

## SERUM IRON LEVELS IN PSORATIC PATIENTS IN PAKISTAN

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### ABSTRACT

**Objective:** The persuasive evidence shows that proper iron (Fe) nutrition has a chief role in human health. Hence a study was designed to estimate the serum iron in psoriatic patients in Pakistan.

**Materials and Methods:** 500 patients (males & females) with different ages and different types of psoriasis were randomly chosen for this study. Similarly 100 non-psoriatic volunteers, sex and age matched were included who served as controls were evaluated for serum iron level. Serum iron level was measured with atomic absorption spectrophotometer (AAS).

**Results:** The serum iron level was found to be low in 80% patients. Mean  $\pm$  SD of serum iron was  $850.40 \pm 2.30$   $\mu$ g/dL in disease group and  $898.10 \pm 1.50$   $\mu$ g/dL in control subjects. In patients serum iron level was notably lower than normal healthy control subjects ( $p < 0.001$ )

**Conclusion:** It was concluded that deficiency of iron may play a role in the pathogenesis of psoriasis and routine serum iron estimation in patient with psoriasis will be helpful in evaluating and describing the severity of psoriasis.

**Keywords:** Iron, Psoriatic patients, AAS, PIMS, KMC, Pakistan

### INTRODUCTION

Globally about 2% people are attacked by psoriasis. Worldwide almost 1.25 billion people are affected from this disease as reported by world health organization (WHO) and amidst them only near half new patients report yearly<sup>1</sup>. To trace the etiology and development of Psoriasis, many research studies have been conducted in the recent past<sup>2</sup>. Psoriasis is an autoimmune a type of dermatitis marked by rapid division of keratinocytes due to reciprocity between keratinocytes and immune cells. Iron status plays main character in improving the role of the immune

structure. Heme oxygenase (HO), heme denigrative enzyme plays vital role in shielding effect to oxidative cellular stress<sup>3</sup>. There is some proof concerning the roles of different metals and metal binding proteins in psoriasis and chances of estimating these as possible markers of the disorders would give reliable earmarks for successful control of the disease. The participation of trace metals<sup>4,5</sup> and changed trace metal homeostasis<sup>6</sup> in psoriasis has been described. Deficiency of iron often embroils inflammatory-mediated long term disorders, irrespective of anaemia. Psoriasis is a persistent, immune mediated skin disorder with systemic pro-inflammatory activation; thus, these subjects may be susceptible to develop Iron deficiency (ID). ID badly influences immune cells performance, which can additionally contribute to ailment progression<sup>7</sup>.

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Recently, there is growing notice regarding iron levels in chronic, immune related diseases. However, in divergence to preceding results mainly focusing on potentially harmful results of iron overburden and linking pathophysiology of many chronic disorders to iron (Fe) excess<sup>8,9</sup>.

The recent study was under taken to evaluate the quantity of serum iron in patients suffering from psoriasis and its relation with disease.

## MATERIALS AND METHODS

A case control study in which five hundreds diagnosed psoriasis subjects, including both sex with the age range from 18 to 60 years were randomly selected from different clinical Labs and tertiary care hospitals of Pakistan on predetermined selection criteria and were compared with 100 apparently normal healthy individuals of same age and sex selected from the same communities who were free from any severe and chronic pathology, with no history of viral hepatitis, smoking habits and or use of alcohol. A written consent was signed by healthy individuals and patients for the participation in our study. The subjects were thoroughly investigated by the skin specialists and a comprehensive medical history of each patient was recorded. The study was approved by the Ethical Committee of Bannu University of Science and Technology, Bannu.

Co-operative and appropriate biopsy proven patients with clinical diagnosis of psoriasis were included in the study. The control comprised of individuals who were healthy and sex and age matched and those patients who were not receiving any topical and systemic therapy were included.

While the following subjects both patients and normal subjects were not included, who were; on vitamin treatment and minerals and those who were suffering from lower or upper respiratory tract infections as well as those who refuse to be a part of study.

All reagents used were of analytical grade. All standard solutions were prepared in a 0.01 M HNO<sub>3</sub>.

**Collection and Preparation of Samples:** Blood samples of approximately 5 mL was taken from antecubital vein using disposable syringes of 5 mL with all precautions. The blood was transferred to a sterilized and already labeled glass tubes and serial numbers were endorsed. The blood was centrifuged in centrifuged machine at 1000–2000 rpm for 10

minutes<sup>9</sup>. The separated layer of serum was clipped out with micropipette into sterile and properly labeled disposable plastic capped (eppendorf) tubes. All the tubes were stored at –20 °C to be used for determination of the desired micronutrient iron. One 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 HClO<sub>4</sub> appeared.

An Atomic absorption spectrophotometer (AAS) (Contra 700, Analytic Jena) was used as per manufacturer's instructions and the digested samples of blood were determined for three times. The working curve for iron (Fe) was directly obtained by diluting concentrated solutions of blood samples in HNO<sub>3</sub> (0.01 M) for a concentration ranges of 20, 40, 80 µg/dL of standard solutions.

To find out any significant change the Student's T– test was used. Any p values < 0.05 were considered significant.

## RESULTS

### Iron Concentration in the Serum of Healthy Individuals

Total number of samples was 100; ratio for females and males was 1:1. Both healthy male and female in control group with age range 18-43 years showed higher mean ± SD serum Fe concentration (898.00 ± 0.55 µg/L and 845.00 ± 0.45 µg/L) respectively and the mean ± SD serum Fe concentration of healthy individuals (male and female) with age group > 43 was 800.00 ± 0.75 µg/L and 724.00 ± 0.41 µg/L as given in table–1. A highly notable change was noted (p<0.005) among male and female controls upon comparison.

The mean ± SD serum iron level in controls and patients with age range 18-60 years was found to be 898.10 ± 1.50 µg/L and 850.40 ± 2.30 µg/L respectively as depicted in Table–2. The serum Fe levels were significantly lower (p<0.001) in psoriatic subjects as compare to controls.

Figure–1 reveals serum Fe levels among controls and different types of psoriasis. Lowest mean ± SD serum iron level (µg/L) was found in Pustular psoriasis followed by Erythrodermic, Scalp and Guttate types' psoriasis respectively.

**Serum Iron Concentration vs. Psoriasis Area Severity Index (PASI):**

The association between serum Fe concentration and severity of psoriasis was analysed, and the analysis showed that higher PASI score was related with lower concentration of Fe. Psoriasis is commonly categorized as mild psoriasis when it covers 2% or less of the body skin and moderate psoriasis covers between 2–10% of the body surface area while severe psoriasis covers greater than 10% of the body skin. Figure–2 depicts serum Fe concentration in male and female groups whose body covers 10% of the body

skin. Figure–3 represents the serum Fe concentration of male and female subjects in which the body covers more than 10% of the total body surface area. Hence, the deficit order of serum Fe regarding %age of body participation in different types of psoriasis is such that patients with pustular psoriasis are more susceptible due to lack of iron when compares with other types. Deficiency orders of other types is erythrodermic > scalp > guttate > plaque.

**DISCUSSION**

Blood has trace elements in normal concentration which play vital role in the maintenance of skin

**Table 1: Serum Iron (Fe) Concentration in Normal Healthy Individuals**

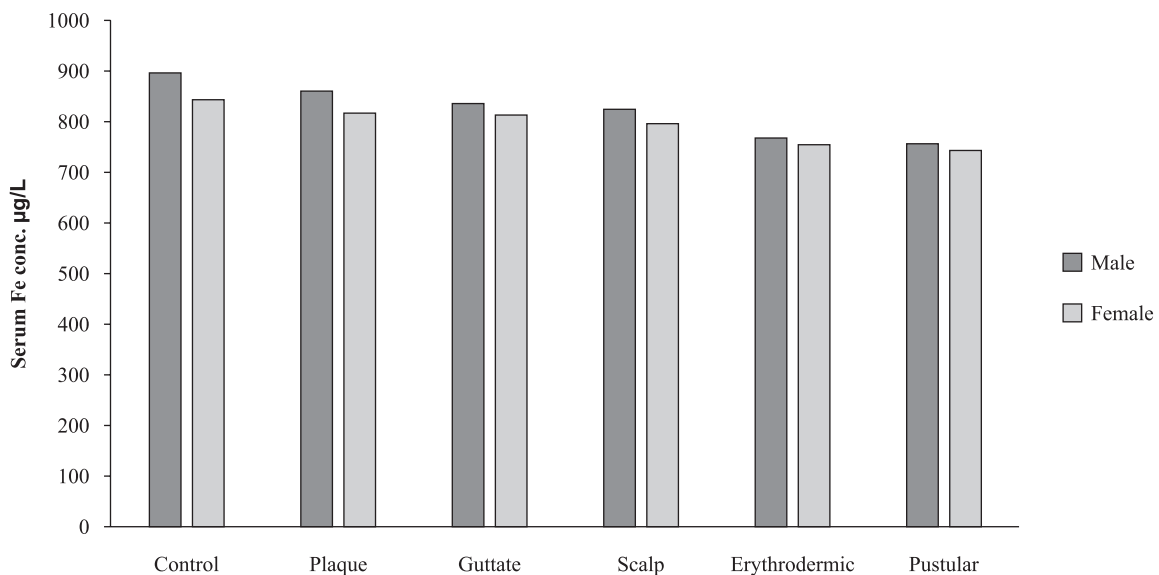
Age (Years)	Gender	Mean ± SD Fe Concentration (µg/L)	p-values
18 – 43	Males	898.00 ± 0.55	HS*
	Females	845.00 ± 0.45	
Above 43	Males	800.00 ± 0.75	HS*
	Females	724.00 ± 0.41	

HS\* means highly significant (p < 0.005).

**Table 2: Serum Iron (Fe) Concentration; Healthy Individuals vs. Psoriasis Patients**

Categories	Age (Years)	No. of Individuals		Mean ± SD Fe Concentration (µg/L)	p-values
		Males	Females		
Controls	18 – 60	50	50	898.10 ± 1.50	HS*
Psoriasis Patients	18 – 60	250	250	850.40 ± 2.30	

HS\* means highly significant (p < 0.001).



**Fig 1: Fe Concentration in Controls Vs different types of Psoriatic Patients on the Basis of Gender**

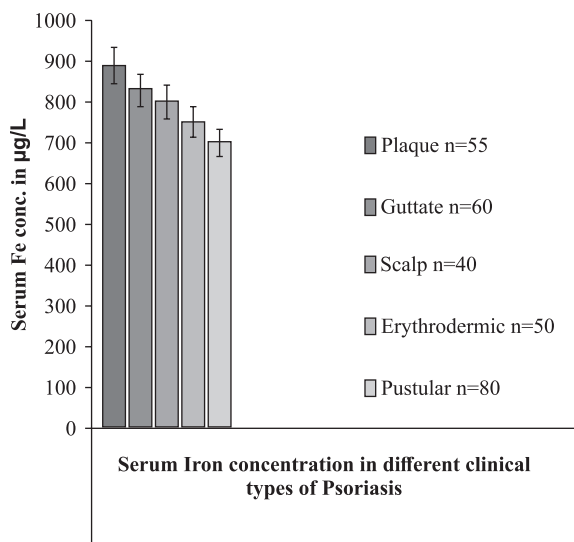


Fig 2: Frequency of Fe deficiency with PASI Score <10

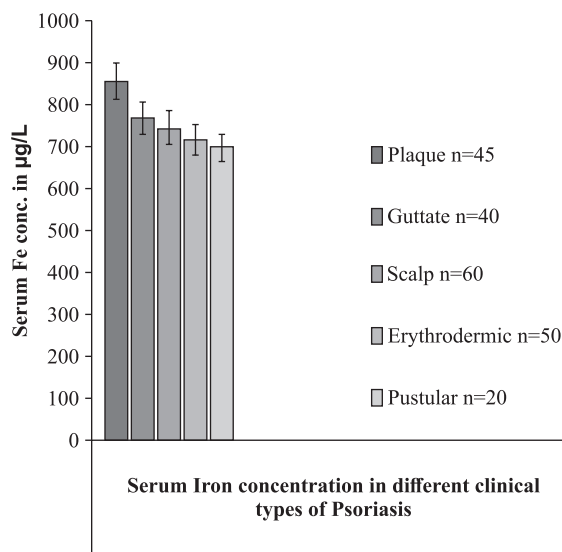


Fig 3: Frequency of Fe deficiency with PASI Score >10

health as they are involved in keratinization and melanin formation. Altered serum levels of many trace elements are evident in psoriasis<sup>11</sup>. The present study investigated iron status in different clinical types of Psoriasis and found significantly reduced serum iron levels in different types of psoriasis patients when compared to controls. This observation supports the possibility that iron, an important requirement of cell division may be increasingly utilized by the proliferating cells resulting in decreased levels of iron in psoriasis. The rapid loss of nutrients from the hyper proliferation and desquamation of the epidermal layer of skin in psoriasis has been reported<sup>12</sup>. So it is suggested that iron may be lost due to desquamation resulting in reduced serum iron concentrations in psoriasis.

A few numbers of studies on trace elements in psoriasis are available and have shown significant alteration in serum iron levels. In a study done by Nagat Sobhy Mohamad (2013)<sup>13</sup>, serum iron levels were significantly high in psoriasis patients which was in accordance with study done by Arpita Gosh et al.,<sup>14</sup>. Heba Elhaddad *et al.*, (2017) found significantly low levels of serum iron in psoriasis which were in agreement with the study conducted by Basavaraj *et al.*, (2009) who also reported significantly decreased serum iron levels in mild and severe psoriasis patients<sup>15, 16</sup>.

Another study conducted by Dilek N and colleagues (2014), which included 46 psoriasis patients

and 32 controls, serum ferritin level in psoriasis patients (59.65 + 2.90 ng/mL) was found to be higher than the controls (56.84 + 3.62 ng/mL). Though, the difference was not significant. Serum iron was significantly low in psoriasis group when compared to controls. No comparisons were made between the PASI score and serum markers, ferritin and iron as the study included patients with merely high PASI score but we have found significant result while comparing PASI<sup>17,18</sup>. Psoriasis Area and Severity Index (PASI) is the current gold standard tool used for judgement of intensity and size of psoriasis. PASI score is being used for the evaluation of strength of psoriasis and as a device to observe feedback to therapy. The use of markers in combination with clinical measures like PASI will help in superior comprehension of disease as well as to evolve therapy planes and monitor responses<sup>12</sup>. It has been suggested that the status of iron is connected to the clinical intensity of psoriasis. We noted that the psoriatic patients with skin involvement on large scale (PASI >10) had lower Fe concentrations as compare to low skin involvement (PASI <10). The present study all types of psoriasis showed low iron level although the pustular type showed the lowest level.

Direct association was observed between seriousness of disorder and these clinical changes. The subjects with serious disease had more reduced iron concentration and, while those with less severe disease had contradictory findings. Therefore the alteration in serum iron reflect the intensity of in-

flammation in psoriasis and its systemic outcome and thus is in agreement with the study conducted elsewhere in the world<sup>19,20</sup>.

## CONCLUSION

Routine serum iron estimation in patient with psoriasis will be helpful in evaluating and describing the severity of psoriasis. Improvement of iron imbalance is helpful in the treatment of psoriasis.

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