ORIGINAL ARTICLE

SERUM SELENIUM LEVELS IN SELECTED TYPES OF PSORIASIS PATIENTS IN PAKISTAN

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ABSTRACT

Objectives: To estimate the micronutrient selenium level in the a serum samples a of a the psoriatic patients of both genders from different areas of Pakistan.

Material and Methods: The serum samples were collected from patients and healthy subjects of same.age and gender groups for comparative study. Serum samples were oxidized by 60% nitric, acid and 70% hypochloric acid"The serum selenium (Se) concentration was measured using HGAAS (hydride generation atomic absorption spectrophotometerHS-55 batch system). Mean ±SD of serum Se levels (μg/L) were 82 ±1.8 and 108 ±1.3 in patients and controls respectively. T-test and One-Way ANOVA were applied. This case control study was carried out in Bannu university of science and technology Pakistan with the collaboration of Govt. Sifwat Ghayur Shaheed memorial children hospital Peshawar Pakistan, NIH(National institute of medical sciences) and National Physical Standard Laboratory PCSIR Islamabad from April 2013 to April 2015.

Results: In psoriatic patients serum Se level was significantly lower than that of healthy controls ($P<0.001$). The result of the study revealed that 480 (98%) of the psoriatic patients have low serum se compared with 100 control. The type of psoriasis may have an effect on serum Se.The lower serum Se is found in pustul psorisis followed by" Erythrodermic, Scalp, Guttate and plaque" psoriasis.

Conclusion: Selenium deficiency can contribute in the pathologic process of psoriasis."

Key words: Selenium,Psoriasis, Serum.

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INTRODUCTION

Psoriasis is a chronic" disease with multifactorial etiologies involving the interactionof both genetic and environmental factors[1]. The pathogenesis of psoriasis remains poorly understood[2]. Many studies have thrown light on the etiopathogenesis of psoriasis at both molecular and tissue concentrations[3]. Several studies have attempted in the past decade to trace the unknown causes and development mechanisms of psoriasis[4]. Trace element imbalance may affect the activity of some enzymatic dependent bio processes such as keratinization and melanin formation[5]. Selenium is one of the mediator responsible for the origination and development of psoriasis. Selenium inadequacy, and polymorphisms or mutations in selenoproteins genes and synthesis cofactors are associated with pathophysiology of many diseases, including cardiovascular disorders, immune dysfunctions, cancer, muscle and bone disorders, endocrine functions and neurological disorders[6].

The serum samples of psoriatic patients have been found to be lower than expected, but studies on its role in the pathogenesis of the disease are rare.In addition to being an antioxidant, selenium plays an important role in non-enzymatic cellular defense against reactive nitrogen and oxygen species[7]. In patients with psoriasis, selenium levels may be diminished, meaning

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adding them back into the diet could be influential for psoriasis patients[8]. This study intends to assess the selenium deficiency in psoriasis patients and to compare the levels of selenium with those of apparent healthy subjects, thus to find an effective, low-cost remedy for the controlling of psoriasis.

MATERIAL AND METHODS

In this present study serum of 500 psoriasis patients, including 250 male and 250 female with the age range of 18-60 years were selected from different hospitals and clinical Labs of Pakistan. All the patients were examined by the consultant dermatologist" and their physical examination and complete medical history were documented. A maximum and accurate information about the healthy and unhealthy subjects were determined.

For comparison purpose non-psoriatic healthy subjects of both genders (n= 100) were assessed with same age group and socioeconomic status. All those individuals were included, who were; suffering with visible psoriasis and those looking apparently healthy for comparison. While those individuals were excluded, who were on minerals, hormones and vitamin therapy. Non-co-operative patients (who refused to participate in the study). Those patients who were suffering with acute or chronic diarrhea. Pregnant and having cutaneous diseases other than psoriasis were also excluded from the study.

All reagents and solutions have been obtained from Merck, Germany, and BDH,UK. Pellets of sodium borohydride (NaBH4) have been dissolved in a 1% sodium hydroxide (NaOH) solution to get 3% NaBH4. 0.5 % HNO3 solution was used for preparation of Se standard solutions and 3% hydrochloric acid (HCl) have been used for hydride generation atomic absorption spectrometery(HGASS).

5 ml blood samples of healthy and psoriatic patients were taken from the ante cubital vein. The samples were transferred to vacutainers and left undisturbed. For 1 hour to clot. After centrifugation at 5000 rpm for 15 min, sera were stored in Eppendorff vials at –20°C until further analysis at 1 mL of serum was added to a Teflon beaker and digested in mineral acids under optimum heating. The temperature of the hot plate was increased steadily in a range 175 °C to 250 °C until fumes of HClO4 appeared. 10 ml of 6N HCl was added and the sample was re-heated at 170 °C for 30 min to reduce Se (VI) into Se" (IV)9. Serum samples after digestion were analyzed in triplicate for selenium concentration using HGAAS, Analytic Jena (Vario VI) HS -55 Batch system.Calibration plots were prepared for a concentration range of 20, 40, 80 ppb of standard solutions.

Quantity Control for the methodology was established by inter lab comparison (ILC) of the serum samples. A composite sample was prepared from 100 serum samples and was properly centrifuged. (HGASS) was used for the analysis of composite sample and both results were compared and a close relationship was observed." Statistical analyses were carried out using the student's T-test and One-Way ANOVA were applied and p-values<0.001 were considered significant.

RESULTS

The results showed that the mean (±SD) of Se level in both male and female healthy subjects in the age range 18-43 years was 104.8±0.54μg/L and 93.7±0.50μg/L respectively and the mean (±SD) of Se level in both male and female in the age range >43 years was (99.90±0.60μg/L and 84.7± 0.55 μg/L respectively) (Table 2). A statistically significant difference was found (p<0.005) between the means of both groups. "The mean value of serum Se in control group and patients with age range 18-60 years was 107.8±1.3μg/L"and 82±1.8μg/L respectively as shown in Table 3. Lowest mean serum Se level was found in Pustular psoriasis (50.3 ±1.3μg/l) followed by Erthyrodermic type psoriasis (57 ± 1.4 μg/l), compared to other three types of psoriasis. A statistically significant difference (p<0.001) was found among patients and control group. Figure 1.shows mean value of serum Se in control and selected types of psoriatic patients. The relation between serum Se levels and Psoriasis Area and Severity Index (PASI) score was examined, and the results showed that higher PASI score was associated with lower serum Se level a. The mean serum Se levels were 80±0.45μg/L in patients with PASI scores <10 as shown in figure 2a. While serum Se levels were 70±0.55μg/L in patients with PASI scores >10 respectively as shown in figure 2b.The mean serum Se level in patients with a lower PASI score was significantly higher than in those with a higher PASI score (P=0.02). Therefore, patients with

pustular psoriasis are more prone to the Selenium deficiency as compare to other types while the deficiency order of other types is erythrodermic> scalp >guttate> plaque.

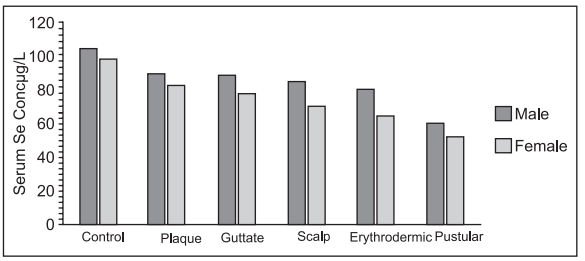

Fig 1: Serum Selenium concentration in control and patients groups regarding sex

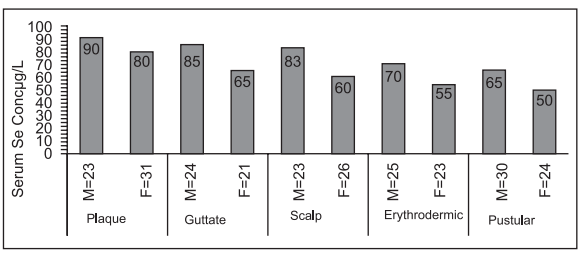

Fig 2A: Serum Selenium levels according to PASI< 10

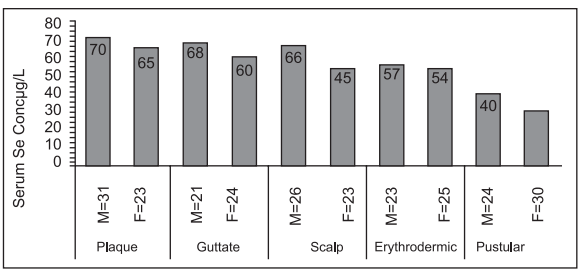

Fig 2B: Serum Selenium levels according to PASI < 10

Table 1: Inter-Lab comparison of the composite samples for Se

Laboratories	Sample Type	Se (µg/L)
Chemical Metrology Division, NPSL (Contra 700, Analytic Jena)	Diseased	89±1.55
	Healthy	120±0.79
PCSIR Labs Complex, Karachi, (Hitachi 8000 with Zeeman background correction, Japan)	Diseased	83±1.90
	Healthy	105±0.75
Abdul Wali Khan University, KPK (AA Analyst 100, Perkin Elmer, with Zeeman Background Correction)	Diseased	80±1.95
	Healthy	125±0.55

values are the mean of three replicates ± SEM

Table 2: Serum Se Conc. in Healthy Individuals

Se Concentration(µg/L)			
Age (yrs)	Gender	Mean	P-values
18-43	Male	104.8±0.54	HS
	Female	93.7±0.50	HS
Above 43	Male	99.90±0.60	HS
	Female	84.7±0.55	HS

Total No. of samples were 100, ratio for male and female individuals was 1:1, PV means Pearson values, HS means highly significant.

Table 3: Mean serum Se concentration in control and patient groups

No. of Individuals				
Samples	Age (Years)	Male	Female	Conc. (µg/L) Mean±SD
Control	18-60	50	50	107.8±1.3
Psoriasis patients	18-60	250	250	82±1.8

Total No. of samples were 100, ratio for male and female individuals was 1:1, PV means Pearson values, HS means highly significant.

DISCUSSION

Disturbances in keratinization, cause excessive loss of trace elements with desquamation, malabsorption, or tissue distribution abnormalities[10]." Although the cause of psoriasis is still unknown, there is compelling evidence of a complex interaction between altered keratinocytic proliferation and differentiation, inflammation and immune dysregulation[11]. Since selenium plays a role in cell proliferation and cell cycle 12 so selenium may modulate psoriatic pathology.

In our study the mean serum selenium level in psoriatic patients is 82± 1.8µg/L which is below normal limit (normal value is 107.8±1.3 µg/L), this result is in agreement with previous studies by Mc Kenzie et al.[13] and Rafferty et al.[14] Corrocher et al[15] and Fairris[16] who reported low serum selenium levels in patients with psoriasis. On the other hand, Donadini[17] and Tossiet al.[18] found no association between severity and Se serum levels in psoriatic patients.

In light of these facts, this study was set up to assess serum selenium levels in patients with various clinical types of psoriasis to explore the plausible association of selenium with psoriasis. Pakistani psoriatic patients also highlight the potential role of selenium in

the pathogenesis of psoriasis.

Our study has showed decreased serum selenium level in 80% of psoriatic patients. Experiments on selenium supplementation in psoriatic patients showed that selenium in inorganic forms, but not as thionine can achieve clinical improvement[19,20].

From Table 2 it can be seen that the average Se content decreases with an increase in the age group and the lowest Se content was found in the age group> 43 years. In our study, we divided the control and patients into 2 groups as follows: Group 1 (age 18-34 years, 50% of men and 50% of women), group 2 (age group> 34 years, 50% of men and 50% of women). Se serum levels in healthy Pakistani individuals showed statistically significant differences regarding sex and age. Se levels were higher in healthy men than in women."

The Psoriasis Area and Severity Index (PASI) score is generally used to measure the severity of psoriasis and evaluate the progress and response to treatment.[21]

Our study also has shown lower level of serum selenium in patients with more extensive skin involvement (PASI> 10) had lower levels of Se in comparison with less involvement of the skin (PASI <10). A this indicates that the higher surface area of involvement is inversely proportional to the serum selenium level

In our study, all types of psoriasis patients showed a low serum selenium level, although the pustular type had the lowest level. A both groups have lower serum selenium than normal controls.

Our study had some limitations, such as the small number of male and female patients, moreover serum levels of Selenium may be affected by various endogenous and exogenous factors, such as diet and decreased physical activity, which could not be compared in our study. Furthermore, we could not study immunological parameters associated with psoriasis that may have been affected by serum levels of Selenium due to financial constraint.

CONCLUSION

Serum selenium levels in cases with different types of psoriasis could prove useful. The data obtained in this study can assist physicians and other health professionals in identifying deficiencies of essential trace element (Se) in biological samples." The results of the present study show a low serum level of (Se) in patients with psoriasis compared to the control group.

Recommendations

Selenium deficiency screening tests should be performed to evaluate the selenium concentration before and after administration of supplements. Hence selenium may be an effective modality of treatment in psoriatic conditions.

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CONFLICT OF INTEREST: Authors declare no conflict of interest

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Dilawar S: Perceived and planned the project.

Shah A: Took the lead in writing the manuscript.

Ahmad Z: Contributed to the interpretation of the results Provided critical feedback and helped shape the research analysis and manuscript.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.