Original Article

OPEN ACCESS

Association of Acne Vulgaris with Mental Health and Quality of Life among Acne Vulgaris Patients

Amber Waqar[1], Mohammad Riaz Khan[2], Mahvish Aftab Khan[3], Nain Setaish[4], Maria Saleem[5], Anum Khan[6]

[1]Post Graduate Resident, [2,3,5]Assistant Professor, [4]Senior Registrar, [6]Medical Officer
Dermatology Department, Pakistan Institute of Medical Sciences, Islamabad

Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [3,5]Active participation in active methodology, analysis, or interpretation of data for the work, [4]Supervision, [1,6]Drafting the work or revising it critically for important intellectual content

Funding Source: None
Conflict of Interest: None

Received: April 19, 2025
Revised: July 17, 2025
Accepted: July 22, 2025

Address of Correspondent
Dr. Amber Waqar
Post Graduate Resident
Dermatology Department,
Pakistan Institute of Medical Sciences, Islamabad
amberwaqar1308@yahoo.com

ABSTRACT

Objectives: To determine the levels of anxiety (HADS-A) and depression (HADS-D) and to assess the association between mental health and quality of life among patients with acne vulgaris.

Methodology: This comparative cross-sectional study was conducted in the Dermatology OPD of PIMS, Islamabad, from October 2024 to March 2025. Age- and gender-matched cases and controls were enrolled through non-probability purposive sampling. Patients diagnosed with acne vulgaris were considered as cases (Group A), while individuals without acne vulgaris or any other skin disease (e.g., patient attendants accompanying patients) were included as healthy controls (Group B). Study participants completed the anxiety (HADS-A) and depression (HADS-D) scales. The Dermatology Life Quality Index (DLQI) questionnaire was administered, and the Global Acne Grading System (GAGS) score was assessed for cases. Descriptive and inferential statistics were applied using SPSS version 26.

Results: The study included a total of 153 male participants (cases = 70; controls = 83) with a mean age of 20.6 ± 3.9 years. The mean GAGS score among cases was 21.3 ± 7.3, and the mean total DLQI score was 6.15 ± 4.9. The mean HADS-A and HADS-D scores among all participants were 4.36 ± 4.4 and 4.45 ± 3.9, respectively. Although the mean HADS-A and HADS-D scores were slightly higher in cases (4.7 and 4.9, respectively), the difference was not statistically significant ($p > 0.05$). DLQI showed a positive correlation with both HADS-D and HADS-A ($r = 0.50$, $p < 0.001$). Patients with moderate to severe acne had higher DLQI scores; however, very severe acne showed a relatively milder impact on DLQI. Additionally, the highest GAGS scores were observed in patients with a longer duration of acne.

Conclusions: This study concluded that acne vulgaris does not cause significant mental health issues, including anxiety and depression. No significant association between acne vulgaris, mental health status, and quality of life was observed. Furthermore, longitudinal studies with larger sample sizes and inclusion of the female population are recommended.

Keywords: Acne vulgaris, Anxiety (HADS-A), depression (HADS-D), Global Acne Grading System (GAGS), Quality of Life (DLQI).

Cite this article as: Waqar A, Khan MR, Khan MA, Setaish N, Saleem M, Khan A. Association of Acne Vulgaris with Mental Health and Quality of Life among Acne Vulgaris Patients. Ann Pak Inst Med Sci. 2025; 21(4):637-643. doi. 10.48036/apims.v21i4.1560.

Introduction

Acne Vulgaris is defined as inflammation of pilosebaceous unit resulting in various types of non-inflammatory lesions and inflammatory lesions. It occurs in both gender and can occur at a time when body and mind are going through physical or psychosocial changes.[1] It is thought to be caused by Cut bacterium acne, however, it is seen that many other factors are supposed to be playing an important role in development of acne like body's immunity or combinations of skin

microbes.[2] Even dietary habits of an acne prone person are linked with acne.[3]

Frequently present on face, it can also involve chest and back as well. Symptoms of Itching and pain in the lesions are commonly found often leading to scarring and post-inflammatory hyperpigmentation if left untreated. Depending upon the severity, the treatment regime ranges from topical creams containing azelaic acid, retinoid, benzoyl peroxide or clindamycin to systemic therapy with antibiotics and retinoid.[4]

Acne predominantly affects the face, which can undermine an individual's confidence and adversely impact mental health, leading to significant anxiety and despair, regardless of the severity of the condition. The quality of life is ultimately impacted.[5,6] Many researches showed that acne vulgaris should be treated aggressively to avoid post inflammatory hyperpigmentation and scarring and should also be screened earlier for depression and anxiety so that referral to a psychiatrist is made on time.[7] A significant correlation of acne vulgaris with depression has been reported in literature (r=0.22, 95% CI 0.17-0.26, P<0.001) and anxiety (r=0.25, 95% CI 0.19-0.31, p<0.001).[7] A study conducted by Yazici K et al reported 26.2% prevalence of anxiety and 29.5% prevalence of depression in patients with acne vulgaris. It was also reported that frequency of depression was greater among acne vulgaris patients as compared to healthy controls (29.5% vs 7.9% respectively). The frequency of anxiety was also greater among acne patients as compared to controls (26.2% vs 0% respectively).[1]

Typically, the mental health of female patients is prioritized, whereas male patients are neglected, leading to delayed psychiatric referrals; nonetheless, men have a higher rate of suicide compared to women.[8] This underscores the necessity of establishing a correlation between depression and anxiety in male patients with acne vulgaris to support the recommendation for routine screening of these conditions in this demographic.

Methodology

This comparative cross-sectional study was conducted at Dermatology OPD, Pakistan Institute of Medical Sciences, Islamabad from October 2024 to March 2025. A sample size of 140 (70 cases and 70 controls) was calculated using WHO sample size calculator, by considering 29.5% prevalence of depression among acne vulgaris patients, 7.9% prevalence of depression among healthy controls, 95% level of confidence, 80% power and level of significance 5%.[1]

Study population was comprised onto cases and control. For both groups, patients having any prior diagnosed psychiatric illness or history of taking psychiatry medicine, any chronic illness like hypertension, diabetes, asthma, ischemic heart disease, cerebrovascular disease, COPD, malignancy or autoimmune diseases were excluded. The inclusion criteria for cases (Group A) were male patients aged 18–60 years diagnosed with active acne vulgaris by a consultant dermatologist, while for controls (Group B) they were age- and gender-matched healthy males within the same age range, without acne vulgaris or other skin diseases. Ethical approval was obtained from the hospital's ethical committee Ref No F-5-2/2024(ERRC)/PIMS, participants were enrolled through non-probability purposive sampling after obtaining informed consent. Demographic information (name, age, marital status, educational status, and employment status) was collected for both groups. All participants completed the Hospital Anxiety and Depression Scale for anxiety (HADS-A) and depression (HADS-D). For cases only, acne duration (months) was recorded, severity was assessed using the Global Acne Grading System (GAGS), and quality of life was measured using the Dermatology Life Quality Index (DLQI).

All responses were noted and scores were calculated for comparison. Hospital Anxiety and Depression Scale (HADS) scales will be used to measure anxiety and depression among cases and controls. HADS-A scale is used to assess anxiety. It consists of 7 items, each item scored on a 4-point scale ranging from 0 (absence) to 3 (extreme presence). The total score for the anxiety subscale (HADS-A) ranges from 0 to 21. Borderline case will be defined as score of 8 or more and definite case as score of 11 or more on sub-scale HADS-A. HADS-D scale is used to assess depression. It consists of 7 items each item scored on a 4-point scale ranging from 0 (absence) to 3 (extreme presence). The total score for the depression subscale (HADS-D) also ranges from 0 to 21. Borderline case will be defined as score of 8 or more and definite case as score of 11 or more on sub-scale HADS-D. Global Acne Grading system (GAGS) score consider six locations with a factor for each location based on surface area (forehead = 2, Right cheek = 2, Left Cheek =2, Nose = 1, Chin = 1, Chest and Upper back = 3), distribution and density of pilosebaceous units. Each region is given a score depending on the type of lesions

(No lesion =0, One come done = 1, Papule=2, One pustule = 3, One nodule = 4) and the sum of scores multiplied by the factors (Local score = Factor × Grade from 0 to 4), the sum of local scores gives the global score (0–52). The severity is graded as mild if the score is 1–18, moderate if 19–30, severe if 31–38, and as very severe if score is >38 following the author's recommendation.[9] Dermatology Life Quality Index (DLQI) consists of 10 questions concerning patients' perception of the impact of skin diseases on different aspects of their health-related quality of life over the last week. The maximum score is 30.[10]

Data entry and analysis was done in IBM SPSS data management software (version 26.0). Mean and standard deviation was calculated for quantitative variables like age, duration of illness in months (cases), HADS-A score, HADS-D score, DLQI score and GAGS score. Frequency and percentages were calculated for categorical variables like marital status, educational status, severity of anxiety and severity of depression. Chi-square test and independent sample t-test was used to measure the association between Acne Vulgaris and anxiety/depression. Quality of life was compared with HADS-D and HADS-A through correlation. Stratification technique was used to control the results for confounding variables like age, education and severity of disease. P-value of less than or equal to 0.05 was considered significant.

Results

This study included a total of 153 male participants with the mean age of 20.6±3.9 years, which were divided into cases (n=70) and controls (n=83). Mean duration of acne in the cases was 14.9±12.2 months, mean GAGS score amongst cases was 21.3±7.3 and mean total DLQI score of cases was 6.15±4.9. Correspondingly, mean HADS-A and HADS-D score among all the participants was 4.36±4.4 and 4.45±3.9 respectively. Demographics and detailed description of HADS-A and HADS-D questionnaires of study participants are mentioned in table-I, which showed that majority are unmarried (137; 89.5%), unemployed (92; 60.1%) males with 68(44.4%) had higher secondary to masters (30; 19.6%) level of education. According to GAGS acne scoring 15(21.4%) patients falls in severe category and only 5(7.1%) had severe acne.

Comparison of demographics, HADS-A and HADS-D questions are mentioned in table-II, which showed significant findings with all demographic characters including; marital status (p=0.032), professional status (p=0.013) and educational status (p=0.001). However, non-significant with both of the questionnaires (p>0.05) except for the HADS-D questions; 'I feel as if I am slowed down' (p=0.041) and 'I have lost interest in my appearance' (p<0.001).

When categorized HADS-A and HADS-D scores, only 5(7.1%) and 5(7.1%) of cases and 6(7.2%) and 3(3.6%) of controls respectively had depression/anxiety, but the findings were not statistically significant (p>0.05) as mentioned in table II.

Table I: Description of study participant's demographics, HADS-A scale, HADS-D scale and DLQI scale.

Demographics		**N**	**%**
Marital status	Married	16	10.5
	Unmarried	137	89.5
Professional status	Employed	61	39.9
	Unemployed	92	60.1
Educational status	Higher Secondary	68	44.4
	Masters	30	19.6
	No formal education	9	5.9
	Primary	12	7.8
	Secondary	34	22.2
Age (Mean±SD)		20.60	3.89
Duration of Acne in months (Mean±SD)		14.91	12.18
Global Acne Grading Scale (GAGS) of cases (Mean±SD)		21.28	7.311
HADS - A (total score) (Mean±SD)		4.36	4.44
HADS-D (total score) (Mean±SD)		4.45	3.99
Total DLQI (Mean±SD)		6.15	4.90
Study groups	Cases	70	45.8
	Control	83	54.2
Global Acne Grading Scale (GAGS) of cases	Mild: ≤ 18.0	24	34.3
	Moderate: 19.0 - 30	26	37.1
	Severe: 31.0 - 38.0	15	21.4
	Very Severe: >38.0	5	7.1
HADS-A score	Normal: <7	120	78.4
	Borderline: 8.0 - 10	22	14.4
	Depression/anxiety: >11	11	7.2
HADS-D score	Normal: <7	120	78.4
	Borderline: 8.0 - 10	25	16.3
	Depression/anxiety: >11	8	5.2

HADS-A and HADS-D mean scores are slightly higher in cases (i.e. 4.7 and 4.9 respectively) as compared to control group (i.e. 4.04 and 4.03 respectively) but the findings were non-significant (p=0.337 and p=0.156 respectively) as depicted in figure I.

The Pearson correlation coefficient (r) is a measure of the strength and direction of the linear relationship between two variables. In our study, the duration of acne showed no correlation and non-significant (p>0.05) results with all the scores (r=0.0). However, negative correlation (r= -0.027) was found among HADS-D score and GAGS scores (p=0.827), while DLQI showed slightly positive

correlation of r=0.5 with HADS-D and HADS-A with statistically significant findings (p<0.001).

Correlation of DLQI total score, duration of acne, HADS-A and HADS-D scores with GAGS categories is shown in figure-II, which showed highest DLQI and HADS-A mean amongst the patients with severe GAGS category.

However, lowest DLQI score in mild category i.e. 4.62±4.8. Mostly moderate to severe acne patient had higher DLQI but very severe acne had relatively milder effect on DLQI so perhaps other factors were possible in reducing life quality index. Consecutively, highest GAGS score was observed in patients with higher duration of acne.

Table II: Comparison of demographics, HADS-A and HADS-D scales amongst the study groups.

Variables			Studied groups		p-value
			Cases	Control	
Marital Status	Married	n	3	13	0.032*
		%	4.3%	15.7%	
	Unmarried	n	67	70	
		%	95.7%	84.3%	
Professional status	Employed	n	20	41	0.013*
		%	28.6%	49.4%	
	Unemployed	n	50	42	
		%	71.4%	50.6%	
Educational Status	Higher Secondary	n	40	28	0.001
		%	57.1%	33.7%	
	Masters	n	17	13	
		%	24.3%	15.7%	
	No formal education	n	2	7	
		%	2.9%	8.4%	
	Primary	n	5	7	
		%	7.1%	8.4%	
	Secondary	n	6	28	
		%	8.6%	33.7%	
HADS – A Score	Normal: <7	n	56	64	0.883
		%	80.0%	77.1%	
	Borderline: 8.0 - 10	n	9	13	
		%	12.9%	15.7%	
	Depression/anxiety: >11	n	5	6	
		%	7.1%	7.2%	
HADS-D Score	Normal: <7	n	56	64	0.386
		%	80.0%	77.1%	
	Borderline: 8.0 - 10	n	9	16	
		%	12.9%	19.3%	
	Depression/anxiety: >11	n	5	3	
		%	7.1%	3.6%	

Chi-square test; *Fisher's exact test

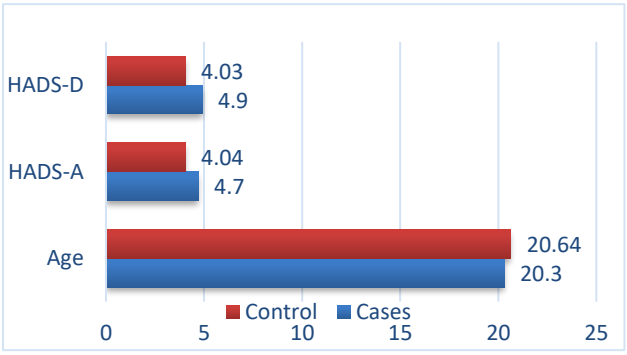

Figure I. Mean difference of studied groups with age, HADS-A and HADS-D scores (p>0.05).

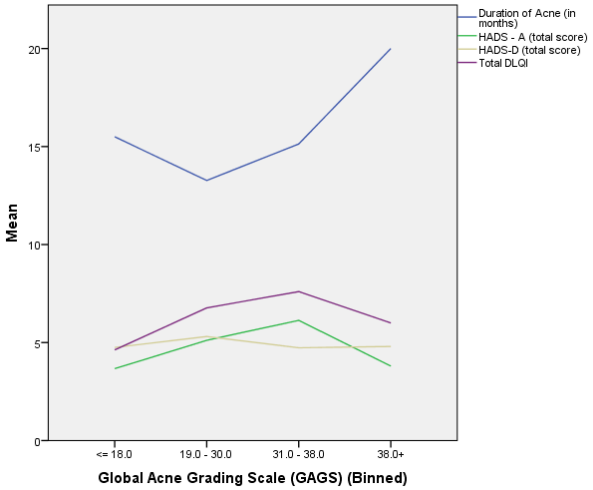

Table III: Correlation among the duration of acne, GAGS, HADS-A, HADS-D and DLQI scores among the studied cases

Pearson Correlation		Duration of Acne (months)	Global Acne Grading Scale (GAGS)	HADS - A (total score)	HADS-D (total score)	Total DLQI
Mean (SD) values of scores		14.91 ± 12.18	21.28 ± 7.3	4.74 ± 4.3	4.95 ± 3.8	6.15 ± 4.9
Duration of Acne (months)	Correlation coefficient	1	0.066	0.065	0.014	0.008
	P value	--	0.587	0.590	0.911	0.949
Global Acne Grading Scale (GAGS)	Correlation coefficient	0.066	1	0.122	-0.027	0.165
	P value	0.587	--	0.313	0.827	0.172
HADS - A score	Correlation coefficient	0.065	0.122	1	0.550	0.585
	P value	0.590	0.313	--	<0.001	**<0.001**
HADS-D score	Correlation coefficient	0.014	-0.027	0.550	1	0.537
	P value	0.911	0.827	<0.001	--	**<0.001**
Total DLQI	Correlation coefficient	0.008	0.165	0.585	0.537	1
	P value	0.949	0.172	<0.001	<0.001	--

Figure II. Correlation of GAGS scores with DLQI, duration of acne, HADS-A and HADS-D.

Discussion

The present results demonstrate that the acne vulgaris burden even in the case of the modest clinical severity goes beyond the dermatological signs to considerable mental health and psychosocial issues in young males. Our research contributes to the existing evidence, which is that mental health and dermatological conditions are tightly interconnected. We have found that, in spite of the fact that the differences in anxiety and depression scores between patients with acne and controls were not statistically significant, the acne group had higher mean scores in both anxiety (HADS-A: 4.7 vs. 4.04) and depression (HADS-D: 4.95 vs. 4.03), which indicated subclinical psychological burden. Moreover, the Dermatology Life Quality Index (DLQI) had a significant correlation with both anxiety and depression scores ($r = 0.585$ and $r = 0.537$ respectively; $p < 0.001$), which is why emotional distress is highly related to the fact that patients feel that the quality of life is getting worse.

As far as the currently-published literature is concerned, our study is one of the first Pakistani-based studies to investigate the complex association between acne vulgaris and psychological in males at an early adult stage. Although it has been consistently revealed that acne may adversely impact mental health particularly in females[11,12], our research provides a localized aspect of the topic, as we selected a Pakistani male population, and therefore we can propose that sociocultural and contextual factors might influence these relationships.[13,14,15] By anchoring our results in this particular context, we offer a more culturally aware insight into the relationship between acne vulgaris and

affective well-being and quality of life, thus adding to the existing literature with region-specific data.

The findings of our research did not reveal statistically significant differences in anxiety and depression score between male acne patients and controls, and it cannot be mistakenly understood to mean that males are less susceptible to psychological distress as a result of acne vulgaris. It has been stated in literature that males are stereotypically less likely to have anxiety and depression than females in general[16,17] and in patients with atopic dermatitis 15% of women were found to have anxiety as opposed to 12% of males, being a substantial difference in the psychological symptoms.[18] Therefore, this male-only cohort, where the results were not significant, could be a re-iteration of reporting biases or psychological

defenses instead of an Actual lack of psychological burden.

Our findings are in line with the previous literature which have consistently reported on the psychological implications of acnes vulgaris. The results of the studies by Almutawa et al. (2023) and Morshed et al. (2023) confirm that people with acne report much higher anxiety and depression levels than their acne-free counterparts, and the quality of life is negatively correlated with psychological symptoms.[19,20] Dumont et al. (2024) and Sieradocha (2024) confirm such results in a young male cohort, stating that the effect of acnes on emotional well-being is often bigger than the clinical severity [(21,22)]. Interestingly, patients with moderate or severe acne had higher scores of DLQI than even those with very severe acnes, which implies that personal perception, and not necessarily clinical grading, affects psychosocial outcomes.

There was no substantial correlation between the period of acne and psychological measures among our study population, which supports one important point: emotional and social impairments can be observed at the early stages of the disease and can be maintained, whether acne is long term or acute. This result helps to comprehend that psychosocial burden of acne is not a mere effect of its persistence or severity, but also immensely influenced by personal psychological tolerance. In that respect, the study by Stone et al. (2025) is specifically applicable as it emphasizes that the stronger emotional strength of patients with acne correlates with the quality of life, despite the persistence of dermatological symptoms.[23]

The findings of our study support the need to shift to holistic approaches to treating acne. The regular application of such instruments as HADS and DLQI in dermatological clinics may assist in recognizing individuals at risk at an early stage and providing them with the necessary counseling and behavioral interventions. In the light of the fact that almost 13% of patients with acne in our study fell into the borderline range in anxiety and depression and therefore were yet to fall within the clinical diagnosis range. The interventions targeted in this gray zone would prevent the development of more severe mental health disorders. Further research is required in the future to examine resilience-intervention interventions and psychosocial protective

factors that mediate the mental health consequences of acne.

Conclusion

Our findings concluded that mean anxiety and depression scores were slightly higher among acne patients compared to controls, but did not reach statistical significance. Nevertheless, quality-of-life scores were moderately positively correlated with both anxiety and depression scores with a statistically significant correlation. The study findings collectively indicated that while acne may not consistently result in clinical anxiety or depression, it does impact psychological well-being and quality of life across domains that are not exclusively dependent on acne duration or severity. Also the male population in general have anxiety and depression to a level that cannot be ignored, pressing the need for regular screening in males to identify underlying causes.

References

1. Yazici K, Baz K, Yazici A, Köktürk A, Tot S, Demirseren D, et al. Disease-specific quality of life is associated with anxiety and depression in patients with acne. J Eur Acad Dermatol Venereol.2004;18(4):435-9. https://doi.org/10.1111/j.1468-3083.2004.00946.x
2. Lee YB, Byun EJ, Kim HS. Potential role of the microbiome in acne: a comprehensive review. J Clin Med. 2019;8(7):987. https://doi.org/10.3390/jcm8070987
3. Penso L, Touvier M, Deschasaux M, Szabo de Edelenyi F, Hercberg S, Ezzedine K, et al. Association between adult acne and dietary behaviors: findings from the NutriNet-Santé prospective cohort study. JAMA Dermatol. 2020;156(8):854-62. https://doi.org/10.1001/jamadermatol.2020.1602
4. Eichenfield DZ, Sprague J, Eichenfield LF. Management of acne vulgaris: a review. JAMA. 2021;326(20):2055. https://doi.org/10.1001/jama.2021.17633
5. Lukaviciute L, Ganceviciene R, Navickas P, Navickas A, Grigaitiene J, Zouboulis CC. Anxiety, depression, and suicidal ideation among patients with facial dermatoses (acne, rosacea, perioral dermatitis, and folliculitis) in Lithuania. Dermatology. 2020;236(4):314-22. https://doi.org/10.1159/000506627
6. Haroon MZ, Alam A, Ullah I, Ali R, Taimur MF, Raza K. Quality of life and depression among young patients suffering from acne. J Ayub Med Coll Abbottabad. 2019;31(3):436-40.
7. Samuels DV, Rosenthal R, Lin R, Chaudhari S, Natsuaki MN. Acne vulgaris and risk of depression and anxiety: a meta-analytic review. J Am Acad Dermatol. 2020;83(2):532-41. https://doi.org/10.1016/j.jaad.2020.02.040
8. Swetlitz N. Depression's problem with men. AMA J Ethics. 2021;23(7):E586-9. https://doi.org/10.1001/amajethics.2021.586
9. Doshi A, Zaheer A, Stiller MJ. A comparison of current acne grading systems and proposal of a novel system. Int J Dermatol.1997;36(6):416-8. https://doi.org/10.1046/j.1365-4362.1997.00099.x
10. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI)—a simple practical measure for routine clinical use. Clin Exp Dermatol. 1994;19(3):210-6. https://doi.org/10.1111/j.1365-2230.1994.tb01167.x
11. Sieradocha K. The mental health implications of acne vulgaris. Qual Sport. 2024;35:56063. https://doi.org/10.12775/QS.2024.35.56063
12. Szepietowska M, Stefaniak AA, Krajewski PK, Matusiak L. Females may have less severe acne, but they suffer more: a prospective cross-sectional study on psychosocial consequences in 104 consecutive Polish acne patients. J Clin Med. 2024;13(1):4. https://doi.org/10.3390/jcm13010004
13. Yang J, Yang H, Xu A, He L. A review of advancement on influencing factors of acne: an emphasis on environmental characteristics. Front Public Health. 2020;8:450. https://doi.org/10.3389/fpubh.2020.00450
14. Morshed AS, Noor T, Uddin Ahmed MA, Mili FS, Ikram S, Rahman M, et al. Understanding the impact of acne vulgaris and associated psychological distress on self-esteem and quality of life via regression modeling with CADI, DLQI, and WHOQoL. Sci Rep. 2023;13(1):21084. https://doi.org/10.1038/s41598-023-48182-6
15. Karadağ AS, Balta I, Saricaoğlu H, Kilic S, Kelekçi KH, Yildirim M, et al. The effect of personal, familial, and environmental characteristics on acne vulgaris: a prospective, multicenter, case-controlled study. G Ital Dermatol Venereol. 2019;154(2):177-85. https://doi.org/10.23736/S0392-0488.17.05532-8
16. Shawon MS, Hossain FB, Hasan M, Rahman MR. Gender differences in the prevalence of anxiety and depression and care seeking for mental health problems in Nepal: analysis of nationally representative survey data. Cambridge Prisms Glob Ment Health. 2024;11:e46. https://doi.org/10.1017/gmh.2024.37
17. Smith DT, Mouzon DM, Elliott M. Reviewing the assumptions about men's mental health: an exploration of the gender binary. Am J Mens Health. 2018;12(1):78-89. https://doi.org/10.1177/1557988316630953
18. Mina S, Jabeen M, Singh S, Verma R. Gender differences in depression and anxiety among atopic dermatitis patients. Indian J Dermatol. 2015;60(2):211. https://doi.org/10.4103/0019-5154.152564
19. Almutawa YM, Bhattarai E, AlGhareeb M, Zhao J. Evaluation of psychiatric comorbidities and quality of life as well as brain-derived neurotrophic factor (BDNF) concentrations among patients suffering from acne vulgaris: a systematic review and meta-analysis. Cureus. 2023;15(1):e33357. https://doi.org/10.7759/cureus.33357
20. Morshed AS, Noor T, Uddin Ahmed MA, Mili FS, Ikram S, Rahman M, et al. Understanding the impact of acne vulgaris and associated psychological distress on self-

esteem and quality of life via regression modeling with CADI, DLQI, and WHOQoL. Sci Rep. 2023;13(1):21084. https://doi.org/10.1038/s41598-023-48182-6

21. Dumont S, Lorthe E, Loizeau A, Richard V, Nehme M, Posfay-Barbe KM, et al. Acne-related quality of life and mental health among adolescents: a cross-sectional analysis. Clin Exp Dermatol. 2025;50(4):795-803. https://doi.org/10.1093/ced/llae453
22. Sieradocha K. The mental health implications of acne vulgaris. Qual Sport. 2024;35:56063. https://doi.org/10.12775/QS.2024.35.56063
23. Stone CJ, Ufkes N, Secrest AM, Murtaugh MA, Vanneman ME, Snyder AM. Relationships between quality of life and emotional resilience for those with and without acne. J Cosmet Dermatol. 2025;24(1):e16744. https://doi.org/10.1111/jocd.16744