Serum calcium level in patients suffering from psoriasis and its correlation with severity of psoriasis: A case control study

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Abstract— *Psoriasis is a chronic, recurrent skin disorder characterized histological by cutaneous inflammation, increased epidermal proliferation, hyperkeratosis, angiogenesis, abnormal keratinization, shortened maturation time and parakeratosis. The recent success of vitamin D and its analogues in the treatment of psoriasis has generated extensive research into the role of vitamin D and calcium in this hyperproliferative skin disease. This study was conducted to determine the role of calcium serum level in patients suffering from psoriasis and its correlation with severity of psoriasis. This case control study was performed at outpatient department, in the Department of Dermatology, Venereology and Leprology, from June 2017 to December 2018, at JLN Medical College, Ajmer, Rajasthan. The study enrolled 400 subjects of either sex with different age groups. Group A (case) included 200 patients of chronic psoriasis of different age and sex and Group B (control) 200 matched healthy individual without psoriasis. It was observed in this study, 42 patients (21%) had hypocalcaemia, 152 patients (76%) had normocalcaemia and 6 patients (3%) had hypercalcaemia in cases group whereas in control group, 8 (4%) patients had hypocalcaemia, 189 (94.5%) patients had normocalcaemia and 3 (1.5%) patients had hypercalcaemia in the group B. Hypocalcaemia was more frequent in more severe kinds of psoriasis. It was concluded from this study that serum calcium levels were significantly lower in the patients with Psoriasis when compared with the controls. This study revealed hypocalcaemia was more frequent in more severe kinds of psoriasis. More studies are required to authentication of hypocalcaemia as etiology in psoriasis.*

Keywords: Psoriasis, Serum calcium, Hypocalcaemia.

I. INTRODUCTION

Psoriasis is a chronic, recurrent skin disorder characterized histologically by cutaneous inflammation, increased epidermal proliferation, hyperkeratosis, angiogenesis, abnormal keratinization, shortened maturation time and parakeratosis.[1,2]

Outbreaks often correlate with environmental triggers, often linked to nutritional deficiencies and poor eating habits[3]. It is an important and prevalent skin diseases developing due to increasing epidermal cells multiplication.

A number of risk factors have been recognized in the etiopathogenesis of psoriasis, including family history and environmental risk factors, such as diet, obesity, smoking, stress and alcohol consumption. Psoriasis tends to worsen during periods of stress, during adverse environmental conditions seen as cold weather, low humidity; with the administration of certain drugs during course of infection in addition ethnic factors are also responsible.[4]

Psoriasis is a hyperproliferative skin disease. This hyperproliferation is supposed to be caused by T cell mediated inflammation of the skin. This leads to very poor differentiation of the epidermal keratinocytes.[5]

The disease may be intensified by different factors such that the lesions may extend, erythroderma (affecting of more than 90% of body skin) may develop and the patient may be hospitalized.[6,7]

Understanding the natural history of psoriasis i.e. the exact cause of the psoriasis is important and mainstay of the treatment of the psoriasis. Various treatment modalities are available like exposure to natural sunlight which is known as heliotherapy, treatment with narrow band photo therapy, treatment with mono chromic ultra violet with bands between 311 to 312 nm, treatment with "standard broadband ultraviolet radiation B (BUVB), (280-315 nm)" and others.[8]

Intracellular calcium plays an important part in the regulation of proliferation and differentiation of keratinocytes.[9,10]

Considering role of vitamin in the improvement of condition of psoriasis, certain studies used vitamin D topical application and found that it was useful in the improvement of the skin lesions in patients with psoriasis.[10]

Psoriasis has been found to be aggravated with the decrease in the serum calcium levels. This is because the calcium has an important role in the regulation of keratinocytes. Cell adhesion molecules can be damaged by hypocalcaemia.[11]

The present study was conducted to find out the role of serum calcium level in patients suffering from psoriasis and correlation with severity of psoriasis in comparison with control subjects.

II. METHODOLOGY

This case control study was performed at outpatient department, in the Department of Dermatology, Venereology and Leprology, carried out from June 2017 to Dec. 2018, at J.L.N. Medical College and attached group of Hospitals, Ajmer, Rajasthan, after taking approval from ethical committee.

The study enrolled 400 subjects of either sex with different age groups. Patients of chronic psoriasis of different age and sex attending at Department of Dermatology, Venereology and Leprology were enrolled in study (Cases) group 'A'. Patients with H/o acute and chronic corticosteroid therapy, thyroid and parathyroid disease, bleeding tendencies, taking Calcium and Calcitriol, tropical application of Calcitriol were excluded from study. Patient who has refused to give written informed consent were also excluded from this study.

In control group (Group 'B') age and sex matched healthy individuals without psoriasis were included. Patients with minor ailments like superficial bacterial, fungal or viral infections and not suffering from psoriasis were taken as controls.

Body Surface Area (BSA) was used to evaluate the severity of the disease and categorize into mild (BSA <3), moderate (BSA 3 to 10) and severe (BSA >10).

All the study subjects of both groups were investigated. All tests were conducted in biochemistry laboratory in JLN Hospital, Ajmer, Rajasthan. Serum Calcium was assessed by Colorimetric method. Normal range of serum calcium was accepted 9 -11 mg/dl.

III. RESULTS

Mean age of study group was 43.90±1.11 years whereas of control group was 33.63±0.98 years. In this study, there were 142 (71%) males and 58 (29%) females in Study group as well as in control group. Although mean age was significantly different in both the groups but sex wise distribution was same in both the groups. (Table 1)

Table 1
Age and sex wise distribution of subjects in both the groups

Variables	Study Group (N=200)	Control Group (N=200)	P Value LS
Age (Mean±SD) in years	43.90±1.11	33.63±0.98	<0.001 S
Male:Female	142:58	142:58	1 NS

When status of Serum calcium was compared in both the groups i.e. study and control, it was found that there were 42 patients (21%) were affected from hypocalcaemia, 152 patients (76%) were normocalcaemia and 6 patients (3%) were affected from hypercalcemia in the study group whereas 8 (4%) patients were affected from hypocalcaemia, 189 (94.5%) patients were normocalcaemic and 3 (1.5%) patients had hypercalcaemic in control group. Hypocalcemics were found significantly higher in study group than control group. (Table 2)

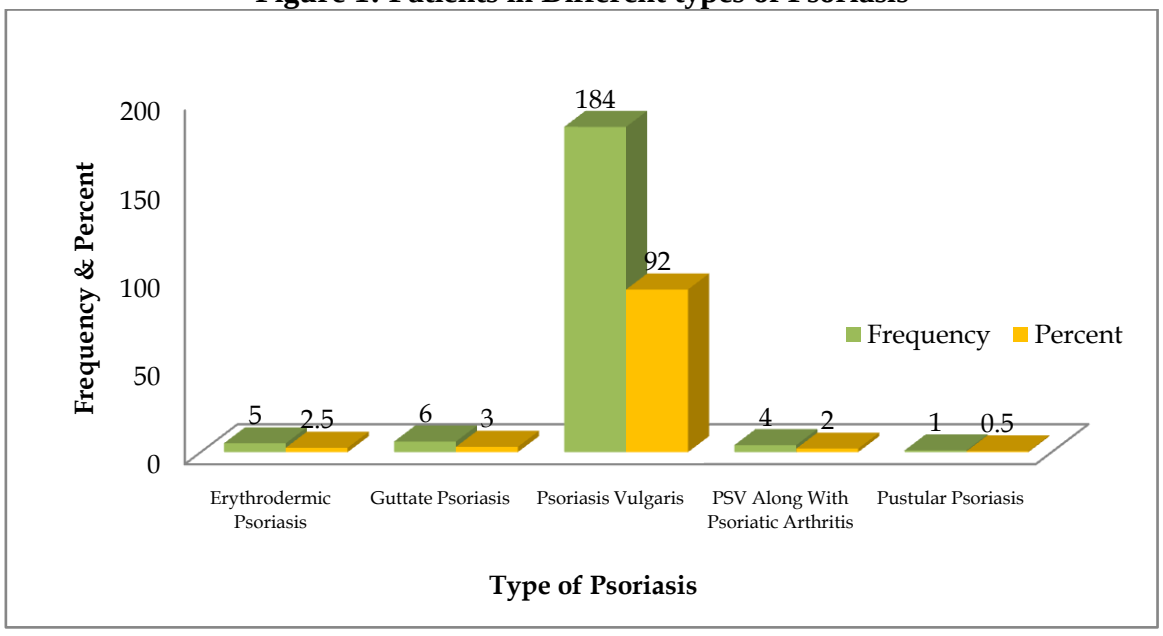
Table 2
Comparison of Serum Calcium status in Study and control group

Serum Calcium status	Study Group (N=200) Number (%)	Control Group (N=200) Number (%)
Hypocalcaemia (<9)	42 (21)	8 (4)
Normocalcaemia (9-11)	152 (76)	189 (94.5)
Hypercalcemia (>11)	6 (3)	3 (1.5)

Chi-square = 28.135 with 2 degrees of freedom; P = 0.000

Study group showed maximum 184 (92%) patients were psoriasis vulgaris followed by 6 (3%) patients were guttate psoriasis (Figure 1).

Figure 1: Patients in Different types of Psoriasis



In study group, hypocalcaemia were found in 100% cases of erythroderma (5), psoriatic arthritis (4) and pustular psoriasis (1) compare to 16.3% (30) in psoriasis vulgaris and 33.3% (2) of guttate psoriasis. On analysis this difference was found significant (P<0.001), so it can be depicted that hypocalcaemia is more with severity of disease. (Table 3)

Table 3
Association of Type of Psoriasis and Serum Calcium Level

Type of Psoriasis	Normal		Hypocalcaemia		Hypercalcaemia		Total Percent
	Frequency	%	Frequency	%	Frequency	%	
Erythrodermic Psoriasis	0	0	5	100	0	0	100
Guttate Psoriasis	4	66.67	2	33.33	0	0	100
Psoriasis Vulgaris	148	80.43	30	16.30	6	3.26	100
Psoriatic Arthritis	0	0	4	100	0	0	100
Pustular Psoriasis	0	0	1	100	0	0	100

Chi-square = 40.752 with 8 degrees of freedom; P <0.001 LS=S

IV. DISCUSSION

In this present study, the mean and median age of case group (A) were 43.90±1.110 years and 43.00±15.701 years respectively whereas those were 33.63±0.979 years and 30.00±13.851 years respectively in control group(B) which simulated well with previous studies. Chaudhari S et al[12] had median age in the study cases was 38.05±15.63 years and median age of control group was 23.94±11.42 years.

Hellgren L. et al [13] found psoriasis affects adult women and men equally. In present study, there were 142 (71%) males and 58 (29%) females in both the groups. The male female ratio was 2.48: 1. This shows male preponderance. It may be due to males approach to the hospital more easily as compared to females. Indrajeet Kaur et al [14] reported the male female ratio of 2.3:1 which was similar to our study.

In Qadim et al[15] study out of 98 hospitalized patients, 43 cases (43.8%) suffered from psoriasis vulgaris, 38 cases (38.7%) from dispersed pustular psoriasis, 4 cases (4.08%) from erythrodermic psoriasis and 14 cases (14.2%) from psoriasis vulgaris along with psoriatic arthritis. Whereas in present study out of 200 patients, there were 184 (92%) psoriasis vulgaris, 6 (3%)guttate psoriasis, 5 (2.5%) erythrodermic psoriasis, 4 (2%) psoriatic arthritis and 1 (0.5%) from pustular psoriasis in group A. This variation may be because in present study only OPD patients were taken.

In present study, 21% had hypocalcaemia, 76% patients had normocalcaemia and 3% patients had hypercalcaemia in study group whereas 4% patients had hypocalcaemia, 94.5% patients had normocalcaemia and 1.5% patients had hypercalcaemia in the control group. This variation was found significant as p value is <0.001. Serum calcium levels were significantly lower in psoriasis patients than in controls. In this present study, hypocalcaemia were found in 100% cases of erythroderma (5), psoriatic arthritis (4) and pustular psoriasis (1) compare to 16.3% (30) in psoriasis vulgaris and 33.3% (2) of guttate psoriasis in group A. We observed, hypocalcaemia was more frequent in more severe kinds of psoriasis as in the study conducted by Qadim et al. [15]

Qadim et al[15] also conducted a case- control study where they compared 98 psoriasis cases with 100 cases without psoriasis. The prevalence of hypocalcaemia was 37.2% in the cases compared to only 9% among the controls. The mean serum calcium levels were significantly low in cases as compared to the controls which were similar to present study. But actual prevalence of hypocalcaemia in both groups of present study was lower as compared to this study which may be due to the same reason of having only OPD(less severe) patients in present study.

Chaudhari S et al [12] analysed serum calcium levels in patients of psoriasis and correlated with severity of psoriasis in comparison with control subjects. They also observed the same that mean Serum calcium levels were significantly lower in psoriasis patients than in controls.

Morimoto et al [16] studied association between serum calcium levels with severity of skin lesions in psoriasis vulgaris. This comparative study of 34 psoriatic patients and 24 healthy controls concluded no significant difference in the mean basal values of 25OHD and 1,25-(OH) 2D in groups of psoriatic patients and controls but a significant negative correlation was found between the serum levels of 1,25-(OH) 2D and the severity of skin lesions.

Stewart et al[17] reported a case who had surgically induced hyperparathyroidism. He developed typical pustular psoriasis of von Zumbusch due to hypocalcaemia. The author found, as the serum calcium level in the patient improved by giving calcium and vitamin D, there was improvement in the psoriasis. But psoriasis flared up as treatment was discontinued. Present study also gave similar findings.

Lebwohl et al [10] in their study of 52 weeks found that 136 patients completed the treatment. The authors studied the efficacy of calcitriol in mild to moderate plaque psoriasis. They concluded that "Calcitriol ointment 3µg/g was a safe, effective, and well-tolerated option for the long-term treatment of chronic plaque psoriasis which supports present study.

Kitamura et al [18] studied cutaneous reactions caused by calcium channel blockers. They concluded that "Ca-antagonists were occasional causes of a wide spectrum of cutaneous reactions and should also be considered as causative factors in patients who develop psoriasiform eruptions or in patients whose psoriasis is exacerbated while using these drugs." Thus low serum calcium levels can trigger psoriasis which again supports present study.

V. CONCLUSION

This present study concluded that serum calcium levels were significantly lower in the patients with Psoriasis when compared with the controls. This study revealed hypocalcaemia was more frequent in more severe kinds of psoriasis. Hypocalcaemia was a significant risk factor of psoriasis. So it is better to include dairy products as calcium resource in daily diet of patients suffering from psoriasis.

CONFLICT OF INTEREST

None declared till now.

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