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# The Relation between Vitamin D3 Level and Acne Severity in Iraqi Patients; A Cross Sectional Study

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**Abstract: Background:** Acne vulgaris (AV) is a chronic inflammatory disease of the pilosebaceous apparatus. Vitamin D controls the immune system and the proliferation and differentiation of sebocytes and keratinocytes. In addition, it has antioxidant and anti-comedogenic properties. Serum Vitamin D levels were previously estimated in AV patients with conflicting results. **Objective:** The aim of this study is to evaluate the serum Vitamin D levels among Iraqi patients with acne vulgaris and to assess the association between vitamin D and disease severity. **Method and material:** This cross_sectional study was carried out in the Department of Dermatology and Venereology at Al-Yarmuk teaching hospital during period of October 2021 to March 2022**.**Vitamin D levels were estimated in 69 iraqi acne patients using the enzyme-linked immunosorbemt assay technique. **Results:** There was a statistically significant low vitamin D levels in Iraqi's acne patients (P - value = 0.000). Vitamin D levels were lower in moderate and severe cases than mild cases. **Conclusions:** Vitamin D may have a role in the pathogenesis of acne vulgaris. Further studies on a larger number of patients are recommended to confirm the validity of our results and to provide a clearer understanding of the correlation between vitamin D and acne severity.

**Keywords.** Vitamin D3, Acne Severity, Iraqi Patients**.**

## INTRODUCTION

Acne is a chronic and inflammatory disease that affects the pilosebaceous unit of the skin. It is commonly believed that increased secretion of sebum, abnormal follicular keratinization, microbial colonization, and inflammation play roles in the pathogenicity of acnes. [Layton, A. M, 2006] There are many factors which regulate sebaceous glands function including androgen stimulation, Vitamin D, and insulin-like growth factor one. Sebaceous follicles that have micro-comedones provide an anaerobic and lipid-rich environment which is ideal for *Propionibacterium acnes* activity. [El-Hamd, M.A. *et al.,* 2006] *P.acnes* triggers cytokine activation by toll-like receptors, indicating the role of innate immunity in acne development. [Layton, A. *et al.,* 2016] The synthesis of Vitamin D in the dermis from cholesterol depends on sun exposure, especially ultraviolet B (UVB) radiation. [Holick, M.F, 2009; Zuchi, M.F. *et al.,* 2015] The best marker of Vitamin D status is plasma 25-hydroxy Vitamin D (25 (OH) D) level.[Zuchi, M.F. *et al.,* 2005] In the skin, Vitamin D acts primarily on the Vitamin D receptors (VDRs) to regulate keratinocyte and sebocyte growth, differentiation, and functions. It also influences the immune functions of dendritic cells and T-lymphocytes. [Lehmann, B, 2009; Schwalfenberg, G.K, 2011] Vitamin D is associated with systemic inflammatory diseases such as rheumatoid arthritis, systemic lupus erythematosus, and inflammatory bowel disease. [Arnson, Y. *et al.,* 2007; Kostoglou-Athanassiou, I. *et al.,* 2012] In dermatological diseases, Vitamin D plays an important role as an immune modulator in atopic dermatitis, psoriasis, and alopecia. [Cheng, H.M. *et al.,* 2014; Aksu Cerman, A. *et al.,* 2014] Vitamin D has anticomedogenic and antioxidant effect. Hence, a Vitamin D deficiency may facilitate the pathogenesis of acne. [Lee, W.J. *et al.,* 2013] Vitamin D has been found to modulate lipid and cytokine production which suggest its possible role in acne pathophysiology. [Agak, G.W. *et al.,* 2014] This study determines vitamin D levels in Iraqi patients diagnosed with any degree of acne and to assess the association between vitamin D and disease severity.

## METHOD AND MATERIAL

This cross-sectional study was carried out in the Department of Dermatology and Venereology at Al-Yarmuk teaching hospital during period of October 2021 to March 2022**.** The study sample included 69 acne patients diagnosed clinically. Any patient on treatment with Vitamin D supplement, has a systemic diseases, dermatological diseases (other variants than acne), pregnant & lactating women, has haematological or endocrine disorders and patients receiving drugs such as diuretics were excluded from the study. All participants were subjected to thorough history taking, complete general examination and full dermatological examination including skin, hair, nail, and oral mucosa. Assessment of acne severity in patients using the Global Acne Grading System





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(GAGS) [Stewart, T.J. *et al.*, 2018] was done. This system divides the face, chest, and back into six areas (forehead, each cheek, nose, chin and chest, and back) and assigns a factor to each area on the basis of size. The factor for nose and chin equals 1 and for forehead, right cheek and left cheek equals 2 and for chest, shoulder and back equals 3. Each type of lesion is given a value depending on severity: no lesions = 0, comedones = 1, papules = 2, pustules = 3, and nodules = 4. The score for each area (local score) is calculated using the formula:

Local score = Factor × Grade (0–4).

Acne severity was graded using the global score. A score of 1–18 is considered mild; 19–30, moderate, 31–38, severe and ≥39 very severe. Blood samples gathered from patients and vitamin D3 levels were recorded. The statistical analysis of the data was performed using the SPSS 23 software package (SPSS, IL, USA). The researcher used the Shapiro–Wilk test to examine the fitness of the variables for the normal distribution. The researcher also used Wilcoxon test in dependent groups and Mann-Whitney U test in the independent groups for the statistical analysis of the variables with an abnormal distribution. When P was less than 0.05, the result was considered statistically significant.

## RESULTS

69 patients with acne included in this study, 44(63.8%) were females and 25 (36.2%) were males, their age ranged 11- 49 years. Mean Vitamin D3 level was12.07 ± 5.04.

**Table 1:** Age group distribution

| Age | Patient no. (% ) |
|---|---|
| 11-20 | 25 (36.2%) |
| 21-30 | 23 (33.3%) |
| 31-40 | 13 (18.8%) |
| More than 40 | 8 (11.6%) |

**Table 2:** Number of patients according to Acne Severity

| Acne Severity | Patient no. (% ) |
|---|---|
| mild | 24 (34.7%) |
| moderate | 31 (44.9%) |
| severe | 14 (20.2%) |

**Table 3:** Number of patients according to vitamin D deficiency in ng /ml

| Vitamin D deficiency (ng /ml) | Number of patients |
|---|---|
| 0-10 | 23 (33.3%) |
| 10-20 | 42 (60.9%) |
| 20-30 | 4 (5.8%) |

**Table 4:** Level of vitamin D3 in mild cases of acne

| Vitamin D3 level (ng /ml) | Patient no. (% ) |
|---|---|
| 0-10 | 9 (37.5%) |
| 11-20 | 13 (54.2%) |
| 21-30 | 2 (8.9%) |

**Table 5:** Level of vitamin D3 in moderate cases of acne

| Vitamin D3 level (ng /ml) | Patient n (% ) |
|---|---|
| 0-10 | 17 (54.8%) |
| 11-20 | 12 (38.7%) |
| 21-30 | 2 (6.5%) |

**Table 6:** Level of vitamin D3 in severe cases of acne

| Vitamin D3 level (ng /ml) | Patient no. (% ) |
|---|---|
| 0-10 | 11 (78.5%) |
| 11-20 | 3 (21.4%) |
| 21-30 | 0 (0%) |



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## DISCUSSION

Acne vulgaris is a skin disease that mainly affects adolescents, has a multifactorial etiology, and involves the formation of papules, pustules, comedones, and cysts on the skin. It is also a chronic disease that has social and psychological effects (Bhambri, S. *et al.,* 2009).Vitamin D is one of the vitamins that dissolve in oil. It is asterol with functions similar to those of hormones. Most of the vitamin D in the human body (90%–95%) is synthesized in the skin, and a very small part of it is derived from dietary intake (Nicholson, I. *et al.*, 2012). In this study, there was a significant low serum levels of Vitamin D in Iraqi patients with acne, vitamin D was found to be inversely related to acne severity suggesting a significant correlation between Vitamin D level and acne severity (p value =0.000). This is in agreement with a previous study which found a decrease in the levels of Vitamin D in patients with nodulocystic acne than that in the control group (Yildizgören, M.T. *et al.*, 2014). Furthermore, Lim, *et al*., 2016, found a significant lower Vitamin D level in patients with acne than normal subjects. Vitamin D levels were inversely correlated with acne severity, especially in patients with more inflammatory lesions. Vitamin D regulates the immune system and the proliferation and differentiation of keratinocytes and sebocytes. Moreover, it has antioxidant and anticomedogenic properties. Hence, a Vitamin D deficiency may contribute in the pathogenesis (van Etten, E. *et al.*, 2005); El-Hamd, *et al*., (2019) reported significantly low serum levels of 25(OH) D in acne Egyptian patients compared with controls. In addition, Stewart and Bazergy (Stewart, T.J. *et al.*, 2018) observed significantly decreased 25(OH) D serum levels in patients' group than normal controls. Only few studies are available in the literature examining the correlation between vitamin D and acne. The results of these studies are conflicting. The difference between our study and the other authors may be related to differences in study design or due to the presence of other circumstances which may affect the severity of acne or Vitamin D status, including genetic factors, seasonal variations, dietary intake, Vitamin D supplementation, the length of exposure to sunlight that varies in each individual or other socioeconomic or environmental factors (Puspita, F. *et al.*, 2020).

## CONCLUSION

The present study reveals that vitamin D level was found to be inversely related to acne severity, suggesting that there is a connection between low Vitamin D and acne hence a possible role for Vitamin D in acne pathogenesis . The main limitation of this study is the small number of patients which may affect the statistical significance of the results. so, we recommend further studies on larger number of patients to confirm the validity and reliability of our results and to provide a clearer understanding of the correlation between vitamin D and acne.

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