

## Original Research Article

### *The association between psychosocial impact and the quality of life of patient with acne vulgaris among public in Al Qunfudah province, southern Saudi Arabia*

#### **Abstract**

##### **Background:**

Acne vulgaris is a common disease condition, affecting approximately 9.4% of the world's population, with the highest prevalence in adolescents. It affects over 90% of men and 80% of women in all ethnic groups. It is not life-threatening or physically debilitating; however, acne lesions can leave post-inflammatory hyperpigmentation and/or atrophic scars in moderate to severe acne cases, influencing quality of life (QoL) and leading to low self-esteem and weak social interactions.

##### **Material and Methods:**

This cross-sectional study was conducted in AlQunfudah, Saudi Arabia, in 2021. Data were collected using a Google form questionnaire. The study population consisted of 210 participants. Saudi women and men aged  $\geq 15$  years who agreed to participate in the study were included, and no exclusion criteria were used. We used the Dermatology Life Quality Index (DLQI), a validated questionnaire that grades QoL.

##### **Results:**

The study included 210 patients with comparatively more women (83.6%) than men (16.2%). The age distribution showed that 48.1% (n=101) of the patients were 21-25 years old, and 21.9% were 26-30 years old. Patients with severe acne scars had a higher DLQI score ( $8.91 \pm 5.56$ ) compared to others ( $p < 0.001$ ), and those with grade III had high scores of  $9.38 \pm 5.14$  ( $p = 0.004$ ). The DLQI scores were higher in individuals with post-acne hyperpigmentation.

##### **Conclusion:**

Acne is a common skin disease in Al Qunfudah people and is a highly prevalent condition that affects both sexes. This has a considerable impact on their QoL. Health education is needed to encourage people to seek appropriate help.

**Keywords:** Acne vulgaris, Quality of life, Dermatology Life Quality Index, psychosocial

impact.

## Introduction:

Acne vulgaris is one of the most common disease conditions, affecting approximately 9.4% of the world's population with the highest prevalence in adolescents. It affects over 90% of men and 80% of women in all ethnic groups. [1,2] In Saudi Arabia, we noticed a variation in the prevalence between different studies upon the revision of previously published studies on the prevalence of acne among female adolescents. However, in general, the prevalence is high. For instance, a survey in central Saudi Arabia, Al Robaee, reported a 56.2% acne rate among Qassim University students, with little difference between the two sexes. [3] In Riyadh city (the capital of the Kingdom of Saudi Arabia), the prevalence of acne vulgaris among adolescent and young women was 68.2%. [4] In Jizan, the prevalence of self-reported acne among intermediate and secondary school students was 65.1% and women were more affected than men (71% and 60%, respectively). [5] In Makkah, the prevalence of acne vulgaris among women (14-38 years) in dermatology outpatient clinics of three hospitals was 56.6%. [6]

There is a general acknowledgment that there are many components in the etiology of acne vulgaris. [7] This could be ascribed to both genetic and environmental factors. There is a familial predisposition to severe forms of acne that supports a genetic element. Acne commonly occurs around puberty, but it may begin later in the thirties and forties (in adulthood). [8-10] It requires several years prior to spontaneous remission. [8] Appearance is substantial in our society and impacts the way in which others view us. The most visible organ of the body is the skin and determines, to a significant extent, our appearance, with a spacious function in social and sexual communication. [11] Skin diseases have adversely impacted human beings, both in the agreement of their self-picture and with the quality of liveliness. [12]

Acne can lead to the deterioration of the quality of life (QoL) and influence the patient's social and psychological functioning; however, acne vulgaris is not life-threatening nor physically debilitating. Acne lesions can leave post-inflammatory hyperpigmentation and/or atrophic scars in moderate to severe acne cases, which can influence QoL and lead to low self-esteem and weak social interaction. [13] Acne usually affects the face, the presenting part of the body, and may cause shame, guilt, and social isolation. It is commonly noted during adolescence, which is the leading time to the development of self-identity and external appearance, with featured social and physical changes in children's lives. Teenagers with acne lesions may experience behavioral and emotional problems during this sensitive period. It has been reported that people with acne experience dissatisfaction and shame because of their appearance and a decrease in self-confidence. [14,15] Not treating acne may lead to scarring. One of the most common sites of acne lesions is the face, which results in considerable distress to the patient, usually disproportionately to the disease severity. The driving forces behind intensive efforts to find a suitable cure, even in mild cases, are the psychological and social impacts of acne. [16]

Acne is a disorder in which commitment has a considerable influence on treatment results. Treatment is usually delayed because patients may wait for more than a year before asking for medical advice. [17] The amelioration of current knowledge and comprehension of the various presentations of acne allows for individualization, tailoring treatment, and improved results in acne patients. [18] The primary complications of acne are scarring and psychosocial distress,

which persist long after the active lesions have vanished. [19] The beginning of acne in a teenager may add to the emotional and psychological confrontation experienced during this phase. [20] This condition has also linked with multiple consequences for the general well-being, including depression, [21-22] low self-confidence, [23] fatigue, [24] dissatisfaction with body image, [25,26] and more suicidal thoughts. [27]

This study was assessed the The association between psychosocial impact and the quality of life of patient with acne vulgaris among Saudi people in AlQunfudah.

## **Material and Methods**

This cross-sectional study was conducted in Al-Qunfudah, Saudi Arabia, in 2021. Data were collected using a Google form questionnaire. The study population consisted of 210 participants. Saudi women and men aged  $\geq 15$  years, who agreed to participate in the study were included, and no exclusion criteria were used.

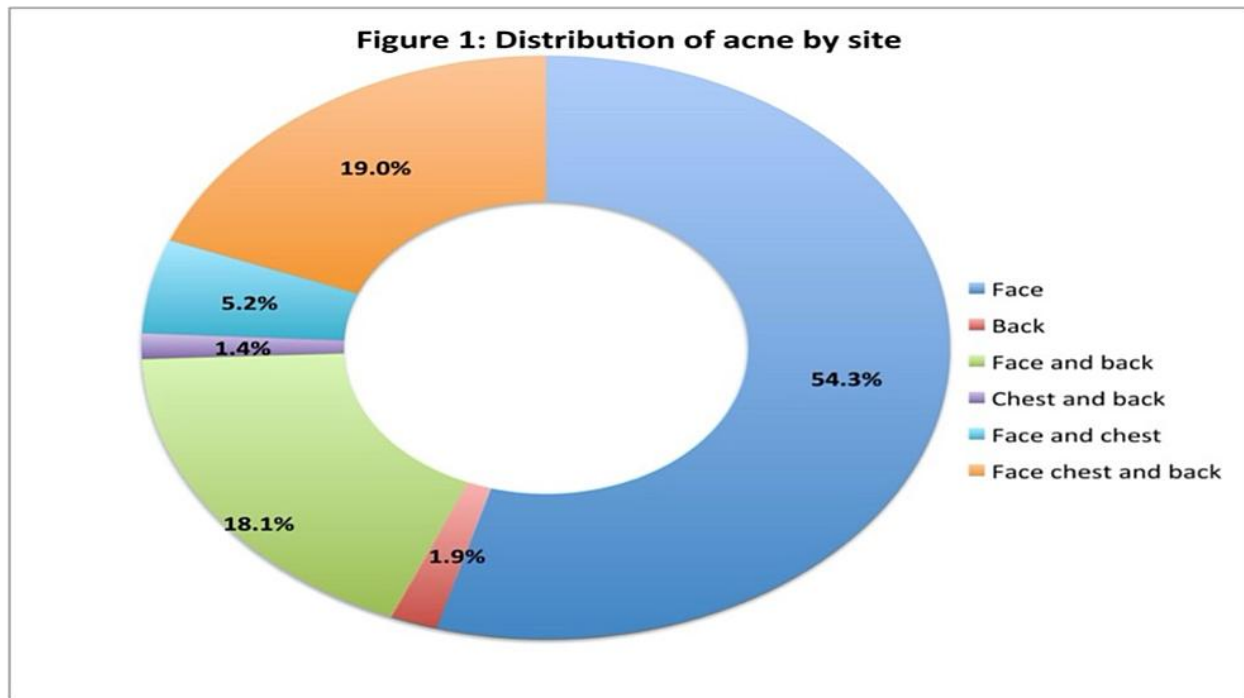
The study used a validated, pre-tested, and Google form questionnaire to collect data. We used the Dermatology Life Quality Index (DLQI), a validated questionnaire that grades the QoL by assessing domains 10 questions. The final DLQI score was the sum of all the scores (range, 0-30 years). High scores indicate a poor QoL.

Data were analyzed using the SPSS version 23 (IBM Corp. Chicago, USA). The normality of the main continuous variable (DLQI scores) was tested and found to be normally distributed (Shapiro-Wilk test,  $p > 0.05$ ). Continuous variables were expressed as mean and standard deviation and categorical variables using frequencies and percentages. Student's t-test and analysis of variance were used to compare the differences in the DLQI scores between the different groups. Pearson's chi-square test was used to evaluate the statistical relationships between the categorical variables. The statistical significance was set at  $P \leq 0.05$ .

The Umm AlQura University College of Medicine Research Committee approved the study protocol. This study was performed in accordance with the tenets of the Declaration of Helsinki.

## **Results:**

The study included 210 patients with comparatively more women (83.6%) than men (16.2%). The participants' age distribution showed that 48.1% ( $n=101$ ) of them were aged 21-25 years, and 21.9% were 26-30 years old. The most common site of acne was seen on the face (54.3%), and 19% had acne on the face, chest, and back (Figure 1).



There were no statistically significant differences in the acne site between the two sexes ( $p=0.540$ ). It was observed that grade 1 (41.9%) and grade II (41.4%) were the common acne types in this study population; additionally, both types were more frequently reported in women than in men, which showed statistically significant differences ( $p<0.001$ ). The more severe type of acne was more commonly seen in women (90.9%) than in men (9.1%); however, there was no statistically significant association between the sex and acne scars ( $p=0.130$ ) (Table 1).

**Table 1:** Comparison between sexes in terms of the site of acne, grade of acne, and acne scar

			Gender		Total	P value
			Female	Male		
Site of acne	Face		94	20	114	0.540
			82.5%	17.5%	54.3%	
	Back		4	0	4	
			100.0%	0.0%	1.9%	
	Face and back		32	6	38	
			84.2%	15.8%	18.1%	

	Face and chest		11	0	11	
			100.0%	0.0%	5.2%	
	Chest and back		3	0	3	
			100.0%	0.0%	1.4%	
	Face chest and back		32	8	40	
			80.0%	20.0%	19.0%	
Grade of acne	Grade 1		74	14	88	<0.001
			84.1%	15.9%	41.9%	
	Grade 2		81	6	87	
			93.1%	6.9%	41.4%	
	Grade 3		16	8	24	
			66.7%	33.3%	11.4%	
	Grade 4		5	6	11	
			45.5%	54.5%	5.2%	
Acne scar	Absent		24	10	34	0.130
			70.6%	29.4%	16.2%	
	Mild 1-4		70	10	80	
			87.5%	12.5%	38.1%	
	Moderate (5-10)		72	13	85	
			84.7%	15.3%	40.5%	
	Severe >10		10	1	11	
			90.9%	9.1%	5.2%	

When we compared the skin type and grade of acne, it was found that more people with “oily skin” had grade III (18.8%) and grade IV (7.1%) acne compared to other skin types, whereas grade 1 was seen more in the dry (81.8%) and normal skin types (61.9%) ( $p<0.001$ ). Similarly, severe acne scars were more common in grade III (45.5%) and moderate acne scars were more common in grade II (54.1%) than in other types ( $p<0.001$ ). We observed that grade II acne displayed more post-acne hyperpigmentation (46.6%), whereas grade III had 14.3% and grade IV had 7.5%, which showed a statistically significant association ( $p<0.001$ ) (Table 2).

<b>Table 2: Comparison of the grade of acne in terms of the type of skin, acne scars, and postacne hyperpigmentation</b>								
			Grade of acne vulgaris				Total	P value
			Grade I	Grade II	Grade III	Grade IV		
Skin Type	Normal		26	9	6	1	42	<0.001
			61.9%	21.4%	14.3%	2.4%	20.0%	
	Dry		9	2	0	0	11	
			81.8%	18.2%	0.0%	0.0%	5.2%	
	Mixed		32	34	2	4	72	
			44.4%	47.2%	2.8%	5.6%	34.3%	
	Oily		21	42	16	6	85	
			24.7%	49.4%	18.8%	7.1%	40.5%	
Acne scar	Absent		25	6	3	0	34	<0.001
			73.5%	17.6%	8.8%	0.0%	16.2%	
	Mild 1-4		42	31	4	3	80	
			52.5%	38.8%	5.0%	3.8%	38.1%	
	Moderate (5-		19	46	12	8	85	

	10)		22.4%	54.1%	14.1%	9.4%	40.5%	
	Severe >10		2	4	5	0	11	
			18.2%	36.4%	45.5%	0.0%	5.2%	
Post acne hyperpigmentation	Absent		46	25	5	1	77	<0.001
			59.7%	32.5%	6.5%	1.3%	36.7%	
	Present		42	62	19	10	133	
			31.6%	46.6%	14.3%	7.5%	63.3%	

The mean DLQI scores among this study population were found to be  $6.92 \pm 4.92$ . There were no significant differences observed in the DLQI scores between age and sex; however, there were significant differences between the duration of the acne, acne scars, acne grade, and post-acne hyperpigmentation. The DLQI scores were comparatively higher in individuals who had acne for 25-36 months ( $13.50 \pm 6.97$ ) and >36 months ( $9.16 \pm 4.92$ ) ( $p < 0.001$ ). Severe acne scars resulted in a higher DLQI score ( $8.91 \pm 5.56$ ) compared to others ( $p < 0.001$ ), and grade III acne resulted in higher scores of  $9.38 \pm 5.14$  ( $p = 0.004$ ). The DLQI scores were higher in the patients with post-acne hyperpigmentation ( $p = 0.010$ ) (Table 3).

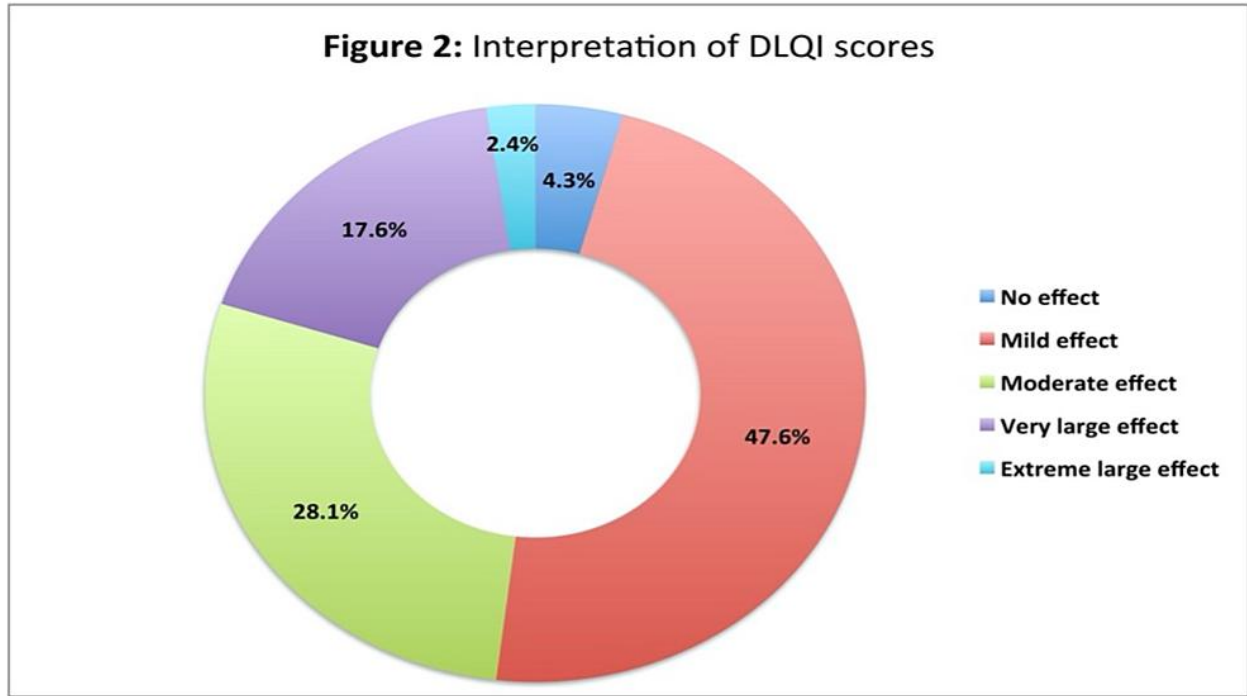
**Table 3: Mean DLQI scores according to age, sex, duration of acne, grade of acne, acne scar, and postacne hyperpigmentation**

	DLQI				
		N	Mean	Std. Deviation	P value
Age	15-20	21	9.33	6.97	0.090
	21-25	101	6.81	4.35	
	26-30	46	6.09	4.81	
	31-35	11	6.91	3.27	
	36-40	20	8.05	6.31	

	>40	11	4.82	2.60	
Gender	Female	174	7.01	5.10	0.437
	Male	34	6.29	3.73	
Duration of acne (Months)	0-6	116	5.26	3.70	<0.001
	7-12	27	8.22	5.12	
	13-24	27	8.19	5.55	
	25-36	8	13.50	6.97	
	>36	32	9.16	4.92	
Acne scar	Absent	34	3.97	2.95	<0.001
	Mild	80	6.16	4.12	
	Moderate	85	8.56	5.47	
	Severe	11	8.91	5.56	
Grade of acne	Grade I	88	5.65	4.15	0.004
	Grade II	87	7.54	5.46	
	Grade III	24	9.38	5.14	
	Grade IV	11	6.91	2.81	
Postacne hyperpigmentation	Absent	77	5.74	4.20	0.010
	Present	132	7.55	5.16	



The interpretation of DLQI scores showed that a very large effect and an extremely large effect were seen in 17.6% and 2.4% of the study population, respectively (Figure 2).



It was found that grade III acne showed a very large effect (41.7%) and severe effect of DLQI (4.2%) compared to other grades of acne ( $p=0.018$ ). When we compared the acne scars with the DLQI, it was found that those who had severe acne scars had a very large effect (18.2%) and an extremely large effect (9.1%) compared to others ( $p<0.001$ ) (Table 4).

Table 4: Distribution of the interpretation of DLQI scores according to the grade of scar and acne									
scar									
			Interpretation of DLQI scores					Total	P value
			No effect	Mild effect	Moderate effect	Very large effect	Extreme large effect		
Grade of scar	Grade 1		6	50	20	12	0	88	0.018
			6.8%	56.8%	22.7%	13.6%	0.0%	41.9%	
	Grade 2		3	40	26	14	4	87	
			3.4%	46.0%	29.9%	16.1%	4.6%	41.4%	

	Grade 3		0	5	8	10	1	24	
			0.0%	20.8%	33.3%	41.7%	4.2%	11.4%	
	Grade 4		0	5	5	1	0	11	
			0.0%	45.5%	45.5%	9.1%	0.0%	5.2%	
Acne Scar	Absent		5	24	3	2	0	34	<0.001
			14.7%	70.6%	8.8%	5.9%	0.0%	16.2%	
	Mild		4	40	26	10	0	80	
			5.0%	50.0%	32.5%	12.5%	0.0%	38.1%	
	Moderate		0	34	24	23	4	85	
			0.0%	40.0%	28.2%	27.1%	4.7%	40.5%	
	Severe		0	2	6	2	1	11	
			0.0%	18.2%	54.5%	18.2%	9.1%	5.2%	

## Discussion:

This cross-sectional study included 210 participants from Al-Qunfudha province, Saudi Arabia, which explored the prevalence and severity of acne vulgaris (AV) and its psychosocial impact on their QoL. The findings of this study showed that the most commonly affected site by AV was the face, grade I (41.9%) and grade II (41.4%) AV were the most common clinical types, and 5.2% of the study population had severe scarring due to AV. Another hospital-based study conducted by Hazarika and Rajaprabha in India, which included 114 patients with AV, showed similar findings, which showed that facial acne was the most common type of AV and grade II was the most common type. [28] A recent systemic review reported that the prevalence of AV is very high in Saudi Arabia, which is comparatively more prevalent in women than in men. [29] Studies conducted in different regions of Saudi Arabia have shown a prevalence of 53.5% in Arar, [4] 58.8% in Jeddah among women university students, [30] and a high prevalence of 84.8% was reported among women medical students in Medinah. [31]

Research evidence showed that AV lesions usually develop during the beginning of adolescence, approximately at 15 years of age and may manifest for the first time in this period or persist

continuously or intermittently, more commonly in women. [32,33] In the etiopathogenesis of AV, there is a strong, complex interrelationship between androgenic hormone stimulation, alterations in the lipid levels, follicular hyper-keratinization, and an increase in the bacterial colonization of *Propionibacterium acnes* (*P. acnes*), and superficial inflammatory dermatoses. [33,34] As in most dermatological diseases, AV also causes significant negative psychological effects and social impacts that could lead to a poor QoL among affected individuals. In this study, 63.3% of the participants reported post-acne hyperpigmentation and found that post-hyperpigmentation negatively impacted the participants' QoL. This is consistent with the findings of previous studies. [28,29,35] Another study conducted by Al Robaee in Central Saudi Arabia reported that acne has minimal impact on QoL. [3] The severity of post-acne hyperpigmentation is determined by the type of skin and color, depth and degree of inflammation, degree of damage at the dermo-epidermal junction, and stability in vitiligo. [36] The QoL was more affected in participants aged 25 years and above. There were no significant differences observed in the DLQI between the sexes. Similar findings were reported by a study done by Durai and Nair in India. [37] It has been reported that the impact of acne worsens with age and negatively influences social life. [38,39] This could be explained on the basis of the concerns or weightage given to self-esteem and appearance during this age as individuals start to socialize as a part of their occupation, which is also the age group in which most individuals think of getting married compared to adolescence, where family is a major part of their life and appearance is not a big concern. [40]

Another significant finding in this study was that participants with oily skin experienced more severe acne than other skin types. These findings are similar to those of previous studies reported by Kulanthan et al. [19] and Hazarika and Rajaprabha. [28]

Research shows that acne negatively influences the QoL, leading to the development of signs and symptoms of depression, anxiety, and poor self-esteem. [41-43] It has also been reported that women experience acne's psychological impact more than men, even in mild clinical conditions. [44] Both topical and systemic treatments have been used to manage AV. Topical medication in the form of creams or gels, such as retinoids (adapalene, tretinoin), antibiotics, benzoyl peroxide, azelaic acid 20%, dapsone, and a combination of two of these medications is commonly used to treat mild to moderate cases of AV. [45-50] In systemic treatment, hormonal therapy, antibiotics, androgen receptor blockers (cyproterone acetate, spironolactone, drospirenone, and flutamide), inhibitors of ovarian androgen production, inhibitors of adrenal androgen production, and isotretinoin were found to be effective in the treatment of AV. [44,51-53] Adjuvant therapies, such as cosmeceuticals and cosmetics, and mechanical procedures (intralesional infiltration with corticosteroids, extractions of comedones, draining of cysts and abscesses, and microdermabrasion) are used to minimize the adverse effects of topical and systemic medicaments. [54-56] In any case of AV, apart from the type of medication used, the doctors' care, attention, and a good relationship with the patient are essential to positively impact the QoL in these patients. It is imperative to provide proper assurance and counseling to these patients to reduce the psychosocial impact of the lesions on their QoL and improve self-esteem.

## Conclusions:

In conclusion, acne is a common skin disease among AlQunfudah and is a highly prevalent condition that affects both sexes. It has a considerable impact on their QoL. Health education is needed to encourage people to seek appropriate help for skin problems.

## COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## References

1. Yosipovitch G, Tang M, Dawn AG, : [et al. Study of psychological stress, sebum production and acne vulgaris in adolescents](#). Acta Derm Venereol. 2007, 87:135-9. [10.2340/00015555-0231](#)
2. Tan J, Bhate KA: [Global perspective on the epidemiology of acne](#). Br J Dermatol. 2015, 172:3-12. [10.1111/bjd.13462](#)
3. Al Robaee AA: [Prevalence, knowledge, beliefs and psychosocial impact of acne in University students in Central](#). Saudi Arabia. Saudi Med J. 2005, 26:1958-61.
4. Abo El-Fetoh NM, Alghamdi RS, Albarqi WA, Asiri SAM, Alruwaili NQ: [Epidemiology Of Acne Vulgaris In Adolescent And Young Females In Riyadh City, Kingdom Of Saudi Arabia](#). Int J Adv Res. 2016, 4:589-98. [10.21474/IJAR01/2434](#)
5. Bajawi S, Salih S, Mahfouz MS, Bajawi N, Asiri B: [Acne Vulgaris Awareness and Impact on Quality of Life and Psychological Status of Adolescent School Children in Jazan, Saudi Arabia](#). International Journal of Sciences: Basic and Applied Research. 2016, 25:374-84.
6. Bahattab ES, Alharbi AA, Alsulami BA,: [et al.Acne Vulgaris and Its Influence on Quality of Life of Female Patients, Makkah, Saudi Arabia](#). Int J Med Res Prof. 2017, 3:184-8.
7. Rzany B, Kahl C: [Epidemiology of acne vulgaris](#). Journal der Deutschen Dermatologischen Gesellschaft. 2006, 4:8-9. [10.1111/j.1610-0387.2005.05876.x](#)
8. Cunliffe WJ, Gould DJ: [Prevalence of facial acne vulgaris in late adolescence and in adults](#). British Medical Journal. 1979:1109-1110. [10.1136/bmj.1.6171.1109](#)
9. Al-Hoqail IA: [Knowledge, beliefs and perception of youth toward acne vulgaris](#). Saudi Medical Journal. 2003, 24:765-768.

10. Tallab TM: [Beliefs, perceptions and psychological impact of acne vulgaris among patients in the Assir region of Saudi Arabia](#). West African Journal of Medicine. 2004, 23:85-87. [10.4314/wajm.v23i1.28092](#)
11. Ongenae K, Beelaert L, van Geel N, Naeyaert JM: [Psychosocial effects of vitiligo](#). J Eur Acad Dermatol Venereol. 2006, 20:1-8. [10.1111/j.1468-3083.2005.01369.x](#)
12. Thomas DR: [Psychosocial Effects of Acne](#). J Cutan Med Surg. 2004, 8:3-5. [10.1007/s10227-004-0752-x](#)
13. Alajlan A, Alhazzani Y, Alhowaish N: [Prevalence, level of knowledge and lifestyle association with acne vulgaris among medical students](#). Journal of Dermatology & Dermatologic Surgery. 2017, 21:58-6. [10.1016/j.jdds.2017.01.001](#)
14. Levenson JL: [Psychiatric issues in dermatology, part 3: Acne vulgaris and chronic idiopathic pruritus](#). Prim Psychiatry. 2008, 15:28-30.
15. Kokandi A: [Evaluation of acne quality of life and clinical severity in acne female adults](#). 2010. [10.1155/2010/410809](#)
16. [Acne: prevalence, perceptions and effects on psychological health among adolescents in Aydin, Turkey](#). Uslu G, Şendur N, Uslu M, Şavk E, Karaman G, Eskin M. J Eur Acad Dermatol Venereol. 2008, 22:462-469. [10.1111/j.1468-3083.2007.02497.x](#)
17. Tan JKL, Vasey K, Fung KY: [Beliefs and perceptions of patients with acne](#). Journal of the American Academy of Dermatology. 2001, 44:439-445. [10.1067/mjd.2001.111340](#).
18. Haider A, Shaw JC: [Treatment of acne vulgaris](#). Journal of the American Medical Association. 2004, 292:726-735. [10.1001/jama.292.6.726](#)
19. Kulthanan K, Jiamton S, Kittisarapong R: [Dermatology life quality index in Thai patients with acne](#). Siriraj Med J. 2007, 59:3-7.
20. Misery L: [Consequences of psychological distress in adolescents with acne](#). J Invest Dermatol. 2011, 131:290-2. [10.1038/jid.2010.375](#)
21. Gupta MA, Gupta AK: [Depression and suicidal ideation in dermatology patients with acne, alopecia areata, atopic dermatitis and psoriasis](#). Brit J Dermatol. 1998, 139:846-850. [10.1046/j.1365-2133.1998.02511.x](#)
22. Vallerand IA, Lewinson RT, Parsons LM, et al. [Risk of depression among patients with acne in the U.K.: a population-based cohort study](#). Brit J Dermatol. February. 2018, [10.1111/bjd.16099](#)
23. Magin P, Adams J, Heading G, Pond D, Smith W: [Experiences of appearance-related teasing and bullying in skin diseases and their psychological sequelae: Results of a qualitative study](#). Scand J Caring Sci. 2008, 22:430-436. [10.1111/j.1471-6712.2007.00547.x](#)
24. Misery L, Wolkenstein P, Amici JM, et al. [Consequences of acne on stress, fatigue, sleep disorders and sexual activity: A population-based study](#). Acta Derm-Venereol. 2015, 95:485-488. [10.2340/00015555-1998](#)
25. Murray CD, Rhodes K: [‘Nobody likes damaged goods’: The experience of adult visible acne](#). Brit J Health Psych. 2005, 10:183-202. [10.1348/135910705X26128](#)
26. Papadopoulos L, Walker C, Aitken D, Bor R: [The relationship between body location and psychological morbidity in individuals with acne vulgaris](#). Psychol Health Med. 2000, 5:431-438. [10.1080/713690219](#)
27. Halvorsen JA, Stern RS, Dalgard F, Thoresen M, Bjertness E, Lien L: [Suicidal ideation, mental health problems, and social impairment are increased in adolescents with acne: a population-based study](#). J Invest Dermatol. 2011, 131:363-370. [10.1038/jid.2010.264](#)

28. Hazarika N, Rajaprabha RK: [Assessment of Life Quality Index Among Patients with Acne Vulgaris in a Suburban Population](#). Indian J Dermatol. 2016, 61:163-168. [10.4103/0019-5154.177758](#)
29. Alanazi AZ: [Acne vulgaris in Saudi Arabia: A systematic review](#). J Dermatol Dermatol Surg. 2020, 24:13-7. [10.4103/jdds.jdds\\_49\\_19](#)
30. Ibrahim NK, Nagadi SA, Idrees HJ, Alghanemi LG, Essa RI, Gari WS: [Acne vulgaris: Prevalence, predictors, and factors influencing quality of life of female medical students at King Abdulaziz University, Jeddah](#). J Dermatol Dermatol Surg. 2019, 23:7-12. [10.4103/jdds.jdds\\_39\\_18](#)
31. Arruhaily AA, Al-Juhani GA, Aljohani AM, Al-Juhani NA: [Prevalence and psychosocial effect of acne among female university students in Madinah, Saudi Arabia](#). International Journal of Medical Research Professionals. 2017, 3:70-4.
32. Rapp SR, Feldman SR, Graham G, Fleischer AB, Brenes G, Dailey M: [The Acne Quality of Life Index \(Acne-QOLI\): development and validation of a brief instrument](#). Am J Clin Dermatol. 2006, 7:185-92. [10.2165/00128071-200607030-00005](#)
33. Goulden V, Clark SM, Cunliffe WJ: [Post-adolescent acne: a review of clinical features](#). Br J Dermatol. 1997, 136:66-70. [10.1046/j.1365-2133.1997.d01-1144.x](#)
34. Bhat YJ, Latief I, Hassan I: [Update on etiopathogenesis and treatment of Acne](#). Indian J Dermatol Venereol Leprol. 2017, 83:298-306. [10.4103/0378-6323.199581](#)
35. Walker N, Lewis-Jones MS: [Quality of life and acne in Scottish adolescent schoolchildren: use of the Children's Dermatology Life Quality Index \(CDLQI\) and the Cardiff Acne Disability Index \(CADI\)](#). J Eur Acad Dermatol Venereol. 2006, 20:45-50. [10.1111/j.1468-3083.2005.01344.x](#)
36. Silpa-Archa N, Kohli I, Chaowattanapanit S, Lim HW, Hamzavi I: [Postinflammatory hyperpigmentation: A comprehensive overview: Epidemiology, pathogenesis, clinical presentation, and noninvasive assessment technique](#). J Am Acad Dermatol. 2017, 77:591-605. [10.1016/j.jaad.2017.01.035](#)
37. Durai PC, Nair DG: [Acne vulgaris and quality of life among young adults in South India](#). Indian J Dermatol. 2015, 60:33-40. [10.4103/0019-5154.147784](#)
38. Jankovic S, Vukicevic J, Djordjevic S, Jankovic J, Marinkovic J: [Quality of life among school children with acne: Results of a cross-sectional study](#). Indian J Dermatol Venereol Leprol. 2012, 78:454-8. [10.4103/0378-6323.98076](#)
39. Lasek RJ, Chren MM: [Acne vulgaris and the quality of life of adult dermatology patients](#). Arch Dermatol. 1998, 134:454-8. [10.1001/archderm.134.4.454](#)
40. Tasoula E, Gregoriou S, Chalikias J, et al. [The impact of acne vulgaris on quality of life and psychic health in young adolescents in Greece. Results of a population survey](#). An Bras Dermatol. 2012, 87:862-9. [10.1590/S0365-05962012000600007](#)
41. Kellett SC, Gawkrödger DJ: [The psychological and emotional impact of acne and the effect of treatment with isotretinoin](#). Br J Dermatol. 1999, 140:273-282. [10.1046/j.1365-2133.1999.02662.x](#)
42. Dalgard F, Gieler U, Holm JØ, Bjertness E, Hauser S: [Self-esteem and body satisfaction among late adolescents with acne: results from a population survey](#). J Am Acad Dermatol. 2008, 59:746-751. [10.1016/j.jaad.2008.07.013](#)
43. Rapp DA, Brenes GA, Feldman SR, et al. [Anger and acne: implications for quality of life, patient satisfaction and clinical care](#). Br J Dermatol. 2004, 151:183-189. [10.1111/j.1365-2133.2004.06078.x](#)



44. Klassen AF, Newton JN, Mallon E: [Measuring quality of life in people referred for specialist care: of acne comparing generic and disease-specific measures](#). J Am Acad Dermatol. 2000, 43:229-233. [10.1067/mjd.2000.105507](#)
45. Bagatin E, Freitas THP, Rivitti-Machado MC, et al.: [Adult female acne: a guide to clinical practice \[published correction appears in\]](#). An Bras Dermatol. 2019, 94:255. Machado MCR [corrected to Rivitti-Machado MC].. [10.1590/abd1806-4841.20198203](#)
46. Thielitz A, Lux A, Wiede A, Kropf S, Papakonstantinou E, Gollnick H: [A randomized investigator-blind parallel-group study to assess efficacy and safety of azelaic acid 15% gel vs. adapalene 0.1% gel in the treatment and maintenance treatment of female adult acne](#). J Eur Acad Dermatol Venereol. 2015, 29:789-796. [10.1111/jdv.12823](#)
47. Berger R, Rizer R, Barba A,; et al. [Tretinoin gel microspheres 0.04% versus 0.1% in adolescents and adults with mild to moderate acne vulgaris: a 12-week, multicenter, randomized, double-blind, parallel-group, phase IV trial](#). Clin Ther. 2007, 29:1086-1097. [10.1016/j.clinthera.2007.06.021](#)
48. Kainz JT, Berghammer G, Auer-Grumbach P,; et al. [Azelaic acid 20 % cream: effects on quality of life and disease severity in adult female acne patients](#). J Dtsch Dermatol Ges. 2016, 14:1249-1259. [10.1111/ddg.12889](#)
49. Kircik LH: [Use of Dapsone 5% Gel as Maintenance Treatment of Acne Vulgaris Following Completion of Oral Doxycycline and Dapsone 5% Gel Combination Treatment](#). 2016. 5, 191-195:
50. Kircik LH. Fixed Combination of Clindamycin Phosphate 1.2% and Benzoyl Peroxide 3.75% Aqueous Gel: [Long-Term Use in Adult Females With Moderate Acne Vulgaris](#). J Drugs Dermatol. 2017, 16:543-546.
51. Bagatin E, Florez-White M, Arias-Gomez MI, Kaminsky A: [Algorithm for acne treatment - Iberian-Latin American Consensus](#). An Bras Dermatol. 2017, 92:689-693. [10.1590/abd1806-4841.20177003](#)
52. Dréno B, Layton A, Zouboulis CC, : et al. [Adult female acne: a new paradigm](#). J Eur Acad Dermatol Venereol. 2013, 27:1063-1070. [10.1111/jdv.12061](#)
53. Cooper AJ, Harris VR: [Modern management of acne](#). Med J Aust. 2017, 206:41-45. [10.5694/mja16.00516](#)
54. Chularojanamontri L, Tuchinda P, Kulthanan K, Pongparit K: [Moisturizers for acne-what are their constituents](#). J Clin Aesthet Dermatol. 2014, 7:36-44.
55. Larsen RL: [Over-the-counter treatments for acne and rosacea](#). Semin Cutan Med Surg. 2016, 35:87-95. [10.12788/j.sder.2016.026](#)
56. Barros BS, Zaenglein AL: [The Use of Cosmeceuticals in Acne: Help or Hoax?](#). Am J Clin Dermatol. 2017, 18:159-163. [10.1007/s40257-016-0249-6](#)