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Original Research Article

Correlation of serum calcium levels with severity of psoriasis

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ABSTRACT

Background: Recently it has been observed that psoriasis can be successfully controlled by use of vitamin D. This has attracted the curiosity into research on psoriasis and vitamin D as well as role of calcium supplements in the control of psoriasis. Studies have shown that psoriasis risk factor is hypocalcemia. The objective of the study was to analyse serum calcium levels in patients of psoriasis and correlation with severity of psoriasis in comparison with control subjects without psoriasis.
Methods: This study recruited 80 subjects, of psoriasis (age and sex control subjects without psoriasis) attending Skin and STD department, Government Medical College Amritsar, Punjab. Both patients and controls studied during period of 2 year from June 2015 to May 2017.
Results: Serum calcium levels were significantly lower in psoriasis patients than in controls. Serum calcium levels values in patients of mild severity (PASI <10), moderate severity (PASI: 11-20) and severe (PASI >21) were 9.00±0.20, 8.93±0.24 & 8.98±0.22 respectively.
Conclusions: Serum calcium levels were found lower in psoriasis patients and there were no correlation with severity of psoriasis. Hypocalcemia is a risk factor of psoriasis.

Keywords: Psoriasis, Serum calcium, Hypocalcemia

INTRODUCTION

Psoriasis is a common chronically recurring inflammatory, disfiguring and proliferative condition of the skin, in which both genetic and environmental influences play a critical role.[1] 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.[1]

Psoriasis is a hyper proliferative skin disease. This hyper proliferation is supposed to be caused by T cell mediated inflammation of the skin. This leads to very poor differentiation of the epidermal keratinocytes.[2]

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.[3]

The skin hyper proliferation in psoriasis is controlled by calcium inside the cells. It also controls the keratinocytes differentiation.[4]

It has been observed that there is disturbance in the metabolism of calcium in few cases with psoriasis. "pustular psoriasis of von Zumbush" has been found to be associated with mild hypocalcemia.[5]

Hypoparathyroidism which may be primary or may be due to surgical removal is found to aggravate the condition of psoriasis. Even pseudohypoparathyroidism has also been found to be associated with psoriasis.[6]

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.[4]

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 hypocalcemia.[7]

"Accordingly, vitamin D systemic compounds and oral calcium are recommended to treat the problem."[8]

The present study was conducted to evaluate calcium serum level in patients suffering from psoriasisand correlation with severity of psoriasis in comparison with control subjects without psoriasis.

METHODS

It was hospital based, case control study conducted in the department of Skin and STD, carried out from June 2015 to May 2017, at Government Medical College Amritsar, Punjab, India, after taking approval from ethical committee. The study enrolled 160 patients of either sex with different age groups, patients were divided into two groups A and B. Group A included 80 patients of chronic psoriasis of different age and sex and Group B 80 patients with minor ailments like superficial bacterial, fungal or viral infections and not suffering from psoriasis were taken as controls. PASI (Psoriatic Area Severity Index) Scoring index was used to evaluate the severity of the disease and categorise into mild (PASI <10), moderate (PASI >11-20) and severe (PASI >21). Both groups were comparable to each other.

The patients who fulfilled inclusion criteria were recruited in study after taking informed written consent.

Inclusion criteria

Inclusion criteria were only clinically (morphological appearance, positive grattage test, and Auspitzsign) and histopathologically diagnosed cases of psoriasis were included in the study.

Exclusion criteria

Exclusion criteria were patients of psoriasis suffering from any chronic medical disease like diabetes mellitus, hypertension and tuberculosis; patients of psoriasis on current consumption of vitamin D (within two months); patients receiving concomitant treatments with the ability to influence serum calcium; pregnancy and lactation.

Investigation

After an informed consent, blood samples were taken from all the patients for routine investigations and estimation of levels of serum calcium.

Statistical analysis

The findings thus obtained were analyzed to study the correlation between severity of psoriasis and serum calcium levels. Categorical variables were presented as absolute numbers and percentages. The observations were tabulated in the form of mean ± standard deviation (SD) and analysed using Chi square test,'t' test for intergroup comparison, ANOVA test and POST HOC test for intra-group comparison.Comparison and level of significance was determined as its 'p' value with p >0.05 as insignificant, p <0.05 as significant <0.001 as highly significant. Normally distributed continuous variables were compared using the unpaired t test. Correlation between serum calcium levels and PASI score was computed.

RESULTS

Demographic characteristics

The median age in the study cases was 38.05±15.63 years and median age of control group was 23.94±11.42.

Table 1 shows the comparison of mean change in the serum calcium levels in cases as well as controls. In cases and controls the value is 8.97±0.22 and 9.15±0.20 respectively. The data is highly significant as p value is <0.001.

Table 1: Comparison of mean change in serum calcium between cases and controls.

Parameter	Group A Mean	Group B Mean	Mean difference	P value
Serum calcium^{+2}	8.97 (±0.22)	9.15 (±0.20)	0.18	<0.001

NS: p>0.05; Not Significant; *p<0.05; Significant; **p<0.001; highly significant

Table 2: Correlation/comparison between serum calcium levels and severity of psoriasis in study cases

Variable	Mild (n=8)	Moderate (n=15)	Severe (n=17)	P value	Mild vs. moderate P value	Mild vs. severe P value	Moderate vs. severe P value
Serum calcium	9.00±0.20	8.93±0.24	8.98±0.22	0.726	>0.05	>0.05	>0.05

NS: p>0.05; Not Significant; *p<0.05; Significant; **p<0.001; highly significant.

In our study, the comparison of value of Serum calcium among different severity levels in cases was made, the ANOVA test analysis showed a significantly higher p-value for inter –level comparisons (0.001). Post-Hoc test was conducted and it was observed that p-value of comparison between mild and moderate form of disease, mild and severe disease and moderate and severe disease was > 0.05 which was statistically non significant.

Table 3: Correlation of PASI with age and serum calcium.

PASI	r value	P value	Significance
With age	0.044	0.786	Not significant
With serum calcium	0.077	0.639	Not significant

This table depicts the correlation of PASI with the age of patient and serum calcium level, (Correlation–coefficient) in the serum calcium was 0.077 whereas in age was 0.044. The p-value in serum calcium was 0.639 and in age was 0.786 which was not significant. As per this the correlation between PASI and serum calcium levels were not significant.

DISCUSSION

The mean serum calcium levels were significantly lower in psoriasis patients compared to the control in the present study. Serum calcium level was compared across severity of psoriasis. The association was not found to be significant statistically. Correlation between age and serum calcium was not significant. The correlation between PASI and serum calcium levels were not significant.

Morimoto et al studied association between serum calcium levels with severity of skin lesions in psoriasis vulgaris.[9] They concluded that slight decrease in vitamin D3 levels may be related with the skin lesions. We also observed similar findings that calcium levels were significantly low in cases compared to controls.[9]

Zhai et al carried out a study to see whether "pre treatment calcium levels can predict the effectiveness of methotrexate for the treatment of severe plaque psoriasis."[10] They found that the improvement level in patients treated with methotrexate but previously received serum calcium and the improvement was 61.07%. The correlation was positive between pre treatment calcium level and improvement. Keratinocyte growth was inhibited by methotrexate and this was also correlated with serum calcium levels. Thus the authors concluded that pre treatment calcium level was positively correlated with methotrexate efficiency.[10]

Qadim et al carried out similar study like the present study where they compared the 98 psoriasis cases with 100 cases without psoriasis.[11] The prevalence of hypocalcemia was 37.2% in the cases compared to only 9% among the controls. We also found that the mean serum calcium levels were significantly low in cases as compared to the controls. The author concluded that for psoriasis patients, hypocalcemia was a significant risk factor and they recommended to include calcium rick foods for psoriasis patients.[11]

Stewart et al reported a case who had surgically induced hypoparathyroidisim.[12] He developed typical pustular psoriasis of von Zumbusch due to hypocalcemia. The author found that as the serum calcium level in the patient improved by giving calcium orally and vitamin D, there was improvement in the psoriasis. But the psoriasis again was seen as the treatment was discontinued. Our study also gave similar findings.[12]

Lebwohl et al in their study of 52 weeks found that 136 patients completed the treatment.[13] The authors studied the efficacy of calcitriol in mild to moderate plaque psoriasis. They concluded that "Calcitriol ointment 3 microg/g is a safe, effective, and well-tolerated option for the long-term treatment of chronic plaque psoriasis. Clinical improvement was maintained for up to 52 weeks, with no clinical effect on calcium homeostasis or other relevant laboratory test parameters."

Kitamura et al studied cutaneous reactions caused by calcium channel blockers.[14] They concluded that "Ca-antagonists are 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 not only the psoriasis but also skin reactions. We also found that hypocalcemia was more common in psoriasis patients compared to the controls.

CONCLUSION

In our study, Serum calcium levels were lower in the patients with Psoriasis when compared with the controls. This study revealed that there was no relationship between serum calcium and severity of Psoriasis.

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