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Oxidants and antioxidant status in psoriasis patients

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Abstract

The imbalance in to oxidants and antioxidants leads to the condition called oxidative stress. The oxidative stress is considered as one of the etiopathological factors for development and /or exacerbation of psoriasis. Therefore we undertook this study to determine serum levels of oxidants (Malondialdehyde MDA, Nitric oxide NO) and antioxidants (Total Antioxidant Status TAS, Superoxide Dismutase SOD) and it's correlation with severity of psoriasis. In present research work we have studied 90 clinically diagnosed psoriasis patients and 90 age and sex matched healthy control subjects. Our results showed increased concentration of oxidants; MDA, NO, and decreased concentration of TAS as well as activity of SOD in the serum of psoriasis patients. Observations of our study clearly indicate positive correlation of increasing serum oxidants and negative correlation of decreasing serum antioxidants with PASI scour i.e. severity of psoriasis.

Introduction

Psoriasis is the dermatological disorder characterized by hyperproliferation and inflammation of the skin. The symptoms of the psoriasis are erythema, itching, thickening and scaling of the skin [1]. The psoriasis is majority affecting young or middle-aged adults although no age is exempted. Along with soles and palms as common areas, psoriasis also affects elbows, knees, scalps and sacral region in symmetrical pattern [2].

The exact etiological factor for psoriasis is yet not clearly known but genetic factor, trauma, skin infection, drugs, emotional stress, alcohol and smoking etc. greatly influences the clinical development of psoriasis [1]. The researchers are recently focused on oxidative stress as one of the important factor in pathogenesis of psoriasis. [3,4, 5,6] This research work was aimed to determine the oxidative stress and it's correlation with the severity of the psoriasis.

Material and Methods

Clinically diagnosed 90 psoriasis patients visiting dermatology OPD of Raichur Institute of Medical sciences and Hospital Raichur and 90 age and sex matched healthy control subjects were studied. The patients were diagnosed by Auspitz sign, clinical features of psoriasis like erythema, itching, thickening and scaling of the skin and histopathological examination whenever required. Psoriasis patients of age group 20 to 60 years and without history of any drug therapy for last two months were includes in the study. The subjects with past or present history of any disease like atherosclerosis, CHD, Diabetes Mellitus etc. which are affecting oxidative stress were excluded from the study. The severity of the psoriasis was determined by PASI score and patients were grouped as mild, Moderate and sever psoriasis.

Under all aseptic precautions 5 ml fasting blood sample was collected in the plain bulb and serum was separated after clot retraction. The serum was analyzed at the earliest for levels of Malondialdehyde (MDA) [7], Nitric Oxide (NO) [8], Total Antioxidant Status (TAS) [9] and Superoxide Dismutase (SOD) [10] on the same day.

The results were compiled and the statistical analysis was done by using students 'T' test.

Results

Table 1 depicts the distribution of psoriasis patients according to PASI score, levels of serum MDA, NO, SOD, TAS of the controls and psoriasis patients.
In presented study it was observed that, the MDA & NO concentrations in the serum of psoriasis patients were sig-

nificantly high (p<0.001) as compared control levels. The serum MDA and NO levels were observed to be significantly increased (P<0.001) from mild to moderate and from moderate to the severe psoriasis patients. This increased concentration of serum MDA & NO were correlates positively with the severity of the psoriasis.

The activity of antioxidant enzyme SOD and concentration of TAS in the serum of psoriasis patients were significantly low (p<0.001) as compared to control subjects. The serum SOD activity and TAS levels were observed to be decreased significantly (P<0.001) from mild to moderate and from moderate to severe psoriasis patients. The decreased serum SOD activity and TAS levels were correlates negatively with severity of the psoriasis.

Discussion

Psoriasis is the recurrent inflammatory skin disorder, characterized by marked increase in keratinocyte proliferation as well as abnormal differentiation. Recently researchers have focused on oxidative stress and its relation with psoriasis. It is proposed that oxidative stress is involved in the pathogenesis of the psoriasis [4].

Few studies had showed increased levels of MDA in psoriatic skin, erythrocytes, and serum [11,12] of psoriasis patients as compared to the controls. Gornicki A, Gutsze A. [13] observed that MDA concentration was increased and activity of the antioxidant enzymes SOD and CAT were decreased in erythrocytes of psoriasis patients as compared to the control subject [14,12].

Rocha Pereira P., Silva. Rebelo A S., figuniredo A, Quinitanilha A, Texeira F. [4] studied the oxidative stress of psoriasis patients in correlation with severity of the disease. He observed significantly increased concentration of plasma MDA, correlating positively, as well as low concentration of Vit-E and Vit-A correlating negatively with the severity of the psoriasis. The concentration of plasma TAS was found significantly low in active psoriasis than in inactive psoriasis patients and controls. However, plasma TAS was found to be non-significantly low in inactive patients as compared to control subjects.

The concentration of MDA was found increased as well as activity of antioxidant enzymes SOD & CAT was decreased, significantly in erythrocytes of psoriasis patients. [15] The observation of Relhan V, Gupta S., Dayal S, Pandde R., Lal H. [6] showed significantly high concentration of MDA in blood of psoriasis patients as compared to the controls.

The report of Gokhale N, Belgaunkar V., Pandit D., Shantanu D., Damle D. & Kharaeva Z, Gostova E, De Luca C, Raskovic D, Korkina L. [16,17] showed significantly high concentration of serum NO, correlating positively with the severity of chronic plaque psoriasis.

Increased concentration of the oxidants and decreased concentration of antioxidants leads to oxidative stress, which indicates lipid peroxidation. This may lead to cell damage by continuous chain reactions. In addition, it may be responsible for activation of phospholipase A_2, production of many mediators by arachidonate, deactivation of adenylate cyclase and activation of guanilate cyclase leading to decrease in the cAMP/cGMP ratio responsible for epidermal proliferation [15,18].

Severin E, Nave B., Stander M, Ott R., Traupe H. [19] has observed no difference in the concentration of serum MDA as well as TAS in psoriasis patients and controls. Gavan N., Ruxandra Popa, Remus Orasan, Maibach H. [20] showed significantly high values of Plasma TAS and SOD activity in psoriasis patients.

Table No 1. Showing PASI score and values of MDA, NO, TAS, SOD in serum of psoriasis patients.

Parameter	**Units**	**Controls** (Group I)	**Mild Psoriasis** (Group II)	**Moderate Psoriasis** (Group III)	**Sever Psoriasis** (Group IV)
Number of Subjects	---	90	30	30	30
PASI Score	---	---	21.90±5.32	50.03 ±7.46	76.50 ± 8.15
Serum MDA	µmol/Lit	2.51± 0.16	*3.14 ±0.24	*# 3.98±0.28	*# § 5.92 ± 0.17
Serum NO	µmol/Lit	68.21± 6.83	*98.65±6.31	*#146.17±9.90	*# §204.10± 8.27
Serum SOD	Units/Lit.	7.74± 0.42	*5.88±0.30	*# 4.55±20	*# §3.52± 0.14
Serum TAS	µmol/Lit	1732.21± 16.89	*1641.67±16.88	*#1490.57±19.88	*#§1097.83± 23.37

Values are expressed as Mean ± S. D.
**p<0.001 as compared to group I*
 # p<0.001 as compared to group II
§ p<0.001 as compared to group III

In present study we observed significantly high values of MDA & NO as well as significantly low values of TAS & SOD activity in serum of psoriasis patients as compared to control values. We also found the positive correlation between increased MDA, NO in serum of psoriasis patients with severity of psoriasis and the negative correlation between decreased TAS, SOD activity in the serum of psoriasis patients with severity of psoriasis. Our finding supports other studies showing oxidative stress and its involvement in pathogenesis of psoriasis.

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