Clinical characteristics of acne vulgaris on patients attending a dermatological clinic in Nigeria

Aiyedun, O.S.[1], Olayemi, O.[2], Shiyanbola, A.C.[3], Ilesanmi, O.N.[1], Bojuwoye, M.O.[1], Agede, O.A.[1], Israel, G.M.[5], Durotoluwa, I.M.[6], Oluwatuyi, K.O.[4], Ogungbemi, A.O.[7], Adedire, A.[8]

[1]Department of Medicine, University of Ilorin Teaching Hospital Ilorin, Ilorin, Nigeria.
[2]Department of medicine, Faculty of Health Sciences Osun State University Osogbo, Nigeria
[3]Department of Medicine, Federal Teaching Hospital Ido-Ekiti, Nigeria
[4]Department of Medicine, Federal Medical Centre Owo, Owo, Nigeria
[5]Department of Medicine, Faculty of Health Sciences, LAUTECH Ogbomoso, Nigeria
[6]Department of Medicine,University of Abuja Teaching Hospital Abuja FCT, Nigeria
[7]Department of Family Medicine Faculty of Health Sciences Osun State University Osogbo, Nigeria
[8]Department of General Surgery Faculty of Health Sciences Osun State University Osogbo, Nigeria

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Corresponding author:
Olayemi O
Olanrewaju.olayemi@uniosun.edu.ng

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Abstract

Background: Acne vulgaris is a disease of the pilosebaceous units of the skin characterized by chronic inflammation, it is a disease of teenager and young adults, affects both male and female in varying degree of severity. This study is designed to evaluate the clinical characteristics of acne vulgaris in teenagers and young adults between the age of 13 and 40years for improved management of the disease.
Materials and Methods: This is a cross-sectional study with the participation 260 patients between 13 and 40 years attending the dermatology clinic in Obafemi Awolowo university teaching hospital Ile-Ife Osun state which involved detailed clerking and clinical examination of the type and site of affectation of the acne under bright light.
Results: Two hundred and sixty (260) people with acne vulgaris participated in the studywith mean age of 20.0+4.7years.The result showed that there were more females (53.7%) than males(42.7%), The pattern of presentation shows comedone accounted for the highest proportion (49.6%) of the acne lessions observed among the sampled patient across different age groups, the results also reveals that (83.8%) of patients had their face affected by acne vulgaris, this was followe by face and neck accounting for (9.2%) and chest(3.1%) ,while the least body part affected was back accounting for (1.2%) of the body part affected. The most common complications foll0wing acne among affected patients was post inflammatory hyperpigmentation accounting for (49.6%) followed by atrophic scars (30.8%), while kelodal scar is the least accounting for (6.5%).
Conclusion: Acne vulgaris is a chronic disease of pilosebaceous unit common in teenagers and young adult with comedonal acne being the most predominant pattern, while nodulocystic was the least and post inflammatory hyperpigmentation is the most common complication and the least was keloidal scar.

Caractéristiques cliniques de l'acné vulgaire chez des patients fréquentant une clinique dermatologique au Nigéria

Résumé
Contexte de l'étude : L'acné vulgaire est une maladie des unités pilo-sébacées de la peau caractérisée par une inflammation chronique. Elle touche les adolescents et les jeunes adultes, hommes et femmes, à des degrés de gravité variables. Cette étude vise à évaluer les caractéristiques cliniques de l'acné vulgaire chez les adolescents et les jeunes adultes âgés de 13 à 40 ans afin d'améliorer la prise en charge de la maladie.
Matériels et méthode de l'étude : Il s'agit d'une étude transversale avec la participation de 260 patients âgés de 13 à 40 ans fréquentant la clinique de dermatologie de l'hôpital universitaire Obafemi Awolowo de l'État d'Ile-Ife Osun, qui impliquait un examen clinique détaillé du type et du site d'affectation de l'acné sous une lumière vive.
Résultat de l'étude : Deux cent soixante (260) personnes atteintes d'acné vulgaire ont participé à l'étude avec un âge moyen de 20,0 + 4,7 ans. Les résultats ont montré qu'il y avait plus de femmes (53,7 %) que d'hommes (42,7 %), le mode de présentation montre que les comédons représentaient la proportion la plus élevée (49,6 %) des lésions d'acné observées parmi les patients échantillonnés dans différents groupes d'âge, les résultats révèlent également que (83,8 %) des patients avaient leur visage affecté par l'acné vulgaire, suivi par le visage et le cou (9,2 %) et la poitrine (3,1 %), tandis que la partie du corps la moins touchée était le dos, représentant (1,2 %) de la partie du corps touchée. Les complications les plus courantes après l'acné chez les patients touchés étaient l'hyperpigmentation post-inflammatoire représentant (49,6 %), suivie des cicatrices atrophiques (30,8 %), tandis que la cicatrice chélodale est la moins représentée (6,5 %).
Conclusion : L'acné vulgaire est une maladie chronique de l'unité pilo-sébacée courante chez les adolescents et les jeunes adultes, l'acné comédonienne étant le modèle le plus prédominant, tandis que l'acné nodulokystique était la moins fréquente et l'hyperpigmentation post-inflammatoire était la complication la plus courante et la moins fréquente était la cicatrice chéloïdienne.
Mots-clés : Acné vulgaire, comédon et hyperpigmentation post-inflammatoire

INTRODUCTION

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous units predominantly affecting adolescents and young adults. Acne vulgaris is a polymorphic disorder mainly occurring on the face, chest, back and upper arms (1). There may be complaint of pain, pruritus or some discomfort at the site of the lesion especially when inflamed (2).

The earliest acne lesions seen are the comedones. There are various types of comedones. Closed comedones (white heads) are pale, slightly elevated small papules without any clinically visible opening (3). They are potential precursors for large inflammatory lesions. Open comedones (black heads) appear as flat or slightly raised lesions with a central dark coloured follicular impaction of keratin and sebum (4). Macro comedones are large black heads or whiteheads more than 1mm in diameter. Submarine comedones are large comedone structures more than 0.5cm in diameter occurring fairly deep in the skin. They are frequently the source of recurrent inflammatory nodular lesions. Secondary comedones may result from exposure to topical steroids, pomades and some systemic drugs (4).

Secondary acne lesions include excoriations, erythematousmacules, post inflammatory hyperpigmentation and post acne scars. Acne lesions can be inflammatory (papules, pustules and nodules) or non-inflammatory (comedones) (6). Inflammatory lesions can be superficial (papules and pustules) or deep (nodules). Deep inflammatory lesions are large, tender fluctuant nodules and deep pustules (7).

Whenever the skin is damaged beyond the uppermost surface level, scars can potentially form. Acne has a potential of damaging deeper tissue and thus, scarring is a possibility in acne. Scars that may be found in acne patients are hypertrophic, keloidal, ice pick, box car and rolling scars (4).

Scarring is a consequence of abnormal resolution or wound healing following the damage that occurs in the sebaceous follicle during acne inflammation (8). A cell- mediated immune response has been found to be involved in these inflammatory events, but such a response not only contributes to the clearance of antigens but also to tissue damage (8). Previously, no attention has been paid to the influence that this response may have on the resolution of acne lesions. The inflammatory response has been implicated as an important component in the development of scars (8).

Scarring usually follows deep inflammatory lesions, but may often happen after superficial lesions in scar- prone patients (9). Close inspection of acne skin under a bright light can reveal some scarring in up to 90% of patients who attend a dermatology clinic (10), but significant socially noticeable, scarring occurs in about 22% of sufferers (10). Scars may show increased collagen as in hypertrophic scars and keloidal scar or be associated with loss of collagen such as ice pick scars, depressed fibrotic scars, atrophic macules and perifollicular elastolysis (10). Some scars are difficult to classify in their earlier phases of development and are classified as intermediate scars, but with time they may then become more obviously hypertrophic or keloid scars, or perhaps in some instances become atrophic and hardly noticeable (10).

Atrophic macular scars are frequently multiple. Ice-pick scars are self- explanatory, they are small jagged atrophic scars 1-2mm in size, and depth. They often exceed 50 in number, and are most evident on the cheeks (10). A common type of scarring on the back and chest consists of relatively inconspicuous small, follicular, macular and almost, but not quite atrophic lesions, called perifollicular elastolysis.[10] Calcification is a rare complication of scarring (11). Community-based cross-sectional study among 539 randomly selected secondary school students aged 11-19 years in Kaduna, North-Central Nigeria, revealed ice-pick scars as the predominant scars found among 23% of students examined (1). Taylor et al. also noted ice-pick scars as the most common post-acne scars seen in 65.57% of the patients (12).

Persistent post-inflammatory hyperpigmentation is a common complication of acne vulgaris, particularly in pigmented skin and may be more disabling than the original disease. Patients may resort to the use of bleaching creams and these may cause more harm to their health (13). In a cross-sectional study amongst adolescents in a secondary school in Kaduna, Northern Nigeria, mild post inflammatory hyper-pigmentation was detected in 32.5% of students with acne, moderate hyper-pigmentation in 6.3%, and 61.2% had no pigmentation at the time of examination.[1]Yeung*et al*. observed 552 adolescent patients with acne vulgaris, of which 52.6% had post-acne hyperpigmentation.[13] Certain diseases that occlude the follicular pores, for example hidradenitis suppurativa and dissecting folliculitis (peri folliculitis capitisabscedens et suffodiens) of the scalp may accompany acne, and are classified as follicular occlusion triad when accompanied by acne conglobate (14).

The aim and the objective of this study are to

determine the clinical characteristics of acne vulgaris and to access the pattern of presentation of acne vulgaris among acne patients.

MATERIALS AND METHODS

This is a cross-sectional study carried out in the dermatology clinic of Obafemi Awolowo University Teaching Hospitals Complex [OAUTHC],Ile-Ife. The hospital is a 650 bedded tertiary health care institution located in the South-West geopolitical zone of Nigeria. It is a referral centre sub-serving people of Osun State and private hospitals, comprehensive health centers, secondary and tertiary hospitals in Ekiti, Oyo, Ondo and parts of Kwara and Edo states.

STUDY POPULATION

The study population comprised of patients with acne vulgaris within the ages of 13 and 40 years attending dermatology clinic of OAUTHC. They were recruited from among the population that fit the selection criteria.

SAMPLE SIZE

The sample-size was calculated based on documented 90.7% prevalence of acne vulgaris (1).

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.

$$n = \frac{z^2pq}{d^2}$$

P= The proportion in the target population estimated to have a particular characteristics (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.

$$\text{So, } n = \frac{(1.96)(1.96)\,x(0.91)\,x(0.09)}{(0.05)(0.05)}$$

$$= \frac{3.8416x\,(0.91)x(0.09)}{(0.00025)}$$

$$= 1258.5$$

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

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

$$= \frac{1258.5}{1+1258.5/200)}$$

$$= \frac{1258.5}{7.2925}$$

$$= 172.57$$

$$= 173.$$

Attrition of 10% = 0.1x173 = 17.3.

Sample size is 173+17.3 = 190.3

=190.

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

Selection criteria:

Inclusion criteria

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

   The above age (13 to 40) was adopted because the CADI questionnaire was validated for teenagers and young adults.

Exclusion criteria

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

ETHICAL ISSUES/APPROVAL

Ethical clearance was obtained from Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife, before the study was carried out. Written informed consent of the selected patients were obtained after detailed explanation on purpose of the study and the study materials to be used.

Statistical analysis of data

The data generated was analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive and inferential statistics were used. Descriptive statistics used include frequency count, percentage, means, median and standard deviation. All the statistical tests used were tested using (0.05%) alpha level. Independent t-test was used to check for difference in means across gender. 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.

Data collection method

Socio-demographic data was obtained, 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.

RESULTS

Socio-demographic characteristics

Two hundred and sixty (260) people with acne vulgaris recruited for the study showed the following features. The mean age for the patients was 20.0±4.7 years. The result also showed that there were more females (57.3%) than males (42.7%). The presentation of patients according to their religion affiliation indicates that significant proportion (80.4%) were adherent of Christianity, while those who practiced Islam accounted for (19.6%). Furthermore, more than two-thirds of the patients who participated in the study were of Yoruba ethnicity, accounting for (90.8%). Similarly, majority of the patients (86.9%) were students.

Pattern of presentation of acne vulgaris among acne patients

The pattern of presentation of acne vulgaris among patients presented in table 2 reveals that comedones accounted for the highest proportion (49.6%) of the acne lesions observed among the sampled patients across the different age groups, with most (23.5%) of the occurrence observed among age group 15-19 years. The least pattern of acne lesions observed was nodulocystic, accounting for just (2.3%) with more occurrence among age group 20-24 years. Furthermore, the Fisher exact test shows that the pattern of occurrence was statistically significant across the different age groups (p-value=0.042).

Table 2 reveals that female patients had more occurrences of comedones (28.5%) than the male patients (21.2%). Similarly, the occurrence of papules was more (17.7%) in females compared to (12.3%) in male patients. The Fisher exact test however reveals that the pattern of occurrence of acne lesions was not statistically associated with sex of the patients (p-value=0.729).

Distribution of acne lesions according to body parts affected.

The distribution of patients according to body parts affected with acne lesion is presented in figure 1. The figure indicated that (83.8%) of patients had their face affected by acne vulgaris. This was followed by face and neck, accounting for (9.2%), chest (3.1%), while the least body part affected was back, accounting for just (1.2%) of the body parts affected.

Acne vulgaris complications in patients.

The most common complication following acne among affected patients was post-inflammatory hyperpigmentation (49.6%), followed by atrophic scars (30.8%), hypertrophic scar and post-inflammatory hyperpigmentation (7.7%), while keloidal scar and post-inflammatory hyperpigmentation accounted for the least (6.5%) complication of acne vulgaris observed amongst affected patients as shown in Figure 2.

Gender and age predilection for acne vulgaris

Gender and age predilection for acne vulgaris presented in (table 4) reveals that more females developed acne vulgaris earlier than male. For instance, (18.1%) of the females developed acne vulgaris at age group 15-19 years, compared to (15.0%) males at the same age group. The fisher exact test however indicates that the observed difference wasnot statistically significant (p-value=0.232)

DISCUSSION

The mean age of the patients in this study was 20 ± 4.7 years, which is higher than that observed in other studies, such as a cross-sectional study of 539 secondary school students in Kaduna, Nigeria, where the mean age was 16.1 ± 1.9 years. In the United State, acne vulgaris is a common reason for seeking medical consultation among patients aged 11-21, this is possibly because puberty relatively begins earlier in the developed countries like America as compared to developing world like Africa. Thus, it accounts for 4% of all visit from patient aged 15-19 (29). Kane *et al*. (18) noted that the mean age of presentation of their patients was 25.58 years in a prospective hospital-based study among 93 patients (18). The hormonal changes of puberty are almost always related to the beginning of typical acne vulgaris. Adrenal maturation and gonad development lead to the production of androgen and subsequent increase in sebaceous gland secretion with the eventual eruption of acne vulgaris in this age groups. In hospital-based study of acne, involving 200

patients over the age of 25 years and comprising 152 (76%) women and 48 (24%) men, the mean age of the patients was 35.5 years. Late-onset acne (onset after the age of 25 years), was seen in 28 (18.4%) of women and 4 (8.3%) of men (19).

The face was predominantly affected in all the study patients. In a cross-sectional study among Americans, face was also predominantly affected in 99% of patients, this is due to high sebum production from the pilosebaceous units in the face, while the back was affected in 15% of the study patients due to lesser sebum production (27). The Facial predilection is due to the high density of pilosebaceous units on the face relative to other sebum producing sites. Similar finding was observed in a hospital-based study (20).

Nodulocystic acne constituted 2.3% across the different age-groups with more occurrence among the 15-19 year age group. *Propionibacterium acnes* are implicated in the inflammatory phase of acne (e.g nodulocystic acne) (25). In addition, males who were more affected by this morphologic type of acne naturally secrete more androgen which can overstimulate sebaceous gland, thus possibly resulting into nodulocystic acne (21). A number of enzyme systems (e.g 5-α reductase enzyme) in the sebaceous gland convert cholesterol or weak androgen to strong androgen (dihydrotestosterone), capable of activating these glands (21). Also, there is a strong genetic components to the development of nodulocystic acne by Cibula et al.[3] The enzymatic activity may be increased in patients with acne. The rate of proliferation of sebocytes and the potency of enzyme system varies between different regions, this might explain the predominance of facial acne (2).

The most common complication following acne among affected patients in this study was post-inflammatory_hyperpigmentation (49.6%). People with acne vulgaris pick the face, squeeze out the pustules, thereby predisposing to scar formation. Inflammatory process in acne vulgaris not only contribute to the clearance of antigens but also to tissue damage, which could result in post inflammatory hyperpigmentation or scar formation depending on extent of injury (26).

Post inflammatory hyperpigmentation was a common complication of acne vulgaris observed in this study, it is particularly common in pigmented skin, and this is similar to a study carried out by Kane *et al*. (18), who noted that 67.7% of their patients had post-acne pigmentation. Yeung*etal*. (22) Observed 552 adolescent patients with acne vulgaris, of which 52.6% had hyperpigmentation. Post-inflammatory hyperpigmentation is a result of epidermal or dermal melanosis (8). The epidermal inflammatory response results in the release and subsequent oxidation of arachidonic acid to prostaglandings, leucotrienes and other products (23). These products of inflammation alter the activity of both immune cells and melanocytes (24). Dermal melanosis occurs when inflammation disrupts the basal cell layer, causing melanin pigment to be released and subsequently trapped by macrophages in the papillary dermis, also known as pigmentary incontinence causing dermal type of post inflammatory hyperpigmentation (9). Post-inflammatory hyperpigmentation located in cosmetically sensitive regions like the face may result in significant amount of emotional distress (28).

Atrophic scars (30.8%) which include ice pick scars, boxcar scar was the second most common complication in this study (figure 16 and 17). A hospital- based cross-sectional study among 309 acne vulgaris patients found post-acne scarring in 39.5% of patients.[7] Atrophic acne scars is an unfortunate complication of acne vulgaris, which may be associated with significant psychological distress (9). Inflammation resulted in skin tissue damage, disrupting the production and structure of the collagen in the affected tissue (9). This disruption results in the loss of collagen and fibrin in the affected area (10). Without this collagen and fibrin, the resulting scar tissue from the acne inflammation sinks into the skin, creating the appearance of ice pick, boxcar and rolling acne scar depending on extent of collagen and fibrin loss.[10]

Cutaneous diseases carry a distinctive psychosocial burden in that patients who suffer from these diseases display the blemish on their skin, especially the face for the world to see and criticize on a daily basis. Acne vulgaris is visible to everybody, affects skin integrity and may therefore lead to low self-esteem. Acne changes the appearance, producing disturbances in body image. On the other hand, acne improvement has been shown to be related to improvement in emotional and psychological disturbance. Specifically, acne has a known potential to cause significant psychological distress, because it predominantly affects the face.[13]

CONCLUSION

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous units of the skin. Comedonal acne was the predominant pattern while nodulocystic was the least. Post-

inflammatory hyperpigmentation was the commonest complication followed by atrophic scars.

These findings was similar to the study which indicates that facial scarring affects both sexes equally and occurs to some degree in 95% of cases with post-inflammatory hyperpigmentation Layton et al. (9). Post-inflammatory hyperpigmentation developed by patients that presented late to dermatologist usually lead to disfiguring face and low self-esteem. There is therefore need for early referral for expert care

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Table 1: Age and gender distribution of the patie

	Frequency	Percent
Age group		
< 15 years	5	1.9
15-19 years	101	38.8
20-24 years	97	37.3
25-29 years	42	16.2
> 29 years	15	5.8
Mean ± SD	20 ± 4.7	
Sex		
Male	111	42.7
Female	149	57.3
Religion		
Christian	209	80.4
Islam	51	19.6
Total	260	100.0
Ethnicity		
Yoruba	236	90.8
Igbo	19	7.3
Edo/delta	5	1.9
Occupation		
Teaching	10	3.8
Student	226	86.9
Petty trading	5	1.9
Undergraduate student	12	4.6
Applicant	1	0.4
Banking	3	1.2
Pharmacist	2	0.8
Medical practice	1	0.4

Table 2: Pattern of acne vulgarisin 260 patients by age group

Age Group	Acne lesions Comedones	Papules	Pustules	comedopa -pular	Papulo - pustular	Nodulocystic	Total	P value
< 15 years	1 (0.4)	1 (0.4)	1 (0.4)	1 (0.4)	1 (0.4)	0 (0.0)	5	**0.042**
15-19 years	61 (23.5)	21 (8.1)	10 (3.8)	5 (1.9)	2 (0.8)	2 (0.8)	101	
20-24 years	47 (18.1)	33 (12.7)	6 (2.3)	5 (1.9)	2 (0.8)	4 (1.5)	97	
25-29 years	15 (5.8)	16 (6.2)	7 (2.7)	3 (1.2)	1 (0.4)	0 (0.0)	42	
> 29 years	5 (1.9)	7 (2.7)	1 (0.4)	0 (0.0)	2 (0.8)	0 (0.0)	15	

Fisher exact test (p-value=0.042)

Table 3: Pattern of acne vulgaris in 260 patients by gender

Sex		Acne lesions Comedones	Papules	Pustules	Comedopapular	Papulopustular	Nodulocystic	Total	p-value
Male	Freq	55	32	12	8	2	2	111	0.729
	%	21.2	12.3	4.6	3.1	0.8	0.8	42.7	
Female	Freq	74	46	13	6	6	4	149	
	%	28.5	17.7	5.0	2.3	2.3	1.5	57.3	
Total	Freq	129	78	25	14	8	6	260	
	%	49.6%	30.0	9.6	5.4	3.1	2.3	100.0	

Fisher exact test (p-value=0.729).

Table 4: Gender and age predilection for acne vulgaris

Sex	Age Group <15 years	15-19 years	20-24 years	25-29 years	> 29 years	Total	χ^2	p-value
Male	17 (6.5)	39 (15.0)	47 (18.1)	7 (2.7)	1 (0.4)	111	5.766	0.232
Female	12 (4.6)	47 (18.1)	71 (27.3)	15 (5.8)	4 (1.5)	149		

Fishers test (p=0.232)