DOI: https://doi.org/10.54393/pjhs.v4i11.1061

PAKISTAN JOURNAL OF HEALTH SCIENCES
https://thejas.com.pk/index.php/pjhs
Volume 4, Issue 11 (November 2023)

Original Article

Frequency of Hypocalcemia among Patients with Moderate to Severe Chronic Plaque Psoriasis

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ARTICLE INFO

Key Words:
Chronic Plaque, Psoriasis, Severity, Hypocalcemia

How to Cite:
Ilyas, S., Mukhtar, R., Bashir, B., Nusrat, W., Ilyas, T., & Malik, L. M. (2023). Frequency of Hypocalcemia among Patients with Moderate to Severe Chronic Plaque Psoriasis: Chronic Plaque Psoriasis. Pakistan Journal of Health Sciences, 4(11). https://doi.org/10.54393/pjhs.v4i11.1061

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Received Date: 22nd September, 2023
Acceptance Date: 12th November, 2023
Published Date: 30th November, 2023

ABSTRACT

Psoriasis is a common skin problem. It is associated with many risk factors including hypocalcemia. It is important to determine serum calcium levels among psoriatic patients that may help in proper management. **Objective:** To determine frequency of hypocalcemia in patients of moderate to severe chronic plaque psoriasis. **Methods:** It was a cross-sectional study that had involved 90 patients of both genders aged between 22-70 years having chronic plaque psoriasis. The patients were evaluated for level of calcium in serum and hypocalcemia was labeled if albumin corrected serum calcium was <8.9 mg/dl. A prior written informed consent was taken from each patient. **Results:** The mean age of the patients was 40.7 ±1 3.9 years. There were 51 (56.7%) male and 39 (43.3%) female patients with a male to female ratio of 1.3:1. The mean duration of disease was 9.2 ± 4.4 years while the mean serum calcium was 8.89 ± 0.79 mg/dl. 59 (65.6%) patients had moderate while 31 (34.4%) patients had severe disease. Hypocalcemia was observed in 35 (38.9%) patients and it was significantly higher in patients with severe disease as compared to moderate disease (58.1% vs. 28.8%; p-value=0.007). **Conclusions:** In this study a substantial proportion of patients with chronic plaque psoriasis had hypocalcemia suggesting potential role of serum calcium in the pathogenesis of psoriasis. Hypocalcemia may also indicate severity of disease. This study advocates routine screening a correction of serum calcium levels among such patients as it leads to timely identification and appropriate management of the disease.

INTRODUCTION

Psoriasis is an immune mediated inflammatory skin condition with a chronic course. It is characterized by erythematous plaques covered with thick scale. It commonly involves elbows, scalp and lower back but it can involve any skin surface. It is associated with many comorbidities including arthritis, cardiovascular, metabolic and psychological problems as a result of which lifespan is reduced [1]. Psoriasis affects both males and females. It has an early onset in females and those having a family history of psoriasis. Its bimodal distribution of age of onset with peaks at 30–39 years. In men age of onset is 60–69 years and 10 years earlier in women [2]. Various epigenetic, genetic, environmental and lifestyle factors are involved in its development. Inflammatory and immune circuits were generated by autoreactive T cells and keratinocytes that cause initiation of the disease process as well as its progression and persistence [3]. Histologically there is inflammation, hyperkeratosis and angiogenesis along with increased epidermal proliferation, abnormal keratinization and shortened maturation time [4]. It is aggravated by infections, stress, alcohol consumption, smoking, obesity, cold weather and drugs e.g. antimalarial, beta blockers and lithium [5]. It causes disfigurement, stigmatization and chronic pruritus leading to development of anxiety in patients of psoriasis. Furthermore, depression and anxiety also trigger psoriasis in a vicious manner [6]. There is increased risk of development of metabolic syndrome, cardiovascular

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disease, diabetes and non-alcoholic fatty liver disease in these patients. High mortality rate has been noted in patients suffering from severe psoriasis mainly due to cardiovascular disease [2]. There is also development of psoriatic arthritis in around 20-30% of patients suffering from psoriasis which affect quality of life as it alters physical function [7]. It causes in intensifying kinds of disabilities and imposes heavy expenditures to the patients. The best cure for psoriasis is to understand what the underlying cause is in first place [4]. It is important to know the exact underlying pathogenesis of the psoriasis as it is the mainstay of treatment. The skin hyperproliferation is controlled by calcium inside the cells. Low calcium level damages cell adhesion molecules like cadherins causing hyperproliferation of keratinocytes which leads to a development of psoriasis [5]. It has also been observed that if calcium channel blockers like diltiazem has been prescribed to some patients it results in development of psoriasiform rash and these rashes disappear on stopping calcium channel blockers. This also suggests a role of hypocalcemia in development of psoriasis [8]. Serum calcium level particularly ionized calcium level depends on level of serum albumin because 45% of serum calcium binds to serum albumin. So, it is important to measure albumin level while measuring calcium level in serum [4]. Various studies reported hypocalcemia in patients with psoriasis [4, 8, 9]. In a study conducted by Qadim at el hypocalcemia was present in 37.2% psoriatic patients [4]. Whereas it was found to be 33.75 % psoriatic patients in comparison to 7.5% in controls in a study conducted by Jomah et al., Mohammed et al., also observed decreased levels of serum calcium in psoriatic patients [8, 9]. This study was conducted to highlight the importance of hypocalcemia in patients with moderate to severe chronic plaque psoriasis and as no such study is done in Pakistan previously. It helped out in making new management guidelines of psoriasis in future.

METHODS

After approval from ethical review board this cross-sectional study was carried out at department of Dermatology Unit 1, Jinnah Hospital Lahore for a period of 6 months starting from 19 June 2019 to 18 December 2019. Non-probability, consecutive sampling was done and informed written consent was obtained. A total of 90 patients of chronic plaque psoriasis including both males and females of age 22 - 70 years were enrolled in study. Patients of chronic kidney and liver disease, hypoparathyroidism and severe dietary deficiencies were excluded. Serum calcium and albumin levels were measured in laboratory of Jinnah Hospital Lahore. Normal calcium range was taken as 8.9-10.1 mg/dl bearing in mind the available kits. Demographic data pertaining to age, sex, duration and severity of disease was noted on a predesigned structured proforma. The collected data were analysed through SPSS version-17.0.

RESULTS

There was a total of 90 patients, out of these 51 (56.7%) were males and 39 (43.3%) were female patients constituting a male to female ratio of 1.3:1. The mean age was 40.7 ± 13.9 years with age ranging from 22 years to 70 years. The mean duration of disease was 9.2 ± 4.4 years with age ranging from 1 year to 16 years. Fifty-nine (65.6%) patients had moderate while thirty-one (34.4%) patients had severe disease (Table 1). Serum calcium level ranged from 7.1 mg/dl to 10.1 mg/dl with a mean of 8.89±0.79 mg/dl (Table 1).

Table 1: Baseline characteristics of study sample

Characteristics	Participants n=90
Age (years)	40.7±13.9
≤45 years	54 (60.0%)
>45 years	36 (40.0%)
Gender	
Male	51 (56.7%)
Female	39 (43.3%)
Duration of Disease (years)	9.2±4.4
1-8 years	49 (54.4%)
9-16 years	41 (45.6%)
Severity of Disease	
Moderate	59 (65.6%)
Severe	31 (34.4%)
Serum Calcium (mg/dl)	8.89±0.79

Hypocalcemia was seen in 35 (38.9%) psoriatic patients

Table 2: Frequency of Hypocalcemia in patients of Chronic Plaque Psoriasis n=90Table 1: Baseline characteristics of study sample

Hypocalcemia	Frequency (%)
Yes	35(38.9)
No	55(61.1)
Total	90(100)

No statistically significant difference was seen in the frequency of hypocalcaemia across various subgroups depending on age, gender and duration of disease. Statistically significant difference was present among patients with severe and moderate disease. Hypocalcemia was significantly higher in patients of severe psoriasis. It was found to be 58.1% in with severe disease and 28.8% with mid psoriasis (p-value=0.007) as shown in Table 3.

Table 1: Baseline characteristics of study sample

Subgroups	N	Hypocalcemia F (%)	p-value
Age			
≤45 years	54	21 (38.9%)	

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>45 years	36	14 (38.9%)	1.000
Gender			
Male	51	20 (39.2%)	0.942
Female	39	15 (38.5%)	
Duration of Disease			
1-8 years	49	19 (38.8%)	0.981
9-16 years	41	16 (39.0%)	
Severity of Disease			
Moderate	59	17 (28.8%)	0.007*
Severe	31	18 (58.1%)	

Chi-square test *indicating observed difference was statistically significant

DISCUSSION

Psoriasis is a heterogeneous skin disease which may persist lifelong. It has various types such as plaque, pustular, guttate, flexural and erythrodermic [2]. It causes loss of productivity approximately around 10% and exerts societal impact by influencing financial status of patient as well as by increasing resource use of community [10]. Disturbances in systemic calcium metabolism have been shown in various forms of psoriasis. It has been shown that hypocalcemia is associated with intensification of lesions in most patients and systemic vitamin D and calcium are recommended to treat this condition. It was shown in recent studies that a significant number of patients with chronic plaque psoriasis had hypocalcaemia and these studies recommended correction of decreased calcium levels in psoriatic patients in future practice [4, 8]. However, the existing evidence is scarce and limited number of local studies are available. This leads to necessitation of present study. The mean age of the chronic plaque psoriatic patients was 40.7 ± 13.9 years in this study. This observation is in accordance with that of Haider et al in which the mean age of patients of chronic plaque psoriasis was 40.0 ± 12.6 years [11]. Similar mean age of 43.90 ± 1.11 years among psoriatic patients was reported in a study conducted by Rawat et al., [12]. In other studies, conducted by Chaudhari and Das et al., mean ages of 38.1 ± 15.6 years and 39.7±7.3 years respectively were observed among psoriatic patients [13, 14]. We observed a slight male predominance among patients of chronic plaque psoriasis. The ratio of male to female is 1.3:1 in this study. Shaiq et al., also observed a similar male predominance among psoriatic patients with male to female ratio of 1.4:1 [15]. Haider et al., reported higher male predominance with male to female ratio of 1.6:1 and 2.5:1 respectively among psoriatic patients [11, 12]. In another study conducted by Asim et al., at Dow University Hospital, Karachi equal gender distribution among such patients was observed [16]. While Bijina et al., found it to be 3:1 (male: female) in Indian patients [17]. The mean duration of disease was 9.2 ± 4.4 years in the present study. Choi et al., also observed a similar mean duration of disease among Romanian patients of psoriasis. It was found to be 9.5 ± 10.2 years [18]. In the present study 38.9% of patients of chronic plaque psoriasis had hypocalcemia. Bijina et al., in a similar study in India also observed that 38.0% of the patients with psoriasis had serum calcium level below normal limit (<8.8 mg/dl) which is in line with the present study [17]. Anuja et al., also reported hypocalcemia in 41.0% patients of psoriasis [19]. Our observation is also in accordance with study conducted by Qadim et al., who observed similar frequency of hypocalcaemia. It was found to be 37.2% among Iranian patients of psoriasis [4]. Basha et al., also reported decreased level of serum calcium in patients of psoriasis vulgaris compared with controls which is consistent with the results of the present study [20]. Zhai et al., found significant improvement in patients of psoriasis who were treated with calcium before starting methotrexate [21]. This observation supports that by correcting levels of calcium, psoriasis may get improved. The frequency of hypocalcemia was 58.1% in patients with severe disease as compared to moderate disease in which it was 28.8%. This suggests important role of serum calcium in the pathogenesis of psoriasis. This is supported by observation made by Jomah et al., that serum calcium decreases as PASI score increases [8]. The present study was a unique kind of study conducted in local population and it helps in adding up to already available scarce international research evidence. Hypocalcaemia was observed in considerable number of psoriatic patients and it was found to be statistically higher among patients presenting with severe disease. The strengths of the present study include large sample size along with strict exclusion criteria. There was stratification of results to address different effect modifiers. There was also limitation to the present study as we did not compare treatment response and recurrence of disease in patients with hypocalcaemia versus patients without hypocalcemia. The effect of management of hypocalcemia on the severity and treatment response of disease was also not observed as it could have further cleared the probable role of hypocalcemia in prevention and treatment of patients.

CONCLUSIONS

This study concludes that it is important to do routine screening of serum calcium level among patients of chronic plaque psoriasis as it may lead to timely identification and proper management which may further improve the outcome of such patients in dermatologic practice. It is also suggested to correct serum calcium

DOI: https://doi.org/10.54393/pjhs.v4i11.1061

levels which may improve the condition and helps in preventing progression to severe forms of disease.

Authors Contribution

Conceptualization: SI
Methodology: RM
Formal analysis: BB
Writing-review and editing: SI, BB, WN, TI, LMM
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

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