Clinical Characteristics of Acne Vulgaris and its Effect on Patient's Quality of Life

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Abstract

Acne vulgaris is a common skin disease affecting a large segment of adolescents globally. In Nigeria, as at 2015, the population of young people aged 10-24 years accounts for more than 30% of the population and this proportion is projected to rise further by 2050 with a profound effect. Yet, there is paucity of data on how acne affects the quality of life (QOL) of adolescents in our locality. This study, was conducted to determine the clinical characteristics of acne vulgaris and its effects on the QOL of patients attending the dermatology clinic of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria. This study used a cross-sectional research design and collected data from two hundred and sixty consenting individuals, in the Dermatology out- patient clinic. Patients were selected randomly using a numerical balloting style. Findings from the study showed consumption of food such as peanut/groundnut, stress and sugary foods/drinks were the top three risk factors for acne vulgaries among the patients. Quality of life (QOL) assessment showed the effect of acne was more pronounced on social life (social interference) of the patients and avoidance of public facility. QOL in acne patients using CADI score was positively correlated with severity of acne vulgaris using GAGS. The impact effect of severity of acne vulgaris on QOL was strongly correlated in females compared to males.

Keywords: Acne vulgaries, risk factors, QOL.

Introduction

In recent years, there is a growing interest in the psychological effect of skin diseases on the life of the patient. Acne vulgaris, a common skin disease affecting a large segment of our adolescent group is not an exception. Acne occurs worldwide and it affects both males and females. It develops earlier in girls than in boys, usually just before onset of puberty (Al-Sshidhani, Al-Rashdi, Al-Habsi and Rizvi, 2015). This may be due to the fact that secondary sexual characteristics also occur earlier in females compared to males. This is supported by another study which shows that the prevalence of acne vulgaris varies by gender and age groups, appearing earlier in females (11years old) than in males (12-13years old), possibly reflecting the earlier onset of puberty (Adityan and Thappa, 2012). Although acne vulgaris usually starts in early teens, however, majority of cases do resolve by mid-twenties and males tend to have more severe acne compared to females since it is androgen driven (Simpson and Cunliffe, 2004).

Acne vulgaris, a chronic inflammatory disease of the pilosebaceous units of the skin predominantly mostly affect adolescents and young adults. It is one of the most common diseases affecting humanity and its impact on quality of life (QoL) is important. The assessment of QOL of life of acne patients will

provide important information and understanding on the devastating effect of acne on QOL of patients. Several studies (Aktan et al., 2000; Jones-Caballero et al., 2007, Ilgen, and Derya, 2005) have assessed the impact of acne on quality of life of patients and have reported negative impact. Moreover, the impact of acne can be felt on almost every aspect of patient's quality of life, with the strongest effect reported on the emotional domain of quality of life, while females have been found to be mostly affected (Al-Shidhani et al., 2015). While most of these studies have reported gender differences with respect to the effect of acne on QOL, few others (Tasoula et al., 2012) have reported no gender difference in the effect of acne on QOL. Other studies (Al Robaee, 2005; Cresce et al., 2014) have assessed the psychological impact of acne of such as depression, self-esteem, depression and suicidal tendency. Some authors have argued that acne on the face, upper trunk and arms is associated with negative psychosocial morbidity such as depression, anxiety and even suicidal ideations (Dalgard *et al.,* 2008). In the study of Tasoula et al., (2012), the impact of acne on quality of life was significantly associated with how severe the acne was. Also, associated with acne and its severity were heredity and stress. Recent study by Hosthota et al., (2016) revealed significant adverse effect on quality of life and self-esteem.

However, research examining the impact of acne among young and middle age populations in Nigeria have not received sufficient attention. It is hoped that this study will help to bridge this wide gap. This study was therefore, conducted to determine the clinical characteristics of acne vulgaris and its effects on the quality of life of patients attending the dermatology clinic of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State.

Acne and quality of life

Quality of life refers to individuals' emotional, social and physical wellbeing, and their ability to function in the ordinary tasks of daily living and not just the absence of disease alone (Both et al., 2007). Quality of life can be measured using two main instruments: Generic or disease specific measure. Generic instruments are designed to be applied to a wide range of populations and interventions outside the clinical context (Coons, Rao, Keininger and Hays, 2000). It assesses the impact of treatment or disease process. Examples of generic instruments include generic instrument for measuring quality of life of patients with dyspepsia (Mahadeva, Wee, Goh and Thumboo, 2009), Short form 36 (Sf-36) (Boueri, Bucher-Bartelson, Glenn and Make, 2001). Specific instruments are disease specific (Talley, Verlinden and Jones, 2001). Examples include acne disability index (ADI) (Motley and Finlay, 1992), psoriasis disability index (PDI) (Kent and Al-Abadie, 1993). They are more sensitive than generic instruments. Cardiff acne disability index (CADI) is a disease specific instrument for acne designed from a much larger instrument by Motley and Finlay (Motley and Finlay, 1992). CADI has been used in many studies and found to be useful in demonstrating the functional disability caused by acne (Hosthota, Bondade and Basavaraja, 2016).

Both generic and specific instruments are tested before their application to ensure that they are reliable in terms of reproducibility. They also have to be valid. This means that they have the ability to measure what they are designed to measure (Luo, Chew, Fong, Koh, Ng, Yoon, et al., 2003). They should be sensitive enough to detect any changes that may occur while being used (Mahadeva, Wee, Goh and Thumboo, 2009).CADI is an instrument of five questions with four graded alternative response used on teenagers and young adults (13 to 40 years) to evaluate the effect of acne on the quality of life of the sufferers (Motley and Finlay, 1992). CADI quality of life questionnaire is analyzed under the following headings:

- Question 1- addresses the psychological (emotions) problems associated with acne vulgaris in general.
- Question 2- addresses the social consequence of acne in general.
- Question 3- is targeted at those with acne on the chest and back.
- Question 4- inquiries about the patient's psychological state.
- Question 5- asks for the patient's (subjective) assessment of current acne severity.

Each question has a possible score from zero to three. The CADI score is calculated by summing up the score of each question to a minimum of zero and a maximum score of fifteen. The CADI score for each participant is computed and interpreted as follows: The higher the score, the more the quality of life is affected by acne while lower scores indicated less affectation. The measurement of quality of life

has been identified to be crucial in the assessment and management of diseases (Finlay, 2000). It helps in the clinical monitoring of patients, allows disabilities encountered from disease condition, and side effects from treatment to be looked out for and corrected early.

Risk factors for acne vulgaries

1. Stress and weather

Stress, during examination periods and weather (raining season) are other factors believed to worsen acne in sufferer (Chiu et al., 2003). In a clinical and questionnaire based prospective observational cohort study at department of dermatology, Stanford University School of Medicine, it was found that patients with acne vulgaris may experience worsening of the disease during examinations. Furthermore, changes in acne severity correlate highly with increasing stress, suggesting that emotional stress from external sources may have a significant influence on acne vulgaris (Annie et al., 2003). A Saudi Arabian study has shown that acne vulgaris exacerbates in winter, and often improves during the summer months (Al-Ameer and Al-Akloby, 2002). An Indian study however showed a contrasting result that majority of patients with acne vulgaris worsened during summer (Sardana et al., 2002).

2. Smoking and alcohol

The association between acne and smoking remains controversial. Schafer *et al* (2002*).* in cross sectional study of eight hundred and ninety-six citizens aged between 1-87 years in the city of Hamburg, found a linear relationship between the number of cigarettes smoked and the prevalence of acne while Firooz *et al (2005)* found no association between cigarette smoking and acne in his study. Another study carried out amongst adolescents found no significant correlation between acne and smoking in boys, but concluded that some component in the cigarette may inhibit the development of papulopustular acne in girls compared to boys (Romboutots et al., 2006). Alcohol may exacerbate post-adolescent acne and other skin conditions (Higgin and du Vivier, 1994).

3. Diet

Several food types have been implicated in the development of acne vulgaris but scientific proof appears to be lacking for most of them. Food that are rapidly digested by the body and eventually causing a rapid rise in blood sugar level are said to have high glycaemic index (>70). Examples include cornflakes, honey and watermelon. The rapid rise in blood glucose level result into an increase in serum insulin concentration and this stimulates sebocytes proliferation and sebum secretion (Smith et al., 2007). There is also an increase in androgen secretion such as testosterone which stimulates sebocytes proliferation and sebum production (Smith et al., 2007).

4. Menstruation (Premenstrual flow)

Some patients experience a flare (increase in lesions) of acne 2-7days before the onset of menstruation though the exact mechanism is unknown. A reduction in acne lesions in the post menstrual phase has also been noticed in some studies (Stolla, Shalita, Webster, Kaplan, Danesh and Penstein, 2001).

5. Genetic Influence

Hereditary factors have been identified as important in determining susceptibility to acne. Acne has also been shown to have an inherited predisposition due to the involvement of the cytochrome (Tasoula, Gregorious and Chalikias, 2012). This is supported by another study which shows that hereditary factors play an important role in acne vulgaris (Herane and Ando, 2003). Post-adolescent acne is related to first-degree relative with the condition in 50% of the cases (Herane and Ando, 2003). Heritability of acne is almost 80% in first- degree relative in another study (Kbhate et al., 2013).

Research objectives

i. Assess risk factors for acne vulgaries among patients
ii. Ascertain the effect of acne vulgaries on Quality of Life of patients

Methodology

Research design and sampling technique

The study was case control study. Data were collected from two hundred and sixty 260 consenting individuals, in the Dermatology out- patient clinic. Acne vulgaris was graded using a simple grading system, Global Acne Grading system (GAGS). Random sampling, involving the use of numerical balloting style was used in selecting patients. Two hundred and sixty patients were appropriately recruited into the study. A proforma was used to collect essential information from each participant. Physical examination of the acne lesions and other part of the body was done in a well-lit room.

Study area

The study was conducted at the Dermatology clinic of Obafemi Awolowo University Teaching Hospitals Complex [OAUTHC], Ile-Ife. The hospital is located in the South-West geopolitical zone of Nigeria. It is a 650 bedded tertiary health care institution serving as a referral centre for people of Osun state including private hospitals, secondary, tertiary and comprehensive health centres located in neighbouring Ekiti, Oyo, Ondo and parts of Kwara and Edo states.

Study population

The study population comprised of patients with acne within the age range 13-40 years, visiting dermatology clinic of OAUTHC.

Selection criteria

Inclusion criteria

1. Patients aged 13 to 40 years with diagnosis of acne vulgaris who presented to the outpatient Dermatology clinic.
2. Patients with acne vulgaris who consented to participate in the study.

The justification for age 13-40 was because the CADI instrument was validated for teenagers and young adult.

Exclusion criteria

1. Patients on drugs that can cause acneiform eruption (e.g. corticosteroids, phenytoin).
2. Patients with co-morbid dermatological illnesses.

Sample size estimation

The sample size was calculated based on documented 90.7% prevalence of acne vulgaris (Cunliffe and Gould, 1979).

Sample size for descriptive cross-sectional study when studying proportion with population <10,000 was;

$$nf = \frac{n}{(1+n/N)}$$

nf= The designed sample size when population is less than 10,000.

N = the estimate of the population size.

n= the desired sample size when population is more than 10,000.

$$n = z^2pq / d^2$$

P= the proportion in the target population estimated to have a particular characteristic (in this case 0.91).

Z = the standard normal deviation (using 95% confidence level = 1.96).

d= the degree of accuracy desired, set at 0.05.

q= 1.0-p.

So, $n = \dfrac{(1.96)\,(1.96) \times (0.91) \times (0.09)}{(0.05)\,(0.05)}$

$= \dfrac{3.8416 \times (0.91) \times (0.09)}{(0.00025)}$

= 1258.5

Estimated annual acne vulgaris disease patient presenting at dermatology clinic, OAUTHC, Ile-Ife is 200.

nf = n / (1+n/N) = 1258.5 / 1+1258.5/200) = 1258.5 / 7.2925

= 172.57

= 173.

Attrition of 10% = 0.1x173 = 17.3.

Sample size is 173+17.3 = 190.3

=190.

The total sample size was increased to 260 to increase the power of the study.

Data collection method

Data were obtained using the study proforma that included demographic data such as age, sex and ethnic group, history of acne, history of drug use, and family history of acne. To ensure that the right information was collected, standard methods were used for forward and backward translation of the CADI questionnaire into Yoruba language by different translators and it was validated with prior permission from Professor Finlay, the original author of the Cardiff Acne Disability Index questionnaire. Clinical examination was carried out to make diagnosis of acne vulgaris and determine its pattern at the clinic with the face, chest and back examined for lesions. Participants were examined in a well-lit room and with the use of a screen to ensure privacy and confidentiality. No magnifying glass was used and no stretching of the skin done as defined by the original authors of this grading method. The pattern of distribution and types of lesion was ascertained. Global acne grading scale (GAGS) was used for grading to evaluate the severity. Pictures of the acne lesions were taken with a digital camera. To avoid inter-observer error, all interviews, clinical examination and photography of the lesion were conducted by the investigator alone. Patients were counselled on the management of their acne. Topical agents such as benzoyl peroxide cream + topical retinoid (tretinoin, adapalene or tazarotene) was effective for mild acne vulgaris. In moderate acne, combination therapy, including, oral antibiotic (tetracycline or doxycycline) with topical benzoyl peroxide ± topical antibiotic (mupirocin or clindamycin) ± topical retinoid is an effective therapy. In cases of severe acne, oral isotretinoin was the most effective therapy.

Data analysis

Data collected for this study was analyzed using Statistical Product Service Solution (SPSS) version 20.0. Descriptive and inferential statistics were used. Descriptive statistics used include frequency count, percentage, means, median and standard deviation. Inferential statistics used include chi square test and fisher exact test. All statistical tests used were accepted using (0.05%) alpha level. Fisher exact test was used for categorical data and in place of chi square test where the frequency count in a cell was observed to be less than five.

Ethical Issues/Approval

Ethical clearance was obtained from Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, before the study was carried out. Written informed consent was obtained from patients aged 18 and above. Patients less than 18 years gave their assent after obtaining consent from their parents. Written informed consent of the selected patients were obtained after detailed explanation on purpose of the study and the study materials to be used.

Results

Socio-demographic characteristics

The mean age for the patients was 22.3±4.2 years and for control was 20.8 ± 4.1 years. The age range of majority of the patients with acne vulgaris and controls was within 20 – 24 years (46.9% vs 40.0%). The result also shows there were more females than males in both the patients and the controls respectively. More than two-thirds of the patients and controls were from the Yoruba ethnic group

(91.5% vs 86.2%) and were Christians (76.9% vs 86.2%). Similarly, majority of the patients (85.4%) were students, while all controls were from the student population (100%).

Duration of acne between age groups and gender

The mean interval/duration of acne from the time of onset to the time of presentation at the clinic was 15.3 ±2.1 months. The duration of onset was observed to be similar between genders; male (15.2±2.0 months) and female (15.4 ±2.2 months). The difference in the mean duration was found to be statistically significant across the age group (χ^2=36.603, p=0.001), but not statistically significant across gender (χ^2=p-value =2.917).

Risk factors for acne vulgaris between case and control group

Table 1 presents the risk factors for acne vulgaris between the case and control group. The result reveals that consumption of food such as peanut/groundnut was a presumed (86.2%) risk factor for acne vulgaris in the patients, while it was (46.9%) in controls, followed by examination stress (80.0%) for the patients and (36.9%) in control, chocolate was (63.1%) in the patients, while it was (20.0%) in the control. Positive family history of acne vulgaris was observed in (42.7%) of patients and (7.7%) in the controls.

Table 1. Risk factors for acne vulgaris between case and control group

Risk factors	Cases				Control			
	Yes	%	No	%	Yes	%	No	%
Peanut/groundnut	112	86.2	18	13.8	61	46.9	69	53.1
Examination stress	104	80.0	26	20.0	48	36.9	82	63.1
Sugary foods/drinks	95	73.1	35	26.9	32	24.6	98	75.4
Chocolate	82	63.1	48	36.9	26	20.0	104	80.0
Family history	62	42.7	68	57.3	10	7.7	120	92.3

Quality of life assessment in acne patients

The quality of life assessment was done using the Cardiff Acne Disability Index (CADI) score. The mean CADI score for the acne patients was 5.2 ±3.4 with a median score of 4.00 and this is indicative of medium impact on QoL. The mean and median score for each of the five CADI domains are shown in Table 2.

Table 2. Quality of life assessment using the CADI score

Variables	Mean + SD	Median score
Total CADI score	5.2+3.4	4.0
Different domains		
Emotional domain (Felt embarrassed){ED}	2.9+0.9	3.0
Social interference {SI}	3.2+0.9	4.0
Avoiding public facilities {APF}	3.5+0.8	4.0
Psychological feeling {PF}	2.5+0.8	2.0
Perception of severity of acne {PS}	2.7+0.8	3.0

ED= emotional domain, SI= social interference, APF= Avoidance of public facilities, PF=psychological function, PS= perception of severity, CADI= total score for QoL.

Impact of acne on quality of life for different age groups and gender using CADI domain

The overall impact of acne on QoL is not statistically different across age group (p>0.05). However, the total CADI was highest in age group < 15 years, while it was lowest in age group > 29 years. Similarly, the total mean CADI score for the females was higher than that of the males. Although, the difference was not statistically significant (p>0.05) as shown in table

Table 3. Impact of acne on quality of life for different age groups and gender using CADI domain

Variable	N	Total CADI Mean $\pm$ SD	P-value
Age Groups			
< 15 years	2	9.5$\pm$0.7	
15-19 years	34	5.8$\pm$3.5	
20-24 years	61	4.8$\pm$3.5	0.217
25-29 years	27	5.2$\pm$3.1	
30 years and above	6	3.8$\pm$2.2	
Gender			
Male	57	4.9$\pm$3.3	0.267
Female	73	5.6$\pm$3.5	
Total	**130**		

One way ANOVA for age groups and independent t-test analysis for gender

Impact of acne on quality of life for different age groups and gender

Acne had a mild impact (CADI 0-4) on the quality of life (QoL) in half of the patients (50.0%), followed by those with moderate impact (45.4%). A higher proportion of females had severe impact compared to the males (3.1% vs 1.5%). However, this difference was not statistically significant as shown in table 3.

Table 3. Impact of acne on quality of life for different age groups and gender

Variable	N	Mild Impact N (%)	Moderate Impact N (%)	Severe Impact N (%)
Age Groups				
< 15 years	2	-	2 (1.5)	-
15-19 years	34	13 (10.0)	19 (14.6)	2 (1.5)
20-24 years	61	33 (25.4)	25 (19.2)	3 (2.3)
25-29 years	27	15 (11.5)	11 (8.5)	1 (0.8)
30 years and above	6	4 (3.1)	2 (1.5)	-
Gender				
Male	57	26 (20.0)	27 (20.8)	2 (1.5)
Female	73	39 (30.0)	32 (24.6)	4 (3.1)
Total	**130**	**65 (50.0)**	**59 (45.4)**	**6 (4.6)**

Fishers test Age Group ((x^2=2.023, p-value=0.232) Gender: (x^2 =1.823, p-value 0.414)

Discussion and conclusion

The mean duration of onset of acne among the subjects before presentation at the clinic was 15.3 ±2.1 months with a range between 13 and 25 months. This may be because patients might have tried self-medications or patronize herbal homes on many occasions before presenting at the clinic when there is no desired improvement. Self-medication in acne vulgaris has been previously documented (Magin et al., 2005). This duration of onset was similar between genders. However, their gender did not show any effect on the duration of the acne presentation. Comedonal acne was found in this study to be the predominant pattern of presentation accounting for 49.6% in the patients with acne vulgaris, with 33.1% in the age-group 20-24 years. This might be because at above age group, many of the patients are in tertiary institution and considered acne vulgaris as cosmetic nuisance, thus, necessitating relatively early presentation. A predominantly comedonal acne was also observed especially in younger age groups in North central Nigeria (Yahya, 2009). Female patients in this study had more occurrence

of comedonal acne compared to males (23.8% vs 20.0%). Severe form of acne vulgaris (nodulocystic) was observed among the males. Furthermore, groundnut was highly considered as a presumed risk for acne vulgaris (86.2%) in the patients while it was 46.9% in the controls. This may be due to increased sebum production associated with dietary fat consumption. Groundnuts is also rich in Omega-6 which is proinflammatory and could enhance inflammation, and thus, constitute a risk of developing acne vulgaris (Magin et al., 2005). Nearly three quarter of the patients associated their acne to sugary food/drinks in contrast to 24.6% in the controls. The role of high glycemic load foods in the pathogenesis of acne vulgaris has been characterized by its ability to cause acute hyperinsulinemia, thus, increasing androgen level and IGF-1 resulting in an increase in sebum production. Positive family history of acne was observed to be 42.7% in the patients but considered to be 7.7% in controls. Heritability of acne is almost 80% in first-degree relative in another study (Kbhate et al., 2013). This showed that hereditary factors play an important role in acne vulgaris. The lower level in this study may be due to patient's reluctance in volunteering family history in our environment. Female subjects developed acne vulgaris earlier than males in the younger age group (15-19 years), (29.2% vs 3.8%). This might be due to the fact that secondary sexual characteristics occur earlier in females compared to males. This is supported by another study which shows that the prevalence of acne vulgaris varies by gender and age groups, appearing earlier in females (possibly due to increase sebum production associated with progesterone) than in males that do develop severe form of acne vulgaris, possibly due to androgen effects (Durai and Nair, 2015). The quality of life assessment was done using the Cardiff Acne Disability Index (CADI) score. The patients with acne vulgaris had moderate affectation of quality of life due to their acne, with a mean CADI of 5.2 ±3.4 and a median score of 4.00. This finding may be explained by the fact that advanced acne vulgaris patients with moderate to severe impact on quality of life are more likely to present in a hospital setting. A similar cross- sectional study of 160 adolescent secondary school students in Lagos, shows overall CADI Score to be 3.4±3.0, which suggest mild impairment in quality of life (Ogedegbe and Henshaw, 2014). Interestingly a hospital-based cross-sectional study in South India among 140 consenting individuals with acne vulgaris reveals mean CADI Score to be 5.2, which is suggestive of moderate impact as observed in this study (Durai and Nair, 2015). The effects of acne on quality of life for the APF (avoiding public facilities) domain significantly differed with age, while the other four domains did not differ with age. The total effects of acne vulgaris on quality of life was lowest among older patients (>29years) unlike the younger age groups, this was indicative that the effects of acne vulgaris on quality of life reduces with increasing age. This is probably because the younger age groups were more concerned about their physical appearance especially the face that is usually affected by acne, thus, anything that affects their facial beauty may give them concern, and invariably impact negatively on their interpersonal relationship and quality of life. The mean score for each CADI domain was marginally higher among the females than males, that is, the quality of life of females were more affected by acne vulgaris than the males. The face is usually affected and females are likely to be more concerned of their facial appearance which may impact negatively on their quality of life, however, the difference was not statistically significant. Acne had a mild impact (CADI 0-4) on the quality of life in more than half of the patients in this study. The proportion of patients with severe impact of acne on quality of life reduces with age whereas the proportion of patients with mild impact increases with age. This implied that impact of acne on quality of life improves with age. Increasing age allows people to realize that looks are not all or maybe they have adjusted to the disease over time. There was gender difference in the impact. The study conclude that acne affect quality of life of patients along different domains, age and gender variation seems was not statistically significant.

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