Community Based Study of the Influence of Social class on the Prevalence and Clinical Profile of Adolescent Facial Acne Vulgaris

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Abstract

Background: Facial acne vulgaris is the most common disease of the skin in adolescents. In Nigeria, studies of the prevalence of adolescent facial acne vulgaris, lesion type and distribution, and influence of social class on prevalence are few. The aim of this study was to determine the prevalence of adolescent facial acne vulgaris, clinical characteristics, and the influence of social class on this prevalence. **Methods:** This was a community-based cross-sectional study. One thousand and seventy-nine students from four secondary schools (two private and two public) were assessed. Students were clinically examined for facial acne vulgaris, and acne severity was graded. A structured questionnaire for sociodemographic variables was administered to the students. Data were analyzed using SPSS 16. **Results:** One thousand and seventy-nine students were studied; 52% were male, and 47.9% were female. The students were aged 9–20 years with a mean age of 14 ± 2.1 years. The prevalence of facial acne vulgaris was found to be 53.2%. More females (56.7%) had acne than males (50%), the prevalence was found to increase from 28% in the 9–11 years age group to 71.1% in the 18–20 years age group and more prevalent in adolescents from the high social class (60.7%). The severity of acne was mild in 67.2%, moderate in 28.9%, and severe in 4.9%. **Conclusion:** Prevalence of adolescent facial acne vulgaris increases with age, more prevalent in adolescents from a high social class. Male gender, age, a family history of acne, and previous treatment of acne contribute to the severity of acne.

Keywords: Acne vulgaris, adolescent, clinical profile, prevalence, severity, social class

INTRODUCTION

Acne vulgaris is a common skin disease in adolescents aged 13–18 years.[1,2] Community-based cross-sectional studies from various countries reveal a prevalence of 59.8% in India[3] 81.5% in Hongkong,[4] 67.5% in Malaysia,[5] 82.9% in Lithuania,[2] 96% in Brazil,[6] and 89.1% in Greece.[7] In Africa, community-based cross-sectional studies of the prevalence of adolescent acne are few and vary, being 59% in Cameroon,[8] 44.4%[9] in Ghana, and 28% in Mali.[10] The low prevalence of acne in the Malian study, according to the authors, was due to the study not being a clinical one, facial pictures were used, and it was conducted in a rural setting. In Nigeria, the few studies on adolescent acne also reveal a varying prevalence; varying from 42% to 90.7%.[11-14]

Globally, the prevalence of acne vulgaris in adolescents is high and this prevalence increases with age; being 11.7% at age 10–11 years and 69.8% at age 17 years.[2,6,10] This increased prevalence with age is in keeping with increased androgen and sebum production in late adolescence.[15] Prevalence reports between the sexes vary. In a cross-sectional study of 452 adolescents aged 10–17 years in Brazil, there was no statistically significant difference in the prevalence of acne between males and females.[6] Acne prevalence was 95.5% in males and 96.1% in females.[6] This was not the case in the cross-sectional study done in 1277 school children aged 7–19 years in Lithuania.[2] In this Lithuanian study, a higher prevalence of acne was found in males (73.6%)

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in comparison to the females (69.9%).[2] This difference in prevalence could be explained by the older age of the Lithuanian study since acne is more prevalent in late adolescence. Acne appears earlier in females reflecting the earlier onset of puberty[15] although more severe in males.[3,5] The severity in males could be explained by the increased androgen levels, which is a potent stimulus for sebum production.[15] A study from Mali on the influence of wealth (social class) on the prevalence of adolescent acne did not find any relationship.[10]

The aim of this study was to determine the prevalence of facial acne vulgaris, its clinical characteristics, and the influence of social class on prevalence in this population of adolescents.

METHODS

This was a descriptive cross-sectional, community-based study in an urban setting. The study was conducted in four randomly selected secondary schools in Ibadan North Local Government Area of Oyo State: two public schools (Anglican Commercial Grammar School and Oritamefa Baptist High School) to represent the low socioeconomic class and two private schools (ABI International School, Bodija, and Emifunmi College) to represent the high socioeconomic class. In Nigeria, the children of the more affluent class attend private schools. Each school had six grades, an arm of each grade was studied.

A multistage sampling method was used for selection of the students. A list of secondary schools in Ibadan North Local Government was obtained from the Ministry of Education. The schools were already classified by the government into public and private. From the list of private schools (26), two schools were selected by balloting. In addition, from the list of public schools (86), two schools were selected by balloting.

The calculated sample size was split into two halves, i.e., the same number of students was to be studied in the public and private schools. On getting to the schools, one arm of each year group, both Junior Secondary School (JSS) and Senior Secondary School (SSS) were selected by balloting to get a cluster sample. All the students found in the selected class were studied in each year group (JSS 1 to SSS 3) in each school.

Each student was clinically assessed for facial acne vulgaris. Lesions were counted, type of lesions was noted, and the severity of acne vulgaris was graded. The subject's sociodemographic parameters (e.g., sex and age) and clinical findings were recorded with the study data collection pro forma. In this study, acne severity was graded using the Comprehensive Acne Severity Scale into mild, moderate, and severe.[16]

Permission to carry out the study was obtained from the Ministry of Education and the various school heads. The study was explained to the subjects and their parents via a letter, and informed consent was obtained from the parents. Ethical approval was given by the research and Ethics Committee of the University College Hospital Ibadan (UI/EC/10/0001).

Data were analyzed using the Statistical Package for Social Sciences (SPSS) (Version 16.0 for Windows; Released 2010. Chicago, SPSS Inc).[17] Univariate descriptive statistics such as means, medians, frequencies, and proportions are presented. Associations between categorical variables were tested using the Chi-square test, while differences in means of groups were tested using the *t*-test and analysis of variance. Linear logistic regression was done to correlate the presence of acne with variables. Variables significant at the 10% level on bivariate analysis were entered into the model. The level of significance of all tests was $P < 0.05$.

RESULTS

One thousand and seventy-nine students were studied and this was made up of 562 (52.1%) males and 517 (47.9%) females [Table 1]. Five hundred and seventy-two (53%) of them were from private schools (high social class) and 507 (47%) from public schools (low social class). The age of the students ranged from 9 to 20 years with a mean age of 14 ± 2.1 years; 12% were aged 9–11 years, 48% were aged 12–14 years, 36% were aged 15–17 years, and 4% were aged 18–20 years.[6]

Acne-related variables

The prevalence of acne was found to be 53.2% (574/1079 of respondents). Age at the onset of acne was 8–11 years in (127) 22.1%, 12–15 years in (370) 64.5%, 16–19 years in (132) 13.2%, and (1) 20 years in 0.2%. The duration of acne was <1 year in 43.9%, 1–2 years in 31.5%, 3–4 years in 12.4%, and over 5 years in 8.4%. Family history of acne was reported in 42.9%, 24.9% had "no family history," and 31.0% had "no knowledge of family history." In general, 75.3% of the students had knowledge of acne treatment. Among persons with acne, 53.7% had treated acne. Modality of treatment was self-medication in 54%, traditional remedies in 1%, hospital treatment in 6%, and no treatment in 39%. In those who had engaged in self-medication, salicylic acid ointment was used in 49.4%, sulfur ointment in 12%, antibiotics in 9.2%, antiseptic soaps in 23.2%, and herbal remedies in 6.1%. The subjective and clinical severity of acne was mild in 52.6% and 67.2%, respectively [Figure 1].
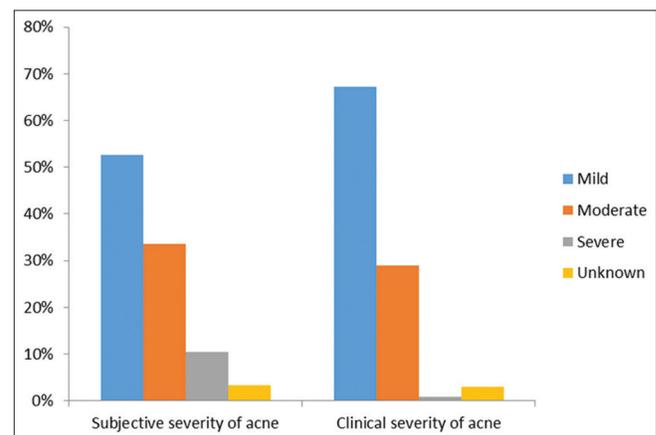

Figure 1: Histogram of severity of acne

Table 1: Relationship between gender and variables

Variable	Gender		Total	χ^2	P
	Male	Female			
Social class					
Low	318 (56.6)	254 (49.1)	572	6.007	0.014
High	244 (43.4)	263 (50.9)	507		
Acne					
Yes	281 (50.0)	293 (56.7)	574	4.816	0.028
No	281 (50.0)	224 (43.3)	505		
Age (years)					
9- 11	71 (12.6)	61 (11.8)	132	9.777	0.021
12- 14	251 (44.7)	269 (52.0)	520		
15- 17	213 (37.9)	176 (34.0)	389		
18- 20	27 (4.8)	11 (2.1)	38		
Clinical severity					
Mild	180 (65.2)	213 (73.7)	393	4.800	0.028
Moderate/severe	96 (34.8)	76 (26.3)	172		
Subject severity					
Mild	157 (55.9)	151 (53.0)	308	0.599	0.741
Moderate	93 (33.1)	103 (36.1)	196		
Severe	31 (11.0)	31 (10.9)	62		
Family history of acne					
Yes	117 (60.9)	135 (65.2)	252	0.784	0.376
No	75 (39.1)	72 (34.8)	147		
Knowledge of acne treatment					
Yes	397 (89.8)	416 (87.8)	813	0.968	0.325
No	45 (10.2)	58 (12.2)	103		
Ever treated acne					
Yes	145 (50.7)	167 (57.6)	312	2.751	0.097
No	141 (49.3)	123 (42.4)	264		
Age at onset					
8- 11	55 (19.6)	72 (24.6)	127	11.475	0.003
12- 15	186 (66.2)	184 (66.8)	370		
16- 19	40 (14.2)	36 (12.3)	76		
20	0	1 (0.3)	1		

Gender distribution

The gender distribution of the variables is shown in Table 1. Statistically significant differences were found for social class, prevalence of acne, age, clinical severity, and age at onset. Acne was present in more females (56.7%) than males (50.0%). This was significant at $P = 0.028$.

There were more females who had acne (52.0%) in the age group of 12–14 years compared to males (44.7%). This attained significance at $P = 0.021$. While the clinical severity of acne was found to be significantly associated with gender ($P = 0.028$), the subjective severity was not ($P = 0.741$).

Presence of acne and variables

The relationship between the presence of acne and variables is displayed in Table 2a. All the variables were significantly associated with the presence of acne. The prevalence of acne was 46.5% among the low socioeconomic class and 60.7% among the high socioeconomic class ($P < 0.001$). Significantly more females than males had acne, and the prevalence of acne increased across the ages.

Table 2b shows the logistic regression of the presence of acne on variables. Variables significant at the 10% level on bivariate analysis were entered into the model. All but 1 variable (gender) remained significant. Respondents from a high socioeconomic class were almost two times more likely to have acne than those from a low socioeconomic class ($P = 0.001$). Males were 1.1 times less likely to have acne than females ($P = 0.396$).

Clinical severity and variables

Only two variables (gender and a history of acne treatment) were significantly associated with the clinical severity of acne. The socioeconomic class was not significantly associated with the clinical severity ($P = 0.375$), with 28.8% of the low socioeconomic class and 32.3% of the high socioeconomic class having clinically moderate/severe acne. Significantly more males than females (35.2% vs. 26.4%) had clinically moderate-to-severe acne ($P = 0.025$). Across the age groups, there was no difference in the severity of acne on examination ($P = 0.193$). Among persons with a family history of acne,

31.9% had moderate/severe acne. Those with no family history of acne had a moderate/severe acne prevalence of 29.8%. This was not statistically significant ($P = 0.663$). Significantly more persons with a history of acne treatment (39.2%), compared with the 19.9% of those without a history of acne treatment, had moderate-to-severe acne ($P < 0.001$). There was no significant association between the clinical severity and the age at onset. $P = 0.928$.

Table 2a: Relationship between the presence of acne and variables

Variable	Acne		Total	χ^2	P
	Yes	No			
Social class					
Low	266 (46.5)	306 (53.5)	572	21.908	<0.001
High	308 (60.7)	199 (39.3)	507		
Class					
JSS1	44 (22.3)	153 (77.7)	197	154.045	<0.001
JSS2	86 (42.2)	118 (57.8)	204		
JSS3	100 (57.8)	73 (42.2)	173		
SSS1	100 (54.9)	82 (45.1)	182		
SSS2	139 (71.6)	55 (28.4)	194		
SSS3	102 (81.6)	23 (18.4)	125		
Sex					
Male	281 (50.0)	281 (50.0)	562	4.816	0.028
Female	293 (56.7)	224 (43.3)	517		
Age (years)					
9- 11	37 (28.0)	95 (72.0)	132	28.228	<0.001
12- 14	242 (46.5)	278 (53.5)	520		
15- 17	268 (68.9)	121 (31.1)	389		
18- 20	27 (71.1)	11 (28.9)	38		

JSS: Junior secondary school, SSS: Senior secondary school

Table 2b: Logistic regression of presence of acne on variables

Variable	OR	OR (95% CI)	P
Social class			
Low	0.551	0.392- 0.774	0.001
High			
Class			
JSS1			<0.001
JSS2	0.147	0.071- 0.308	
JSS3	0.312	0.160- 0.607	
SSS1	0.566	0.291- 1.100	
SSS2	0.409	0.217- 0.774	
SSS3	0.726	0.397- 1.329	
Age (years)			
9- 11			0.024
12- 14	0.300	0.109- 0.828	
15- 17	0.437	0.184- 1.036	
18- 20	0.712	0.312- 1.626	
Sex			
Male	0.884	0.664- 1.176	0.396
Female			

OR: Odds ratio, CI: Confidence interval, JSS: Junior secondary school, SSS: Senior secondary school

Logistic regression of clinical severity on variables is shown in Table 3. Variables with at least a 10% level of significance on bivariate analysis were entered into the model. Only the gender and a history of acne treatment remained significant.

Agreement between subjective severity and clinical severity of acne

The test of agreement between the clinical severity of acne and the subjective (self-rated) severity was poor with a kappa statistics of 0.206 and a proportion in agreement of 61.6%, $P < 0.001$.
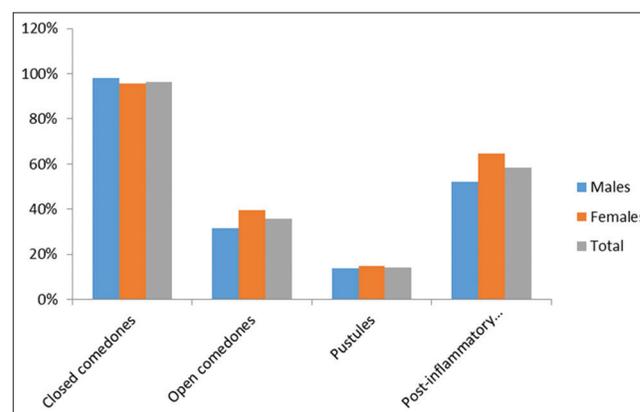
Prevalence of lesion types

Figure 2 displays the prevalence of the various lesion types. The mean count of closed comedone lesions was 5.24 (4.07) with a prevalence of 96.5%, while open comedone lesions had a prevalence of 96.5%, with a mean count of 2.48 (1.89). The prevalence of pustular lesions was 14.3% and a mean count was 2.32 (1.61). A mean count of 4.95 (4.07) and a prevalence of 58.5% were found for postinflammatory macules.

Discussion

Adolescents from four secondary co-educational schools, two private and two public, were the subjects of this study. The private schools served as the high socioeconomic class, while the public schools served as the low socioeconomic class.

The prevalence of adolescent facial acne in this study is high. This prevalence of acne vulgaris is within the documented prevalence range of adolescent acne, as reported in previous community-based studies of adolescent acne in Nigeria and Cameroon of between 42.5% and 90%.[8,11-13] However, this study revealed a lower prevalence of adolescent acne than that from a study of acne and diet carried by Okoro *et al*. in the same town.[11] The reason for this difference in the prevalence of acne may be due to the fact that the Okoro *et al*. study was mainly on diet and acne and not on the prevalence of acne and had fewer students (464) than this study (1079). Furthermore, these two studies were carried out in different schools with a different population of adolescents. The study from Kaduna,[12] (prevalence of 90.7%) is within the documented prevalence

Figure 2: Histogram of prevalence of lesion types

Table 3: Logistic regression of clinical severity of acne on variables

Variable	OR	95% CI	*P*
Age (years)			
9- 11			
12- 14	0.444	0.132- 1.500	0.541
15- 17	0.779	0.325- 1.870	
18- 20	0.852	0.360- 2.014	
Sex			
Male	1.681	1.143- 2.247	0.008
Female			
Ever treated acne	2.646		
Yes	1.780- 3.932		<0.001
No			

OR: Odds ratio, CI: Confidence interval

range of adolescent acne,[6,7] in Western counties but higher than the other reported Nigerian prevalence.[11,13,14] The reason for this could be a regional influence on prevalence as the Ibadan and Ife studies were conducted in the southwestern part of the country and the Kaduna study in the northern part of the country. Studies should be carried out to ascertain this regional or weather influence on the prevalence of adolescent acne.

Cordain *et al*.[18] in their report had concluded that acne vulgaris is a Western disease. These documented Nigerian reports of the prevalence of acne disprove this, showing that acne does occur in non-westernized countries, including Nigeria. More than half of the adolescents in this study had facial acne vulgaris lending credence to the fact that acne is common in adolescents.

Significantly more females than males in this study were found to have acne. Looking through the different age groups, it was mainly the females in the age group of 12–14 years who had a higher prevalence than the males. This is the age group at which females attain menarche with an increase in hormone production. This may be responsible for this increased prevalence in this age group. This higher prevalence of acne in females in this study is similar to that reported in studies by Mbaugbaw *et al*. and Campbell and Strassmann *et al*.[2,8,10] where they also had a higher female prevalence. It was, however, at variance with the studies by Yahya[12] where prevalence was higher in males and Bagatin *et al*. where there was no gender difference in prevalence[6] The reason for this variation in gender prevalence in the different studies is not known.

With regard to the age at onset of adolescent acne vulgaris, more females had acne onset at age 8–11 years compared to the males. It is documented that acne occurs earlier in females compared to males because females attain puberty 2–3 years earlier than males[19] with consequent earlier androgen secretion and androgen secretion is implicated in the pathogenesis of acne.[1,19] Mbaugbaw *et al*.[8] in their studies of adolescent acne also reported an earlier onset of acne in adolescent females as in this study.

The prevalence of adolescent facial acne was found to increase across the age groups. The increase in acne prevalence with age is related to increased androgen and sebum production with age in adolescents. Increased androgen and sebum production is implicated in the pathogenesis of acne.[1] This increase in the prevalence of acne with increasing age is in keeping with reports from other studies.[6,7,10,12]

Family history of acne was found to be high among adolescents with acne. The tendency to develop acne runs in families, but an exact pattern of inheritance has not been defined.[20] Other studies have also shown a family history of acne in adolescents who have acne[6,8] and a family history of acne is also said to be associated with an earlier occurrence of acne and an increased number of acne lesions.[1,8]

In this study, the prevalence of adolescent facial acne vulgaris was higher in the high socioeconomic class and this was statistically significant. This difference in prevalence between the two social groups may be due to a difference in diet. Students from a high socioeconomic class are able to afford sugary drinks, sweets, and chocolate which have been implicated in acne causation. The relationship between acne and diet was not one of the objectives of this study, so conclusive statements cannot be made regarding dietary differences between these two groups. The positive association between social class and prevalence of acne in this study was also noticed in Ghana[9] although in a rural study from Mali, the socioeconomic class did not correlate with acne prevalence.[3] This study and the Ghanian study were conducted in an urban setting. This may be responsible for the differing observations from the one from Mali.

Prevalence was found to increase with the level of education of the students. Prevalence was found to be higher in SSS 3 adolescents compared to JSS 1 adolescents. This increase in prevalence with a higher level of education can be accounted for by age because the older adolescents in whom acne is more prevalent are the ones in SSS 3 and the prevalence of acne increases with age in adolescents.

Half of the adolescents had had treatment for facial acne vulgaris, with self-medication being the commonest mode of treatment and a salicylic acid cream the most common medication used. This salicylic acid cream is readily available over-the-counter and prepared from benzoic acid 6%, salicylic acid 2.5%, titanium dioxide, and precipitated sulfur 4.6%.[21] This study has shown that most adolescents get some form of treatment for acne and that there is a high percentage of over the counter medication use. Karciauskiene *et al*.,[2] Yahya,[12] and Hanisah *et al*.[5] in their studies of acne in adolescents also documented the use of over-the-counter medications for acne vulgaris by adolescents as in this study.

Most of the adolescents knew that facial acne could be treated. Knowledge of the treatment of acne is important in adolescents because this will make them seek treatment and seek it early. Acne is a treatable condition, and early treatment of acne is associated with less scarring.[20] Furthermore, knowledge of treatment could improve compliance. Bagatin *et al*. in their study of beliefs and perceptions of adolescents about acne,

also, found adolescents to be quite knowledgeable about acne treatment.[6]

Most students had mild acne. Adolescent acne is thought to be physiological with the occurrence of mostly mild acne, and most adolescents outgrowing the acne. Mild acne has been documented to be the most prevalent class of acne by other authors of adolescent acne.[1,5,6,12,13] More males, compared to females had severe acne in this study. This greater severity of acne in male students can be explained by increased androgen secretion in males. Studies from India and Malaysia reported greater severity of acne vulgaris in adolescent males compared to females as in this study.[3,5]

This study also revealed an increase in acne severity with age. Increased severity of acne with age could be due to increased androgen secretion and increased sebum secretion with age. Studies from Malaysia, Lithuania, Mali, and Brazil on adolescent acne show this increase in severity with increasing age.[2,5,6,10]

Acne was more severe in adolescents with a family history of acne than those without a family history of acne in this study. A family history of acne is said to be associated with an earlier occurrence of acne and an increased number of acne lesions,[1] a family history of acne in acne sufferers has also been documented by other authors.[6,8]

History of previous treatment of facial acne was found to be associated with the severity of acne. More of the students who gave a history of previous treatment for facial acne had moderate-to-severe acne compared to students who did not give a history of previous treatment for facial acne. This greater severity of acne in the adolescents, who gave a history of previous treatment, may have been due to wrong medication since most of this treatment was by self-medication. Furthermore, these adolescents may have sought treatment because of the severity of the acne. Bagatin *et al*. in their study also found an increase in the severity of acne in adolescents who had had previous treatment.[6]

The agreement between students self-assessed severity of acne and clinical assessment of severity was poor with a kappa of 0.206. The students assessed their acne to be milder than what it really was. This self-assessment of the severity of acne was subjective, depending on what the students felt while clinical severity was based on actual lesion count. The students may have rated their acne as mild because at this adolescent age, the students see other students with the same lesion and regard having acne as a normal occurrence with growing up despite seeking treatment for it.

The predominant lesion type was closed comedone followed by open comedone and then pustules. About half the students had postinflammatory hyperpigmentation. This shows that at some point in time, some of these students had inflammatory acne. Nodulocystic acne and other scars of acne were not seen in this study. The occurrence of more noninflammatory acne and lack of typical acne scars in these adolescents can be accounted for by mild acne being the main form of acne found in adolescents.[20] Predominantly comedonal (mild) acne was reported in other studies on adolescent acne.[2,6,10]

CONCLUSION

Facial acne vulgaris has a high prevalence in adolescents with an affectation of more females than males. The prevalence of facial acne increases with age and mild acne is the most prevalent form of acne in adolescents. Adolescent acne is more prevalent in adolescents from a high social class. Male gender, age, a family history of acne, and previous treatment of acne contribute to the severity of acne. Most adolescents are aware that acne can be treated and a lot of them make use of over-the-counter drugs.

Limitation to the study
Limitation of the study includes the inability to study the dietary patterns of these adolescents and ascertain the influence of diet on acne.

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Conflicts of interest
There are no conflicts of interest.

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