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ASSOCITION BETWEEN VITAMIN D LEVEL IN ACNE AND CORRELATION WITH DISEASE SEVERITY

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Abstract

Objective: *To evaluate the relationship between serum vitamin D levels and the severity of acne vulgaris in patients compared to healthy controls.*

Study Design: *Cross-Sectional Analytical Study.*

Study Setting: *Department of Dermatology, PNS Shifa Hospital, Karachi*

Study Duration: *Feb 2024 to July, 2024.*

Methodology: *A total of 90 participants aged 18–50 years were recruited and divided into three groups: moderate acne (n=30), severe acne (n=30), and healthy controls (n=30). Patients with polycystic ovarian syndrome, pregnancy, or recent use of vitamin D or retinoid therapy were excluded. Acne severity was assessed using the Global Acne Grading System. Serum 25(OH)D levels were measured using chemiluminescent immunoassay and categorized as adequate (>20 ng/mL), insufficient (12–20 ng/mL), or deficient (<12 ng/mL). Data were analyzed using SPSS version 24, with $p<0.05$ considered significant.*

Results: *A significant inverse relationship was observed between serum vitamin D levels and acne severity. The median serum vitamin D levels were 23.54 ng/mL (IQR 4.81) in controls, 17.52 ng/mL (IQR 3.24) in moderate acne patients, and 15.47 ng/mL (IQR 2.67) in severe acne patients ($p=0.000$). No significant gender differences were observed among the groups ($p=0.669$).*

Conclusion: *Low serum vitamin D levels were significantly associated with increased severity of acne vulgaris. These findings suggest the potential role of vitamin D assessment and optimization as an adjunct in the management of moderate to severe acne.*

INTRODUCTION

Acne vulgaris is amongst the most common types of chronic inflammatory diseases of the pilosebaceous unit, which are found in about 85 percent of teenagers around the globe and continue into adulthood in more than half of subjects affected with it. [1] Even though it is widely neglected as a simple self-limiting disorder, acne may have deeply damaging physical and psychological impacts such as permanent scarring, poor self-esteem, social isolation and depression. [2, 3]

In most cases, it manifests as a mix of non-inflammatory lesions (comedones) and inflammatory lesions (papules, pustules, nodules) and is affected by genetic, hormonal, environmental, and immunological factors to a certain extent. [4]

Acne pathophysiology is complex and can be broken down into excessive production of sebum, hyperkeratinization of follicular epithelium, overgrowth of the Cut bacterium acnes, and innate

and adaptive immune reaction. [5, 6] Recent studies have extended the theme to comprehend the role of systemic factors especially that of micronutrient deficiencies in regulating these pathogenic pathways. [7] Of these, there is vitamin D, which has attracted interest because of its immunomodulatory and anti-inflammatory functions. Vitamin D is a fat-soluble hormone that is a secosteroid produced in the skin through ultraviolet B (UVB) synthesis and supplemented in the diet. It has control over a variety of cutaneous processes such as the differentiation of keratinocytes, sebocyte characteristics, and regulation of the immune system. [8] It enhances the secretion of antimicrobial peptides like cathelicidins and defensins and inhibits pro-inflammatory cytokines like tumor necrosis factor-alpha (TNF 6), and interleukin-6 (IL 6). [9] The mechanisms are of special interest in acne conditions, with inflammation and microbial dysregulation playing the key roles in disease pathogenesis.

Emerging observations are seen to indicate that the more serum vitamin D, the less the severity of acne. Abdelaziz et al. presented a study on the decreased number of acne lesions after vitamin D supplementation (the reduction was determined as significant). [10] Likewise, Iqbal et al. found a significant decline in the serum vitamin D levels of patients with moderate to severe acne as opposed to the healthy controls. [11] These findings were confirmed in a systematic review conducted by Rasti et al. who also pointed out that there was a recurrent tendency in hypovitaminosis D observed in acne patients. [12] But not every evidence is definite. Other reports fail to find a covariant correlation of significance which emphasizes the impact of confounding factors, including sun exposure, eating, body mass index (BMI) and genetic variability.

Vitamin D deficiency is particularly worrying in populations of South Asian origin because of low sun exposure, darker skin phototype, and cultural clothing patterns overwhelmingly, the burden is notably alarming among populations in South Asia because of unlimited exposure to sunlight, darker skin and the customs of dressing. [15] Since acne is highly prevalent, and vitamin D deficiency affects the whole world, it is clinically and financially important to evaluate such a relationship.

The objective of this study is to assess the relationship that exists between serum levels of vitamin D and severity of acne vulgaris. By making this connection, it may be possible to prove the incorporation of vitamin D check in the process of treating acne, providing a cost-efficient supplemental method to use in enhancing patient outcomes.

METHODOLOGY:

The specified descriptive study is cross-sectional and completed by the period of two months from February to April 2024 after the approval from the CPSP and Ethics Review Committee (Ref. No: ERC/2023/DERM/78, Dated: 24-02-2024). The present research attempted to analyze the frequency of the connection between the extent of acne and serum vitamin D levels.

The enrolment of 90 research participants and subsequent separation of 3 distinct groups, 30 severe acne, 30 moderate acne and 30 healthy controls gave a breakthrough to understanding the heart of the matter. The PASS software version 11 was used in calculating the results with 95 percent confidence interval, 80 percent power and the prevalence were taken as 84.6 percent of acne patients (the vitamin D deficient cases) and 75 percent healthy controls. The patients, who were aged 18-50 years, had moderate to severe acne vulgaris. Pregnant patients, patients with PCOS and patients who had taken vitamin D supplements, or systemic/topical retinoids one month before study participation were considered exclusion criteria.

The patients sampled were independently assessed using the global acne severity scale (GAGS) six-regional scale to estimate the face and the trunk in terms of the kind of lesions and the severity indices and a cumulative gag to determine the acne as mild/moderate/severe/ very severe. Serum 25(OH)D assay was performed after an overnight fast when blood was drawn aseptically into a venous vessel. The Chemiluminescent Immunoassay (CLIA) has analyzed the levels of vitamin D in 24 hours. The quantity of serum vitamin D was determined as sufficient (>20 ng/mL), insufficient (12-20 ng/mL) and deficiency

(<12 ng/mL). Analysis and data had been done in the IBM SPSS statistics 24. Redundancy in age, vitamin D was reported as mean SD or med and IQR as appropriate.

The remarkable factors were categorical, and such factors as sex were presented as frequency and percentage. The trend variables were attracted and compared as follows: The one-way analysis of variance (ANOVA) was used to compare the continuous variables and on the other hand, the Chi-square test was used to compare categorical variables. The p-value less than 0.05 was considered the statistically significant value

RESULTS:

The research was conducted on 90 subjects that were assigned to one of the three groups (30 with moderate acne, 30 with severe acne, and 30 control correspondent). Average age was 24.55 ± 6.21 years with moderate acne, 23.14 ± 4.32 years with severe acne, and 26.52 ± 4.84 years in control, and they differed significantly from each other (p=0.000).

Serum vitamin D levels and acne severity were found to be significantly correlated negatively. The median vitamin D concentration in the control group (23.54 ng/mL; IQR 4.81) was substantially elevated compared to the moderate acne group (17.52 ng/mL; IQR 3.24) and the severe acne group (15.47 ng/mL; IQR 2.67) (p=0.000). These data demonstrate a significant relationship and statistical link between low vitamin D levels and the prevalence of more severe acne. It shows a general relationship between being someone and the functions of natural tendency early in childhood (See also Table 1 and Figure 1) Between the three groups (by sex) there was not a significant difference (p=0.669). The mild group comprised 43.33 percent males and 56.67 percent females; the severe group consisted of 56.67% males and 43.33% females; and in the control group the males' involved 46.67 % and females 53.33 %. These findings indicate the potential future convergence with a notion that vitamin D deficiency is one of the main reasons that lead to the acne severity. The results are consistent with the therapeutic significance of the measurement of blood vitamin D as the disease of acne patients with moderate to severe manifestations

TABLE 1: DEMOGRAPHIC AND BIOCHEMICAL CHARACTERISTICS OF STUDY GROUPS

Group	Mean Age (years)	Vitamin D (ng/ml) Median	Vitamin D IQR	Male (%)	Female (%)
Moderate Acne	24.55	17.52	3.24	43.33	56.67
Severe Acne	23.14	15.47	2.67	56.67	43.33
Control	26.52	23.54	4.81	46.67	53.33

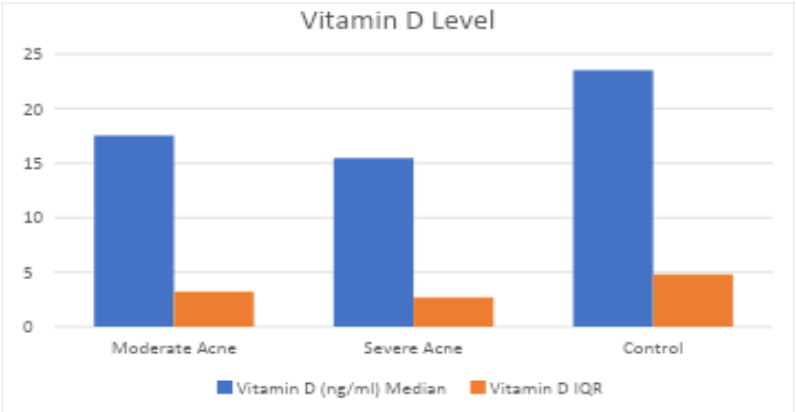

FIGURE 1: COMPARISON OF MEDIAN SERUM VITAMIN D LEVELS AMONG MODERATE ACNE, SEVERE ACNE, AND CONTROL GROUPS

DISCUSSION:

The current finding indicates a negative absolute correlation between the acne severity and the serum vitamin D levels. This is a finding consistent with other research that has been done earlier and has also been reported as attributing vitamin D as the cause in the development of acne vulgaris. Prevalent decreasing of the serum level of vitamin D did also take place outstandingly in severe cases of acne compared with the control subjects whereby their serum levels were considerably higher than the cases and this indicates the possible protective and/or regulatory effects of sufficient vitamin D status. The findings are in line with other research studies on other groups of people. Abdelaziz et al. found many vitamins D deficient acne patients and showed a strong decrease in grading of acne after supplementation [12] the patients with moderate to severe acne were found to have a significantly lower level of serum vitamin D compared to the control group (Iqbal et al.). [13] In their analysis of the literature, Rasti et al. also illustrates the tendency to gradually decline in the level of vitamin D depending on the severity of acne (Rasti et al.). [14] The occurrence of such observations would support the hypothesis that hypovitaminosis D as a factor may contribute to the development of inflammatory acne due to the development of HDIMs dysregulation. The possible mechanism is that vitamin D alleviates pro-inflammatory cytokines, IL-6 and TNF-a, and stimulates the production of antimicrobial peptides, which include cathelicidins 10,11. These biologic processes may regulate most of the core pathophysiologic elements of acne viz, suppression of follicular inflammation, suppression of sebocytic and keratinocyte differentiation. [15]

The prevalence of low vitamin D status is high in many countries across the globe and especially in areas where there are cultural limits or environmental constraints to sunlight exposure, which underpins the necessity of a special focus on screening of vitamin D in the practice of dermatology. [8, 9] Along with that, age-related sex difference in the severity of acne in our case could reflect a combination of hormonal effects and other environmental factors on vitamin D metabolism as well. [2, 4]

Various limitations instruct us to interpret our findings with a lot of caution. No cause-effect relationship can be determined by any means due to the presence of a cross-sectional study. We could not manage the body mass index (BMI) nor genetics backgrounds through the number of sun exposure hours or what was consumed. Larger multicenter studies and interventional trials involving acne patients to determine the clinical response to the treatment using vitamin D analogs are needed by screening the programs of such patients.

CONCLUSION:

The findings of this research article have shown a rather strong negative relationship between the severity of the acne vulgaris and the levels of vitamin D in the blood. The concentration of the vitamin D in the serum by the moderate-to severe acne patients was extremely low as compared to that of the controls and this proves the part played by the vitamin D deficiency in the pathology of the acne. It gives preference to the health-promising nature of periodic vitamin D level checks to the patients of inflammatory acne. Even though it does not prove the presence of cause-effect relationship, optimization of the vitamin D status, which is reached through a combination of exposure to sun and dietary or supplementary supplementation of vitamin D may potentially serve as an adjunct to acne control. Future interventional trials on the confirmation of these results are to be more ambitious.

REFERENCE:

Bhate K, Williams HC. Epidemiology of acne vulgaris. Clin Exp Dermatol. 2020;45(4):404–12.

Zaenglein AL. Acne vulgaris. N Engl J Med. 2022;386(3):157–66.

Fabbrocini G, Annunziata MC, D'Arco V, De Vita V, Lodi G, Cacciapuoti S, et al. Acne scars: Pathogenesis, classification and treatment. Dermatol Res Pract. 2020;2020:8936178.

Dreno B, Gollnick HP, Kang S, Thiboutot D, Bettoli V, Torres V, et al. Global alliance to improve outcomes in acne. J Am Acad Dermatol. 2020;82(1):157–66.

Layton AM, Eady EA, Zouboulis CC. Acne. Lancet. 2023;401(10380):737–47.
Toossi P, Azizian Z, Yavari H, Fakhim TH, Amini SH, Enamzade R. Serum 25-hydroxy vitamin D levels in patients with acne vulgaris and its association with disease severity. Clin Cases Miner Bone Metab. 2021;18(1):44–9.
Reichrath J. Vitamin D and the skin: An ancient friend, revisited. Exp Dermatol. 2021;30(5):628–34.
Charoenngam N, Holick MF. Immunologic effects of vitamin D on human health and disease. Nutrients. 2020;12(7):2097.
Alhetheli G, Elneam AIA, Alsenaid A. Vitamin D levels in patients with and without acne and its relation to acne severity: A case-control study. J Coll Physicians Surg Pak. 2020;30(8):759–65.
Thiboutot DM, Dreno B, Gollnick HP. New insights into the management of acne: An update from the Global Alliance to Improve Outcomes in Acne. J Am Acad Dermatol. 2021;84(4):1257–69.
Youssef DA, Miller CW, El-Abbassi AM, Cutchins DC, Cutchins C, Grant WB, et al. The impact of vitamin D supplementation on inflammatory acne vulgaris. J Dermatol Treat. 2022;33(4):1972–7.
Abdelaziz WM, Farahat TM, Shaheen HS, Gaber MA, Khalil NM. Effect of vitamin D supplementation on patients with acne vulgaris: An intervention study. Egypt Fam Med J. 2021;5(3):177–87.
Iqbal T, Asim SA, Bhatti S, Sajid M, Mirza R, Huma Z. Association of vitamin D with moderate to severe acne vulgaris. J Coll Physicians Surg Pak. 2023;33(5):527–30.
Rasti SD, Dewinta NR, Kamal RH, Adissadah AF, Madanny AE, Dewanti L. Correlation between serum 25-hydroxy vitamin D levels and the severity of acne vulgaris: A systematic review. Indian J Dermatol. 2022;67(1):31–6.
Naheed A, Naveed T. Exploring the influence of vitamin D in the management of acne vulgaris: A pilot study. J Rawalpindi Med Coll. 2023;27(2):112–6.