Original Article

Serum 25-Hydroxy Vitamin D Level in Patients with Psoriasis and its Relationship with Severity of the Disease

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Abstract

Background: Psoriasis is a common, chronic, immune mediated inflammatory disease. Recent studies suggest that 25-hydroxy vitamin D could have important immune modulatory effects in psoriasis. It plays a pivotal role in modulating dendritic cell function and regulating keratinocytes and T cell proliferation.

Aims: To determine the serum 25-hydroxy vitamin D level in psoriatic patient and to assess its relationship with severity of the disease.

Materials & Methods: This cross sectional study included 40 psoriatic patients from the department of Dermatology & Venereology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Ethical clearance for the study was taken from the Institutional Review Board (IRB) of BSMMU. Disease severity was measured by Psoriasis Area Severity Index (PASI). Blood sample was collected from each patient & sample was preserved & analyzed for 25-hydroxy vitamin D level. Statistical analysis was carried out by using the Statistical Package for the Social Sciences (SPSS) software version 23.0.

Results: Deficiency of serum 25-hydroxy vitamin D level was found in 55.5% and insufficiency in 32.5% psoriatic patients. The mean serum 25-hydroxy vitamin D level was 20.6±7.7 ng/ml and mean Psoriasis Area and Severity Index (PASI) was 14.6±5.7. There was significant correlation between serum 25-hydroxy vitamin D and PASI ($r = -0.496$; $p= 0.001$).

Limitations: Small sample size was selected from single tertiary center in Dhaka city, so that the results of the study may not reflect the exact picture of the country.

Conclusion: Present study revealed a negative correlation between disease activities of psoriasis with patient's serum 25-hydroxy vitamin D concentration. So, in psoriasis serum 25-hydroxy vitamin D can be considered as a marker of disease activity.

Keywords: Psoriasis, 25-hydroxy vitamin D, Psoriasis Area Severity Index (PASI)

Introduction:

Psoriasis is a chronic, noncontagious, inflammatory skin disease with strong genetic, environmental and immunological background.[1] The prevalence of psoriasis in Bangladesh is 0.7% with a global prevalence 2-3%.[2-3] Clinically it presents with recurrent episodes of well-defined erythematous and scaly skin plaques.[4]

Skin exposure to ultraviolet B radiation stimulates the synthesis of Vitamin D (25-hydroxy vitamin D). It has many important roles on human body besides calcium-phosphorus metabolism. It plays an important role on skin through its genomic and non-genomic effects. Non-genomic effects are regulated by intra-cellular calcium.[5] Genomic effects

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are mediated by vitamin-D receptor binding followed by suppression of production and release of pro-inflammatory cytokines and is thought to induce terminal differentiation and suppress proliferation.[6]

Vitamin D deficiency is associated with adverse course of a wide variety of diseases including cancer, autoimmune, cardiovascular and infectious diseases.[7] There are good evidences on role of vitamin D in the initiation and propagation of range of autoimmune diseases like psoriasis.[8]

Although the role of vitamin D in psoriasis was established long before, there are insufficient number of studies to conclude a comprehensive overview in this aspect. The aim of this study was to assess the level of serum 25-hydroxy vitamin D in psoriatic patients to find out its relationship with disease severity according to Psoriasis Area Severity Index (PASI).

Materials and methods:

This cross sectional study was conducted from May, 2017 to April, 2018, in the department of Dermatology, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh after taking ethical clearance from the institutional review board (IRB) of BSMMU. Adult patients with plaque psoriasis between age 18-65 years of both sexes who consented to participate after having received full information and purpose of the study were enrolled. Patients, who were pregnant and lactating, alcoholic, smoker, having nail psoriasis or psoriatic arthritis were excluded. Patients with chronic kidney disease, chronic liver disease, other autoimmune diseases and who received therapeutic intervention that might influence vitamin D status including bisphosphonates, systemic corticosteroid, calcium supplements, phototherapy and systemic biologics were also excluded. Psoriasis area and severity index (PASI) was used for assessment of the disease severity.

Preliminarily patients were selected on the basis of history, physical examination and laboratory tests. Then 40 patients with psoriasis were enrolled finally for this study according to the aforementioned inclusion & exclusion criteria. Height, weight, body mass index (BMI), waist circumference of all participants were measured. Duration of disease was measured in year. Disease severity of each and every patient was measured by PASI. The score of PASI usually varies between 0 and 72. PASI score of less than or equal to 10 is classified as mild disease, whilst a score of greater than 10 is considered moderate to severe.

Fasting blood samples were collected from patients at first visit and serum 25-hydroxy vitamin D was measured by the automated analyzer: Architect Plus ci4100. Statistical analysis was carried out by using the statistical package for the social sciences (SPSS) software version 23.0. Continuous data were expressed as mean±standard deviation (SD) and categorical variables were expressed as percentages. The differences between groups were analyzed by unpaired t-test, and Fisher's exact test. Spearman's rank correlation coefficient test was used to correlate between mean serum 25-hydroxy vitamin D with continuous variable. For all statistical tests, P-value is less than 0.05 was considered as statistically significant.

Results:

The mean age for patients was 34.2± 9.5. Majority of the study subjects were male (62.5%). The mean BMI was found 26.4±4.8 kg/m2. The mean duration of psoriasis was 1.2±0.6 years. The PASI was used for assessment of psoriasis severity, and the mean PASI in patients was 14.6±5.6%. The mean serum 25-hydroxy vitamin D level was found 21.02±7.8 ng/ml. Table-I shows that more than half (67.5%) patients having PASI > 10.The mean PASI score was found 14.6±5.7 percent with range from 3.6-22.9 percent.

Table I: Distribution of the study populations by PASI Score (n=40)

PASI Score (%)	Number of patients	Percentage
≤10 (Mild)	13	32.5
>10 (Moderate to severe)	27	67.5
Mean±SD	14.6+5.7	
Range (min, max)	3.6-22.9	

Table II: Distribution of serum 25-hydroxy Vitamin D concentration among patients of psoriasis

Serum 25-hydroxy Vitamin D level (ng/ml)	Number of patients	Percentage
Deficiency (<20)	22	55
Insufficiency (20-29.9)	13	32.5
Normal (30-100)	5	12.5
Mean±SD	20.6±7.7	
Range (min, max)	8.8-40	

Table II shows serum 25-hydroxy Vitamin D level of the study patients where more than half (55.0%) patients were in deficiency group. The mean serum 25-hydroxy vitamin D level was found 21.02±7.8 ng/ml with range from 8.8-40 ng/ml.

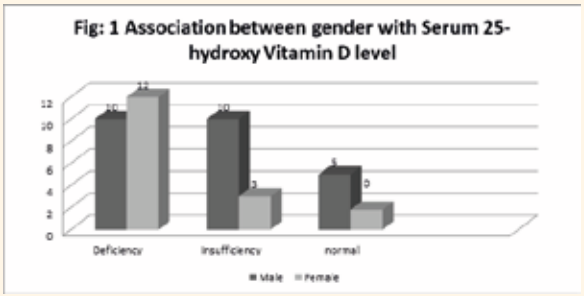

Figure 1 Shows association between genders with serum 25-hydroxy vitamin D level of the study population. It was also observed that majority of patients 12 (54.5%) out of 22 females were in deficiency group. The difference was statistically significant (p<0.05) between the groups.

Table III shows association between PASI score with serum 25-hydroxy vitamin D level of the study patients. It was observed that majority 19(86.4%) out of 22 patients were in deficiency group and 6(46.2%) out of 13 patients were in insufficiency group and 2(40.0%) out of 5 were in normal group respectively when PASI score is >10. The difference was statistically significant (p<0.05).

Table III: Association between PASI score with serum 25-hydroxy vitamin D level (n=40)

PASI score	Serum 25-hydroxy Vitamin D level (ng/ml)						p value
	Deficiency (n=22)		Insufficiency (n=13)		Normal (n=5)		
	N	%	N	%	N	%	
≤10 (Mild)	3	13.6	7	53.8	3	60	0.018[s]
>10 (moderate to severe)	19	86.4	6	46.2	2	40	

s= significant
p-value reached from Fisher's exact test

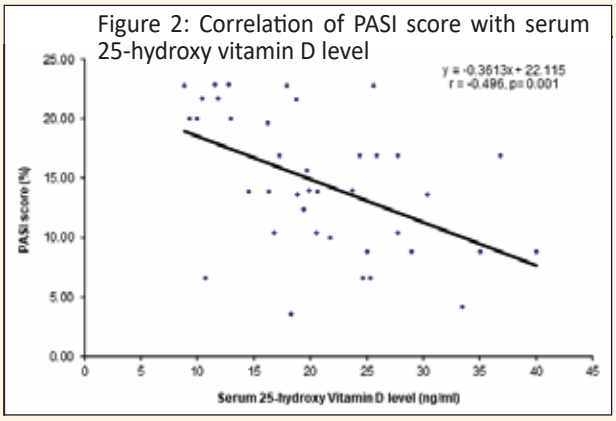

Figure 2 shows Scatter diagram shows negative correlation (r= -0.496; p=0.001) between Serum 25-hydroxy vitamin D level (ng/ml) and PASI score.

Discussion:

Psoriasis is a chronic inflammatory disease involving the innate and acquired immunologic systems as well as keratinocyte differentiation.[9] Vitamin D as a hormone, performs different functions besides being involved in calcium-phosphorus metabolism. Recent studies have emphasized on the association of several dermatological conditions, such as atopic dermatitis and psoriasis with low vitamin D blood levels.[10] Also, Vitamin D has been shown to regulate keratinocyte differentiation, promotes keratinocyte growth and development, protecting them from early apoptosis.[11] Vitamin D also regulates the expression of K1 and K10 in the stratum spinosum, which are found to alter in psoriatic skin.[12] Vitamin D normalizes the altered distribution of integrins such as CD26 and ICAM-1 at the dermoepidermal junction of psoriatic skin.[13] This cross sectional study was carried out with the aim to measure serum 25-hydroxy vitamin D in psoriatic patients and to find out its relationship with disease activity. Here more than half (55.0%) of the patients had deficient & 32.5% had insufficient serum 25-hydroxy vitamin D level. Srirama et al. (2017)[14] found the mean vitamin D level in psoriatic patients was 18.24±4.55 ng/ml. Zuchi et al. (2015)[15] also found the mean vitamin D level was 23.55±7.60 ng/ml in subjects with psoriasis. This deficiency can be explained by a fact that patients with psoriasis, except those undergoing phototherapy, tend to keep their affected areas covered. This attitude, prolonged during the years, could lead to decreased UV exposure with consequent reduced vitamin D levels. Therefore, those affected by long-time psoriasis, and not undergoing phototherapy, could possibly be more prone to have reduced level of vitamin D.[16]

Also, it can develop from frequent use of drugs that interfere with 25(OH)D metabolism (such as gluco-corticoids and immunosuppressive agents), or from low intake of 25-hydroxy vitamin D.[17] In this study statistically significant difference was observed between genders in serum 25-hydroxy vitamin D level of the study population. Visser et al.(2019) found that significantly more females experienced suboptimal vitamin D levels than males (18 vs. 5%; $p < 0.01$).[18] Al-Horani et al. (2016) found that significant differences ($P < 0.050$) in vitamin D levels were detected between the total male subjects (25.82 ± 8.33 ng/mL) and the total female subjects (21.95 ± 6.39 ng/mL).[19] The present study output may be explained by the contributing factors: reduced intake of vitamin D rich food due to lack of awareness among female in Bangladesh, along with lack of sun exposure, use of sunscreen due to cosmetic reason and a good number of female population usually cover their body for religious purpose.

In this study majority (84.6%) of those having deficiency of vitamin D and 46.2% having insufficiency of vitamin D had moderate to severe psoriasis ($p < 0.05$). Here there was a negative association between vitamin D levels and severity of psoriasis (table III). This finding can be partially explained by alterations in isoenzymes that affect the synthesis of vitamin D in psoriatic patients.[20] Here D receptor polymorphisms in patients with psoriasis may be responsible[20]. Deficient 25(OH)D levels in psoriatic patients may also be secondary to an inflammatory environment. This is consistent with the findings of Bergler-Czop et al (2016), Pavlov et al. (2016), and Ricceri et al (2013) who found an inverse relationship between the severity of vitamin D deficiency and PASI.[10, 21-22] But findings of some previous studies oppose the current study where no link was proved between vitamin D and PASI score. As the sample size was small, the findings derived from study cannot be generalized to reference population and the data should be interpreted with utmost caution. The study population was selected from single tertiary center in Dhaka city, so that the results of the study may not reflect the exact picture of the country. Also dietary factors were not considered.

Limitations

Sample size of the study is small.

Conclusion:

Psoriatic patients fall in high risk group for vitamin D deficiency, therefore it is reasonable to screen vitamin D level in patients with psoriasis and replenish the deficiency. Serum 25-hydroxy vitamin D level may serve as a biological marker of psoriatic disease activity and use of vitamin D has great potential in clearing psoriatic skin lesions.

Conflict of interest

No conflict of interest

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