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Research Article

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Study of Correlation of Heamoglobin and Serum Ferritin levels in Psoriasis: Case Control Study

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Introduction

Psoriasis is a chronic, immune-mediated inflammatory skin disease. It ranges in severity from a few scattered red, scaly plaques to involvement of almost the entire body surface. It may progressively worsen with age, or wax and wane in its severity; the degree of severity depends on inheritance and environmental factors [1]. The prevalence of the disease in countries ranges from 0.09% and 11.43% with at least 100 million people affected worldwide. The condition is rarely dangerous to life but it is at all times quite vexatious. A number of people worldwide needlessly suffer from psoriasis due to delayed or incorrect diagnosis, inadequate treatment options, and insufficient access to care and stigmatization [1].

Psoriasis Area and Severity Index (PASI) is the current gold standard tool used for assessment of severity and extent of psoriasis [2]. It is a measure of the average erythema, in duration and scaling of target plaques, weighted by the area of involvement. The score ranges from 0 (no disease) to 72(maximal disease). The ranges have been translated into mild 0-7, moderate 7-12 and severe 12-72 [3].

While the PASI has been the most widely used clinical measure in research works, it is rarely used by clinicians in their everyday practice due to its limitations [4,5]. Many clinical measures were developed to overcome the limitations of PASI but they could not exceed PASI on most of the clinimetric properties. No biomarkers have been defined yet to assess the disease severity. Objective measures are needed that are reliable, flexible, easy to use and universally applicable [4]. Identification of a valid biomarker of disease severity would represent a major advance [6].

The monocytes and macrophages release oxygen metabolites and proteases which cause oxidative and proteolytic damage to plasma constituents and red blood cells. The heme biosynthetic capacity of red blood cells is decreased [7].

Normal trace elements in the blood are important for the maintenance of skin health as they are involved in keratinization and melanin formation. Altered serum levels of many trace elements are evident in Psoriasis [8-10]. Trace metals promote the production of Reactive Oxygen species (ROS) [11]. The metalloproteins are known to ameliorate the lethal effects of ROS by binding to the redox active metals (like copper and iron), thus minimizing their capacity to catalyze ROS production via Fenton reaction. Possibilities of evaluating these as potential biomarker may provide better targets for the treatment of Psoriasis [12].

Iron is a rare element in the universe and is essential for the normal functioning of the biological system. The iron is stowed in liver, spleen, bone marrow and intestinal mucosal cells in its storage form, ferritin. Apart from providing iron stores for heme synthesis, it is known to play role in regulation of hemopoiesis, production of ROS, maturation of monocytes to macrophages (in vitro) and many more [13].

Concentration of serum ferritin is a reflection of total body iron stores in the absence of inflammation and infections. The levels are significantly altered in response to inflammation, acute infections and/or a variety of diseases [12]. Chronic inflammatory diseases are often associated with deranged iron status. Iron released from the storage protein, ferritin can be potentially harmful when present in excess. It can catalyze the formation of toxic ROS via Fenton chemistry resulting in frequent oxidative damage [14].

A number of studies have shown increasing interest on the iron status in Psoriasis [15-17]. However, very few studies have focused on the iron parameter, serum ferritin in Psoriasis.

Thus, the present study was undertaken to estimate the heamoglobin and serum ferritin levels and its possible role in psoriasis patients. Further, an attempt was also made to assess any possible correlation between the heamoglobin and serum ferritin and PASI score.

Aims and Objectives

The study aimed to

- Estimate the Heamoglobin and serum ferritin levels in psoriasis patients.
- Estimate the Heamoglobin and serum ferritin levels in age and sex matched healthy controls.

- Assess any possible correlation between the levels of Heamoglobin and serum ferritin and PASI score.

Material and Methods

The study was conducted at S N. Medical College and H S K Hospital and Research Center, Bagalkot, Karnataka, India. Approval by Institutional Ethics committee was obtained prior to the study. The study group included 30 psoriasis patients, newly diagnosed by the dermatologist attending the Skin OPD. An age and sex matched group of 30 healthy volunteers was used as control group for the assessment of Heamoglobin and serum ferritin levels.

Sample size was calculated by using Open Epi software version 2.3.1 according to study done by Dilek N et al [11]. Results were calculated to be 22 in each group at confidence level of 95% and power of the study 80%. Thus, the study included 30 cases and 30 controls.

The formula used was = $2 (t\alpha + t\beta)2\ \sigma^2/ d^2$ Cases and controls aged between 20 and 60 years were included. Patients with Diabetes Mellitus, hypertension, other chronic inflammatory diseases, individuals with history of chronic alcoholism and smoking, pregnant and lactating women were excluded from the study. Informed consent was obtained from all the participants. Detailed history and clinical examination was done and PASI score was calculated. Under aseptic precautions 5mL of blood was drawn in 2 plain tubes each. One tube is used for hemoglobin concentration which was determined by the hemoglobin cyanide method which is the photometric determination of total hemoglobin in the form of hemoglobin cyanide. It is the method of choice. Reference values: Male 12-16 mg/dl, Female 11– 14 mg/dl. Another tube is subjected to centrifugation at 3000 rpm for 20 minutes to separate the serum. Serum ferritin was estimated by chemiluminescence method using automated MAGLUMI SNIBE 1000 hormone analyzer. Principle of the test – Sandwich chemiluminescence immuneassay. The results were expressed in ng/ml. Interpretation of results - Reference values: Male 25 – 350 ng/ml, Female 13 – 232 ng/ml [18-22].

Statistical analysis was done using SPSS software version 19. Students unpaired 't' test was used to compare the serum ferritin levels between psoriasis patients and controls. Pearson's correlation was used to correlate between heamogloin, serum ferritin levels and PASI score in psoriasis patients.

Results

The study included a total of 60 subjects - 30 cases (Psoriasis patients) and 30 controls. The Mean + SD age of cases was 31.05 + 7.03 and in that controls was 35.63 + 10.43. (Table 1)

Table 1: Age and Gender distribution in Psoriasis patients and Controls

Profile	Psoriasis patients Cases (n=30)	Controls (n=30)
Age (in years)	31.05±7.03	35.63±10.43
Male	17	15
Female	13	15

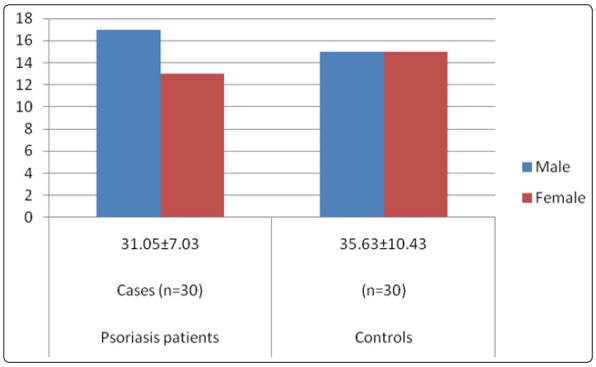

Figure 1: Age and Gender distribution in Psoriasis patients and Controls

Table 2: showing Heamoglobin level in cases and controls

Group		N	Mean	Std. Deviation	Std.Error Mean
Hb	Control	30	10.367	1.0902	.1990
	cases	30	12.572	13.9581	2.5920

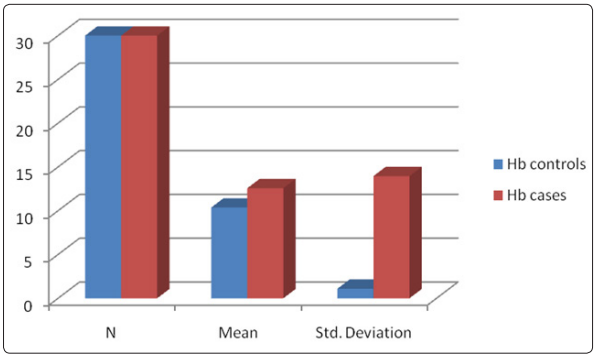

Figure 2: Showing Heamoglobin level in cases and controls

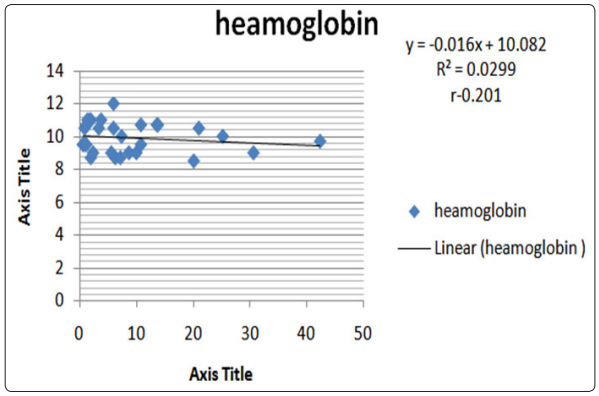

Figure 3: showing correlation of Heamoglobin level in cases and controls with PASI score

Serum ferritin levels

Serum ferritin level in Psoriasis patients was 45.75 + 45.63 ng/ml and that of controls was 112.93 + 41.24 ng/ml. The serum ferritin levels were significantly reduced in cases when compared to controls. (Table 3, Figure 4)

Table 3: Serum ferritin levels in Cases and Controls

Parameter	Psoriasis patients (Mean±standard deviation)	Controls (Mean±standard deviation)	t	'p'
Serum Ferritin (in ng/mL)	45.75±45.63	112.93±41.24	5.983	0.000*

* highly significant

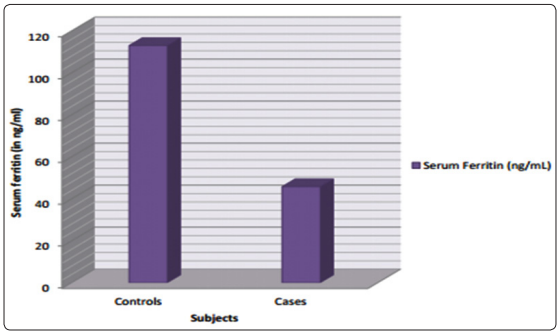

Figure 4: Serum ferritin levels in Psoriasis patients and controls

Serum ferritin levels and PASI score

No significant correlation was found between serum ferritin levels in psoriasis patients and the
PASI score. 'r' value was found to be 0.091.

Table 4: Correlation between serum ferritin levels and PASI score in Psoriasis patients

Serum ferritin level(ng/ml) (Mean±SD)	PASI Score	r	'p'
45.75±45.63	9.16±9.88	0.091	0.633

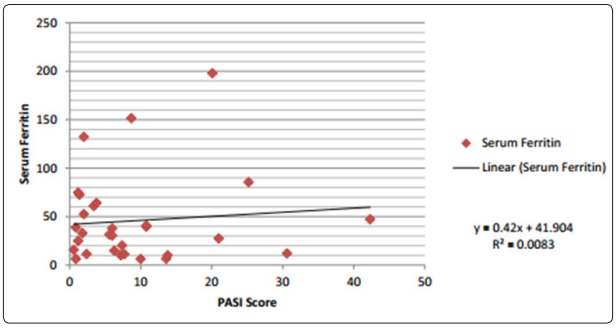

Figure 5: Correlation between serum ferritin levels and PASI score in Psoriasis patients

Discussion

The pathological effects of psoriasis on the structural and functional characteristics of erythrocytes are known since long. These include reduction in the antioxidant defenses and membrane fluidity with ultimate fall in heamoglobin.

The present study found significantly reduced serum ferritin levels in 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 reduced levels of ferritin in psoriasis. However tissue ferritin levels were not evaluated and merely serum ferritin levels were estimated in psoriasis patients [12]. Quite a few number 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, serum iron levels were significantly elevated in psoriasis patients which was in accordance with study done by Arpita Gosh et al [8,20]. Heba Elhaddad et al found significantly low levels of serum iron in psoriasis which were in agreement with the study conducted by Basavaraj et al. who also reported significantly decreased serum iron levels in mild and severe psoriasis patients [10,24]. None of the studies which were reviewed by us have yet shown a significant alteration in the serum ferritin levels in Psoriasis. R Rashmi et al found low levels of serum ferritin (50.4 +46.24 µg/ml) in mild groups of psoriasis from that of controls (77.42 + 12.42 µg/ml). Serum ferritin in moderate psoriasis (83.23 + 16 µg/ml) group was found to be slightly higher than controls. Overall, serum ferritin levels were low in the psoriasis patients when compared to that of controls but the difference was not statistically significant [12].

In another study conducted by Dilek N et al, 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 [11]. Numerous attempts have been made to correlate biochemical parameters like trace elements, immunologic markers, certain metabolic end products and enzymes16 with the clinical severity in terms of PASI score to identify laboratory biomarkers [9,10,23,24].

A direct relationship was found between severity of disease and these clinical changes. The patients with severe disease had more decreased hemoglobin level and highly decreased serum ferritin, while the patients with less severe disease had opposite results. Therefore the changes in hemoglobin levels and serum ferritin reflect the severity of inflammation in psoriasis and its systemic effects [25,26].

Conclusion

Routine Heamoglobin, serum ferritin estimation will be helpful in assessing and describing the severity of psoriasis.

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