Research Article

Biochemistry Section

Psoriasis: An oxidative stress condition

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ABSTRACT

Psoriasis is a chronic inflammatory skin disease that has been associated with abnormal lipid metabolism and a high frequency of cardiovascular events. Several studies have attributed the hypertriglyceridaemia and hyperlipoproteinaemia to retinoids, corticosteroids and thiazide diuretics which are used in the treatment of psoriasis. The present study was undertaken to evaluate whether psoriasis per se is associated with an abnormal lipid profile or whether an abnormal lipid profile occurs due to the medications of psoriasis. Efforts were made to find other diseases which were associated with psoriasis.

This study included 20 male and 20 female, moderate to severe psoriatic patients between the age group of 20-50 years. These patients were clinically diagnosed as psoriasis and had not yet received any treatment. These patients were compared with age and sex matched healthy control subjects. We estimated serum lipid profile, Vitamin E, malondialdehyde (MDA), fasting blood sugar and aspartate amino transferase (AST) and alanine amino transferase (ALT) levels in psoriatic patients and in the control subjects by using the "auto analyzer" and spectrophotometric methods. The psoriatic patients presented a significant increase in the serum lipid profile and malondialdehyde levels and a significant decrease in vitamin E levels. They also showed a significant increase in the fasting blood sugar and the AST and ALT levels.

The data which were obtained from the study i.e. increase in serum lipids and malondialdehyde and decrease in Vitamin E levels show an established state of oxidative stress. The increase in fasting blood sugar and AST and ALT levels indicate that psoriasis may be associated with other oxidative conditions like diabetes mellitus and "non specific" liver disease.

Key Words: Psoriasis, Oxidants, Antioxidants, Oxidative Stress Conditions, Cardiovascular Events

INTRODUCTION

Psoriasis is the most common chronic inflammatory skin disease, affecting about 2% of the general population. The prevalence rates in Europe are quoted to be about 1.5%, whereas in U.S.A., the prevalence is estimated to be about 4.6%. In contrast, lower prevalence rates have been observed in east Africans, American blacks, Indians (0.7%) and among the Chinese populations (0.4%) [1]. While the causes of this disease are unknown, genetic, metabolic, immune and environmental factors have been proposed [2]. The significance of the genetic background becomes evident, with a concordance of approximately 60% in monozygotic twins [1].

Psoriasis is a chronic inflammatory skin disease which is characterized by an increased prevalence of obesity, hypertension, hyperlipoproteinaemia and oxidative stress, leading to occlusive vascular diseases, cardiovascular accidents, arthritis, diabetes and liver diseases [3], [4], [5].

Several studies have attributed obesity, hypertension and hyperlipoproteinaemia to retinoids, corticosteroids and thiazide diuretics, and liver disease to cyclosporine and methotrexate (anti-metabolites) which are used in the treatment of psoriasis [6], [7].

So, the present study was undertaken to evaluate whether psoriasis per se is a metabolic disease with multisystem involvement or whether the multisystem involvement occurs due to the various medications which are used by the psoriatic patients.

MATRIALS AND METHODS

The present study included 20 male and 20 female, moderate to severe psoriatic patients between the age group of 20-50 years, who were attending Chigateri Hospital which is attached to the J. J. M. Medical College, Davangere. These patients were clinically diagnosed as psoriatic, they had not received any treatment and all the factors for secondary hyperlipidaemia were excluded. The patients and the control subjects were explained in detail about the study and informed consent was taken from them. Approval was taken from the Ethical Committee of J.J.M. Medical College, Davangere, to use human subjects in the research work.

We estimated serum lipid profile, vitamin-E, malondialdehyde, fasting blood sugar, and AST and ALT levels in the patients and the control subjects by using a Hitachi-916 auto analyzer. Vitamin-E and malondialdehyde levels were estimated by spectrophotometric methods also [8],[9].Approximately 5ml of fasting venous blood sample was drawn and centrifuged and serum was used for analysis.

STATISTICAL ANALYSIS

Descriptive data tests were presented as Mean ± SD. The Mann-Whitney test was used for group comparison. For all, a p-value of 0.05 or less was considered for statistical analysis.

RESULTS

We found in our study that the psoriatic patients had significantly increased serum lipids, MDA, fasting blood glucose and AST and ALT levels and significantly decreased levels of Vitamin-E as compared to the control subjects. [Table/Fig 1]

Parameters	Patients	Controls	p-value
Total cholesterol (mmol/L)	5.39±0.91	5.15±0.83	0.05
Triacylglycerol (mmol/L)	1.94±0.95	1.67±0.85	<0.05
HDL-Cholesterol (mmol/L)	1.08±0.08	1.19±0.08	<0.05
LDL-Cholesterol (mmol/L)	3.48±1.06	3.27±0.88	<0.05
Glucose (mmol/L)	4.67±0.30	4.45±0.25	<0.05
Vitamin-E (µg/ml)	13.4±2.5	14.6±3.8	<0.05
MDA (nmol/ml)	6.17±1.21	1.85±0.41	<0.001

AST (U/L)	48.19±0.6	30.11±0.75	<0.05
ALT (U/L)	63.12±0.82	42.02±0.34	<0.001

[Table/Fig:1] Serum lipids, Vitamin-E, MDA, AST and ALT levels in psoriasis and in control subjects (mean±SD)

(Significantly different from control subjects at p<0.05 (Mann- Whitney test)

DISCUSSION

We found in our study that the psoriatic patients had significantly increased serum lipids, MDA, fasting blood glucose and AST and ALT levels and decreased levels of Vitamin-E as compared to the control subjects, which was in accordance with the findings of other studies [3],[5].

Although there have been extensive studies on the roles of serum lipids, oxidants and antioxidant levels in psoriasis, their importance in the aetiology or in the enhancement of the disease remains controversial. It has been suggested that there is a genetic predisposition for developing the disease and that several conditions may trigger an enhancement of the disease such as infections, skin traumas, oxidant drugs and stress conditions. Psoriasis is also frequently associated with some diseases, namely cardiovascular diseases, diabetes mellitus and rheumatoid arthritis. It is interesting to notice that these commonly associated pathologies are known as "oxidative stress conditions". Psoriasis as a clinically inflammatory skin disease, may per se impose an oxidative stress condition [5].

Several studies have found that in psoriasis, the fatty acid composition of the plasma and adipose tissue show a number of aberrations. There was a marked increase in the levels of arachidonic, palmitic and palmitoleic acids and a decrease in the levels of linoleic and α-linolenic acids, which were found to be associated with hypertriglyceridaemia and hyperlipoproteinaemia [6],[10].

The pattern of the increased levels of palmitic and palmitoleic acids and decreased levels of linoleic acid has been considered to be an indicator of a relative deficiency of essential FAs, which has been reported in patients at a risk of [10,11] and suffering from coronary heart disease [12],[13] , diabetes [14] and liver disease [15].

The cause of the decreased levels of linoleic and α-linolenic acids is not clear. A much decreased intake of these FAs in relation to saturated FAs is one possibility. Reduced absorption may also be considered, especially in view of the proposed intestinal mucosal changes in psoriasis [10], [16].

Furthermore, in severe psoriasis, there may also be pronounced losses from the skin, not only of FAs, but also of trace elements that are necessary both for the intestinal absorption of linoleic acid and for the further metabolization of the essential FAs. Thus, in psoriasis, zinc losses are probably high [17] and zinc seems to influence the absorption of linoleic acid [10], [18].

Thus, the data which was obtained from our study suggests that psoriasis is a clinically inflammatory skin disease which may per se impose an oxidative stress condition, which leads to other oxidative stress conditions such as myocardial infarction, diabetes and "non specific" liver disease and that these conditions are not primarily caused due to the medications of psoriasis.

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DECLARATION ON COMPETING INTERESTS: No competing Interests

Date of Submission: **Jan 24, 2011**
Date of Acceptance: **Feb 12, 2011**
Date of Review: **Feb 07, 2011**
Date of Publication: **Apr 11, 2011**