Original Article

Association of Serum Calcium with Psoriasis: A Case Control Study

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Abstract

Background: *Psoriasis is termed as hyperproliferative disease as epidermal basal cell exhibit increased frequency of mitosis in the disease. Although causes and pathogenesis of psoriasis remain unclear, a number of risk factors have been recognized. Several studies have demonstrated close association between psoriasis and serum calcium levels.* ***Objective:*** *The main objective of our study was to assess serum calcium level in patients suffering from psoriasis and find out its association with severity of psoriasis.* ***Materials and method:*** *A case control study was conducted in the department of Biochemistry, Nilphamari Medical College, Nilphamari, Bangladesh, from June 2021 to December 2021. The study enrolled 160 subjects of either sex with different age group from dermatology OPD. Among them 80 psoriatic patients were selected as cases and control group included 80 non-psoriatic patients with minor ailment.* ***Results:*** *Among 160 subjects participated, 90(56.25%) were female and 70(43.75%) were male. The mean age of the study group and of control group was 35.80±17.99 years and 37.65±15.70 years respectively. The mean serum calcium concentration was 9.08±0.26 mg/dL and 9.46±0.51 mg/dL in cases and controls respectively. The difference was statistically significant. Level of serum calcium was found significantly different among different groups of cases.* ***Conclusion:*** *Serum calcium level was significantly lower in patients of psoriasis compared to controls. Calcium concentration decreased significantly in more severe type of psoriasis.*

Keywords: *Psoriasis; Serum calcium.*

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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] Although the cause of psoriasis remains unknown, interaction of multiple genes, the immune system and environmental factors play major role behind this complex disorder.[2] The pathogenesis of psoriasis is not clear, but a number of risk factors have been recognized, including family history, diet, obesity, smoking, alcohol

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consumption, stress, cold weather and low humidity.[3] Epidermal hyperproliferation in psoriasis is supposed to be caused by T cell mediated inflammation of the skin. This leads to very poor differentiation of the epidermal keratinocytes.[4] Intracellular calcium plays an important part in the regulation of proliferation and differentiation of keratinocytes.[5] Cell adhesion molecules can be damaged by hypocalcemia.[6] Considering the role of vitamin in the improvement of condition of psoriasis, certain studies had used vitamin D topical application and found that it was useful in the improvement of the skin lesions in patients with psoriasis.[7] The main objective of our study was to assess serum calcium level in patients suffering from psoriasis in comparison with control subjects without psoriasis and comparison of it among subjects with different severity of psoriasis.

Materials and method

A case control study was conducted in the department of Biochemistry, Nilphamari Medical College, Nilphamari, Bangladesh, from June 2021 to December 2021. The study enrolled 80 psoriatic patients of either sex with different age group from dermatology OPD. Control group included 80 age and sex matched non-psoriatic patients with minor ailment like superficial bacterial, fungal or viral infections. After taking informed written consent, blood samples were taken from all the subjects for estimation of serum calcium level. To evaluate the severity of the disease, PASI (Psoriatic Area Severity Index) scoring index was used. The severity of psoriasis was categorized into mild (PASI <5), moderate (PASI 5-10) and severe (PASI >10). The groups were comparable to each other. The data obtained were analyzed to study the comparison between severity of psoriasis and serum calcium levels. The observations were expressed as mean±standard deviation (SD); chi square test and t test were used for intergroup comparison; ANOVA test and Post-Hoc test were used for intragroup comparison. The level of statistical significance was set at a value of $p>0.05$ as insignificant, $p<0.05$ as significant and $p<0.001$ as highly significant.

Results

Among the 160 subjects who participated in this study, 90(56.25%) were female and 70(43.75%) were male. The mean age of the study group was 35.80±17.99 years and mean age of control group was 37.65±15.70 years and there was no significant difference in mean age among the groups.

Table I: Distribution of age and sex of the study subjects

Variables	Case (n=80)	Control (n=80)	p value*
Age (mean±SD) years	35.80±17.99	37.65±15.70	>0.05
Male:Female	42.5:57.8	44.0:55.0	>0.05

*p>0.05: Not significant; p<0.05: Significant; p<0.001: Highly significant

We compared the mean serum calcium levels in cases as well as controls. The value was 9.08±0.26 mg/dL and 9.46±0.51 mg/dL in cases and controls respectively and the difference was significant.

Table II: Comparison of mean change in serum calcium between cases and controls

Parameter	Case Mean(±SD)	Control Mean(±SD)	Mean difference	p value*
Serum calcium (mean±SD) mg/dL	9.06 (±0.26)	9.46 (±0.51)	0.40	0.001

* p>0.05: Not significant; p<0.05: Significant; p<0.001: Highly significant

In this study, we made the comparison of value of serum calcium among different severity levels of psoriasis cases, the ANOVA test analysis showed the data is significant for inter-level comparison (p value is <0.05). Post-Hoc test was done and it was observed that p value of comparison between mild and moderate form of disease, mild and severe form of disease was 0.009 and 0.005 respectively which was statistically significant. Whereas p value of comparison between moderate and severe form of disease was 0.189 which was not significant statistically.

Table III: Comparison between serum calcium levels and severity of psoriasis in study group

Variable	Mild (n=58)	Moderate (n=8)	Severe (n=14)	p value*	p value*		
					Mild vs. moderate	Mild vs. severe	Moderate vs. severe
Serum calcium (mean±SD) mg/dL	9.57±0.33	9.00±0.51	8.65±0.57	0.009	0.009	0.005	0.189

* p>0.05: Not significant; p<0.05: Significant; p<0.001: Highly significant

Discussion

Psoriasis is termed as ahyperproliferative disease as epidermal basal cell exhibit increased frequency of mitosis in the disease. Several studies have demonstrated close association between psoriasis and serum calcium level.[8] In the present study, we found mean serum calcium in psoriasis patients were 9.06(±0.26) mg/dL which was significantly lower compared to that in control group. Serum calcium levels were compared to the different severity levels of psoriasis. The association was found to be significant statistically.

Chaudhuri and Rathi[9] studied correlation of serum calcium levels with severity of psoriasis. They also observed that serum calcium levels were significantly low in cases compared to controls. But association of serum calcium with the severity of psoriasis was not found to be significant statistically which was contrary to the observation of present study. Rawat et al.[10] conducted a case control study where they compared 200 cases of chronic psoriasis cases with 200 healthy controls. They found 21% cases had hypocalcemia whereas hypocalcemia was found in 4% controls. They stated that, psoriasis patient had significant lower level of serum calcium level compared to controls and hypocalcemia was more frequent in more severe kind of psoriasis[10]. We found similar findings in present study. Kitamura et al.[11] 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." So low serum calcium levels can trigger psoriasis and also skin reactions. Morimoto et al.[12] 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 that slight decrease in vitamin D3 levels may be related with the skin lesions. Bijina et al.[13] reported 38% psoriasis patients had hypocalcemia. They observed positive correlation with PASI score and hypocalcemia. This observation was similar as this study. Puri and Mahajan[14] documented several biochemical parameters of psoriasis patients before and after treatment. They observed hypocalcemia in 10% patients before treatment and all patients had normal serum calcium level at the end of the treatment.

Conclusion

In this study, serum calcium levels were significantly lower in psoriasis patients when compared with the controls. The study revealed that there was positive relationship between decreased serum calcium concentration and severity of psoriasis.

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