SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 9.
Issue: 2
Page N. 97-102
Year: 2025

Case Study www.wjahr.com

ASSESSMENT OF VITAMIN D3 LEVEL AMONG PATIENTS WITH ACNE: A CASE CONTROL COMPARATIVE STUDY

[1]*Gassaq Khalil Ismail, [2]Besma Mohamed Ali, [3]Dooha Khalil I. Alhamdi and [4]Khalil I. Alhamdi

[1]Basrah Health Directorate, Basrah, Iraq.
[2]Gasi Al-Hariri Hospital for Surgical Specialties, Medical City, Baghdad, Iraq.
[3,4]College of Medicine, University of Basrah, Basrah, Iraq.

Received date: 11 December 2024 **Revised date:** 01 December 2025 **Published date:** 21 January 2025

***Corresponding Author: Gassaq Khalil Ismail**
Basrah Health Directorate, Basrah, Iraq.

ABSTRACT

Background: Acne vulgaris is a common inflammatory disorder of the pilosebaceous unit. It usually affects adolescent and young adult. Vitamin D is thought to play a role in the differentiation and proliferation of the skin, in addition it's reported to have antimicrobial effects and it acts as an immune-modulator that is why its deficiency may cause certain skin and hair disorders. The correlation is not well established, although many research works reported that vitamin D deficiency among patients with acne vulgaris is inversely related to the severity of acne. So that this study is designed to investigate the level of vitamin D among a sample of Iraqi patients with acne vulgaris in comparison to normal individuals and its relation to the severity of acne. **Patients and methods:** A case- control clinical investigational study that was conducted in Basra teaching hospital and two private dermatological clinics, where a total of (51) patients with acne vulgaris and (58) normal individuals were enrolled in this study. After taking hstory and clinical examination, serum vitamin D3 level was estimated for all participants. **Results:** a total of 108 participants (51) patients and (58) normal individuals where enrolled in this study. (84.3%) were females. The mean of vitamin D3 level is significantly lower among patients (14.99 ± 11.72) compared to the normal group (27.24 ± 12.30). patients with nodulocystic acne had lower mean of serum vitamin D3 level (11.89), in contrast with those presenting with papulopastular acne where the mean level of vitamin D3 was (16.41). although, the difference was not statistically significant. **Conclusions:** Vitamin D is significantly lower among patients with acne in comparison with control group. Vitamin D deficiency is more among patients with severe nodulocystic acne in comparison with papulopustular type although, the difference is not statically significant.

KEYWORDS: It usually affects adolescent and young adult.

INTRODUCTION

Acne vulgaris is a common inflammatory disorder of the pilosebaceous unit. It is of multifactorial etiology. Its pathogenesis may involve genetic, hormonal, psychological, environmental, and dietary factors.[1] It usually affects adolescents and young adults; both sexes are affected, where the male-to-female ratio is said to be around 1:1.8, although the disease starts earlier in females.[2] Acne vulgaris can show up in different ways in the clinic, such as comedones, papules and pustules, nodules and cysts, and different levels of scarring severity.[1,3] We use a variety of treatment modalities, including topical and systemic treatment. Antibiotics, retinoids, topical keratolytic agents, and anti-androgen drugs all have different success rates when it comes to healing scars, erythema, and hyperpigmentation caused by acne.[1] Scientists have found two types of vitamin D in nature. Vitamin D2 (ergocalciferol) is made photochemically in plants, and vitamin D3 (cholecalciferol) is made in the skin after being exposed to sunlight, especially ultraviolet B radiation. Calcitriol (1,25(OH)D), which is the active form of vitamin D, works with the vitamin D receptor (VDR) to do its job in the body.[4] Vitamin D is thought to play a role in the differentiation and proliferation of the skin; in addition, it's reported to have antimicrobial effects, and it acts as an immune modulator; that is why its deficiency may cause certain skin and hair disorders.[5] The correlation is not well established, although many research works reported that vitamin D deficiency among patients with acne vulgaris is inversely related to the severity of acne. So this study is designed to investigate the level of vitamin D among a sample of Iraqi patients with acne

vulgaris in comparison to normal individuals and its relation to the severity of acne.

METHOD

Basra Teaching Hospital and two private dermatological clinics conducted a case-control clinical investigational study from January 2024 to July 1, 2024. A total of 51 people with acne vulgaris and 58 healthy people were enrolled in the study after it was approved by the Arab Board of Medical Specialization with the number 01809. All participants were interviewed, and a detailed history was taken regarding the age, onset of acne, occupation, exposure to sunlight, detailed dietary intake, and treatment given, including vitamin D and any associated systemic diseases. We also took the history of menstrual cycle, hirsutism, and diffuse hair loss from the female patients.

Then, all of the patients were fully checked out, including looking at the types of acne lesions and where they were located, as well as checking to see if there were any coarse terminal hairs on the face or body and the scalp hair. Vitamin D3 levels were estimated for patients. and a control group. Statistical analysis conducted using SPSS 22, employing frequency and percentage for categorical data, and mean, median, and standard deviation for continuous data. The chi-square test is employed to evaluate the link between categorical variables. The T-test is employed to assess differences between the mean and median of continuous data. A P-value less than or equal to 0.05 is considered significant.

RESULTS

As show in table 1. **Gender**: Females had a higher prevalence of acne vulgaris (84.3%) compared to males (15.7%), but the difference was not statistically significant (**P = 0.4**).

Age Groups: Acne was most common in the 20–29 age group (51.0%) and less prevalent in individuals ≥30 years (17.6%). There was a significant association between age group and acne vulgaris (**P = 0.04**).

Occupation: Students (S) showed higher prevalence of acne (51.0%), while house wives (HW) had (29.4%) prevalence compared to employers (19.6%). The association between occupation and acne vulgaris reaching significance (**P = 0.05**).

Age of Onset: All cases of acne began either below 20 years (60.8%) or at 20 years and older (39.2%), with a highly significant association (**P = 0.0001**).

Marital State: No significant difference in acne prevalence between married (31.4%) and single individuals (68.6%) (**P = 0.8**). All patients in both group have niether chronic disease previously, nor having chronic drugs use and no one of included females was pregnant (female's patients).

Table 1: Association between (gender, age group, occupation, age of onset, marital state) and acne vulgaris.

	Group		P-value
Gender	**Normal**	**Acne V.**	
Female	44 (77.2%)	43 (84.3%)	0.4
Male	13 (22.8%)	8 (15.7%)	
Age groups	**Normal**	**Acne V.**	**P-value**
11-19	23 (40.4%)	16 (31.4%)	**0.04**
20-29	16 (28.1%)	26 (51.0%)	
≥30	18 (31.6%)	9 (17.6%)	
Occupation	**Normal**	**Acne V.**	**P-value**
Employer	19 (33.3%)	10 (19.6%)	**0.05**
HW	8 (14.0%)	15 (29.4%)	
S	30 (52.6%)	26 (51.0%)	
Age of onset	**Normal**	**Acne V.**	**P-value**
No	57 (100.0%)	0 (0.0%)	**0.0001**
<20	0 (0.0%)	31 (60.8%)	
≥20	0 (0.0%)	20 (39.2%)	
Marital state	**Normal**	**Acne V.**	**P-value**
M	19 (33.3%)	16 (31.4%)	0.8
S	38 (66.7%)	35 68.6%)	

As show in table 2. **Types of Acne**: a papulo-pustular acne was present in 68.6% of cases, while nodulocytic type was present in 16 (31.4) of cases. There was no patients with comedonal acne among included patients.

Hirsutism: Hirsutism was observed in 29.4% of patients with acne vulgaris, compared to none in the normal group. The association between hirsutism and acne was highly significant (**P = 0.0001**).

Menses Regularity: The menses was regular in (56.9%) of acne group while the remaining (43.1%) of patients had irregular. In addition, the menses in the control group

was regular in 100%. This association was highly significant (**P = 0.0001**).

Androgenetic Alopecia: Androgenetic alopecia was observed in 25.5% of patients with acne, with no cases in the normal group. This association was highly significant (**P = 0.0001**).

Table 2: association between (Types of acne, Hirsutism, Menses regularity, Androgenetic alopecia) and acne vulgaris.

	Group		P-value
Types of acne	**Normal**	**Acne V.**	
Nodulocytic	57 (100.0%)	16 (31.4%)	**0.0001**
Papulopostular	0 (0.0%)	35 (68.6%)	
Hirsutism	**Normal**	**Acne V.**	**P-value**
N	57 (100.0%)	36 (70.6%)	**0.0001**
Y	0 (0.0%)	15 (29.4%)	
Menses regularity	**Normal**	**Acne V.**	**P-value**
IR	0 (0.0%)	22 (43.1%)	**0.0001**
R	57 (100.0%)	29 (56.9%)	
Androgenetic alopecia	**Normal**	**Acne V.**	**P-value**
DHL	0 (0.0%)	13 (25.5%)	**0.0001**
N	57 (100.0%)	38 74.5%)	

Proper Sun Exposure: A slightly higher percentage of patients with acne vulgaris (72.5%) reported that they had no proper sun exposure compared to normal individuals (59.6%). This difference was not statistically significant (**P = 0.2**).

Use of Treatment for Acne: Among included patients with acne vulgaris, 92.2% did not use any treatment for acne, while 7.8% used treatment. This association was significant (**P = 0.04**).

Use of Vitamin D: A higher percentage of patients with acne vulgaris (13.7%) reported using vitamin D supplements compared to the normal group (7.0%), but the difference was not statistically significant (**P = 0.3**) as seen in **Table 3.**

Table 3: association between (Proper Sun Exposure, Use of Treatment for Acne, Use of Vitamin D) and acne vulgaris.

	Group		P-value
Proper Sun Exposure	**Normal**	**Acne V.**	
N	34 (59.6%)	37 (72.5%)	0.2
Y	23 (40.4%)	14 (27.5%)	
Use of Treatment for Acne	**Normal**	**Acne V.**	**P-value**
N	57 (100.0%)	47 (92.2%)	**0.04**
Y	0 (0.0%)	4 (7.8%)	
Use of Vitamin D	**Normal**	**Acne V.**	**P-value**
N	53 (93.0%)	44 (86.3%)	0.3
Y	4 (7.0%)	7 (13.7%)	

Dairy Products: Similar proportions of patients with acne vulgaris (60.8%) and the normal group (56.1%) consumed dairy products. The difference was not statistically significant (**P = 0.7**).

Egg Consumption: patients with acne vulgaris showed a significantly higher consumption of eggs (78.4%) compared to the normal group (54.4%). This association was statistically significant (**P = 0.014**).

Seafood Consumption: Seafood consumption was nearly identical in both groups, with 49.0% of patients with acne vulgaris and 49.1% of the normal group consuming seafood. No significant association was observed (**P = 1.000**).

Green Dark Vegetables: Consumption of green dark vegetables was similar between the acne vulgaris group (51.0%) and the normal group (49.1%). No significant association was observed (**P = 1.000**).

Chicken and Meat Consumption: A significantly higher proportion of patients with acne vulgaris (84.3%) consumed chicken and meat compared to the normal group (54.4%). This association was highly significant (**P = 0.001**). as shown in **table 4.**

Table 4: association between (Dairy Products, Egg Consumption, Seafood Consumption, Green Dark Vegetables, Chicken and Meat) and acne vulgaris.

	Group		P-value
Dairy Products	**Normal**	**Acne V.**	
N	25 (43.9%)	20 (39.2%)	0.7
Y	32 (56.1%)	31 (60.8%)	
Egg Consumption	**Normal**	**Acne V.**	**P-value**
N	26 (45.6%)	11 (21.6%)	**0.014**
Y	31 (54.4%)	40 (78.4%)	
Seafood Consumption	**Normal**	**Acne V.**	**P-value**
N	29 (50.9%)	26 (51.0%)	1.000
Y	28 (49.1%)	25 (49.0%)	
Green Dark Vegetables	**Normal**	**Acne V.**	**P-value**
N	29 (50.9%)	25 (49.0%)	1.000
Y	28 (49.1%)	26 (51.0%)	
Chicken and Meat	**Normal**	**Acne V.**	**P-value**
N	26 (45.6%)	8 (15.7%)	**0.001**
Y	31 (54.4%)	43 84.3%)	

Serum Vitamin D3 Levels: The mean serum vitamin D3 level was significantly lower in patients with acne vulgaris (14.99 ± 11.72) compared to the normal group (27.24 ± 12.30). This difference was highly significant (**P = 0.0001**) as shown in **table 5.**

Table 5: level of Serum vitamin D3 in both groups.

	Group	N	Mean of Vitamin D3	Std. Deviation	P-value
Serum vitamin D3 level	***Normal***	57	27.24	12.30	**0.0001**
	Acne V.	51	14.99	11.72	

As shown in table 6, patients with nodulocystic acne had lower mean of serum vitamin D3 level (11.89), in contrast with those presenting with papulopastular acne where the mean level of vitamin D3 was (16.41). The difference between the types of acne with its severity and the level of vitamin D3 was not statistically significant.

Table 6: level of Serum vitamin D3 in in types of acne patients.

	Group	N	Mean of Vitamin D3	Std. Deviation	P-value
Serum VD	Nodulocystic	16	11.89	6.18	0.1
	Papulopostular	35	16.41	13.36	

DISCUSSION

Acne vulgaris is a common inflammatory skin disease of multifactorial etiology, affecting mostly adolescent and young adults.[1,3] The role of vitamin D in acne vulgaris is not well established although few studies reported an inverse relationship between acne vulgaris and its severity with serum level of vitamin D.[2,5] The study showed that female predominate male (84.3 % VS 15.7%) which is relatively similar to that reported by other studies[6], the difference is possibly attributed to more concern of female about their cosmetic appearance in comparison to males. The results of present study revealed also that acne is more common among adolescents and young adults (60.8%) than those older than 30 years with a statistically significant difference, this result is constant with that reported in literatures.[6] On other hand, students showed higher prevalence than other occupation, which may be either due to their younger age group, stress and dietary habits. For the marital status, no significant difference in the prevalence of acne between singles and married patients indicating that marriage don't affect prevalence and outcome of acne. In regards to the type of acne, papulopustular acne was reported in 68.6% of cases. In the remaining 31.4%, the acne was nodulocystic. These two types represent the most common modes of presentation, similar to that reported in literatures.[1,3] Among the associated features, hirsutism was reported in 29.4% of the acne group in comparison to non in control group with highly statistically difference, similarly menses was irregular in 56.9% of cases with acne while it was irregular in 13.7% of the control. The difference between the two groups is high significant (p value 0.0001). On the other hand, androgenetic alopecia was observed in 25.5% of patients with acne in contrast to the control group where none of them had the same condition. The significant association between acne and hirsutism, menses and androgenic alopecia is attributed to sharing possible underlying hormonal abnormality and or polycystic changes particularly among female patients. These results are mostly like that reported by other studies.[7] Regarding sun exposure (56.6%) of acne patients claimed to have inadequate exposure to sunlight, in comparison to (72.5%) among the control group, with no statically

significant difference. Although sun exposure was reported to exacerbate acne[1,3,8], yet the results of the present study showed that sun exposure is not necessarily indicating that vitamin D3 had no role in acne as collection of data is subjective and it is not known weathered exposure to sunlight is real, for sufficient duration, full exposure and at proper time of day. Regarding the food and their role on exacerbation or improvement of acne, the study showed that patients with acne consumed significantly higher amounts of animal protein including eggs, dairy product, meat and chicken in comparison with control groups. The consumption of milk and meat is thought to have large amount of amino acids, that enhance insulin secretion and induce hepatic insulin-like growth factor-1 (IGF-1) synthesis, which in turn stimulates follicular epithelial growth and keratinization[9-12], in addition, milk and other dairy products containing hormones like testosterone and progesterone, so when it's taken in higher amount than the recommended can cause activation of sebaceous glands with more sebum production and inflammation that increase the severity of acne.[1,3] Although milk and dairy products are one of the main natural sources of vitamin D3, but we thought that it's not actually taken in large amount or it may be modified by adding sugar (sweetened milk) that counter act effect of vitamin D3. Furthermore, patients consume large amounts of animal proteins, which is supposed also to contain a considerable amount of vitamin D3; this controversy is possible because the patients take the meat in form of fast and fried food, which are rich in saturated and trans-fat. Other types of food including seafood and green vegetables were not considerably taken by the patients and control group with no statically significant difference between the two groups. The study showed that the mean serum level of vitamin D3 among patients was (14.99± 11.72) which is significantly lower than that of the control group (27.24 ± 12.30) with p value (0.0001). In addition, vitamin D3 level was reported to be related to the severity of acne where it was (11. 89) among nodulocystic versus (16.41) with papulopustular, but the difference is not statistically significant. These results signified that vitamin D3 is really deficient among acne patients and its level is more or less correlated with the severity of acne indicating possibly that vitamin D3play a role in pathogeneses of acne. These result are similar to that reported by other studies which concluded that vitamin D3 was significantly low among patients and inversely correlated with its severity.[5] But other studies revealed that there is no significant difference in vitamin D3 between patients and control group.[13] Furthermore, other studies found that vitamin D3 had a role in the treatment of acne.[14] Although the exact role of vitamin D3 in acne is not well understood, but it's thought that it exerts its effect through having anti-inflammatory, antimicrobial effects and immunomodulatory action.[13]

LIMITATIONS

The main limitations are

1. We could not include a larger number of patients and controls because of short time, the investigations are not always available in governmental hospitals and costly in private laboratories.
2. The data collected from the patients is subjective and not always exactly given.

CONCLUSIONS

1. Vitamin D is significantly lower among patients with acne in comparison with control group
2. Vitamin D deficiency is more among patients with severe nodulocystic acne in comparison with papulopustular type although, the difference is not statically significant.
3. Certain diets including dairy products, red meat and chicken especially in form of fried and fast food may exacerbate acne and their intake should be reduced in patients with acne.

Recommendations

1. A further study including larger number of patient and for longer period is recommended.
2. A therapeutic comparative study with vitamin D with other conventional therapies is advisable.

REFERENCES

1. Andrea L., Zaenglein, Diane M. Dermatology. 4th.Edition. USA: Acne Vulgaris. Jean L., Julie V, Lorenzo C., 2018; 687-702.
2. Lim SK, Ha JM, Lee YH, Lee Y, Seo YJ, Kim CD, Lee JH, Im M. Comparison of Vitamin D Levels in Patients with and without Acne: A Case-Control Study Combined with a Randomized Controlled Trial. PLoS One., Aug 25, 2016; 11(8): e0161162. doi: 10.1371/journal.pone.0161162. PMID: 27560161; PMCID: PMC4999291.
3. Sutaria AH, Masood S, Saleh HM, et al. Acne Vulgaris. [Updated 2023 Aug 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, Jan. 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459173/
4. Almuhyi RA, Alhamdi KI, Alhamdi DK. Topical Vitamin D_3 Derivative (Calcipotriol) Versus Intralesional Vitamin D_3 in the Treatment of Cutaneous Warts: A Clinical Therapeutic Comparative Trial. Dermatol Res Pract, Nov. 5, 2024; 2024: 5236290. doi: 10.1155/2024/5236290. PMID: 39534647; PMCID: PMC11557176.
5. Hasamoh Y, Thadanipon K, Juntongjin P. Association between Vitamin D Level and Acne, and Correlation with Disease Severity: A Meta-Analysis. Dermatology, 2022; 238(3): 404-411. doi: 10.1159/000517514. Epub 2021 Aug 4. PMID: 34348293.
6. Yang YC, Tu HP, Hong CH, Chang WC, Fu HC, Ho JC, Chang WP, Chuang HY, Lee CH. Female gender and acne disease are jointly and independently associated with the risk of major

depression and suicide: a national population-based study. Biomed Res Int., 2014; 2014: 504279. doi: 10.1155/2014/504279. Epub 2014 Feb 11. PMID: 24678508; PMCID: PMC3942337.

7. Turcu A, Smith JM, Auchus R, Rainey WE. Adrenal androgens and androgen precursors-definition, synthesis, regulation and physiologic actions. Compr Physiol, Oct. 2014; 4(4): 1369-81. doi: 10.1002/cphy.c140006. PMID: 25428847; PMCID: PMC4437668.
8. Piquero-Casals J, Morgado-Carrasco D, Rozas-Muñoz E, Mir-Bonafé JF, Trullàs C, Jourdan E, Piquero-Martin J, Zouboulis CC, Krutmann J. Sun exposure, a relevant exposome factor in acne patients and how photoprotection can improve outcomes. J Cosmet Dermatol, Jun. 2023; 22(6): 1919-1928. doi: 10.1111/jocd.15726. Epub 2023 Mar 22. PMID: 36946555.
9. Barrea L, Di Somma C, Macchia PE, Falco A, Savanelli MC, Orio F, Colao A, Savastano S. Influence of nutrition on somatotropic axis: Milk consumption in adult individuals with moderate-severe obesity. Clin Nutr., Feb. 2017; 36(1): 293-301. doi: 10.1016/j.clnu.2015.12.007. Epub 2015 Dec 18. PMID: 26732027.
10. Beasley JM, Gunter MJ, LaCroix AZ, Prentice RL, Neuhouser ML, Tinker LF, Vitolins MZ, Strickler HD. Associations of serum insulin-like growth factor-I and insulin-like growth factor-binding protein 3 levels with biomarker-calibrated protein, dairy product and milk intake in the Women's Health Initiative. Br J Nutr., Mar. 14, 2014; 111(5): 847-53. doi: 10.1017/S000711451300319X. Epub 2013 Oct 7. PMID: 24094144; PMCID: PMC3978780.
11. Rahaman S.M.A., De D., Handa S., Pal A., Sachdeva N., Ghosh T., Kamboj P. Association of insulin-like growth factor (IGF)-1 gene polymorphisms with plasma levels of IGF-1 and acne severity. J. Am. Acad. Dermatol, 2016; 75: 768–773.
12. Mirdamadi Y., Thielitz A., Wiede A., Goihl A., Papakonstantinou E., Hartig R., Zouboulis C.C., Reinhold D., Simeoni L., Bommhardt U., et al. Insulin and insulin-like growth factor-1 can modulate the phosphoinositide-3-kinase/Akt/FoxO1 pathway in SZ95 sebocytes in vitro. Mol. Cell. Endocrinol, 2015; 415: 32–44.
13. Lim SK, Ha JM, Lee YH, Lee Y, Seo YJ, Kim CD, Lee JH, Im M. Comparison of Vitamin D Levels in Patients with and without Acne: A Case-Control Study Combined with a Randomized Controlled Trial. PLoS One, Aug. 25, 2016; 11(8): e0161162. doi: 10.1371/journal.pone.0161162. PMID: 27560161; PMCID: PMC4999291.
14. Abdelaziz, W., Farahat, T., Shaheen, H., Gaber, M., khalil, N. 'Effect of vitamin D supplementation on patients with acne vulgaris: An intervention study', *The Egyptian Family Medicine Journal*, 2021; 5(1): 177-187. doi: 10.21608/efmj.2021.61198.1066