Original Article

Assessment of Quality of Life in Acne Vulgaris Patients in Terms of Clinical Severity and Psychological Burden: A Multi Centre Study in Anand District

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ABSTRACT

Background

The term "acne" is derived from the Greek word "acme," meaning "point" or "spot." Acne vulgaris is one of the most common chronic dermatological conditions, predominantly caused by the Gram-positive anaerobic bacterium *Cutibacterium acnes*. It affects individuals across various age groups, with a significant impact on physical appearance, quality of life (QoL), and psychological well-being.

Methodology

This cross-sectional, observational study was conducted from December 2021 to March 2022, involving individuals aged 18–30 years diagnosed with acne vulgaris. Patients visiting a dermatology clinic were assessed for clinical severity, QoL impairment, and psychological burden using a validated, self-administered questionnaire.

Results

A total of 171 patients were enrolled in the study, with a mean age of 24.83 ± 2.92 years. The cohort comprised 45 males and 126 females, with a positive family history of acne in 82 participants. Assessment of QoL impact revealed that 101 patients experienced a moderate effect, while 66 reported a very large impact on daily life. Clinical grading of acne showed that 12 patients had mild acne, 104 had moderate acne, 54 had severe acne, and 1 patient presented with very severe acne. Psychological evaluation indicated that individuals with moderate to severe acne exhibited mild to moderate depressive symptoms. Additionally, 147 patients reported experiencing a moderate psychological burden associated with their condition.

Conclusion

Acne vulgaris significantly affects patients' QoL, with the majority experiencing moderate impairment. The condition is linked to emotional distress, including feelings of embarrassment, aggression, and negative self-perception regarding facial appearance. Given its psychosocial impact, an integrated approach focusing on dermatological management and psychological support is essential for improving patient outcomes.

Keywords

Acne vulgaris; Dermatology Life Quality Index (DLQI); Global Acne Severity Scale; psychological burden; self-perception, emotional distress.

INTRODUCTION

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit, predominantly affecting adolescents and young adults [(1,2)]. Clinically, it presents as a spectrum of cutaneous lesions, including comedones, papules, pustules, nodules, and cysts, with varying degrees of severity[3]. The pathogenesis is complex and multifactorial, primarily driven by follicular hyperkeratinization, excessive sebum production, *Cutibacterium acnes* colonization, and an aberrant inflammatory response. A range of intrinsic and extrinsic factors, including hormonal fluctuations, genetic predisposition, environmental influences, and dietary components, contribute to disease

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progression. Although often perceived as a self-limiting dermatological condition, acne vulgaris carries significant psychosocial consequences, affecting self-esteem, emotional well-being, and overall quality of life (QoL) [4].

Acne severity varies widely, with some cases resulting in persistent post-inflammatory hyperpigmentation and permanent scarring. Standardized grading systems, such as the Global Acne Severity Scale (GASS), provide an objective framework for evaluating lesion type, distribution, and overall disease burden. The impact of acne on daily life is commonly assessed using the Dermatology Life Quality Index (DLQI), which highlights that even mild acne can lead to considerable psychological distress[5]. Acne is frequently associated with psychological disturbances, including embarrassment, social withdrawal, anxiety, and depressive symptoms. Several studies have demonstrated a strong correlation between acne severity and mental health disorders, with severe cases often leading to diminished self-esteem and, in extreme instances, suicidal ideation. The Hamilton Depression Rating Scale (HDRS) serves as a widely accepted tool to assess the psychological burden in acne patients[6].

The chronic and highly visible nature of acne often affects social interactions, academic performance, and professional opportunities, ultimately impacting overall well-being[7]. The psychosocial burden of acne has been shown to be comparable to that of other chronic medical conditions, reinforcing the need for a holistic and patient-centered treatment approach. The distress caused by acne extends beyond its physical manifestations, necessitating a broader perspective that includes mental health support and psychosocial counseling. The psychological distress associated with acne is frequently underestimated, despite compelling evidence suggesting a bidirectional link between dermatological conditions and mental health [8].

Management of acne should not be limited to dermatological interventions alone but should also incorporate psychological support and counseling to ensure comprehensive patient care. Early intervention with evidence-based pharmacological and non-pharmacological therapies, including topical and systemic agents, dietary modifications, and stress management techniques, plays a crucial role in improving both clinical outcomes and QoL[9]. Dermatologists must tailor treatment plans to individual patient needs, taking into account acne severity, patient preferences, and psychosocial impact.

Pharmacological treatment options include topical retinoids, benzoyl peroxide, and antibiotics for mild to moderate cases, while systemic therapies such as oral antibiotics, hormonal therapy, and isotretinoin are reserved for more severe or refractory acne. Adjunctive non-pharmacological approaches, including laser therapy, chemical peels, and dietary modifications, have shown promise in improving acne outcomes. Stress reduction techniques, mindfulness practices, and cognitive behavioral therapy (CBT) have also demonstrated efficacy in addressing the emotional burden associated with acne[10].

Assessing acne severity is essential for guiding treatment decisions and monitoring disease progression. Various grading systems have been developed to quantify acne severity, each with its strengths and limitations. GASS is widely used due to its practicality and ability to classify acne into five grades: clear, almost clear, mild, moderate, and severe [(11)]. Lesion counting remains a highly specific and objective method; however, it is time-consuming and influenced by external factors such as lighting, examiner expertise, and skin characteristics. Moreover, lesion counting fails to account for inflammation, erythema, post-inflammatory hyperpigmentation, or scarring, which are critical in evaluating the long-term impact of acne[12].

In contrast, global grading systems such as GASS and the Global Acne Grading System (GAGS), first introduced by Doshi et al., offer a more clinically relevant approach by incorporating lesion type, anatomical distribution, and disease burden. While these grading systems are practical for routine dermatological use, they remain somewhat subjective, with interpretations varying between clinicians. To enhance consistency, photographic scales have been introduced, allowing for standardized visual comparisons and reducing interobserver variability in acne severity assessment. Although self-assessment by patients is often deemed unreliable, studies suggest a strong correlation between perceived acne severity and quality-of-life impairment. Acne significantly affects self-esteem, social interactions, and mental health, underscoring the importance of integrating patient-reported outcomes into clinical assessments[13]. The DLQI serves as a valuable adjunct to objective severity scales by capturing the psychosocial burden of acne,

emphasizing the need for a comprehensive approach to acne management.

Recent advancements in multi-modal imaging and digital assessment tools have provided new opportunities for objective acne evaluation. These technologies utilize ultraviolet (UV) imaging, polarized filters, and computer algorithms to analyse lesion characteristics, erythema, and pigmentation changes with high precision. While these methods offer greater accuracy and reproducibility, they require specialized equipment and expertise, limiting their widespread adoption in routine clinical practice. Each acne severity assessment method has distinct advantages and limitations[14]. While lesion counting offers precise numerical data, GASS and GAGS remain the most practical grading systems for routine dermatological use. Digital imaging and multi-modal assessment techniques show promise in improving acne evaluation, but their implementation is often restricted by cost and accessibility. A combined approach, integrating standardized grading scales with patient-reported quality-of-life measures, is essential for a comprehensive, patient-centred acne assessment and treatment strategy[15,16].

This study aims to evaluate the clinical severity of acne vulgaris, its impact on QoL, and its associated psychological burden among young adults. By utilizing validated assessment tools such as DLQI, GASS, and HDRS, this research seeks to elucidate the relationship between acne severity and its broader psychosocial implications. A deeper understanding of these associations will enable dermatologists to develop more effective and holistic management strategies that address both cutaneous manifestations and psychological distress, ultimately enhancing patient care and treatment outcomes. The growing recognition of acne as a condition with significant psychosocial ramifications underscores the importance of an integrated treatment approach that prioritizes both dermatological health and emotional resilience.

METHOD AND MATERIALS

Study Design

Study Location: This multicenter study was conducted at three Hospital: Shraddha Hospital (Borsad), Anjali Hospital (Borsad), and Jalaram Hospital (Dharmaj).

Source of Data: Patient data, including demographics, presenting complaints, disease duration, past and medication history, family history, and acne distribution, were collected through medical records and patient counseling during OPD visits.

Study Duration: The study was conducted over four months after obtaining ethical clearance.

Study Criteria

(A) Inclusion Criteria

- Patients of all genders diagnosed with acne vulgaris attending dermatology OPD.
- Age group 18–30 years.
- Willingness to provide written informed consent.

(B) Exclusion Criteria

- Patients with pre-existing mental illness affecting psychological assessment.
- Age below 18 years or above 30 years.
- Pregnant or lactating women.
- Patients with co-existing dermatological conditions (e.g., psoriasis) or surgical conditions.

The study was initiated after obtaining approval from the Institutional Ethics Committee – CHARUSAT Charotar University of Science and Technology, Changa, with **reference no. IEC/CHARUSAT/21/3(78)**. Eligible acne vulgaris patients visiting the OPD during the study period were enrolled following the acquisition of informed consent. Patient demographic and clinical details were documented in a structured case report form (CRF). Quality of Life (DLQI), psychological burden (HDRS), and acne severity (Global Acne Severity Scale) were assessed, and the corresponding scores were recorded.

Statistical Analysis

Aim & Objective

Aim: Assessment of Quality of Life in Acne Vulgaris Patients in Terms of Clinical Severity and Psychological Burden: A Multicentre Study in Anand District.

Objectives:

- To evaluate the overall impact of acne vulgaris on the quality of life of adults in Anand District.
- To examine the relationship between acne vulgaris severity and quality of life.
- To assess the psychosocial effects of acne vulgaris on adults.
- To investigate the relationship between acne vulgaris and potential risk factors.

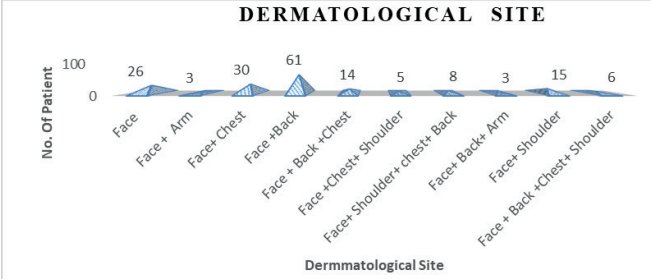
ETHICAL CLEARENCE

The study was conducted after receiving approval from the Institutional Ethics Committee of CHARUSAT Charotar University of Science and Technology, Changa (Reference No. IEC/CHARUSAT/21/3(78)). The research was carried out in compliance with ethical guidelines, and informed consent was obtained from the patient. The patient's privacy has been safeguarded, and their identity has been kept confidential

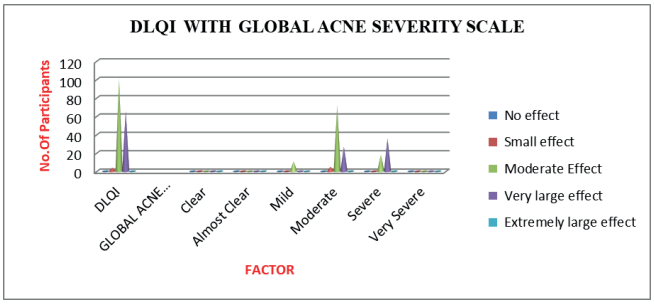
RESULT

Among the 171 enrolled patients with acne vulgaris, 74.3% were female and 25.7% were male, with the highest prevalence observed in the 23–26-year age group (49.7%). The most commonly affected anatomical sites included the face and back (35.7%), followed by isolated facial involvement (15.2%) and face with chest involvement (17.5%). Additionally, cases with multisite involvement (e.g., face, back, chest, and shoulders) were observed, reflecting a more extensive disease presentation as shown in graph 1. Based on the Global Acne Severity Scale (GASS), 60.8% of patients had moderate acne, 31.6% had severe acne, and 7% had mild acne. Quality of life assessment using the Dermatology Life Quality Index (DLQI) indicated that 56% of patients experienced a moderate impact (DLQI 6–10), while 41% had a large impact (DLQI 11–20), highlighting the substantial burden of acne on daily functioning and psychosocial well-being as shown in graph 2. The Hamilton Depression Rating Scale (HDRS) as shown in graph3 revealed that 86% of patients had mild to moderate depression (HDRS 7–20), while 10.5% exhibited moderate to severe depression (HDRS 21+), demonstrating a strong correlation between acne severity and psychological distress. Regarding occupational influence, acne prevalence was highest among job employees (48.5%), followed by students (28.6%) and housewives (21.1%). In terms of disease chronicity, 37% of patients had acne for less than one year, and 47.95% had a positive family history, suggesting a genetic predisposition. Treatment adherence was suboptimal, with only 33.3% of patients receiving pharmacological intervention, while 66.7% remained untreated.

Overall, acne severity was found to significantly impact quality of life and mental health, reinforcing the necessity for an integrated dermatological and psychological management approach, particularly for patients with widespread and severe manifestations.



Graph 1: Anatomical Distribution of Acne Lesions

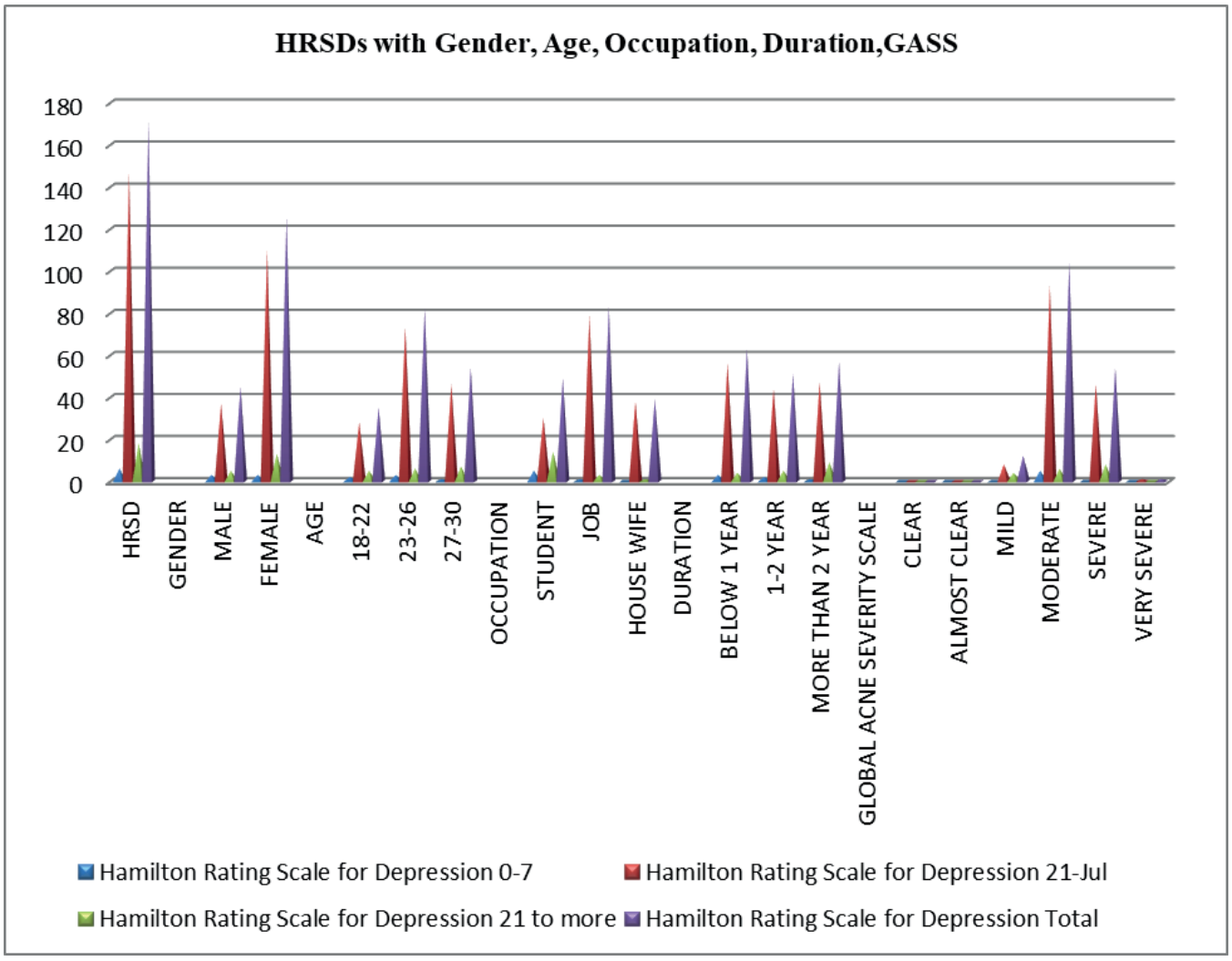


Graph:2 Correlation Between Acne Severity (GASS) and Quality of Life (DLQI)

DISCUSSION

Assessing acne severity is a critical component in guiding treatment strategies and tracking disease progression. Various grading systems have been developed to quantify acne severity, each offering distinct advantages and limitations. The *Global Acne Severity Scale* (*GASS*) is widely utilized due to its practical application and ability to categorize acne into five severity levels: clear, almost clear, mild, moderate, and severe[17]. Unlike lesion counting, which necessitates the precise enumeration of *comedones*, *papules*, *pustules*, and *nodules*, GASS provides a standardized clinical assessment incorporating both qualitative and quantitative elements. While lesion counting remains a highly specific and objective method, it is often time-intensive, reliant on external variables such as examiner expertise, lighting conditions, and individual skin characteristics, and does not adequately account for inflammation, erythema, *post-inflammatory hyperpigmentation*, or scarring—factors essential for evaluating the chronic impact of acne [18].

In contrast, global grading systems such as *GASS* and the *Global Acne Grading System* (*GAGS*), initially introduced by Doshi et al., present a more comprehensive and clinically relevant approach by



Graph: - 3 Association of Psychological Burden (HDRS) with Demographic and Clinical Factors

incorporating lesion type, anatomical distribution, and overall disease burden.[19] Although practical for dermatological assessment, these grading systems retain a degree of subjectivity, as clinical interpretations may vary among practitioners. To enhance consistency, photographic scales have been developed, facilitating standardized visual comparisons and reducing inter-observer variability in acne severity assessment. Furthermore, while patient self-assessments have traditionally been considered unreliable, research indicates a strong correlation between perceived acne severity and quality-of-life impairment. Acne exerts a profound impact on *self-esteem*, *social interactions*, and *mental health*, underscoring the importance of incorporating patient-reported outcomes into clinical evaluations [20,21].

Assessment tools such as the *Dermatology Life Quality Index* (*DLQI*) complement objective grading systems by capturing the psychosocial burden of acne, reinforcing the necessity of a holistic, patient-centered management approach. The DLQI quantifies the impact of acne on daily activities, relationships, and emotional health, making it an indispensable component of acne assessment. Additionally, specific mental health assessment tools, such as the *Hamilton Depression Rating Scale* (*HDRS*), may be utilized in cases where acne is associated with significant psychological distress [22].

Recent advancements in multi-modal imaging and digital assessment technologies have introduced novel opportunities for objective acne evaluation. These methods utilize *ultraviolet* (*UV*) imaging, *polarized*

filters, and sophisticated *computer algorithms* to analyze lesion characteristics, erythema, and pigmentation alterations with remarkable precision. High-resolution imaging can also assist in the early identification of scarring and treatment response monitoring. Although these emerging technologies offer enhanced accuracy and reproducibility, their routine clinical integration is often hindered by the requirement for specialized equipment, technical expertise, and associated costs [23]. Furthermore, AI-powered diagnostic tools are being developed to assist dermatologists in assessing acne severity and predicting treatment response, potentially improving individualized patient care [24].

Each acne severity assessment methodology possesses distinct strengths and limitations. While lesion counting provides precise numerical data, *GASS* and *GAGS* remain the most practical and widely adopted grading systems in dermatological practice. Digital imaging and multi-modal assessment technologies hold promise in refining acne evaluation; however, their widespread implementation is constrained by accessibility and economic considerations. Additionally, patient-reported outcome measures, such as DLQI, provide valuable insight into the burden of acne beyond its physical manifestations, helping clinicians tailor treatment strategies to address both dermatological and psychological needs[25].

An integrated assessment model—combining standardized grading scales with patient-reported quality-of-life measures—offers the most comprehensive, patient-centered approach to acne evaluation and management. By embracing both clinical and psychosocial dimensions, dermatologists can enhance treatment precision, improve patient satisfaction, and optimize long-term outcomes in individuals affected by acne vulgaris. Future research should focus on refining existing assessment tools, validating AI-driven acne evaluation models, and ensuring accessibility to advanced imaging techniques to improve the accuracy and effectiveness of acne severity assessment in diverse clinical settings[26].

CONCLUSION

Our study evaluated the impact of acne vulgaris on patients' quality of life (QoL), with a particular focus on clinical severity and psychological burden. The Dermatology Life Quality Index (DLQI) subscale analysis demonstrated that acne significantly affects emotional well-being, self-esteem, and social confidence. Many patients reported discomfort due to itching, soreness, pain, and the inconvenience of ongoing treatment.

While the overall psychological impact was moderate, those with moderate to severe acne experienced significantly greater distress than individuals with mild acne. This underscores the strong correlation between acne severity and QoL impairment. Beyond physical symptoms, acne can profoundly influence self-perception, often leading to feelings of low self-worth, diminished self-esteem, and social withdrawal. As acne severity increases, its impact on self-image, interpersonal relationships, and daily life also intensifies.

Given these findings, dermatologists should routinely incorporate QoL assessments into acne management to ensure that the psychological impact is adequately addressed. Acne treatment is typically guided by lesion grading, but recognizing and managing associated emotional distress is equally important. In cases of significant psychological burden, referral for counseling, psychotherapy, or psychiatric intervention—including psychopharmacotherapy—may be necessary.

Our study also revealed that the majority of patients seeking treatment had moderate to severe acne, with no cases of clear or almost clear skin, highlighting the need for early and comprehensive intervention. The DLQI is a valuable tool for assessing patient distress and should be routinely utilized to guide personalized treatment plans. Since even mild acne can cause considerable psychological distress in some individuals, a patient-centered approach that integrates dermatological and mental health care is essential for optimal management and improved outcomes.

Limitations of the study

1. Limited sample size due to time constraints.
2. The study was confined to the western region of India, limiting generalizability.
3. Reliance on self-reported data, which may affect reliability.
4. The study had a limited duration and did not include follow-up on patients' clinical severity or psychological impact.

List of Abbreviations

- AV: Acne Vulgaris
- CRH: Corticotrophin-Releasing Hormone
- DLQI: Dermatology Life Quality Index
- GASS: Global Acne Severity Scale
- HRSD: Hamilton Depression Rating Scale
- OPD: Out Patient Department
- QoL: Quality of Life

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Conflict of Interest

The authors affirm that there are no conflicts of interest regarding the publication of this case report.

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Authors' Contribution

The contributions of the authors are as follows: D.S.R., C.H., A.M., P.Y., and A.N.J. were responsible for conceptualizing the study. C.H., A.M., P.Y., and A.N.J. gathered the data. The study design was developed by D.S.R., C.H., A.M., P.Y., and A.N.J. A.N.J., V.R.G., and R.A. were responsible for writing and submission. Finally, A.N.J., V.R.G., and R.A. reviewed, edited, and approved the final version of the manuscript.

REFERENCE

1. Yuwnate A, Chandane R, Sah R. Impact of acne and psoriasis on patient's quality of life: A multicentre study from health-care centers in Wardha district. *Natl J Physiol Pharm Pharmacol*. 2017;**1**. Available from: http://dx.doi.org/10.5455/njppp.2017.7.1235425012017.
2. Sultana T. Evaluation of severity in patients of acne vulgaris by global acne grading system in Bangladesh. *Clin Pathol Res J*. 2017;**1**(1). Available from: http://dx.doi.org/10.23880/cprj-16000105.
3. Akyazı H. Quality of life in adult patients with acne vulgaris before and after treatment. *Dicle Med J*. 2011;**38**(3):282–8. Available from: http://dx.doi.org/10.5798/diclemedj.0921.2011.03.0032.
4. Behnam B, Taheri R, Ghorbani R, Allameh P. Psychological impairments in the patients with acne. *Indian J Dermatol*. 2013;**58**(1):26–9. Available from: http://dx.doi.org/10.4103/0019-5154.105281.
5. Hedlund JL, Viewig BW. The Hamilton rating scale for depression: a comprehensive review. *J Oper Psychiatry*. 1979;**10**:149–65.
6. Firestone RW, Firestone LA. Firestone Assessment of Self-Destructive Thoughts Manual. San Antonio, TX: Psychological Corporation; 1996.
7. Berrios GE, Bulbena-Villarasa A. The Hamilton Depression Scale and the numerical description of the symptoms of depression. Psychopharmacol Ser. 1990;**9** :80–92. Available from: http://dx.doi.org/10.1007/978-3-642-75373-2_10.
8. Mba EGM. Acne vulgaris: Overview of management. In: Dellavalle RP, Levy ML, Owen C, editors. Acne and Acne Management. 2019.
9. Adityan B, Kumari R, Thappa DM. Scoring systems in acne vulgaris. *Indian J Dermatol Venereol Leprol.* 2009;**75**(3):323–6. Available from: http://dx.doi.org/10.4103/0378-6323.51258.
10. Dawson AL, Dellavalle RP. Acne vulgaris. *BMJ*. 2013;**346**: Available from: http://dx.doi.org/10.1136/bmj.f2634.
11. Benner N, Sammons D. Overview of the treatment of acne vulgaris. *Osteopat Fam Phys.* 2013;**5**(5):185–90. Available from: http://dx.doi.org/10.1016/j.osfp.2013.03.003.
12. Fuster V, Rydén LE, Cannom DS, Crijns HJ, Curtis AB, Ellenbogen KA, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation: full text. *Europace.* 2006;**8**(9):651–745. Available from: http://dx.doi.org/10.1093/europace/eul097.
13. Department of Health and Human Services, Office of Public Health and Science, Office on Women's Health. Acne. 2009;**16**:
14. Melnik B, Jansen T, Grabbe S. Abuse of anabolic-androgenic

steroids and bodybuilding acne: an underestimated health problem. *J Dtsch Dermatol Ges*. 2007;**5**(2):110–7. Available from: http://dx.doi.org/10.1111/j.1610-0387.2007.06176.x.

15. Taylor M, Gonzalez M, Porter R. Pathways to inflammation: acne pathophysiology. *Eur J Dermatol*. 2011;**21**(3):323–33. Available from: http://dx.doi.org/10.1684/ejd.2011.1357.
16. Nurani FA, Rejeki NR, Setyoputri T, Wardani PK, Ridwan FB, Suparmi S, et al. The potency of ethanolic extract from corn silk as natural antibiotics for acne-related bacteria: A preliminary study. *Bangladesh J Med Sci*, 2022 ;**21**(1):84-9. https://doi.org/10.3329/bjms.v21i1.56331
17.
1. Questions and Answers about Acne, National Institutes of Health 1: 5p. National Institute of Arthritis and Musculoskeletal and Skin Diseases. 2016.
18. Bek-Thomsen M, Lomholt HB, Kilian M. Acne is not associated with yet-uncultured bacteria. *J Clin Microbiol*. 2008;**46**(10):3355–60. Available from: http://dx.doi.org/10.1128/jcm.00799-08.
19. Lomholt HB, Kilian M. Population genetic analysis of Propionibacterium acnes identifies a subpopulation and epidemic clones associated with acne. *PLoS One*. 2010;**5**(8):e12277. Available from: http://dx.doi.org/10.1371/journal.pone.0012277.
20. Davidovici BB, Wolf R. The role of diet in acne: facts and controversies. *Clin Dermatol.* 2010;**28**(1):12–6. Available from: http://dx.doi.org/10.1016/j.clindermatol.2009.03.010.
21. Ferdowsian HR, Levin S. Does diet really affect acne? *Skin Therapy Lett.* 2010;**15**(3):1–2, 5.
22. Smith RN, Mann NJ, Braue A. The Effect of a High Protein, Low Glycemic Load Diet versus a Conventional, High Glycemic Load Diet on Biochemical Parameters associated with Acne Vulgaris: A Randomized, Investigator Masked, Controlled Trial. *J Am Acad Dermatol*. 2007;**57**(2):247–56.
23. Melnik BC. Evidence for Acne Promoting Effects of Milk and Other Insulinotropic Dairy Products. Nestlé Nutr Institute Workshop Series: *Pediatr Prog.* 2011;**67**:131–145.
24. Cengiz GF, Gürel G. Difficulties in emotion regulation and quality of life in patients with acne. *Qual Life Res.* 2020 Feb;**29**(2):431-438. doi: 10.1007/s11136-019-02318-2. Epub 2019 Oct 11. PMID: 31605308.
25. Kutlu Ö, Karadağ AS, Wollina U. Adult acne versus adolescent acne: a narrative review with a focus on epidemiology to treatment. *An Bras Dermatol.* 2023 Jan-Feb;**98**(1):75-83. doi: 10.1016/j.abd.2022.01.006.
26. Jennings T, Duffy R, McLarney M, Renzi M, Heymann WR, Decker A, Lawrence N. Acne scarring-pathophysiology, diagnosis, prevention and education: Part I. *J Am Acad Dermatol.* 2024 Jun;**90**(6):1123-1134. doi: 10.1016/j.jaad.2022.04.021