

## Study of Lipid profile and Paraoxonase-1 Activity in Psoriatic patients

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### Abstract

**Background:** Psoriasis is a common recurrent disease of skin characterised by excessive cell proliferation and incomplete differentiation in lesional epidermis.

**Aim:** The present study was aimed to determine lipid parameters and paraoxonase activity in psoriatic patients.

**Methods:** The study included 100 subjects of age group 30-60 years, out of which 50 were patients of psoriasis (Case group) and rest 50 were normal healthy individuals of same age group (Control group).

**Result:** Our study showed significant increase ( $p < 0.001$ ) in the levels of Cholesterol, Triglyceride, LDL and VLDL in patients of psoriasis as compared to control group. Also, we found significant decreased levels of serum HDL and PON-1 in psoriatic patients as compared to control group.

**Conclusion:** Our study concludes that altered lipid profile and paraoxonase may be responsible for the higher prevalence of systemic complication such as metabolic and cardiovascular diseases.

**Keywords:** PON-1, Lipid profile, Psoriasis, Cholesterol

### 1.Introduction

Psoriasis is a dermatological disorder affecting 0.1 to 3% of general population. Psoriasis is a common chronic, inflammatory and proliferative disease of skin. Most characteristic skin lesions are red, scaly sharply demarcated, indurated plaques[1]. Living with psoriasis may have psychological consequences for both patients and their families. Psychological problems can arise from the fillings of the patient about body appearance, social rejection, guilt, embarrassment, emptiness, sexual problems, professional inability[2]. The exact etiological factor for psoriasis is yet not clearly known but genetic factor, trauma, skin infection, drugs, emotional stress, alcohol, smoking, etc greatly influences the clinical development of psoriasis[1].

Lipid metabolism may play a role in pathogenesis of psoriasis[3]. Previous studies have demonstrated that patients with psoriasis may have an increased risk of variety of non-cutaneous diseases including arterial and venous occlusive diseases. Changes in plasma lipid and lipoprotein composition in patients with psoriasis may be the reason for the

increased risk of atherosclerosis in these individuals[4].

PON1 (paraoxonase activity, EC 3.1.8.1) was named after its ability to hydrolyze the organophosphate substrate paraoxon, that is the toxic metabolite of the insecticide parathion[5]. It is produced by the liver and is associated with HDL particles and is known to modulate the antioxidant and anti-inflammatory role of high density lipoprotein (HDL)[6][7]. Paraoxonase (PON) family consists of PON1, PON2, and PON3 located on chromosome 7q21,3-22.1.[5] PON1 is a calcium dependent esterase associated exclusively with HDL[8]. PON1 has 3 known enzymatic molecules including PON, arylesterase and dyazoxonase[7]. Serum PON1 also hydrolyzes proinflammatory oxidized lipids which is present in oxidized low density lipoprotein and ruins their atherogenic characteristics[5]. Because of its ability to hydrolyze organophosphates such as paraoxon and aromatic esters like phenylacetate, it decreases the accumulation of lipid peroxidation products. Human serum PON1 acts in conjunction with arylesterase to

function as single esterase enzymes that have lipophilic antioxidant characteristics. These enzymes play a role in decreasing oxidative stress. PON1 is an important endogenous free radical scavenging system in the human body[7].

Psoriasis is associated with increased risk of cardiovascular abnormalities, hypertension, dyslipidemia, atherosclerosis, diabetes mellitus (type 2), obesity, chronic obstructive pulmonary disease (COPD), cerebral stroke, osteoporosis, cancer and depression. The previous literature also suggests that lipid metabolism disorders may play a role in pathogenesis of psoriasis[9]. Therefore, it is important to evaluate various factors responsible for pathogenesis of these co morbidities and co mortalities. Thus, the present study is undertaken to evaluate antioxidant and dyslipidemias by measuring serum paraoxonase (PON1) levels and serum lipid profile in patients of psoriasis.

## 2. Materials and Methods

The present study was carried out in the Department of Biochemistry and Central Investigation Laboratory at Muzaffarnagar Medical College and Hospital, Muzaffarnagar, India. The study was approved by Institutional Ethical and Research Committee. Informed consent was taken from patient and control subjects. The study was conducted from January 2014 to June 2014. The patients of psoriasis and healthy controls voluntarily participated in the study.

### 2.1 Subjects

A total 100 subjects were selected for the present study based on inclusion and exclusion criteria. Out of 100 subjects, 50 were cases of psoriasis and rest 50 were normal healthy controls.

### 2.2 Inclusion Criteria

#### 2.2.1 Cases

The study includes 50 psoriatic patients of age group 30-60 years referred by various Hospitals to the Muzaffarnagar Medical College and Hospital, Muzaffarnagar.

### 2.2.2 Controls

50 normal healthy subjects of same age group without a history of any systemic illness belonging to the same socio-economic status were considered as controls.

### 2.3 Exclusion criteria

Cases of Sexually transmitted diseases (STDs), Diabetes Mellitus, Cardiac Diseases, Renal Diseases, Hepatic disease, Myocardial infarction, Gout, Arthritis and Prolonged illness were excluded from the study.

### 2.4 Collection of Blood Sample

Blood from overnight fasting subjects was collected into tubes without anticoagulant in order to obtain serum. Blood was obtained by venous arm puncture and serum was separated by centrifugation at 3000 rpm for 15 min. Separated serum was used for biochemical analysis

### 2.4.2 Parameters Measured

The following parameters were estimated in the present study-

1. Serum Paraoxonase by Aryl esterase method by using Phenylacetate as a substrate (1979)[10].
2. Serum Total cholesterol (CHO), HDL and triglycerides (TG) were estimated by enzymatic method. (Siemens, Gujarat, India).
3. Serum Low Density lipoprotein (LDL) and very Low Density lipoprotein (VLDL) were calculated by Friedwald's Equation.

### 2.5 Statistical analysis

Results were statistically analyzed by 'GraphPad QuickCals t-test calculator'. Student's t-test was used to assess the significance of difference between the groups. All results are presented as mean  $\pm$  S.D. A 'p' value of less than 0.05 was considered significant.

## 3. Result

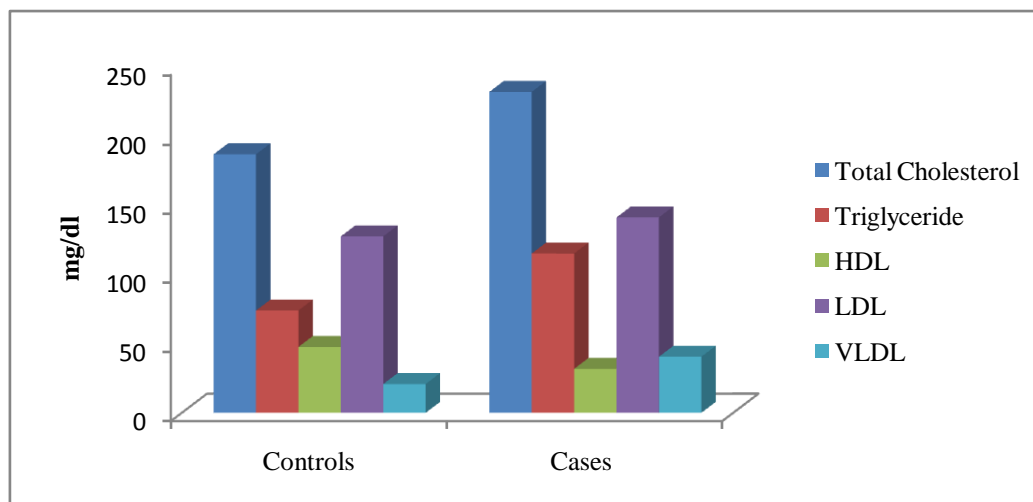
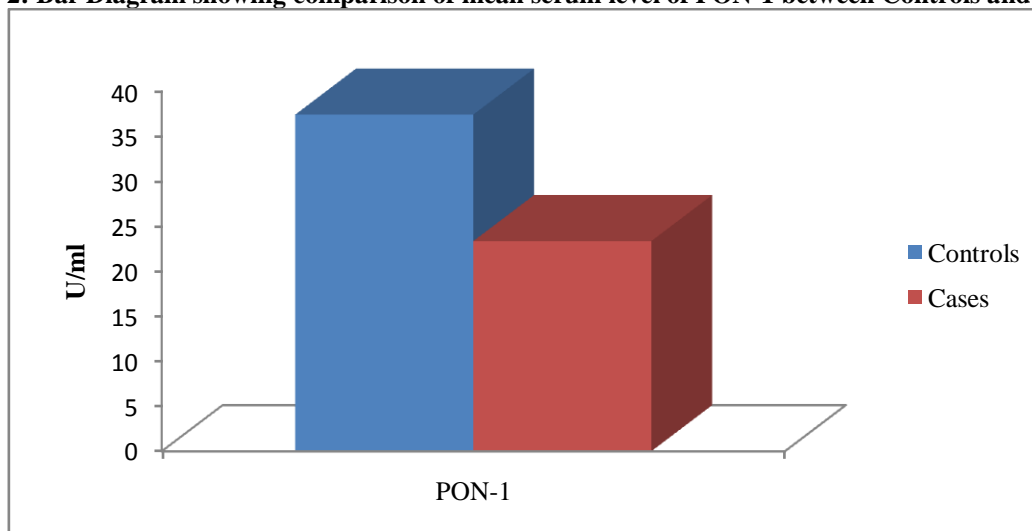
The clinical data for control and psoriatic patients are presented in table No.-1.

**Table No.-1: Showing mean serum levels of lipid parameters and Paraoxonase-1 in Psoriatic patients and normal healthy individuals**

Variables	Healthy individual (Controls)	Psoriatic patients (Cases)	p-Value
Cholesterol (mg/dl)	186.77 $\pm$ 20.12	231.83 $\pm$ 18.06	<.0001*
Triglyceride (mg/dl)	73.90 $\pm$ 6.01	115.08 $\pm$ 23.79	<.0001*
HDL(mg/dl)	47.56 $\pm$ 5.39	31.75 $\pm$ 1.37	<.0001*
LDL(mg/dl)	127.47 $\pm$ 3.07	141.18 $\pm$ 2.16	<.0001*
VLDL(mg/dl)	20.8 $\pm$ 1.82	40.51 $\pm$ 2.47	<.0001*
Paraoxonase1 (U/ml)	37.42 $\pm$ 4.50	23.36 $\pm$ 4.28	<.0001*

\*P-Value <.0001 considered as statistically significant

As shown in table No.1, lipid parameters (CHO, TG, LDL and VLDL) were higher in psoriatic patients as compared to healthy normal individuals which was statistically significant ( $p < .0001$ ) while HDL level was significantly lower in psoriatic patients as compared to normal control group ( $p < .0001$ ). Also, there was significant decrease in the serum level of PON-1 in psoriatic patients as compared to control group ( $p < .0001$ ).

**Figure 1: Bar Diagram showing comparison of mean serum levels of lipid parameters between Controls and Cases.****Figure 2: Bar Diagram showing comparison of mean serum level of PON-1 between Controls and Cases.**

#### 4. Discussion

Psoriasis is a chronic inflammatory skin disease characterized by an accelerated turnover of epidermal cells and an incomplete differentiation in epidermis with lesions. However, the exact etiology of psoriasis is unknown. Also, abnormalities in essential fatty acid metabolism, free radical generation, lipid peroxidation, and release of lymphokines have been proposed in psoriasis[11].

In the present study, there was significant increase in total cholesterol in psoriatic patients as compared to control group. This is in accordance with Aldona *et al*[12] who also found increased level of total cholesterol in psoriatic patients as compared to control group. Nemati *et al*[13], Piskins *et al*[3], Javidi *et al*[14] and Aldhalimi *et al*[15] also support our results.

We found statistically significant increase in the levels of triglyceride in psoriatic patients as compared to controls. Similar findings have been reported by Vanizor *et al*[16] and Javidi *et al*[14].

In our study, we found significant increased level of LDL in psoriatic patients as compared to normal healthy individuals. Our study is in agreement with Piskins *et al*[3], Javidi *et al*[14] and Aldhalimi *et al*[15]. We found significant elevated level of VLDL in psoriatic patients as compared to control group. Similar findings have been reported by Piskins *et al*[3], Aldhalimi *et al*[15] and Vanizor *et al*[16]. In present study, there was statistically significant decrease in the level of HDL in psoriatic patients as compared to control group. A similar finding has been reported by Vanizor *et al*[16], Torkhovskaia *et al*[17] and Reyhoso-von-Drateinc *et al*[18].

Skin is one of the most active lipid synthesizing tissue sterols and fatty acids are major lipids found in stratum corneum cells of skin. In psoriasis there is epidermal hyperproliferation, defective keratinisation and inflammatory changes in both epidermis and dermis. The increased cholesterol biosynthesis by hyperproliferating epidermal cells are responsible for the increase serum cholesterol level in

psoriatic patients, increased level of cholesterol activates thrombocytes. The activated thrombocytes release platelet activating factor which in turn activates phospholipase-A<sub>2</sub>. The increased activity of phospholipase A<sub>2</sub> leads decreased turnover of fatty acids into phospholipid molecules especially phosphatidylcholine and these fatty acids are used in synthesis of triglycerol in psoriatic epidermis. These metabolic alterations might be responsible for alteration in lipid profile.

Paraoxonase (PON1) is a serum HDL-bound enzyme with an antioxidant function. It hydrolyzes lipid peroxides protecting LDL from oxidative modifications. Psoriatic patients are at greater risk of oxidative stress, which is associated with abnormal plasma lipid metabolism.

In the present study, we found that there was significant decrease in serum paraoxonase (PON-1) activity in psoriatic patients as compared to control group. Our result is in agreement with He *et al*[19] who also found that the activity of paraoxonase-1 (PON-1) decreased in psoriasis and negatively correlated with the psoriasis area and severity index (PASI). As PON-1 has antioxidant function, the decreased level of PON-1 in psoriatic patients may be due to increased oxidative stress in these patients

## 5. Conclusion

Patients with psoriasis had a significant increase in cholesterol, triglyceride, LDL and VLDL and significant decrease in HDL and Paraoxonase activity. Our study concludes that altered lipid profile and paraoxonase may be responsible for the higher prevalence of systemic complication such as metabolic and cardiovascular diseases. However, further studies with adequate sample size are necessary to finally accept the concept.

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