

Research Article

Psychological Impact of Acne and Post Inflammatory Hyperpigmentation Among Sudanese Women

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Abstract

Introduction: Acne vulgaris is a chronic inflammatory disorder of the skin which often causes a negative impact on a woman's psychological state and quality of life. This study seeks to provide basic data and information about the psychological impact of acne on Sudanese women. **Methodology:** A cross-sectional questionnaire-based study was conducted during the period from June 2022 to January 2023. A total of 400 females aged 15 years and above were included in this study. These are Sudanese women who had suffered from acne in their lives, and who responded to the online study questionnaire. Cardiff Acne Disability Index (CADI) was used to assess the psychological effect of acne. **Results:** Seventy one percent of respondents had active acne. Acne scars were observed in (74.8%) of participants, while post-acne hyperpigmentation was observed in (71.3%). Facial acne was the most common, as it was observed in (75.8%) of the respondents. The mean age at acne onset was 15.66 years and ranged between 10 and 36 years. Mild and moderate acne were the most common types, accounting for (37.0%) and (41.5%) of cases, respectively. Acne was found to affect the psychological state of the vast majority of the respondents (89%). Cosmetics or makeup were used by (42.3%) of the respondents to conceal acne and scars. Late onset of acne treatment was reported in (42%) of the cases. Most respondents (72.5%) visited doctors to treat acne. The mean Cardiff Acne Disability Index (CADI) score was 4.55, which reflects mild effects of acne on the quality of life of most of the respondents. The adverse psychological impact was found to be significantly associated with increased acne severity, scarring, and hyperpigmentation as well as with university educated respondents. **Conclusion:** It was found that acne has mild effects on the quality of life of Sudanese women. Late onset of acne treatment resulted in widespread scarring and post-inflammatory hyperpigmentation in most participants, which was associated with the psychological impact of acne. There is an urgent need to encourage early treatment of acne to reduce the physical sequelae of acne to reduce the psychosocial consequences associated with the disease and the risk of scarring and hyperpigmentation on Sudanese women. Sudanese health authorities and Sudanese doctors can address this issue through education and awareness programs.

Keywords

Acne, Psychological, Impact, Cosmetics, Adolescent, Women, Sudan

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1. Introduction

Acne is a chronic inflammatory disorder of the skin which affects around 80 percent of the world population during their lifetime. It is estimated to affect more than 90 percent of adolescent patients and 15 percent of the general population [1-3]. Despite of being mostly associated with adolescents, adults also are affected with increasing in their prevalence in last years [4, 5]. Acne has negative significant impact on quality of life (QoL) and self-image that may even lead to anxiety and depression [6, 7]. Acne is more common in oily skin, but it may affect all skin types [8]. In the adult female it presents as numerous main subtypes with different characteristics, either persistent acne (80%) which is a continuation of the disease from adolescence into adulthood and middle age or late-onset acne (20%) which first presents after puberty (usually between 21 and 25 years of age) [9-11].

Post-adolescent acne is mostly present on the jaw, chin, and neck, while adolescent acne is commonly located in the upper cheek, forehead and nose, and usually present as inflammatory and noninflammatory comedonal lesions [12]. Adult acne is usually resistant to treatment and require long term therapy and follow-up [13, 14]. The etiology of late onset acne is thought to be due to stress, cosmetics, and other inherited factors. Hormonal effects and the menstrual cycle are also affecting acne in adult females [15-17]. An increasing interest in adult acne made the related adverse psychological and social effects more apparent. Factors such as female gender, increased age and longer acne duration are all associated with a more impact on quality of life (QoL) [18-20].

2. Methodology

2.1. Study Design and Population

A descriptive, cross-sectional, questionnaire-based study was conducted using an online questionnaire during the period from June 2022 to January 2023. The study population consisted of Sudanese women aged 15 years and over who suffered from post-adolescent acne or hyperpigmentation in their life. The study included 400 participants who filled out the questionnaire and met the inclusion criteria of this study. A standardized structured questionnaire was developed, pre-tested, and used to collect relevant data. A pilot study was conducted through an online interview and a face-to-face interview with ten of the target population to ensure the ease and quality of the research instrument. The questionnaire was developed in English and translated into Arabic to make it easier for participants to understand. Data collected included demographic characteristics and acne-related data covering family history, prevalence of active acne, scarring, hyperpigmentation, acne site and severity, and patients' perception of acne.

Cardiff Acne Disability Index Score

The Cardiff Acne Disability Index (CADI) is designed for

use in teenagers and young adults with acne. The CADI score is calculated by summing the score of each question resulting in a possible maximum of 15 and a minimum of 0. Higher scores indicate that quality of life is more impaired. Quality of life according to the CADI scores was categorized into two groups: low scores (<8) and high scores (8+) [21, 22].

2.2. Statistical Analysis

The data were entered into the computer program Statistical Package for the Social Sciences (SPSS), version 25.0. Descriptive statistics were used to summarize the data (mean, standard deviation, median) and analyzed by frequency tables. The Chi-square test was used to evaluate the association between categorized variables. A logistic regression analysis was performed to measure the association between the Cardiff Acne Disability Index score and explanatory variables. All statistical tests were considered statistically significant when the P value was <0.05.

3. Results

The mean age of the study respondents was 26.76 years and ranged from a minimum of 15 years to a maximum of 53 years. Table 1 shows the demographic characteristics of the respondents.

Most participants (242, 60.5%) experienced acne at the age of ≤ 15 years, while the average age when participants developed acne was 15.66 years and ranged from a minimum of 10 years to a maximum of 36 years, Figure 1.

Table 1. Demographic characteristics of the respondents, (n = 400).

Variables	Frequency	Percent (%)
Age group:		
15 – 25 years	189	47.3
26 – 35 years	156	39.0
≥ 36 years	55	13.8
Educational level:		
Primary school	1	0.3
Khalwa*	2	0.5
Secondary school	46	11.5
University	196	49.0
Post-graduation degree	155	38.8
Marital status:		
Single	183	45.8

Variables	Frequency	Percent (%)	Variables	Frequency	Percent (%)
Married	147	36.8	University student	107	26.8
In a relationship or engaged	57	14.3	School pupil	36	9.0
Divorced	10	2.5	Not working	19	4.8
Widow	3	0.8	Employee	193	48.3
Job title:					
Worker or businesswomen	19	4.8			
Housewife	26	6.5			

(*) Khalwa is traditional religious primary school

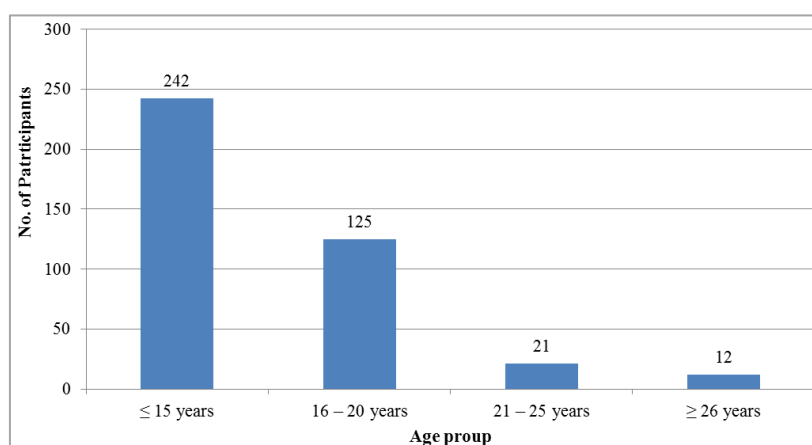


Figure 1. Distribution of the respondents according to the age in which acne started to appear, (n = 400).

Facial acne was the most common type of acne (321, 75.8%), while multiple site involvement (face, chest, and back together) was reported by (114, 28.85%) of the respondents, [Figure 2](#).

Most participants had a family history of acne (316, 70%), and nearly half of the respondents (197, 49.3%) reported that they had always had active acne, while the degree of acne

encountered was either mild (148, 37%) or severe in (166, 41.5%), [Table 2](#).

Prevalence of active acne or facial lesions at the time of the survey was noted by (286, 71.5%) of the respondents. Having Acne scars and post acne hyperpigmentation was reported by (299, 74.8%) and (285, 71.3%) of the respondents, respectively.

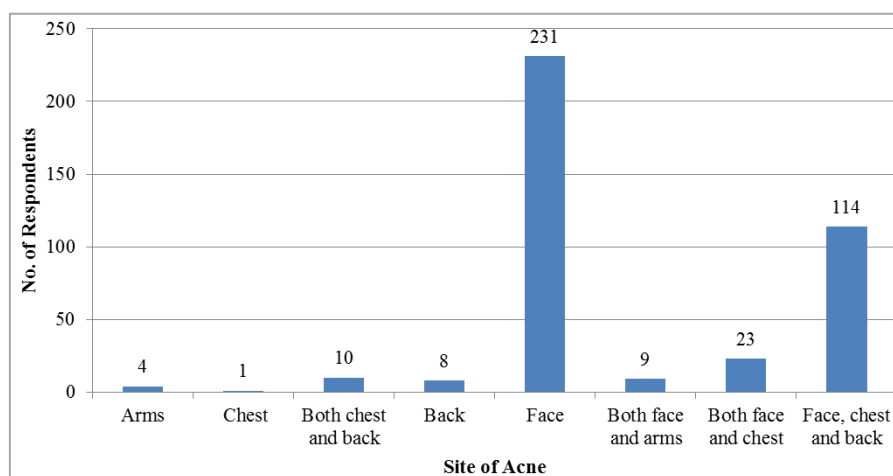


Figure 2. Distribution of the respondents according to the site of acne, (n = 400).

Table 2. Distribution of the respondents according to the degree of acne and frequency of active acne incidences per year, (n = 400).

Variables	Frequency	Percent (%)
Degree of acne:		
Mild	148	37.0
Moderate	52	13.0
Moderately sever	34	8.5
Sever	166	41.5
Duration of active acne incidences per year:		
Always	197	49.3
2 – 3 months	68	17.0
3 – 6 months	48	12.0
6 – 9 months	28	7.0
Rarely (few times per year)	59	14.8

Analysis of participants' perception of acne showed that a higher proportion of them were perceived as being negatively affected or feeling ashamed, stressed, or embarrassed by their acne.

Regarding the psychological impact of acne as thought by the participants, a high percentage thought that acne affects their psychological state (357, 89.3%), and (358, 89.5%) believed that it reduces their beauty. In addition, more than half of the participants (215, 53.8%) reported that they avoided going out of the house when they had active facial acne. However, only (144, 36%) of participants reported that they were embarrassed by their acne, [Table 3](#).

Concerning participants' attitude towards acne care and treatment, (290 72.5%) respondents reported that they consulted the doctor because of acne. Besides, (271, 67.8%) reported the usage of certain soap or face washing solutions, (258, 64.5%) avoided certain foods, while (169, 42.3%) resorted to the use of cosmetics or makeup to conceal acne and scars. only (87, 21.8%) of the respondents indicated the use of lightening creams to treat or hide acne scars, [Table 3](#).

Of the 357 participants - who believed that acne affects their psychological state - (199, 57.7%) noted that all factors related to acne affect their psychological state, while (61, 17.1%) indicated the presence of scars as a major factor, followed by the prevalence of active acne (41, 11.5%), then the severity of acne (27, 7.6%) and the duration of acne (25, 7.0%), [Figure 3](#).

Table 3. Participants' perception about the psychological impact of acne and their attitude towards acne care and treatment, (n = 400).

Participants' Perception and Attitude	Frequency	Percent (%)
Perception		
Acne affects psychological state.		
No	43	10.8
Yes	357	89.3
Acne decreases beauty.		
No	42	10.5
Yes	358	89.5
Avoid going outside home.		
No	185	46.3
Yes	215	53.8
Feel embarrassment by acne.		
No	256	64.0
Yes	144	36.0
Attitude		
Consult the doctor because of acne.		
No	110	27.5
Yes	290	72.5
Use certain soap or face washing solutions.		
No	129	32.3
Yes	271	67.8
Avoid certain foods to avoid acne.		
No	142	35.5
Yes	258	64.5
Use cosmetics or makeup to hide acne and scars.		
No	231	57.8
Yes	169	42.3
Use lightening creams to treat or hide acne scars.		
No	313	78.3
Yes	87	21.8

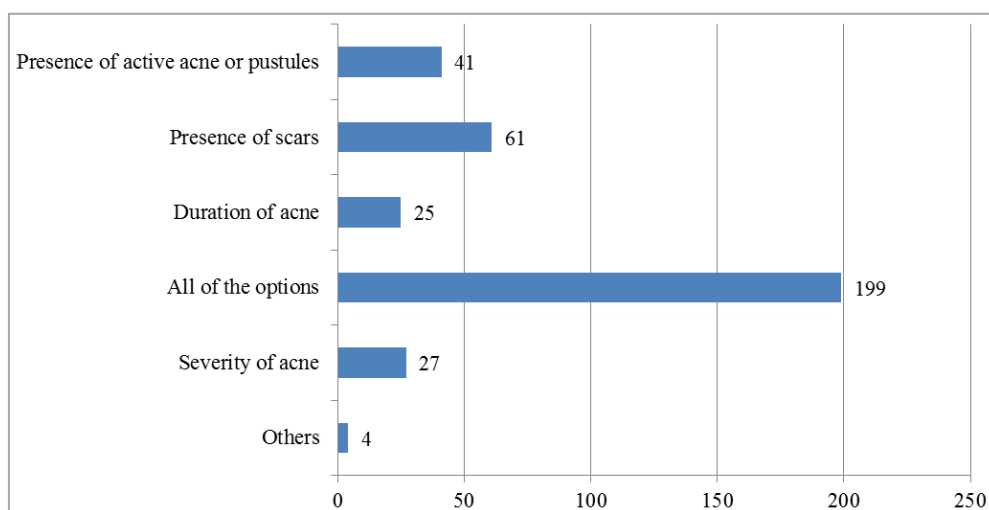


Figure 3. Respondents' opinions on the factors associated with acne affecting psychological state, (n = 357).

The duration between acne onset and start of treatment varied widely between participants, with most participants of active acne had a late start to treatment. Of the 290 participants who reported receiving treatment for this disease, only (92, 31.72%) received treatment immediately after active acne

onset. A smaller proportion of this group (79, 27.24%) received treatment months after, while a larger proportion (119, 42.03%) received treatment years after acne onset. Moreover, (191, 52.1%) of this group noted to treat acne on irregular basis, [Figure 4](#).

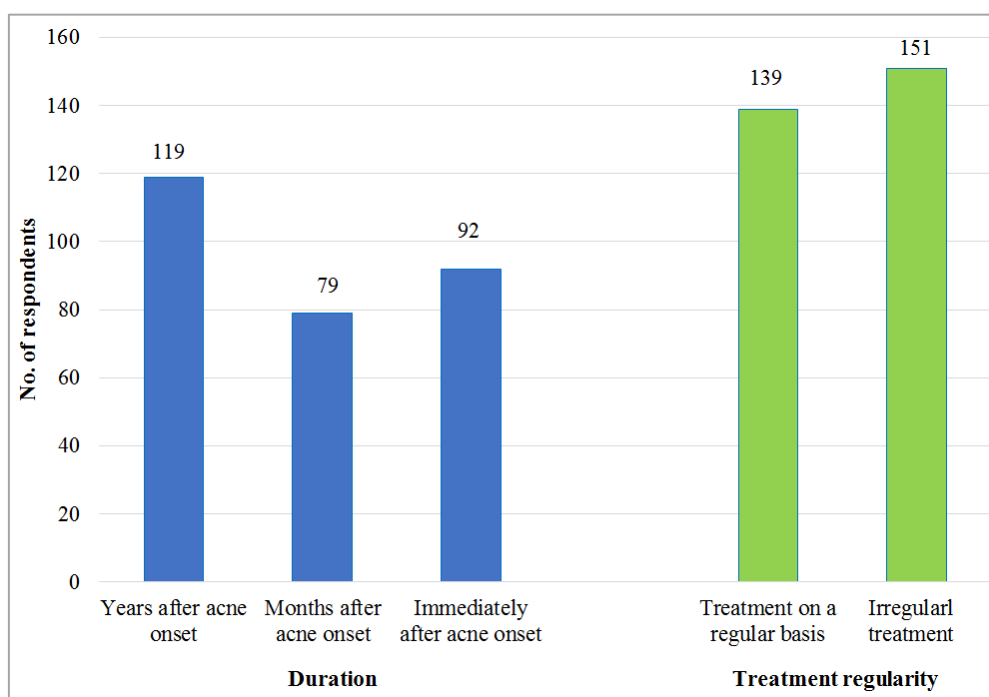


Figure 4. Duration between acne onset and start of treatment, and treatment regularity of Acne (n = 290).

The mean of the Cardiff Acne Disability Index (CADI) was 4.55. It ranged between 0 to 15. The average CADI score was 4.55. It ranged from 0 to 15.

The results revealed that of the 400 study cases only (96, 24.0%) were classified as having high scores, indicating that their quality of life was severely affected. The rest (304, 76.0%)

of the respondents were classified as having low scores, [Figure 5](#).

Cross-tabulation between the CADI score and demographic characteristics revealed a significant association between the CADI score and each of the age groups and education levels of the respondents, p value = 0.001 and 0.000, respectively,

while no significant relationship was indicated with other demographic factors as shown. In Table 4.

Presence of active acne, post acne hyperpigmentation and degree of acne were the acne related factors that indicated significant association when tested in cross tabulation with CADI score, with p values = 0.038, 0.006 and 0.000, respectively, Table 4.

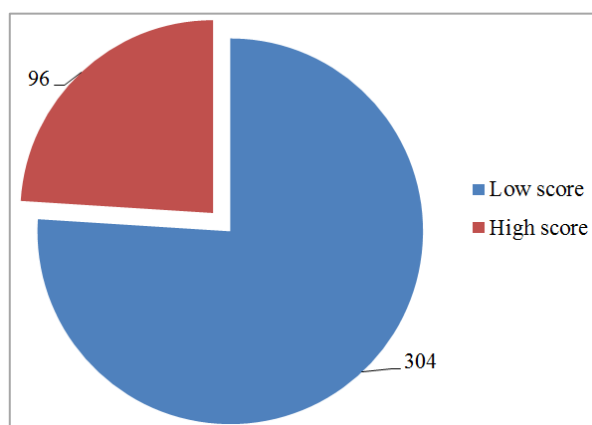


Figure 5. Distribution of the respondents according to Cardiff Acne Disability Index score, ($n = 400$).

Table 4. Cross tabulation between the Cardiff Acne Disability Index score and respondents' demographic factors; and acne related factors, ($n = 400$).

Variables	Cardiff Acne Disability Index score		P value
	Low score	High score	
Demographic Factors			
Age groups:			
15 – 25 years	132	57	0.001
26 – 35 years	134	22	
≥ 36 years	38	17	
Educational level:			
Primary school	1	0	0.000
Khalwa	1	1	
Secondary school	22	24	
University	150	46	
Post grads degree	130	25	
Acne Related Factors			
Prevalence of active acne or facial lesions			
No	95	19	0.038
Yes	209	77	

Variables	Cardiff Acne Disability Index score		P value
	Low score	High score	
Prevalence of post acne hyperpigmentation			
No	98	17	0.006
Yes	206	79	
Degree of acne			
Mild	125	23	0.000
Moderate	36	16	
Moderately sever	15	19	
Sever	128	38	

Cross-tabulation results also indicated significant associations between the CADI score and respondents' perceptions of the psychological impact of acne; and their attitudes toward treating acne. Factors with significance association were the belief that acne negatively affects psychology, use cosmetics or makeup to hide acne and scars, feeling embarrassment by acne and use of lightening creams to treat or hide acne scars, p values = 0.001, 0.000, 0.000 and 0.000, respectively, Table 5.

Table 5. Cross tabulation between the Cardiff Acne Disability Index score and respondents' perception and attitudes, ($n = 400$).

Variables	Cardiff Acne Disability Index Score		P value
	Low score	High score	
Belief that acne negatively affects psychology			
No	41	2	0.001
Yes	263	94	
Use cosmetics or makeup to hide acne and scars			
No	201	30	0.000
Yes	103	66	
Feel shay by acne			
No	233	23	0.000
Yes	71	73	
Use of lightening creams to treat or hide acne scars			
No	260	53	0.000
Yes	44	43	

Based on the results of the cross tabulation, a binary logistic regression model was used to examine the factors associated

with acne adverse psychological impacts. The independent variables entered in the model were the variables that were thought to exert adverse acne psychological impact on the respondents or thought to be correlated with the adverse impact. These variables included prevalence of active acne, hyperpigmentation, severity of acne, age groups, education levels, respondents perception, and attitudes of feeling embarrassed, use of cosmetics and use of lightening creams.

Variables found to have significant associations were severe degree of acne ($p=0.000$), attitudes feeling embarrassed ($p=0.000$), use of cosmetics ($p=0.000$), post acne hyperpigmentation ($p=0.001$), respondents' psychological effect per-

ception ($p=0.010$), university level of education ($p=0.002$), and presence of active acne ($p=0.030$), [Table 6](#). The Odds ratio which is labeled as Exp(B) in the table corresponds to change in the odds after a change of one unit in the predictor.

The results of [Table 6](#) demonstrate that the odds of having adverse acne psychological impact increases by a factor of 6.8 if a respondent has a severe degree of acne compared to those without severe acne. Similarly, odds of getting acne psychological impact increases by factor of 5.8 if a female is a university graduated compared to those of other education levels. The regression R square is 0.505.

Table 6. Binary logistic regression model results on factors affecting the psychological state of the respondents, ($n = 400$).

Variables	B	S.E	Wald	d.f.	Significance	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age *	0.313	0.270	1.344	1	0.246	1.368	0.805	2.323
Education * Primary school			10.924	4	0.027			
Secondary school	2.494	1.896	1.729	1	0.189	12.106	0.294	497.916
University	1.764	0.558	9.998	1	0.002	5.838	1.956	17.429
Post-graduation degree	0.674	0.393	2.949	1	0.086	1.963	0.909	4.238
Active acne *	0.856-	0.394	4.727	1	0.030	0.425	0.196	.919
Hyperpigmentation *			16.396	3	0.001			
Degree of acne * (mild)	0.314-	0.369	0.726	1	0.394	0.730	0.355	1.505
Moderate	0.423	.444	0.910	1	0.340	1.527	0.640	3.644
Moderately sever	1.916	.546	12.330	1	0.000	6.796	2.332	19.807
Sever	1.559	.917	2.891	1	0.089	.210	0.035	1.269
Psychological status perception *	0.807-	0.315	6.569	1	0.010	0.446	0.241	0.827
Cosmetics use *	2.071	.328	39.973	1	0.000	0.126	0.066	0.240
Feel embarrassed *	1.782	.373	22.825	1	0.000	0.168	0.081	0.350
Use lightening creams *	0.631	0.694	0.826	1	0.363	1.879		
Constant	0.313	0.270	1.344	1	0.246	1.368	0.805	2.323

Reference category*: Age, Education, Active acne, Hyperpigmentation, Degree of acne, psychological status perception, Cosmetics use, feel shame, use lightening creams.

4. Discussion

The study results indicated that the mean age when the respondents' experienced acne was 15.66 years. This reveals that acne in Sudanese women tends to appear early during the adolescence rather than the adulthood. These results are consistent with the results of Ismail *et al.* who reported that acne showed peak during adolescence between 15 and 18 years of

age [10]. They are also in line with that of Tasoula *et al.* who indicated that the mean age of their studied population was 15.77 years [18].

Active acne was found be prevalent in (71.5%) of the respondents. The presence of acne scars was noticed by (74.8%) of the respondents, while (71.3%) of the respondents were suffering from post-inflammatory hyperpigmentation. Similarly, Tanghetti *et al.* reported in their study that post inflammatory hyperpigmentation and scars were common

among their study participants [11].

Results of the study illustrated that most of the respondents (75.8%) have facial acne, which tends to be mild (37.0%) and moderate (41.5%) in severity. Similarly, Katlein *et al.* reported that post inflammatory hyperpigmentation was more predominant in the face [4]. Moreover, Dreno *et al.* and Ta-soula *et al.* reported that adult acne is mainly mild-to-moderate in severity [5, 18].

The results showed that the use cosmetics or makeup to conceal acne and scars was common among most of the studied cases (42.3%). However, embarrassment and low self-esteem due to facial acne were observed by only (36.0%) of participants, but the common use of cosmetics to hide acne and avoid going out of homes could indicate that most of the study respondents felt embarrassed by their conditions. Such results are akin with the results of Katlein *et al.* and Tanghetti *et al.* who reported the frequent use of makeup by their studied patients to conceal acne and indicated that most of the patients felt embarrassed due to their condition [4, 11].

Results of the Cardiff Acne Disability Index (CADI) revealed that only (24.0%) of the study respondents were categorized as having high CADI scores. The mean of the CADI scores was 4.55, which implies that the quality of life of most respondents was not severely impacted despite the prevalence of acne and post inflammatory scars and hyperpigmentation. This can be justified by the fact that most participants reported consulting doctors and using medication despite the irregular consultation by some respondents. Consulting doctors and committing to acne treatment may be the reason behind reducing the severity of the effects of acne on the quality of life. Such results are in line with those of Ayanlowo *et al.* who reported that the mean CADI score for all respondents was 3.27 which represents a mild effect on the quality of life [20]. Katlein *et al.* and Alanazi *et al.* reported that the quality of life of most of their studied patients was not adversely impacted by acne and post inflammatory hyperpigmentation [4, 17].

Despite the low severity of the effects of acne on quality of life as measured by the CADI score, most participants indicated that acne had affected their psychological state. The adverse psychological impact of acne was found to increase significantly with increasing acne severity, presence of scars, and hyperpigmentation, as well as among university-educated respondents. This can be because university educated respondents were more exposed to public interactions and more concerned about their look. The presence of acne or hyperpigmentation was thought to decrease their beauty and therefore affect their quality of life. Hosthota *et al.* reported in their study that acne severity may have a considerable adverse impact on quality of life (QOL) and self-esteem [6]. Similarly, Hazarika *et al.* reported in their study that mean Dermatology Life Quality Index (DLQI) score was 7.22. DLQI scores were statistically influenced by the age of the patient, duration and grade of acne, acne scar, and post acne hyperpigmentation [23].

5. Conclusion

Acne in Sudanese women tend to appear early during the adolescence rather than the adulthood and tends to be mild and moderate in severity. Late onset of acne treatment was a main reason behind increased severity of acne, high percent of acne scars and post inflammatory hyperpigmentation. These, in turn, were significantly and positively correlated with acne adverse psychological impact. Late onset of acne treatment reveals low or poor awareness of the disease or treatment options. The mean CADI score for all respondents was 4.55, which reflects a mild effect on the quality of life. Moreover, the adverse psychological impact was mostly experienced by university educated respondents because they were more concerned about their look and exposed to public interactions either as students or employees.

6. Recommendations

The study results underscore the importance of counselling along with early and regular treatment of acne vulgaris to reduce the psychosocial sequelae associated with the disease. Encourage patient adherence to treatment through acne education and awareness programs, and simplified regimens tailored to patients' needs and abilities. Adolescents and teenagers should be considered as special age groups that need special consideration and reassurance from their families and doctors as well. Family doctors and the dermatologist need to emphasize the psychosocial effects of acne to their patients through encouragement and regular follow up sessions.

Abbreviations

CADI	Cardiff Acne Disability Index
DLQI	Dermatology Life Quality Index
QoL	Quality of Life
SPSS	Statistical Package of Social Sciences

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Declarations

Ethical Approval and Consent to Participate

Ethical clearance was granted from Sudan Medical Specialization Board (SMSB). Informed consent was taken from each participant/legal guardian/parent, with assurance of

confidentiality and all rights.

Consent to Publish

Not applicable.

Author Contributions

Hiba Salah Abdelgadir: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing

Hind Salah Abdelgadir: Formal Analysis, Writing – review & editing

Mosab Abdelgadir Ahmed: Writing – review & editing

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Data Availability Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no conflicts of interests.

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