

Study of Serum Alkaline Phosphatase Levels among Psoriasis Patients and Comparative Group in Tertiary Care Institute

Milind D. Deshmukh¹, Paresh Shirish Agiwal^{2*}, Anil S. Gogle³, Shrikant Kumavat⁴ and Manoj Pawar⁵

¹Associate Professor, Department of Dermatology, Dr. Vasant Rao Pawar Medical College Hospital & RC, Nashik – 422003, Maharashtra, India; milind_deshmukh06@yahoo.co.in

²PG Resident, Department of Dermatology, Dr. Vasant Rao Pawar Medical College Hospital & RC, Nashik – 422003, Maharashtra, India; paresh123agiwal@gmail.com

³Professor and Head, Department of Dermatology, Dr. Vasant Rao Pawar Medical College Hospital & RC, Nashik – 422003, Maharashtra, India; anil.gogle@yahoo.com

⁴Senior Resident, Department of Dermatology, Dr. Vasant Rao Pawar Medical College Hospital & RC, Nashik – 422003, Maharashtra, India; shri.kumavat@gmail.com

⁵Assistant Professor, Department of Dermatology, Dr. Vasant Rao Pawar Medical College Hospital & RC, Nashik – 422003, Maharashtra, India; manojpawar624@yahoo.com

Abstract

Background: Psoriasis is a chronic relapsing autoimmune skin disease of unknown etiology, characterised by complex alterations in epidermal growth and differentiation. Oxidative stress is a known risk factor for exacerbation of psoriasis. Serum alkaline phosphatase level is a marker of oxidative stress in body. **Aims and Objectives:** To study and compare serum alkaline phosphatase levels in cases of psoriasis. **Materials and Methods:** Serum Alkaline Phosphatase levels were evaluated in 100 cases of psoriasis and controls. **Results:** There was no statistically significant difference between serum alkaline phosphatase levels among cases and controls. **Conclusion:** Serum alkaline phosphatase levels, as a marker of oxidative stress is not significantly raised in cases of psoriasis.

Keywords: Alkaline Phosphatase, Oxidative Stress, Psoriasis

1. Introduction

Psoriasis is a chronic relapsing autoimmune disorder of skin, hair and nails, characterised by hyper-proliferation and abnormal differentiation of epidermal keratinocytes and angiogenesis. Psoriasis is a chronic, inflammatory skin disease¹ characterized by symmetrical, erythematous, plaques over extensor aspects of body. Prevalence of psoriasis varies in different parts of the world in different populations varying from 0% to 11.8%²⁻⁵. For most of the data given, the range extends from around 0.5% to close

to 2.5%. It has a bimodal distribution of age of onset. A German study reported two peaks of onset: the larger, early peak between 16 and 22 years and the later one at 57-60 years⁶. The most common age of presentation found by an Indian study is third and fourth decade². Incidence is equal in both sexes. Age of onset is younger in females. In early onset of psoriasis, peak age of onset is 22 years in males and 16 years in females⁷. The prevalence of psoriasis is found approximately twice in females as compared to males according to various Indian studies². The clinical course of psoriasis is unpredictable and

*Author for correspondence

marked by relapses and remissions³. The chronicity of psoriasis is associated with high impact on health-related cost and quality of life. Patients with psoriasis require long term management and planning of therapeutic strategies. Various injuries and stimuli including physical, chemical, surgical, infective and inflammatory insults are recognized to elicit psoriatic lesions⁷.

Psoriasis is more “stress sensitive” than many other skin diseases. Stress induces alteration in psoriatic lesions by increasing neuropeptides level, mast cell chymase, vasoactive intestinal peptide, calcitonin gene related peptide, nerve growth factor.

Psoriasis is characterized by chronic, symmetrical, erythematous, well defined, dry, red, scaly papules and plaques. Scales are abundant, loose, dry and silvery white or micaceous. Psoriasis exhibits Koebner’s phenomenon i.e. development of isomorphic lesions at the sites of local trauma (mechanical, physical, chemical, allergic) in uninvolved area of skin of the psoriatic patient⁷⁻¹⁰.

Alkaline phosphatase is part of a family of zinc metalloproteinase enzyme that catalyzes the hydrolysis of phosphate esters at an alkaline pH¹¹. The most commonly used method produces a reference range of 35 to 125 IU per litre in an adult population¹². Most human tissues contain alkaline phosphatase; kidney, liver, bone, intestine, reticuloendothelial tissue and placenta are particularly rich sources. Oxidative stress is a powerful inducer of alkaline phosphatase in vascular and bone cells. Among biomarkers of oxidative stress, γ -Glutamyl-Transpeptidase and alkaline phosphatase is regarded as robust indicators of whole body oxidative stress¹³. In the study high alkaline phosphatase levels were found in active and remitted phase of psoriasis^{14,15}. In this study, we intend to compare serum alkaline phosphatase levels in cases of psoriasis and healthy controls.

2. Aims and Objectives

To study and compare serum alkaline phosphatase levels in cases of psoriasis.

3. Materials and Methods

The present comparative cross sectional study among patients of psoriasis and healthy controls was carried out in department of dermatology in a tertiary health care institute. Approval of institutional ethical committee was

taken. A written informed consent of each patient was taken. A total of 69 males and 31 females were included in the study during the period of October 2015 to August 2017.

4. Eligibility Criteria

4.1 Inclusion Criteria

Cases:

1. Newly diagnosed patients of psoriasis vulgaris.
2. Patients above the age of 12 years.
3. Patients willing to participate in the study.

Comparative group:

1. Patients attending hospital OPD without any evidence of psoriasis vulgarism.
2. Individuals fulfilling these criteria and ready to participate in the study.

5. Exclusion Criteria

Cases and Comparative group:

1. Those who have systemic illnesses affecting liver or bone.
2. Pregnant women, lactating women.
3. Children aged less than 12 years.
4. Patients not willing to participate in the study.
5. Patients with disease or condition known to alter serum alkaline phosphatase levels.

Table 1. Mean age in the two study groups

Age	Case	Control
Age (years)	46.77±14.66	46.76±14.71

P= 0.996 using unpaired t test. Since p value is >0.05, there is no significant difference between two study groups.

6. Methodology

The study was conducted in Department of Dermatology, Venereology and Leprology in a tertiary care centre. 100 subjects satisfying the eligibility criteria were enrolled for the study. 100 controls without psoriasis with age and sex matching were enrolled for the study. Subjects were enrolled for study after taking a written informed consent. A detailed history of psoriasis was taken. Diagnosis was

confirmed using histopathological findings. A blood sample (5 ml) was collected of each case and control for the estimation of serum alkaline phosphatase levels in the endocrinology laboratory. Patient was asked for follow up. The reports were informed to the patient. Patients with abnormal findings were noted in the study. Similar procedures regarding history, examination and investigations were carried out in matched controls. The data collected was evaluated using Chi Square test and unpaired t test.

7. Results

1. Age Distribution
2. Sex distribution

Table 2. Sex distribution in the two study groups

Gender	Case	Control	Total
Male	69 (69%)	69 (69%)	138
Female	31 (31%)	31 (31%)	62
Total	100 (100%)	100 (100%)	200

P=1.00 using Chi Square test since p value is >0.05, there is no significant difference between two study groups.

Out of 100 cases and controls, 69 (69%) were males and 31 (31%) were females (Table 3). The male: female ratio is 2.2:1.

3. Onset of Psoriasis

Table 3. Mode of onset of psoriasis in the cases

Onset	Frequency	Percentage
Insidious	88	88.00%
Sudden	12	12.00%
Total	100	100.00%

4. Duration of Psoriasis

Table 4. Duration of psoriasis

Duration	Frequency	Percentage
<12 months	18	18.00%
12-60 months	52	52.00%
>60 months	30	30.00%
Total	100	100.00%

5. Comparison of Alkaline phosphatase levels

Table 5. Mean alkaline phosphatase levels in cases and controls

Characteristic	Case	Control
Alkaline phosphatase	74.492 ± 21.85	72.31 ± 21.97

P=0.482 using unpaired t test. Since p value is >0.05, there is no difference in Alkaline phosphatase in both study groups

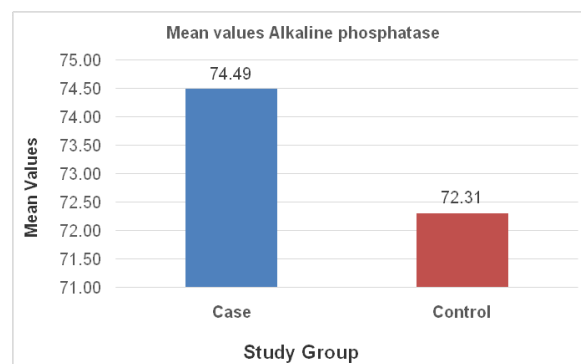


Figure 1. Chart showing comparison of alkaline phosphatase levels in cases and controls.

6. Comparison of alkaline phosphatase abnormality

Table 6. Comparison of alkaline phosphatase abnormality in cases and controls

Alkaline phosphatase	Study group		Total
	Case	Control	
25-105 (Normal)	91 (91%)	93 (93%)	184
>105 (Raised)	9 (9%)	7 (7%)	16
Total	100	100	200

P=0.2717 using Chi Square test. Since P value is >0.05, there is no significant difference in proportion of patients with Alkaline Phosphatase abnormality in cases and controls.

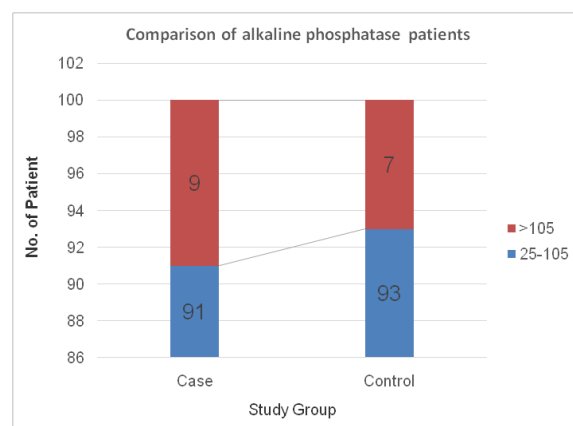


Figure 2. Chart showing comparison of alkaline phosphatase abnormality in cases and controls.

Prevalence of raised alkaline phosphatase in psoriasis cases is 9% compared to 7% in healthy controls. Raised Alkaline Phosphatase levels are not associated with psoriasis.

8. Discussion

Psoriasis is a chronic relapsing autoimmune skin disease of unknown etiology, characterised by complex alterations in epidermal growth and differentiation and multiple biochemical, vascular and immunologic abnormalities¹⁶.

Oxidative stress is a known risk factor for exacerbation of psoriasis. Metalloenzymes such as alkaline phosphatase and Superoxide dismutase reduce the oxidative stress¹⁷. Serum alkaline phosphatase level is a marker of oxidative stress in body.

1. Age Distribution

In this study, we found the mean age of patients of psoriasis as 46.77 ± 14.66 years (Table 1). Found the mean age to be 40 years in a study of 201 patients of psoriasis vulgaris¹⁸. In the study by Cohen et al, mean age was 47.7 years among 340 patients of psoriasis¹⁹. The mean age found in our study is in accordance with these studies.

2. Sexual preponderance

In this study, the number of male patients with psoriasis is 69 (69%) and females are 31 (31%) (Table 2). The male: female ratio is 2.2:1. The various studies conducted on prevalence and patterns reported this ratio to be 2.46:1, 2.4:1 and 2.03:1². The sex ratio found in our study is in accordance with these studies.

3. Duration of psoriasis

The duration of psoriasis was classified into less than 1 year, 1-5 year and more than 5 years. Eighteen percentages of psoriasis patients had duration less than 1 year, 52% had duration between 1-5 years and 30% patients had duration more than 5 years (Table 4).

Reported 17% patients had duration of psoriasis less than 1 year, 45% had duration between 1-5 years and 38% patients had duration more than 5 years. The duration of psoriasis in our study is in accordance with this study²⁰.

4. Alkaline Phosphatase

In this study, mean serum Alkaline Phosphatase levels were 74.492 ± 21.85 IU/L (Table 5 and Figure 1). We did not find statistically significant difference of serum

alkaline phosphatase levels in both the study groups (Table 6 and Figure 2).

Found^{14,21} significantly raised serum alkaline phosphatase levels in psoriasis cases^{17,22} whereas found no significant alteration in serum alkaline phosphatase levels in psoriasis patients. The finding in our study is in concordance with these latter studies.

Oxidative stress has been widely implicated in pathogenesis of psoriasis. It has been suggested that generation of Reactive Oxygen Species (ROS) from neutrophils, keratinocytes and fibroblasts can contribute to neutrophil activation, which plays an important role in pathogenesis of psoriasis. Metalloenzymes including alkaline phosphatase and superoxide dismutase are important antioxidants in the body. Changes in their serum levels indicate the oxidative stress of body in patients of psoriasis¹⁷.

9. Conclusion

In this study, association between serum alkaline phosphatase levels and psoriasis is studied. Serum Alkaline Phosphatase levels, as a marker of oxidative stress is not significantly raised in cases of psoriasis. In conclusion, there is insufficient epidemiologic evidence to conclude significant association between psoriasis and serum alkaline phosphatase abnormalities.

10. Bibliography

1. Nickoloff BJ, Nestle FO. Recent insights into the immunopathogenesis of psoriasis provide new therapeutic opportunities, *J. Clin. Invest.* 2004; 113:1664–75.
2. Dogra S, Yadav S. Psoriasis in India: Prevalence and pattern, *Indian J. Dermatol. Venerol. Leprol.* 2010; 76:595–601.
3. Bedi TR. Clinical profile of psoriasis in North India, *Indian J. Dermatol. Venereol. Leprol.* 1995; 61:202–5.
4. Kaur I, Handa S, Kumar B. Natural history of psoriasis: A study from the Indian subcontinent, *J. Dermatol.* 1997; 24:230–4.
5. Malligarjunan H, Gnanaraj P, Subramanian S, Elango T, Dayalan H. Clinical efficacy of propylthiouracil and its influence on prolactin in psoriatic patients, *Clin. Biochem.* 2011 Oct; 44(14-15):1209–13. Epub. 2011 Jul 28. <https://doi.org/10.1016/j.clinbiochem.2011.07.009>.
6. Smith AE, Kassab JY, Rowland Payne CME, Beur WE. Bimodality in age of onset of psoriasis in both patients and relatives, *Dermatology.* 1993; 186:181–86.

7. Pavithran K, Karunakaran M, Aparna P, Raghunatha S. Psoriasis In: Valia RG, Valia AR. EDS. Disorders of keratinization. IADVL textbook of dermatology. Third edition. Volume 1, reprint. Bhalani publishing house; 2012. 30, p. 1021–56.
8. Gudjonsson JE, Elder JT. Psoriasis. In: Goldsmith LA, Katz SI, Gilchrist, Paller AS, Leffell DJ, Wolff K. Eds. Fitzpatrick Dermatology in General Medicine. Eighth edition. Volume I; 2008. 18, p. 197–231.
9. Griffiths CEM, Barker JNWN. Psoriasis In: Tony B, Stephen B, Neil C, Christopher G. editors. Rook textbook of dermatology, Eighth edition. Volume 1, Wiley-Blackwell; 2010. 20, p. 1–20.
10. Peter Cm, Kerkhof vd, Nestle FO. Psoriasis In: Bolognia JL, Jorizzo JL, Schaffer JV, Eds. Dermatology, Third edition. Elsevier; 2008. p. 135–56.
11. Smith CH, Anstey AV, Barker JN et al. British Association of Dermatologists guidelines for use of biological intervention in psoriasis, Br J Dermatol. 2005; 153:486–97.
12. David H. Vroon, Zafar Israili. Clinical Methods: The History, Physical, and Laboratory Examinations. 3rd Edition.
13. Oxidative Medicine and Cellular Longevity. 2016 (2016). Article ID 8490643, p. 7.
14. Bhatnagar M, Bapna A, Khare A K. Serum proteins, trace metals and phosphatases in psoriasis, Indian J. DermatolVenereol. Leprol. 1994; 60:18–2
15. Franck H, Ittel T. Serum osteocalcin levels in patients with psoriatic arthritis: An extended report, Rheumatol Int. 2000; 19(5):161–4
16. Nestle FO et al. Skin immune sentinels in health and disease, Nat. Rev. Immunol. 2009; 9(10):679–91.
17. Sheikh G, Masood Q, Majeed S, Hassan I. Comparison of levels of serum copper, zinc, albumin, globulin and alkaline phosphatase in psoriatic patients and controls: A hospital based case control study, Indian Dermatol. Online J. 2015 Mar-Apr; 6(2):81–3. <https://doi.org/10.4103/2229-5178.153006>.
18. Enerback C, Martinsson T, Inerot A, Wahlstrom J, Enlund F, Yhr M, Swanbeck G. Evidence that HLA-cw6 determines early onset of psoriasis, obtained using sequence-specific primers (PCR-SSP), Acta. Dermatovenerologica. 1997; 77(4):273–76.
19. Cohen A D, Gilutz H, Henkin Y, Zahger D, Shapiro J, Bonneh D Y, Vardy D A. Psoriasis and the Metabolic Syndrome. ActaDermVenereol 2007; 87: 506–509. <https://doi.org/10.2340/00015555-0297>.
20. Madanagobalane S, Anandan S. Prevalence of metabolic syndrome in south Indian patients with psoriasis vulgaris and the relation between disease severity and metabolic syndrome: A hospital-based case-control study, Indian J. Dermatol. 2012; 57:353–7.
21. Golov KG, Varshavskii VA, OkunevDlu, Neverov NI, Shestakova MV, Proskurneva FP. Urinary enzymes in the assessment of the early stage of kidney involvement in psoriasis and diabetes mellitus, Ter. Arkh. 1995; 67(10):80–1 (Russian).
22. McMillan EM, Rowe D. Plasma zinc in psoriasis: relation to surface area involvement, Br. J. Dermatol. 1983 Mar; 108(3):301–05. PubMed PMID: 6830695.