ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 16, Issue 6, 2023

Online - 2455-3891
Print - 0974-2441

Research Article

IRON PROFILE STATUS IN PSORIASIS PATIENTS AND THEIR CORRELATION WITH THE DEGREE OF SEVERITY OF DISEASE

SHEETAL RATHORE[1], ANURADHA R JAIN[1], MANISH KUMAR KAIN[1], NITIN PANDYA[2]*, TRIPTI SAXENA[1]

[1]Department of Biochemistry, Gandhi Medical College and Hamidia Hospital, Bhopal, Madhya Pradesh, India. [2]Department of Dermatology, Gandhi Medical College and Hamidia Hospital, Bhopal, Madhya Pradesh, India. Email: nitink952@gmail.com

Received: 11 January 2023, Revised and Accepted: 13 February 2023

ABSTRACT

Objectives: (1) The objective of the study was to evaluate and compare the levels of ferritin, iron, total iron binding capacity (TIBC), and hemoglobin (Hb) in cases and controls (2) and to correlate these parameters with the severity of psoriasis.

Methods: Iron-profile including serum ferritin, iron, TIBC, and Hb was evaluated in 100 subjects, 50 cases (psoriatic) and 50 controls (normal healthy individuals). A preformed pro forma was filled for each patient after taking written consent. Ferritin was evaluated using fully automated chemistry analyzer, iron, and TIBC were evaluated by semi-autoanalyzer and Hb by Automated Hematology Cell Counter.

Results: In our study, a lower level of serum ferritin, iron, and Hb was found in cases than controls, whereas the levels of TIBC were found higher in cases than controls. ($p<0.05$) We found a negative correlation of ferritin and a positive correlation of hemoglobin with psoriasis area and severity index.

Conclusion: We conclude that iron profile should be done early in the course of disease to improve dietary advices and treatment modalities.

Keywords: Psoriasis, Ferritin, Iron, Total iron binding capacity, Haemoglobin.

 DOI: http://dx.doi.org/10.22159/ajpcr.2023v16i6.47314. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

Psoriasis is a chronic, recurrent, relapsing, remitting autoimmune systemic inflammatory skin disease [1-4] with varying degrees of severity and disability affecting both adults and the pediatric population [5,6]. For assessment of the severity and extent of psoriasis, the current gold standard tool is psoriasis area and severity index (PASI) [3,5,7,8] It is a measure of the average erythema, induration, and scaling of target plaques, weighted by the area of involvement [5,7]. The score ranges from 0 (no disease) to 72 (maximal disease) and the ranges are mild 0–7, Moderate 7–12, and Severe 12–72.

Ferritin is an acute phase protein, produced in the liver during inflammation. Concentration of serum ferritin is a reflection of total body iron stores, but in case of acute infection, inflammation, and various diseases, the levels may alter [5]. There is the proliferation of cells in psoriasis, so iron (important for cell division) is utilized, and results in reduced ferritin levels [5]. With increasing severity of psoriasis, ferritin level may decrease.

Iron is stored in liver, spleen, bone marrow, and intestinal mucosal cells in the form of ferritin [5,9] and also does keratinization and melanin formation to maintain healthy skin [5].

Total iron-binding capacity (TIBC) - **i**ron-binding capacity is the capacity of transferrin to bind with iron [10]. As only one-third of transferrin is saturated with iron, so the transferrin present in serum has an extra binding capacity (67%) [11]. This is unsaturated iron-binding capacity. TIBC is the sum of serum iron and UIBC. TIBC levels may alter in psoriasis.

TIBC = Serum Iron + UIBC (UIBC- unsaturated iron binding capacity).

Hemoglobin (Hb) is a tetrameric protein of erythrocytes (RBCs) formed by developing erythrocytes in bone marrow [12,13]. Decrease in levels of Hb results in anemia. Psoriasis is associated with decreased hemoglobin concentration due to proteolytic damage of RBCs through several inflammatory mediators [5].

METHODS

A comparative observational study was performed on 100 subjects of age group of 18–60 years with 50 cases (who presented to the Dermatology OPD in our institute with Psoriasis) and 50 controls (normal healthy individuals) from January 2021 to July 2022. A preformed pro forma was filled for each patient after taking written consent. The pro forma included all the details of the patients such as name, age, sex, CR no, case/control, new/old case, duration of illness, type of psoriasis, grade of psoriasis, and relapsing or not. Detailed history of the patient including past medical history, current medical history, and history of treatment were included. Our study was approved by the Institutional Ethics Committee of Gandhi Medical College and Hamidia Hospital, Bhopal (M.P.). Ferritin was evaluated using fully automated chemistry analyzer; iron and TIBC were evaluated by semi-autoanalyzer and Hb by Automated Hematology Cell Counter. Statistical analysis was done using Epi-info software. Students unpaired 't' test was used to compare the levels of ferritin, Iron, TIBC, and Hb between psoriasis patients and controls. Correlation of PASI Score with continuous variables was assessed using the Pearson Correlation Coefficient. A statistically significant $p<0.05$.

Inclusion criteria

- All participants from 18 to 60 years.

Exclusion criteria

- Patients not giving consent
- Patients having any active infections
- Pregnancy and lactation
- Other inflammatory conditions.

RESULTS

Male predominance was observed in both cases and controls as compared to female.

Severity of psoriasis was decided according to PASI Score as was divided into mild, moderate, and severe type of psoriasis.

Table 1: Distribution of cases and controls according to age (n=50)

Age (years)	Frequency (%)	
	Cases	Controls
<20	2 (4)	2 (4)
21–30	3 (6)	10 (20)
31–40	15 (30)	10 (20)
41–50	14 (28)	15 (30)
>50	16 (32)	13 (26)
Mean±SD	44.34±10.95	41.46±12.12

SD: Standard deviation

Table 2: Distribution of patients according to sex (n=50)

Sex	Frequency (%)	
	Cases	Controls
Male	30 (60)	27 (54)
Female	20 (40)	23 (46)

Table 3: Distribution of cases according to severity of psoriasis

Severity	PASI score
Mild	0–7
Moderate	7–12
Severe	12–72
Severity of psoriasis	**Cases (n=50), frequency (%)**
Mild	20 (40)
Moderate	12 (24)
Severe	18 (36)

PASI: Psoriasis area and severity index

Table 4: Comparison of iron profile of cases and control group

Parameters	Cases (n=50)	Control (n=50)	p
Ferritin (ng/mL)	41.84±20.9	167.6±102	0.0001
Iron (µg/dL)	60.18±27	154.5±55	0.0001
TIBC (µg/dL)	475±184	334±128	0.0001
Hb (g %)	9.3±1.8	13.34±2.0	0.0001

TIBC: Total iron binding capacity, Hb: Hemoglobin

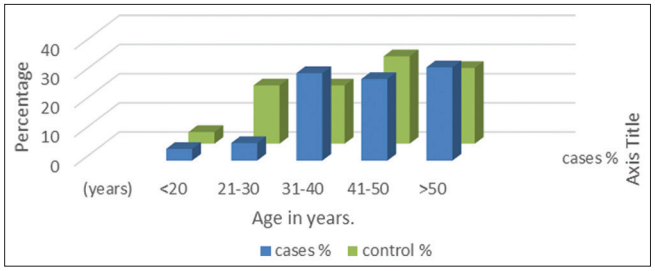

Fig. 1: Age distribution of cases and controls (percentage)

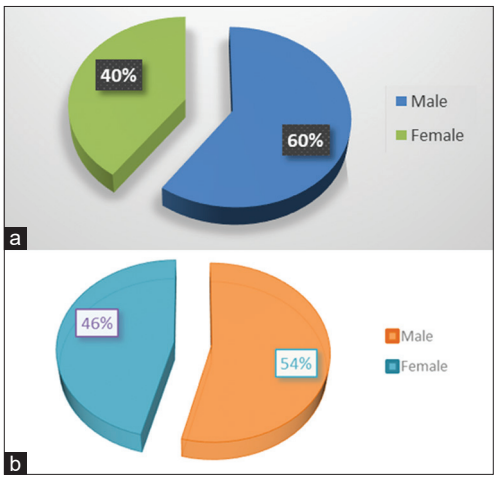

Fig. 2: (a) Distribution of cases according to sex. (b) Distribution of controls according to sex

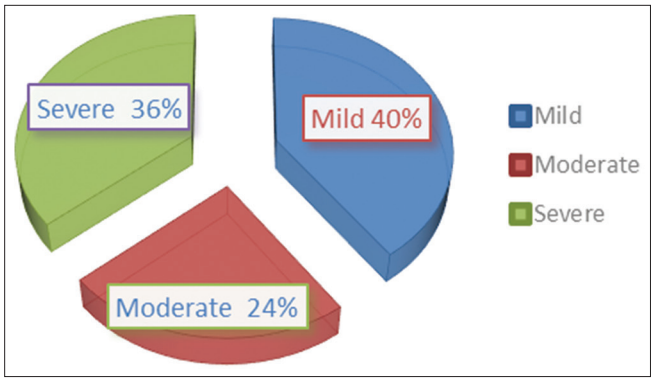

Fig. 3: Distribution of cases according to severity of psoriasis

DISCUSSION

This study conducted at the Department of Biochemistry and Department of Dermatology, Gandhi Medical College and Hamidia Hospital Bhopal on 100 subjects has compared iron profile in cases (psoriatics) and controls (normal healthy individuals).

The mean age of psoriasis cases in our study was 44.34±10.95, whereas that of controls was 41.46±12.12. The findings of this study were in accordance by many studies [6,14-16].

Males and females are equally affected by psoriasis [4]. Males outnumbered in our study with thirty males and 20 females in psoriatic cases, whereas 27 males and 23 females in controls. Male-to-female psoriatic patients in our study were 1.5:1. Several studies also found similar results [5,6,15-17].

We in our study had 20 cases of mild psoriasis, 12 cases of moderate psoriasis, and 18 cases of severe psoriasis. Similar results were also found in several different studies [7,14,18,19].

Serum ferritin level in psoriasis patients was 41.84±20.9 ng/mL and that of control was 167.6±102 ng/mL ($p<0.05$). Our results were in concordance with many studies [5,20]. While in a study by Dilek *et al.* [18], serum ferritin level was more in cases than controls which were not comparable to our study. We also got statistically in significant negative correlation of PASI with serum ferritin (r=−0.002, p=0.6438).

In our study, mean Hb among cases was 9.3±1.8 mg/dL, whereas among control was 13.34±2 mg/dL (p=0.0001). Our results were not in accordance with a study by Mahajabeen and Nidhi [5], Hb was more in cases as compared to controls. We discovered a slight but positive connection between Hb and PASI (r=0.118, p=0.4102). We found statistically insignificant positive correlation of PASI with Hb (r=0.118, p=0.4102).

We also found mean serum iron concentration 60.18±27 µg/dL in cases, whereas 154.5±55 in controls with statistical significant difference with $p<0.0001$. Our results were in favor by many studies [10,21]; our results were not in favor by two studies Mohamad [22] and Ghosh *et al.* [23], both these studies got high serum iron in cases than controls.

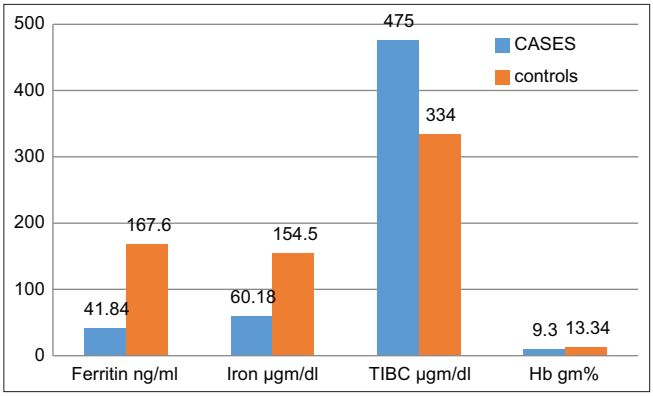

Fig. 4: Comparison of iron profile of cases and control group

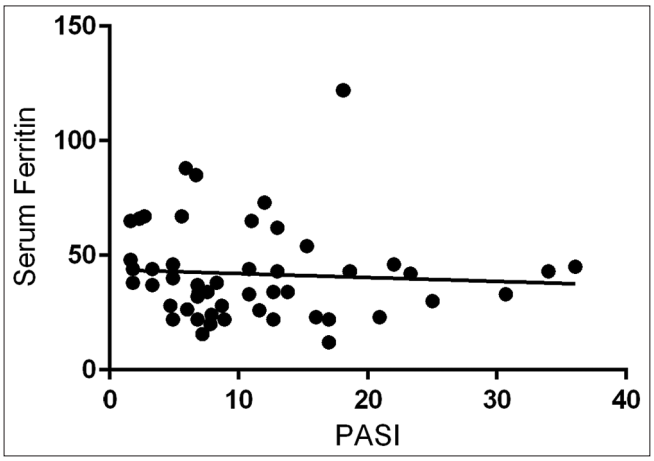

Fig. 5: Correlation of serum ferritin with PASI in cases. Scatter diagram showing statistically in significant negative correlation of PASI with serum ferritin (r=−0.002, p=0.6438)

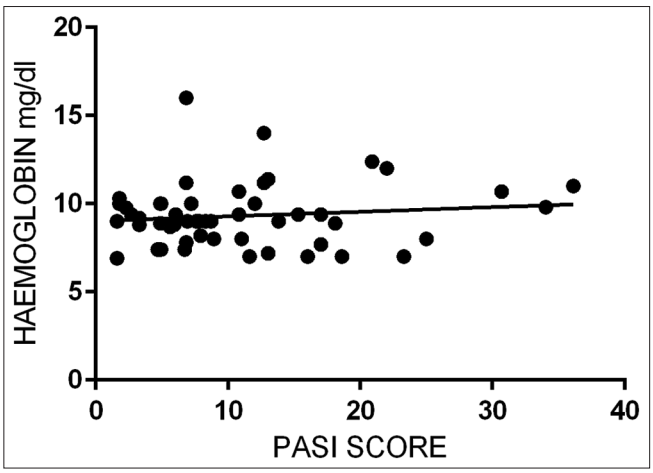

Fig. 6: Correlation of serum Hb with PASI in cases. Scatter diagram showing statistically in - significant positive correlation of PASI with haemoglobin (r=0.118, p=0.4102)

CONCLUSION

Iron is an essential micro element in the human body due to its wide range of functions. Iron deficiency frequently occurs in human population and complicates natural course of chronic diseases. We found a reduced level of iron and ferritin in our cases in comparison to healthy individuals concluding that iron and ferritin should be estimated in psoriasis, and if found anemic proper diet including iron and treatment of anemia should be given. We found increased TIBC in our study. Our data show reduced hemoglobin concentration which may be due to reduction in the number of erythrocytes in psoriasis patients and present several changes denoting an enhanced damage and/or aging process which seem to be strongly connected with neutrophil activation, oxidative stress, and worsening of psoriasis. Routine Hb, ferritin, and iron including TIBC estimation will be helpful in accessing and describing the severity of psoriasis.

Serum iron profile has some diagnostic and prognostic significance in psoriasis and also the levels of these parameters are in relation to how severe the psoriasis is. Hence, we conclude iron profile should be done in earliest stages of psoriasis to help in severity assessment, treatment, prognosis of the disease, monitoring, and follow-up of treatment modalities. We suggest that these parameters should be included in the investigation profile of psoriasis and further research on more number of patients should be done to give a definitive investigation profile.

AUTHOR'S CONTRIBUTIONS

Sheetal Rathore- Preparation of manuscript, literature search, review of literature. Anuradha R Jain- Agreed 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. Manish Kumar Kain- Have made a substantial contribution to the concept or design of the article; or the acquisition, analysis, or interpretation of data for the article. Nitin Pandya- Drafted the article or revised it critically for important intellectual content. Tripti Saxena- Approved the version to be published.

CONFLICTS OF INTEREST

Nil.

AUTHOR'S FUNDING

Nil.

REFERENCES

1. Rocha PP, Santos SA, Rebelo A, Figueiredo A, Quintanilha A, Teixeira F. The inflammatory response in mild and severe psoriasis. Br J Dermatol 2004;150:917-28.
2. Eapi S, Chowdhury R, Lawal OS. Etiological association between psoriasis and thyroid diseases. Cureus 2021;13:e12653.
3. Arican O, Bilgic K, Koc K. The effect of thyroid hormones in psoriasis vulgaris. Indian J Dermatol Venereol Leprol 2004;70:354-56.
4. Burns T, Breathnach S, Cox N, Griffiths C. Rook's Textbook of Dermatology. 8th ed. United States: Blackwell Publishing Ltd.;
5. Mahajabeen M, Nidhi P. Study of correlation of haemoglobin and serum ferritin levels in psoriasis: Case-control study. Int J Clin Expl Dermatol 2019;4:1-4.
6. Axita CV, Deepti GI, Vidya P, Vijayetha P, Shilpasree AS. A study of thyroid profile in patients with psoriasis. Natl J Lab Med 2017;6:B001-4.
7. Gokalp H. Effect of psoriasis severity on inflammation parameters: Controlled study. Turkderm Turk Arch Dermatol Venereol 2018;52:91-4.
8. Valduga JA, Rebeiko LB, Skare TL. Prevalence of Hashimoto's thyroiditis in psoriasis patients. Rev Assoc Med Bras 2021;67:52-7.
9. Ponikowska M, Szepietowski JC. Is iron deficiency involved in the pathogenesis of chronic inflammatory skin disorders? Postepy Hig Med Dosw 2019;73:359-63.
10. Elhaddad H, Morsy R, Mourad B, Elnimr T. A comprehensive study on the content of serum trace elements in psoriasis. J Elementol 2017;22:31-42.
11. Faruqi A, Mukkamalla SK. Iron binding capacity. In: Stat Pearls. Treasure Island, FL: Stat Pearls Publishing; 2022.
12. Murray RK, Granner DK, Mayes PA, Rodwell VW. Harper's Illustrated Biochemistry. 28th ed. United States: McGraw Hill; .
13. Burtis CA, Ashwood ER, Bruns DE. Tietz Fundamentals of Clinical Chemistry. 6th ed. Netherlands: Elsevier;.
14. Kumaraswamy SK, Setty NK, Nagaraja MS. Profile of psoriasis among in-patients of dermatology department of a government tertiary care teaching hospital in Mysore: A medical record based study. J Evol Med Dent Sci 2016;5:959-63.
15. Neena K. Illustrated Synopsis of Dermatology and Sexually Transmitted

Diseases. 6th ed. Netherlands: Elsevier;. p. 43-55.
16. Roman II, Constantin AM, Marina ME, Orasan RI. The role of hormones in the pathogenesis of psoriasis vulgaris. Clujul Med 2016;89:11-8.
17. Vachatova S, Andrys C, Krejsek J, Salavec M, Ettler K, Rehacek V, *et al*. Metabolic syndrome and selective inflammatory markers in psoriatic patients. J Immunol Res 2016;2016:5380792.
18. Vadakayil AR, Dandekeri S, Kambil SM, Ali N. Role of Creactive protein as a marker of disease severity and cardiovascular risk in patients with psoriasis. Indian Dermatol Online J 2015;6:322-5.
19. Jain K, Krishna A, Rathore BS. Assessing disease severity by hsCRP as a biochemical marker for psoriasis. Int J Res Dermatol 2017;3:501-5.
20. Farshchian M, Ansar A, Sobhan M, Hoseinpoor V. C-reactive protein serum level in patients with psoriasis before and after treatment with narrow-band ultraviolet B. An Bras Dermatol 2016;91:580-3.
21. Basavaraj KH, Darshan MS, Shanmugavelu P, Rashmi R, Mhatre AY. Study on the levels of trace elements in mild and severe psoriasis. Clin Chim Acta 2009;405:66-70.
22. Mohamad NS. Trace elements homeostatic imbalance in mild and severe psoriasis: A new insight in biomarker diagnostic value for psoriasis. Our Dermatol Online 2013;4:449-52.
23. Ghosh A, Mukhopadhyay S, Kar M. Role of free reactive iron in psoriasis. Indian J Dermatol Veneral Leprol 2008;74:277-8.