)	3.66 ± 0.22	4.46 ± 2.02	<0.001
Vitamin E (mg %)	1.48 ± 0.28	0.86 ± 0.22	<0.001
Vitamin A (µg/dl)	39.04 ± 1.112	24.88 ± 1.714	<0.001
Vitamin C (mg %)	1.36 ± 0.14	0.77 ± 1.02	<0.001
SOD (IU/gm of Hb)	690 ± 6.40	572.24 ± 16.12	<0.001
GPX (IU/gm of Hb)	1.62 ± 0.12	0.74 ± 0.21	<0.001

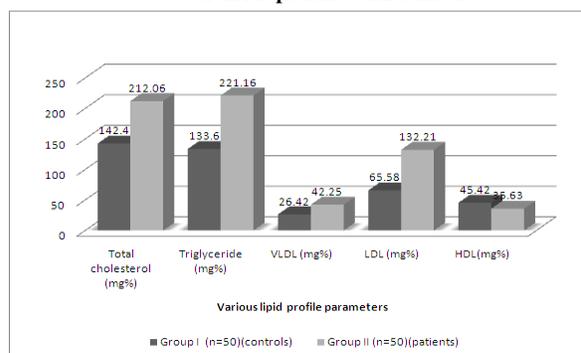
(Values are shown in mean ± SD)

The graphical representation of the results should be shown here.

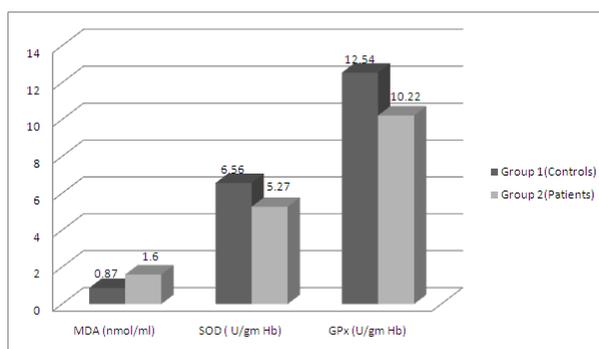
**Fig. 1: Comparison of antioxidant status of controls and patients of Psoriatic arthritis**



**Fig 2: Comparison of lipid Profile of psoriatic arthritis patients with controls**



**Fig 3: Comparison of Pro oxidants and antioxidants in patients with psoriatic arthritis with controls**



### 4. Discussion

Psoriatic arthritis is a chronic inflammatory skin disorder with joint involvement characterized by pathological skin lesions due to various exogenous and endogenous factors and is associated with a number of biochemical and immunological disturbances and considered to be an autoimmune disorder, initiated by the overactive skin innate immune system. A complex network of cytokines and chemokines mediates the pathological reaction in chronic nature of psoriasis.<sup>6</sup> Though conflicting reports are available regarding the serum lipid values in psoriasis<sup>3,7,8,10</sup>, the potential role of lipid abnormality in psoriatic arthritis patients has been discussed. High levels of total cholesterol, triglycerides, VLDL, and LDL-cholesterol in patients of psoriatic arthritis were seen as shown in our table-I. Thus, psoriatic arthritis is a risk factor for hyperlipidemia and its possible subsequent sequel such as obstructive vascular disease can-not be excluded. The free radicals induced oxidation of polyunsaturated fatty acids results in the formation of lipid per-oxidation products such as MDA. Our study showed an increase in the level of MDA in psoriatic arthritis patients when compared to the normal controls ( $p < 0.001$ ) as shown in our table-2. This shows an increased oxidative stress in psoriatic arthritis patients. Similarly our study showed that the lipid profile parameters like total cholesterol, LDL, VLDL and triglycerides were statistically significantly increased in psoriatic arthritis patients when compared to the normal controls ( $p < 0.001$ ) as shown in our table-2.

Superoxide dismutase, an antioxidant enzyme, catalyzes the dismutation of superoxide into the less harmful molecules, oxygen and hydrogen peroxide. Our study showed a decrease in the levels of antioxidant enzyme SOD in psoriatic arthritis patients when compared to the normal controls ( $p < 0.001$ ) as shown in our table-2. The decrease in the levels of antioxidant SOD in patients of psoriatic arthritis is probably to counter act the stress caused by oxidation.

Cells contain enzymes GPx which change the hydro peroxide group to the much less toxic hydroxyl moiety. Furthermore our study also showed that the level of GPx was statistically significantly decreased in patients with psoriatic arthritis as compared with the healthy controls ( $p < 0.001$ ) as shown in our table-2. Selenium being an integral part of the enzyme GPx, reduction in the enzyme activity leads to the accumulation of hydroxyl radicals in inflamed tissue.

Finally our study showed a statistically significantly decrease in antioxidant vitamins like vitamin E, vitamin A and water soluble vitamin C in psoriatic arthritis patients when compared to the normal controls ( $p < 0.001$ ) as shown in our table-2.

Finally our study results showed an increased oxidative stress and decreased antioxidants in patients with psoriatic arthritis as compared with the healthy controls respectively. In conclusion, hyperlipidemia along with increase in lipid peroxidation and decrease in antioxidants levels are a feature of psoriatic arthritis. Inactivating the effects of free radicals and stabilization of the cell membranes in order to prevent new epidermal destruction could be achieved by antioxidant supplementation.

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