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Assessment of Vitamin D level in Patients with Psoriasis and it's Correlation with Disease Severity

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Abstract
Psoriasis is a chronic, disfiguring, proliferative and inflammatory ailment of skin characterized by keratinocyte hyper-proliferation, abnormal keratinocyte differentiation and immune-cell infiltration into the epidermis and dermis. The ailment is extremely inconstant in duration and spell of flares. Vitamin D is a fat soluble steroid hormone. 25-hyroxy vitamin D is the most stable form with a half-life of 2-3 weeks, hence reliable medical indicator of vitamin D status. Vitamin D has pleotropic functions. Various studies have reported the involvement of vitamin D in the pathogenesis of different skin diseases, including Psoriasis. Lesions begin as erythematous papules that gradually enlarge into rich red (also referred to as salmon pink) plaques. The shape of plaque and the amount of scaling are variable, but most lesions are covered by silvery white scaling. This case-control study included Ninety outpatients. Fifty-five patients with psoriasis were selected consecutively from the dermatology outpatient department. Thirty-five age- and sex-matched control subjects were selected among healthy volunteers who were the attendants of patients other than psoriasis. The diagnosis of plaque psoriasis was made clinically. Inclusion criteria for patients were age between 18 to 65 years, not treated with oral and topical steroids, immunosuppressant and vitamin D supplements, not undergoing current phototherapy and absence of chronic inflammatory diseases like systemic lupus erythematosus, multiple sclerosis, inflammatory disease and malignancy. For control subjects, all inclusion criteria were the same as for cases except for the absence of psoriasis. The mean ages of the both groups were 42.2±5.4 and 40.7±3.6 years respectively and their difference in means was not statistically significant (P>0.05). The two groups were therefore comparable. The mean BMI of both groups were 23.1±2.9 and 23.5±2.8 respectively. The difference between the means was also not statistically significant. (P>0.05). A statically significant difference (P<0.05) was observed when the mean vitamin-D level of the cases (17.8±8.8) and controls (20.9±12.4) were compared. Eighty one percent of the cases and 71.4% of the control subjects had vitamin-D deficiency. Six percentages (2 cases) of psoriasis cases had sufficient level of serum vitamin D, whereas the majority 81.8% (45 cases) had deficient vitamin-D levels. About 14.5% (8 cases) had insufficient vitamin-D values. Mild, moderate and severe PASI groups had the following mean serum vitamin D levels, 31.2±7.1, 20.5±7.2 and 12.3±3.9 respectively and a statistically significant difference was observed between them (P<0.001). The study found a signicant relationship between vitamin D and psoriasis.

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Key Words
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INTRODUCTION

Psoriasis is a chronic, disfiguring, proliferative and inflammatory ailment of skin characterized by keratinocyte hyper-proliferation, abnormal keratinocyte differentiation and immune-cell infiltration into the epidermis and dermis[1]. The most typical abrasion involves red, crusty, tightly demarcated, indurated plaques, existing mainly over scalp and extensor surfaces. The ailment is extremely inconstant in duration and spell of flares[2]. Disease presents with a bimodal distribution of age at onset, with a peak between 15 and 20 years and another peak between 55 and 60 years. Psoriasis is associated with Psoriatic Paronychia and Psoriatic Arthritis[3]. There are several psoriasis phenotypes[4]. The most common clinical variant effecting nearly 85-90% of all patients is Psoriasis Vulgaris, recognized by elevated, distinct, erythematous lesions with silvery scale, mostly effecting scalp, knees, sacral region and elbows[5]. Overall prevalence of Psoriasis ranges from 0·1% in east Asia to 1·5% in western Europe, highest being in high-income countries[6]. Prevalence and incidence is lower in children compared to adults and equal across both genders[7].

Vitamin D is a fat-soluble steroid hormone. 25-hyroxy vitamin D is the most stable form with a half-life of 2-3 weeks, hence reliable medical indicator of vitamin D status[8]. Vitamin D has pleotropic functions[9]. Vitamin D inhibits keratinocytes proliferation and induces their differentiation. Thus, these two important findings of vitamin D in keratinocytes have led to the discovery of the role of vitamin D in the pathogenesis of psoriasis, ie, a decrease in vitamin D causes an increase in proliferation of keratinocytes and cutaneous inflammation. [10] Vitamin D regulates the synthesis and release of human beta-defensin 2 (HBD2), antimicrobial peptides and cathelicidin which take part in the etiopathogenesis of psoriasis[11]. Various studies have reported the involvement of vitamin D in the pathogenesis of different skin diseases, including Psoriasis. Lesions begin as erythematous papules that gradually enlarge into rich red (also referred to as salmon pink) plaques. The shape of plaque and the amount of scaling are variable, but most lesions are covered by silvery white scaling[12].

In this context, due to uncertain mechanisms, the intricate relationship between vitamin D levels and chronic autoimmune or inflammatory diseases such as Psoriasis becomes obvious. So, this case-control study was designed to determine the serum 25-hydroxy vitamin D levels and its association, if any, with various sociodemographic and clinicopathological parameters of patients with psoriasis.

MATERIALS AND METHODS

This case-control study included Ninety outpatients. Fifty-five patients with psoriasis were selected consecutively from the dermatology outpatient department. Thirty-five age-and sex-matched control subjects were selected among healthy volunteers who were the attendants of patients other than psoriasis. All patients were enrolled between January and December 2023 and were from different parts of City.

Inclusion criteria for patients were age between 18 to 65 years either gender clinical diagnosis of Psoriasis. For control subjects, all inclusion criteria were the same as for cases except for the absence of psoriasis. Full written informed consent was obtained from all patients and control subjects.

Exclusion Criteria: As liver disease, kidney disease, autoimmune diseases, inflammatory bowel disease, malabsorption syndromes, malignancy, pregnancy or any acute febrile illness have an effect on total vitamin D levels, the cases as well as controls having those conditions were excluded from the study. Patients on vitamin D supplements and systemic therapy like methotrexate, cyclosporine, were not allowed to participate. In addition, psoriasis patients on biologics were excluded from the study.

Clinical and Laboratory Parameters

Details of age, sex, sun exposure per day, history of physical exercise, history of smoking, history of alcohol intake and associated disease were recorded for both patients and control subjects. Details of the duration of psoriasis, age at onset and positive family history were recorded. The severity of psoriasis was assessed according to the PASI. Fitz Patricks skin type was assessed. The weight, height and waist circumference were measured. Body mass index (BMI) was calculated. The blood pressure of the patient was taken after 5 minutes of rest and the average of two readings was recorded. Five milliliters of blood were drawn and fasting blood sugar (FBS), triglycerides (TAG) and high-density lipoproteins (HDL) were analyzed. Serum 25(OH) D was assessed by chemiluminescent immunoassay in the biochemistry lab of our hospital and classified according to severity.

Statistical Analysis: Data were entered in Microsoft Excel 2010 and were further analyzed in SPSS version 26. For epidemiological results, graphical and tabular presentations were done. Continuous variables were expressed as the mean (±SD) or as median whereas categorical variables were expressed as number (%). The normality of continuous variables was analyzed by

Table 1: Comparison of psoriasis and control subjects according to their age and BMI.

Variables	Psoriasis n=55		Control n=35		p-value
	Mean	SD	Mean	SD	
Age	42.2	5.4	40.7	3.6	P=0.340
BMI	23.1	2.9	23.5	2.8	P=0.158

Table 2: Comparison of categorical variables like sex, occupation, types of psoriasis.

Variables	Components	Psoriasis n=55		Control n=35		p-value
		No	%	No	%	
Sex	Male	24	43.6	15	42.9	P=0.940
	Female	31	56.4	20	57.1	
Occupation	Ministerial	6	10.9	7	20.0	P=0.510
	Drivers	7	12.7	5	14.3	
	Housewife	21	38.2	8	22.9	
	Professional	11	20.0	6	17.1	
	Others	10	18.2	9	25.7	
Types of psoriasis	Palmoplantar	13	23.6	0	0.0	Nil
	Plaque	25	45.4	0	0.0	
	Scalp psoriasis	9	16.4	0	0.0	
	Erythrodermic psoriasis	4	7.3	0	0.0	
	Guttate psoriasis	4	7.3	0	0.0	

Table 3: Comparison of serum vitamin D between the control and psoriasis subjects.

Variable	Psoriasis		Control		p-value
	Mean	SD	Mean	SD	
Vit.D	17.8	8.8	20.9	12.4	P=0.034

A statically significant difference (P<0.05) was observed when the mean vitamin-D level of the cases (17.8±8.8) and controls (20.9±12.4) were compared. (Table 3)

Table 4 Vitamin D deficiency prevalence in both groups.

Groups	No of cases Vit-D deficiency (<20ng/ml)	Prevalence (%)
Psoriasis	45	81.8
Control	25	71.4

Eighty one percent of the cases and 71.4% of the control subjects had vitamin-D deficiency. (Table 4)

Table 5: Distribution of cases according to their serum vitamin D level.

Serum vit D level (ng/ml)	PASI–Mild	PASI-Moderate	PASI-Severe	Total	%
>30 (normal)	1	1	0	2	3.7
20 to 30 (insufficiency)	2	6	0	8	14.5
<20 (deficiency)	2	19	24	45	81.8
Total	5	26	24	55	100.0

Table 6: Comparison of PASI with serum vitamin D of psoriasis subjects.

PASI groups	N	Mean serum Vitamin-D	SD	Sig	Correlation(r)	r2
Mild (<3)	4	31.2	7.1	P<0.001	-0.754	0.520
Moderate (3to10)	20	20.5	7.2			
Severe (>10)	21	12.3	3.9			

using a Kolmogorov-Smirnov test. To compare the mean values of quantitative variables between the psoriasis patients and healthy controls, Student's t-test was used. The qualitative variables were analyzed by Chi-squared test or Fisher's exact test when one cell had an expected count of less than 5. A multi variable logistic regression analysis was done to measure the association between psoriasis and vitamin D insufficiency (<30ng/mL). Odds ratios (ORs) were determined by the Wald Chi-squared test and predictors with P<0.20 were assessed for multi variate analysis. P<0.05 was considered statistically significant.

RESULTS AND DISCUSSIONS

In Table 1 the variables of age and BMI were compared between the control and cases. The mean ages of the both groups were 42.2±5.4 and 40.7±3.6 years respectively and their difference in means was not statistically significant (P>0.05). The two groups were therefore comparable. The mean BMI of both groups were 23.1±2.9 and 23.5±2.8 respectively. The difference between the means was also not statistically significant. (P>0.05). Statistically significant difference was not observed in sex and occupation of the both groups (P>0.05) and hence they were comparable (Table 2).

Most common type of psoriasis observed was chronic plaque psoriasis shown in Table 2. We have observed Psoriasis case with a wide range of PASI scores from 2-48.

Six percentages (2 cases) of psoriasis cases had sufficient level of serum vitamin D, whereas the majority 81.8% (45 cases) had deficient vitamin-D levels. About 14.5% (8 cases) had insufficient vitamin-D values. (Table 5)

Few of the cases along with their PASI scores are shown in the Table 6. Mild, moderate and severe PASI groups had the following mean serum vitamin D levels, 31.2±7.1, 20.5±7.2 and 12.3±3.9 respectively and a statistically significant difference was observed between them (P<0.001). They had a statistically significant (P<0.001) correlation among them. The percentage of determination of psoriasis by vitamin D was 53.8%.

In the present study, majority of psoriasis cases belonged to the 55-65 years of age group [31.6%]. The mean age of psoriasis in cases was 42.2±5.4 years and 40.7±3.6 years in control group. This mean age is

almost same as reported by Srirama L *et al* in an Indian study[13]. In this study, majority [68 (59.6%)] of patients belonged to Urban areas may be because the study was done in urban area.

We observed 18.4% prevalence of vitamin D de ciency in our study. This nding was similar to study done in Egypt by Hesham Abd El-Moaty Zaher[14] We also observed prevalence of vitamin D insuf ciency to be 30.7% in study group. We found a signi cant association between vitamin D and cases and controls ($p<0.01$).

The mean vitamin D among cases were 17.8±8.8 ng/ml and controls were 20.9±12.4 ng/ml. This showed a highly signi cant difference of vitamin D levels between cases and controls ($p<0.000$). This result was found to be consistent when compared with the other studies done in other parts of the world.

El-Moaty Zaher[15] conducted a case control study in 40 psoriatic patient v/s 40 healthy controls which showed a signi cant difference in vitamin D levels with $p<0.000$, another comparison study consisting of 200 subjects done by Al-Mutairi *et al* found signi cant difference in vitamin D levels with $p<0.0001$[16].

There was negative correlation of disease duration with vitamin D levels ($p = 0.000$) in our study with the mean vitamin D level was 17.8±8.8 ng/ml in psoriatic patients with>10 years of disease duration. This nding was consistent with that reported in a meta-analysis[17].

Few of the cases along with their PASI scores are shown in the Table 6. Mild, moderate and severe PASI groups had the following mean serum vitamin D levels, 31.2±7.1, 20.5±7.2 and 12.3±3.9 respectively and a statistically significant difference was observed between them ($P<0.001$). They had a statistically significant ($P<0.001$) correlation among them. The percentage of determination of psoriasis by vitamin D was 53.8%. We found a signi cant correlation of mean vitamin D levels with PASI score category ($p=0.000$) which was similar to that observed by Stoyan[18].

It is now considered that psoriasis is a systemic in ammatory disease, mainly involving Th1-Th17-Th22 immune pathway. It presents as abnormal keratinocyte hyper proliferation and in ltration of in ammatory cells. Vitamin D is known to regulate at physiological level cell differentiation and proliferation, immune modulation, expression of K1 and K10 and normal distribution of integrins[19]. These suggests that vitamin D may have a role in psoriasis. The serum level of vitamin D is affected by various factors like polymorphism or de ciency of Vitamin D receptor (VDR), which is required for active vitamin D uptake and function, less dietary intake or intake of food items or drug which interfere with vitamin D synthesis and activation, adequate sun-exposure and clothing for cutaneous synthesis of vitamin D which is disturbed as psoriasis patient tend to cover their affected area. Various metabolic disorder tends to reduce the bioavailability of circulating vitamin D via accumulating it in fat cells[20,21].

CONCLUSION

To conclude, our study showed a signi cant correlation of psoriasis with vitamin D but it is still not clear to say that serum vitamin D levels interfere with psoriasis disease duration or severity. Further meta-analysis is required to understand the exact correlation.

REFERENCES

1. Dogra, S. and S. Yadav, 2010. Psoriasis in India: Prevalence and pattern. Indian J. Dermatol., Venereology, Leprology, 76: 595-601.
2. Bikle, D.D., 2012. Protective actions of vitamin D in uvb induced skin cancer. Photochemical & Photobiological Sci., 11: 1808-1816.
3. Hewison, M., M. A. Gacad., J. Lemire and J. S. Adams, 2001. 1. Vitamin D as a cytokine and hematopoetic factor. Rev.Endocr.Metab.Disord., 2: 217-227.
4. Norman, P.E. and J.T. Powell, 2005. Vitamin D, shedding light on the development of disease in peripheral arteries. Arteriosclerosis, Thrombosis, Vasc. Biol., 25: 39-46.
5. Zehnder, D., R. Bland, M.C. Williams, R.W. McNinch, A.J. Howie, P.M. Stewart and M. Hewison, 2001. Extrarenal expression of 25-hydroxyvitamin d3-1a-hydroxylase1. The J. Clin. Endocrinol. & Metab., 86: 888-894.
6. Srirama, L., 2016. Serum concentration of 25-hydroxy vitamin D in psoriatic patients in a tertiary care hospital - A case control study. IAIM 3: 97-104.
7. Zaher, H.A.E.M., M.H.M. El-Komy, R.A. Hegazy, H.A.M.E. Khashab and H.H. Ahmed, 2013. Assessment of interleukin-17 and vitamin D serum levels in psoriatic patients. J. Am. Acad. Dermatol., 69: 840-842.
8. Al-Mutairi, N., B.E. Eassa and V. Nair, 2013. Measurement of vitamin D and cathelicidin (ll-37) levels in patients of psoriasis with co-morbidities. Indian J. Dermatol., Venereology, Leprology, 79: 492-496.
9. Lee, Y.H. and G.G. Song, 2018. Association between circulating 25-hydroxyvitamin d levels and psoriasis, and correlation with disease severity: A meta-analysis. Clin. Exp. Dermatol., 43: 529-535.
10. Wilson, P.B., 2013. Serum 25-hydroxyvitamin d status in individuals with psoriasis in the general population. Endocrine, 44: 537-539.

11. Holubar, K., 2003. Psoriasis and parapsoriasis: Since 200 and 100 years, respectively. J. Eur. Acad. Dermatol. Venereology, 17: 126-127.
12. Guðjónsson, J.E., H. Valdimarsson, A. Kárason, A.A. Antonsdóttir, E.H. Rúnarsdóttir, J.R. Gulcher and K. Stefánsson, 2002. Hla-cw6-positive and HLA-cw6-negative patients with psoriasis vulgaris have distinct clinical features. J. Invest. Dermatol., 118: 362-365.
13. Griffiths, C.E.M., A.W. Armstrong, J.E. Gudjonsson and J.N.W.N. Barker, 2021. Psoriasis. The Lancet, 397: 1301-1315.
14. Lai, J.K.C., R.M. Lucas, M.S. Clements, S.L. Harrison and E. Banks, 2010. Assessing vitamin D status: Pitfalls for the unwary. Mol. Nutr. & Food Res., 54: 1062-1071.
15. Adams, J.S. and M. Hewison, 2010. Update in vitamin D. The J. Clin. Endocrinol. & Metab., 95: 471-478.
16. Mattozzi, C., G. Paolino, A.G. Richetta and S. Calvieri, 2016. Psoriasis, vitamin D and the importance of the cutaneous barrier's integrity: An update. The J. Dermatol., 43: 507-514.
17. Relhan, V., K. Goel, A. Kochhar, V. Garg and B. Wadhwa, 2015. Vitamin d and skin diseases: A review. Indian J. Dermatol., Venereology, Leprology, 81: 344-355.
18. Feldman, S., 2004. A quantitative definition of severe psoriasis for use in clinical trials. J. Dermatological Treat., 15: 27-29.
19. Berth-Jones, J., K. Grotzinger, C. Rainville, B. Pham and J. Huang et al., 2006. A study examining inter- and intrarater reliability of three scales for measuring severity of psoriasis: Psoriasis area and severity index, physician's global assessment and lattice system physician's global assessment. Br. J. Dermatol., 155: 707-713.
20. Finlay, A.Y., 2005. Current severe psoriasis and the rule of tens. Br. J. Dermatol., 152: 861-867.
21. Sacchidanand 2022. IADVL Textbook of Dermatology. In: Disorders of keratinization., Pavithran, K., M. Karunakaran, P. Aparna and S. Raghunath, (Eds.)., S. Sacchidanand editor., Bhalani Publishing House, ISBN-14: 978-9381496701, pp: 1009-1011.