

Original Research Article

Inter relationship of plasma lipid profile parameters with plasma uric acid levels in psoriasis

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ABSTRACT

Background: Psoriasis is a chronic immune mediated skin disease accompanied with disturbances in systemic lipid turnover. Hyperuricemia has been frequently observed as an additional complication in psoriasis. The relationship between the raised plasma lipid parameters and the uric acid levels in psoriasis need to be ascertained. A study was undertaken to assess the possible relationship of plasma lipid parameters with plasma uric acid levels in psoriasis and to relate any such relationship to psoriasis disease severity.

Methods: Non arthritic psoriasis patients were randomly selected and were grouped into mild (Group 1), moderate (Group 2) as well as severe (Group 3) based on their PASI scores. Plasma lipid parameters and uric acid levels were assessed in these patients.

Results: The results show a significant ($p < 0.001$) parallel raise in plasma uric acid levels along with plasma lipid parameters with the severity of disease in these patients.

Conclusions: A plasma uric acid level along with plasma total cholesterol and triacylglycerol levels fetch much information on the severity of psoriasis disease.

Keywords: Psoriasis, Uric acid, Total cholesterol, Triacylglycerol

INTRODUCTION

Psoriasis is a dermatological syndrome with a population prevalence of 2-3%.¹ Its prevalence is affected by genetic, environmental, viral, immunological, biochemical, endocrinological and psychological factors as well as alcohol and drug abuse. It is a common disease affecting approximately about 120-180 million people across the globe.² In the recent years psoriasis has been recognised as a systemic disease associated with multi organ abnormalities and complications.³

Dyslipidemia is one of the principle co-abnormalities seen in psoriatic patients, as generally lipid metabolism

and lipid turnover seem to be affected due to an underlying cardiovascular involvement as well as due to underlying psychological stress. It has been shown by many researchers that plasma lipid levels are altered in psoriasis patients.⁴⁻¹⁹

Uric acid, the end product of purine catabolism in humans, is being implicated and its plasma levels have been shown elevated in inflammatory conditions, in cardiovascular complications and in diabetes mellitus.²⁰⁻²³ Its proportional elevation with plasma cholesterol levels has been observed in diabetic hypercholesterolemia.²⁴ Since the day in 1958, Walkerin, first suggested that psoriasis may be associated with raised plasma uric acid

levels, a few reports are available regarding the uric acid levels in psoriasis patients.²⁵⁻²⁷

Although the uric acid levels are implicated in psoriasis but the relationship with plasma lipid profile parameters as well as with the severity of the disease is not well established. Hence a study was undertaken to evaluate the plasma uric acid levels in psoriasis patients and to compare these values with the lipid profile parameters.

METHODS

The psoriasis patients attending dermatology outpatient department (OPD) of Subbaiah Institute Medical Hospital and other associated hospitals attached to Subbaiah Institute of Medical Sciences, NH-13, Purale, Shivamogga, were randomly selected. The patients having arthritis complications were excluded from the study. Detailed history, regarding the illness, duration of disease, the drugs taken as well as food habits was collected from these selected psoriasis patients. The normal control subjects were chosen from the employees of Medical College and Medical college hospitals. The present work was carried out during the period August 2017 to January 2018.

A fasting heparinised blood sample (5-7 ml) was collected from both selected psoriasis patients and normal control subjects after obtaining an informed consent. The blood samples were centrifuged at 3500 rpm for ten minutes. The separated plasma was employed for estimation of total cholesterol (TC), triacylglycerols (TAG), HDL cholesterol (HDLC) and uric acid.²⁸⁻³¹ VLDL cholesterol (VLDLC) and LDL cholesterol (LDLC) were calculated using the relationships:

- a) VLDLC= TC/HDLC
- b) LDLDC= TC-(VLDLC+HDLC)

Table 1: Showing the grouping of psoriasis patients based on their PASI score.

Groups	PASI score
Group-1 (mild psoriasis)	<3
Group-2 (moderate psoriasis)	3.0-6.0
Group-3 (severe psoriasis)	>6.1

Table 2: Showing the plasma levels of TC, TAG, VLDLC, LDLC, HDLC and uric acid levels in normal control subjects as well as in psoriasis patients.

Groups	TC (mg/dl)	TAG (mg/dl)	VLDLC (mg/dl)	HDLC (mg/dl)	LDLC (mg/dl)	Uric acid (mg/dl)
Normal control subjects (25)	161.86±31.82	114.64±32.21	28.35±9.08	58.27±8.68	104.86±20.28	4.69±1.11
Psoriasis subjects (25)	214.85±28.12***	247.78±22.16***	50.70±11.12***	45.52±9.38***	123.85±17.28***	8.29±1.61***

Note: 1: The values expressed are in mean±SD. 2: The number in parenthesis indicates the number of subjects. 3: Probability *p<0.01, **p<0.005 and ***p<0.001.

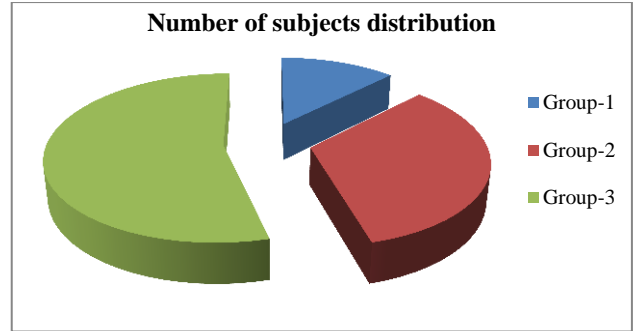


Figure 1: Showing distribution of psoriasis patients in Group-1, Group-2 and in Group-3.

The present study included a total number of 50 subjects: 25 normal control subjects and 25 psoriasis patients. The psoriasis patients were grouped into three groups according PASI (Psoriasis Area Severity Index) scores as depicted in Table 1.³²

There were 4 patients in Group-1 (16%), 8 patients in Group-2 (32%) and 13 patients in Group-3 (52%) (Figure 1).

Statistical analysis

The data obtained were expressed as their Mean±SD and the statistical significance was calculated using student t-test. p<0.05 was considered as significant.

RESULTS

The results obtained in the present study are depicted in Table 2 and in Table 3. Table 2 shows the plasma levels of TC, TAG, VLDLC, LDLC, HDLC and uric acid in normal control subjects and in psoriasis patients. It is evident from the table that TC (p<0.001), TAG (p<0.001), VLDLC (p<0.001) and LDLC (p<0.001) levels are significantly elevated in psoriasis patients as compared to normal control subjects whereas as a significant fall (p<0.001) is seen in HDLC levels in psoriasis patients as compared to normal control subjects. Further it is seen that there is a significant raise (p<0.001) in plasma uric acid levels in psoriasis patients as compared to the normal control subjects.

Table 3: Showing the plasma levels of TC, TAG, VLDLC, LDLC, HDLC as well as plasma uric acid levels in Group-1, Group-2 and in Group-3 psoriasis patients.

Groups	TC (mg/dl)	TAG (mg/dl)	VLDLC (mg/dl)	HDLC (mg/dl)	LDLC (mg/dl)	Uric acid (mg/dl)
Group-1 (Mild psoriasis) (04)	142.68±18.18	110.16± 22.13	20.18±6.16	56.16± 16.16	100.66± 21.22	4.42±1.16
Group-2 (Moderate psoriasis)(08)	172.12±14.12 ***	152.26±18.18 ***	36.63±7.12 ***	49.13±15.12 ***	112.12±18.12	6.72±1.31 ***
Group-3 (Severe psoriasis)(13)	208.36±20.12 ***	242.16±24.14 ***	49.12±16.18 ***	43.12±16.16 ***	122.8±16.16 ***	8.18±1.81 ***

Note: 1: The values expressed are in mean±SD. 2: The number in parenthesis indicates the number of subjects. 3: Probability *p<0.01,**p<0.005 and ***p<0.001.

Table 3 narrates the plasma levels lipid profile parameters – TC, TAG, VLDLC, LDLC, HDLC and uric acid levels in Group-1, Group-2, Group-3 psoriasis patients. It is evident from the table that the lipid profile parameters except the HDLC are significantly elevated ($p<0.001$) in Group-3 as compared to Group-1 and Group-2, in Group-2 as compared to Group-1 as well as in Group-3 as compared to Group-2. Further it is evident from the table that there is a parallel elevation in uric acid levels with TC levels as well as with TAG levels in all the three psoriasis groups studied.

DISCUSSION

Generally in inflammatory conditions, various cell signal compounds including the cytokines, the interleukins (IL), tissue necrotic factor (TNF a) and other factors are released by the cells. The raise observed in the present studies, in psoriasis patients, in plasma lipid profile parameters, specifically, the TC and the TAG is in agreement with earlier workers.^{6-8,10,11,14-18,32-35} The raised plasma levels of lipid parameters in psoriasis may be due to psoriasis-induced inflammation which leads to an increased systemic synthesis of lipids, cholesterol and triacylglycerols because of inflammatory triggered production of cell signalling compounds including the cytokines and the other factors which tends to stimulate the systemic lipid synthesis by inducing Sterol Response Element Binding Protein (SREBP) genes as well as by inducing the genes responsible for HMG CoA reductase enzyme production there by enhancing lipid and cholesterol synthesis, which is essential for the supply of extra lipids and other lipid parameters required for the psoriatic plaque formation.^{36,37} The various lipid transporting protein and related apoproteins synthesis may also be boosted in order to transport these lipid components.³⁸

Uric acid is a product of the metabolism of purine nucleotides, which are the principle constituents of cellular energy stores, like ATP, and are the components of the nucleic acids, DNA and RNA. In most mammals uric acid is further converted in liver by a liver enzyme

uricase to allantoin, thereby reduces the plasma uric acid levels. This enzyme gene in humans is non-functional resulting in normally found uric acid levels in humans.^{3,39} The elevated levels of plasma uric acid observed in inflammatory conditions may be for the compensatory mechanism to counteract raised oxidative stress accompanied with inflammation as uric acid is a known potential antioxidant.⁴⁰ Another interesting point regarding inflammation is, the inflammatory conditions may trigger cell apoptosis resulting in increased nucleic acid turnover and increased purine catabolism leading to an elevated plasma uric acid levels. The results obtained in the present studies in psoriasis patients shows a significant increase ($p<0.001$) in plasma uric acid levels as compared to the healthy normal control subjects (Table 2).

Since the day in 1958, Walkerin, first suggested that psoriasis may be associated with raised plasma uric acid levels, very few reports are available regarding the uric acid levels in psoriasis patients.²⁵ Though the inter relationship between the uric acid levels and the severity of psoriasis been suggested but the study conducted in England negates such relationship.^{41,42} In the present study the psoriasis patients were divided into three groups depending on their PASI scores and it is observed that the plasma uric acid levels in psoriasis patients are significantly ($p<0.001$) elevated as compared to the normal healthy control subjects (Table 2). Further it is observed in the present study that the raise in plasma uric acid levels in psoriasis patients is quite comparable between the psoriasis groups studied. It is observed that there is a proportionate raise in plasma uric acid levels in Group-1, Group-2 and in Group-3 psoriasis patients suggesting a linearity raise with the severity of the disease which in agreement with the findings of Isha et al and Landert et al.^{43,44} It is evident from the results depicted in the Table 3 that the raise in plasma uric acid levels are significant ($p<0.001$) in both Groups-2 and 3 as compared to Group-1 and in Group-2 as compared to Group-1 ($p<0.001$) and in Group-3 as compared to Group-2 ($p<0.001$). Further it is evident from the results shown in Table 3 that the raise in plasma uric acid levels

in Group-1, Group- 2, Group-3 psoriasis patients is proportional to plasma cholesterol and plasma triacylglycerols levels suggesting that the raise observed in plasma uric acid levels in psoriasis is directly related to plasma lipid levels which in turn directly proportional to the severity of psoriasis disease as given by the PASI scores.

CONCLUSION

It can be concluded by the results obtained in the present study in psoriasis patients that the plasma uric acid levels are significantly elevated in psoriasis patients as compared to normal control subjects and the elevation in plasma uric acid levels is proportional to the severity of the disease as well as proportional to the elevated plasma lipid profile parameters. A parallel raise in plasma uric acid levels in relation to the severity of the psoriasis disease as evidenced by the present studies suggests the clinical usefulness of estimation of plasma uric acid levels in psoriasis patient to assess ones disease status. Anyhow more elaborate further research studies are needed with more number of patients with the detailed consideration of the psoriatic complications to establish clearly the exact relationship of psoriasis induced hyperuricemia with the elevated lipid profile parameters as well as the reason behind the raise of plasma uric acid levels in psoriasis patients.

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