http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 16 (6): 291-294, 2013
ISSN 1028-8880 / DOI: 10.3923/pjbs.2013.291.294

Studying the Calcium Serum Level in Patients Suffering from Psoriasis

H.H. Qadim, F. Goforoushan, S.B. Nejad and M. Goldust
Tabriz University of Medical Sciences, Tabriz, Iran

Abstract: 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 aimed at studying the calcium serum level in patients suffering from psoriasis. In this case control studies, 98 hospitalized cases with psoriasis were compared with 100 patients who were hospitalized due to other diseases. Two groups were matched for age and gender. The type of psoriasis, age and sex of patients and serum calcium and albumin levels in two groups were documented in a especial questionnaire. Of all 98 patients with psoriasis, 37.2% were hypocalcemic and 63.7% had normal serum calcium. There was no hypercalcemia. In other group 9% were hypocalcemic, 89 and 2% were normocalcemic and hypercalcemic respectively. In 64.9% of hypocalcemic psoriatic patients, low serum albumin was noted. But all of control group had normal levels. Hypocalcemia is a risk factor of psoriasis. It is better to include dairy as calcium resource in daily diet of patients suffering from psoriasis.

Key words: Psoriasis, calcium, albumin, inflammation, skin disease

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 (Gisondi *et al*., 2011; Hagforsen *et al*., 2012). Outbreaks often correlate with environmental triggers, often linked to nutritional deficiencies and poor eating habits (Hazarika, 2009). It is of important and prevalent skin diseases developing due to increasing epidermal cells multiplication. 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 (Durakovic *et al*., 2001; Gold 2009). Evidently, it will result in intensifying kinds of disabilities as well as imposing heavy expenditures to the patients (Waqar and Sarkar, 2009). The best cure and remedy for psoriasis is to understand what is causing it in the first place. In addition to standard broadband ultraviolet radiation B (BUVB), (280-315 nm), narrowband phototherapy (NBUVB) (monochromatic UV between 311 and 312 nm) and heliotherapy (treatment with natural sunlight) have become important treatment modalities for psoriasis (Carlesimo *et al*., 2010; Osmancevic *et al*., 2010). Intracellular calcium plays an important part in the regulation of proliferation and differentiation of keratinocytes (Lebwohl *et al*., 2009). Some cases of various forms of this skin disease have been found to show disturbances in systemic calcium metabolism. Association of mild hypocalcemia with pustular psoriasis of von Zumbush, a rather severe form of psoriasis, has been observed (Plavina *et al*., 2008). Reportedly, hypoparathyroidism may cause the onset or aggravate psoriasis in patients with surgical hypoparathyroidism and primary hypoparathyroidism. Association of the disease with pseudohypoparathyroidism was also reported (Braun *et al*., 2007). Moreover, we showed that topical application of 1,2,5 dihydroxyvitamin D, [1,25-(OH),D], a well known calcitropic hormone, improved skin lesions of psoriatic patients (Lebwohl *et al*., 2007). It has been demonstrated that decrease of calcium serum leads to intensifying and extending the lesions in most patients. Accordingly, vitamin D systemic compounds and oral calcium are recommended to treat the problem (Noborio *et al*., 2006). The present study was conducted to evaluate calcium serum level in patients suffering from psoriasis.

MATERIALS AND METHODS

The present study was a case-control one. The case group was consisted of 98 psoriatic patients hospitalized at skin clinic of Sina hospital, Tabriz, Iran from Apr. 2010 to Apr. 2012. There were 100 non-psoriatic patients in the control group hospitalized in the same center. This study was approved by ethic committee of Tabriz University of

Corresponding Author: M. Goldust, Medical Student, Student Research Committee,
Tabriz University of Medical Sciences, Tabriz, Iran Tel: 00989111289630 Fax: 00984113368805

medical sciences. Written consent was obtained from all the study population. Both groups were the same considering number of males and females and age range and calcium metabolism disorder was not seen in these groups. Calcium and serum albumin levels were measured in both groups. All tests were conducted in biochemical laboratory of Sina Hospital. Considering available kits, normal calcium range of serum was 8.2-10.5 mg dL^{-1} with ionized calcium. Other understudy variables included evaluating kind of psoriasis, serum calcium level considering kind of psoriasis and in the case group, calcium intake in daily diet as well as signs of muscular and skeletal pains in the subjects. SPSS™, version 16 is the used statistical software program. The results were expressed as Means±SD The Chi-square test was used for statistical analysis. The level of statistical significance was set at a value of $p<0.05$.

RESULTS

Out of 98 hospitalized patients, 43 cases (43.8%) suffered from vulgaris psoriasis, 38 cases (38.7%) from dispersed pustular psoriasis, 4 cases (4.08%) from erythrodermic psoriasis and 14 cases (14.2%) from vulgaris psoriasis along with psoriatic arthritis. Considering serum calcium level, the patients were divided into three hypocalcaemia (low calcium serum level), normocalcaemia (normal calcium level) and hypercalcaemia (calcium level higher than normal). In this study, hypercalcaemia was not observed. Out of 98 hospitalized patients, low level of serum calcium was seen in 37 cases (37.2%) but hypocalcaemia frequency was only 9% in the control group (Table 1). Calcium serum levels were compared considering kinds of psoriasis. As observed, hypocalcaemia frequency is high in more severe kinds of psoriasis (e.g., erythrodermic psoriasis). Fifty seven point one percent of the patients with vulgaris psoriasis along with arthritis had hypocalcaemia since 42.9% of the patients had normal level of calcium (Table 2). Results obtained from evaluating other understudy variables are as follow: out of 37 patients with hypocalcaemia, 21 (56.8%) were male and 16 (42.3%) female. In hypocalcemic patients, 24 cases (64.9%) had low level of serum albumin, 22 cases (59.6%) suffered from dispersed muscular, skeletal pain as well as backache and 26 patients (72.7%) did not use calcium resources in their daily diet or their consumption was very insignificant. In all patients of the control group, serum albumin was at normal level.

Table 1: Demographic data of psoriasis patients

Psoriasis type	No.	%
Vulgaris psoriasis	43	43.80
Dispersed pustular psoriasis	38	38.70
Erythrodermic psoriasis	4	4.08
vulgaris psoriasis along with psoriatic arthritis	14	14.20
Calcium level		
Hypocalcaemia	37	37.20
Normocalcaemia	61	62.80
Hypercalcaemia	0	0.00

Table 2: Frequency of calcium serum level (%) in hospitalized patients suffering from psoriasis

	Serum calcium level		
Clinical kind of psoriatic	Hypocalcaemia	Normal calcium	Hypercalcaemia
Vulgaris psoriasis	14.2	85.8	0
Dispersed pustular psoriasis	50.0	50.0	0
Erythrodermic psoriasis	100.0	0.0	0
Vulgaris psoriasis along with arthritis	57.1	42.9	0

DISCUSSION

Psoriasis is categorized as hyper proliferative diseases because increase of frequency of epidermis basal cells contributing in mitosis is seen in the disease. Considering available reasons of psoriasis, the main reason is not known but several factors such as family records and accompanying with some Human Leukocytes Antigens (HLA) has been mentioned (Duweb *et al*., 2005). Several studies have approved the close relation between psoriasis and serum calcium level. The researches demonstrated that hypocalcaemia resulting from psoriasis intensifies following parathyroidectomy such that psoriasis intensification and atopic dermatitis have been introduced as manifestations of hypoparathyroidism (Cuevas and Arrazola, 2005). On the other hand, hypocalcaemia may lead to developing of kinds of generalized pustular psoriasis (Lee *et al*., 2005). It should be remembered that intracellular calcium is kept in mitochondria, reticulum sarcoplasmic and reticulum endoplasmic. Activating cell cytoplasmic membrane receptors lead to rerelease of calcium in cytosol. If concentration of the free intracellular calcium decreases, it will either actively release from free intracellular resources or enter the cell actively and through adenosine triphosphatase (Guilhou, 1998). About 45% of serum calcium connects to albumin, therefore, serum calcium especially ionized calcium level depends on serum albumin level and it is better to measure serum albumin level while measuring serum calcium level. Under hypoalbuminosis conditions, the measured number should be corrected in order to obtain real numbers

(Matsushita *et al*., 2005). According to the researches, there are several evidences regarding involvement of nucleotid in pathogenesis of psoriasis such that decrease of circular adenosine monophosphate result in increase of cellular proliferation in psoriatic patients (Dimon-Gadal *et al*., 1998). It seems that increase of phosphorylase kinase activity involving in adenosine triphosphatase metabolism result in psoriasis intensification and decrease of its activity due to treating with calcipotriol result in psoriasis recovery. It can be attributed to calcium metabolism changes (Dessy *et al*., 2011). Several studies have indicated to calcium role in controlling cellular multiplication and differentiation. On the other hand, measuring epidermis calcium concentration in patients suffering from psoriasis demonstrated low level of the material and justify parakeratosis in such conditions (Shahriari *et al*., 2010). Prescribing some calcium channels blockers such as diltiazem in some patients have resulted in developing psoriasiform rashes. The lesions were recovered after stopping the drugs consumption (Brown and Slatopolsky, 2008). According to the results of the present study, low level of serum calcium was observed in all erythrodermic and half of the patients suffering from dispersed pustular psoriasis. The results are in correspondence with other researches (Kitamura *et al*., 1993). Additionally, hypocalcaemia in the control group is clearly less frequent than the case group (9% vs. 37.2%). Since erythroderma and dispersed pustular psoriasis are regarded as more severe kinds of psoriasis, more frequency of hypocalcaemia is justifiable in the patients and it can be considered as one of the factors leading to lesions intensification or extension. However, calcium replacement has been conducted in all patients. Also, as mentioned previously, it is better to calculate corrected amounts of serum ionized calcium in patients suffering from hypoalbuminemia. In spite of correcting the numbers, calcium was at normal range just in few patients and it is practically ignorable. According to the same evidences, use of vitamin D compounds such as calcipotriol has been recommended in treating psoriasis. Vitamin D analogues play a significant role in cellular multiplication and differentiation in addition to calcium balance (Gumowski-Sunek *et al*., 1995). Meanwhile, vitamin D facilitates entrance of calcium inside the cells (through calcium-dependent proteins) and imposes its hormone effects in cell differentiation. Immune modulation feature can be regarded as another effect mechanism of these compounds (Reichrath, 2007). Therefore, vitamin D analogues result in recovery of psoriatic lesions through different mechanisms.

CONCLUSION

It is better to include dairy as calcium resource in daily diet of patients suffering from psoriasis. Additionally, considering that vitamin D compounds such as calcipotriol are topical drugs and lack severe systemic complications, their role in treating psoriatic lesions should be taken into account. In case of intensification of psoriasis lesions, it is important to pay attention to hypocalcaemia as an important factor.

REFERENCES

Braun, G.S., M. Witt, V. Mayer, H. Schmid, 2007. Hypercalcemia caused by vitamin D3 analogs in psoriasis treatment. Int. J. Dermatol., 46: 1315-1317.

Brown, A.J. and E. Slatopolsky, 2008. D Vitamin analogs: Therapeutic applications and mechanisms for selectivity. Mol. Aspects Med., 29: 433-452.

Carlesimo, M., E. Mari, A. Arcese, F. de Angelis and E. Palese *et al*., 2010. Safety and efficacy of calcium folinate in psoriasis: an observational study. Int. J. Immunopathol. Pharmacol., 23: 649-653.

Cuevas, P. and J.M. Arrazola, 2005. Dobesilate in the treatment of plaque psoriasis. Eur. J. Med. Res., 10: 373-376.

Dessy, A., S. Kubowicz, M. Alderighi, C. Bartoli, A.M. Piras, R. Schmid and F. Chiellini, 2011. Dead sea minerals loaded polymeric nanoparticles. Colloids Surf., B., 87: 236-242.

Dimon-Gadal, S., F. Raynaud, D. Evain-Brion and G. Keryer, 1998. MAP kinase abnormalities in hyperproliferative cultured fibroblasts from psoriatic skin. J. Invest. Dermatol., 110: 872-879.

Durakovic, C., A. Malabanan and M.F. Holick, 2001. Rationale for use and clinical responsiveness of hexafluoro-1,25-dihydroxyvitamin D3 for the treatment of plaque psoriasis: A pilot study. Br. J. Dermatol., 144: 500-506.

Duweb, G., J. Alhaddar and M. Abuhamida, 2005. Psoriasis vulgaris: Once-versus twice-daily application of calcipotriol cream. Int. J. Tissue React., 27: 155-158.

Gisondi, P., M. Rossini, A. di Cesare, L. Idolazzi and S. Farina *et al*., 2011. Vitamin D status in patients with chronic plaque psoriasis. Br. J. Dermatol., 166: 505-510.

Gold, L.F., 2009. Calcitriol ointment: Optimizing psoriasis therapy. J. Drugs Dermatol., 8: s23-s27.

Guilhou, J.J., 1998. The therapeutic effects of vitamin D3 and its analogues in psoriasis. Expert. Opin. Invest. Drugs, 7: 77-84.

Gumowski-Sunek, D., R. Rizzoli and J.H. Saurat, 1995. Oral calcium tolerance test in extensive psoriasis treated with topical calcipotriol. Dermatology 190: 43-47.

Hagforsen, E., I. Pihl-Lundin, K. Michaelsson and G. Michaelsson, 2012. Calcium homeostasis and body composition in patients with the psoriasis variant palmoplantar pustulosis: A case-control study. Br. J. Dermatol., 166: 74-81.

Hazarika, D., 2009. Generalized pustular psoriasis of pregnancy successfully treated with cyclosporine. Indian J. Dermatol. Venereol. Leprol., 75: 638-638.

Kitamura, K., M. Kanasashi, C. Suga, S. Saito, S. Yoshida and Z. Ikezawa, 1993. Cutaneous reactions induced by calcium channel blocker: high frequency of psoriasiform eruptions. J. Dermatol., 20: 279-286.

Lebwohl, M., A. Menter, J. Weiss, S.D. Clark and J. Flores *et al*., 2007. Calcitriol 3 microg/g ointment in the management of mild to moderate plaque type psoriasis: results from 2 placebo-controlled, multicenter, randomized double-blind, clinical studies. J. Drugs Dermatol., 6: 428-435.

Lebwohl, M., J.P. Ortonne, P. Andres and P. Briantais, 2009. Calcitriol ointment 3 microg/g is safe and effective over 52 weeks for the treatment of mild to moderate plaque psoriasis. Cutis, 83: 205-212.

Lee, Y., Y.H. Nam, J.H. Lee, J.K. Park and Y.J. Seo, 2005. Hypocalcaemia-induced pustular psoriasis-like skin eruption. Br. J. Dermatol., 152: 591-593.

Matsushita, Y., Y. Shimada, S. Kawara, K. Takehara and S. Sato, 2005. Autoantibodies directed against the protease inhibitor calpastatin in psoriasis. Clin. Exp. Immunol., 139: 355-362.

Noborio, R., K. Kobayashi, Y. Shintani and A. Morita, 2006. Comparison of the efficacy of calcipotriol and maxacalcitol in combination with narrow-band ultraviolet B therapy for the treatment of psoriasis vulgaris. Photodermatol. Photoimmunol. Photomed., 22: 262-264.

Osmancevic, A., K. Landin-Wilhelmsen, O. Larko, A.L. Krogstad, 2010. Vitamin D status in psoriasis patients during different treatments with phototherapy. Vitamin D status in psoriasis patients during different treatments with phototherapy. 101: 117-123.

Plavina, T., M. Hincapie, E. Wakshull, M. Subramanyam and W.S. Hancock, 2008. Increased plasma concentrations of cytoskeletal and Ca^{2+}-binding proteins and their peptides in psoriasis patients. Clin. Chem., 54: 1805-1814.

Reichrath, J., 2007. Vitamin D and the skin: an ancient friend, revisited. Exp. Dermatol., 16: 618-625.

Shahriari, M., P.E. Kerr, K. Slade and J.E. Grant-Kels, 2010. Vitamin D and the skin. Clin. Dermatol., 28: 663-668.

Waqar, S. and P.K. Sarkar, 2009. Exacerbation of psoriasis with beta-blocker therapy. CMAJ, 181: 60-60.