Prevalence and Risk Factors of Acne Vulgaris Among Secondary School Students in Ebonyi State, Nigeria

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ABSTRACT

Background: Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous gland with a high prevalence in adolescents, associated with complications including psychosocial impact. There is a paucity of studies on acne prevalence in urban versus rural areas in Southeastern Nigeria, and even fewer studies on how acne triggers vary between these contrasting environments. This knowledge gap underscores the importance of conducting the present study.

Objectives: To determine the prevalence of acne vulgaris in urban versus rural secondary school students in Ebonyi and identify its risk factors.

Methods: This cross-sectional study was conducted in four secondary schools (two urban and two rural) and five hundred (500) participants across Ebonyi State. Pre-tested, structured interviewer-administered Questionnaires were used to collect data, and acne severity was measured clinically using the Global Acne Grading System. (GAGS). Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.

Results: The overall prevalence of acne vulgaris was 67.9%, with a female-to-male ratio of 1.4:1. It was higher in rural participants (79.4%) than in urban participants (59.4%). It had a significantly earlier age of onset (13.24±1.52 years) in urban than in rural participants (13.88±1.70 years), $p<0.05$. Males had higher odds of developing severe acne (urban OR = 0.14, p = 0.015; rural OR = 0.76, p = 0.73) than females. Other factors positively associated with acne severity in the participants included age (urban OR=0.75, P=1.07 vs rural OR=0.17, P=1.49), milk intake (urban p=0.69, rural=1.00), family history, and body weight; however, these did not reach statistical significance.

Conclusion: Acne vulgaris is more prevalent among rural than urban secondary school students in Ebonyi State. Several potential risk factors were identified, though most were not statistically significant. Targeted preventive measures are recommended for both urban and rural adolescents.

Keywords: acne vulgaris, prevalence, adolescents, risk factors, Nigeria

Prévalence et Facteurs de Risque de l'Acné Vulgaire Chez les élèves du Secondaire de l'État d'Ebonyi, au Nigéria

Résumé

Contexte : L'acné vulgaire est une affection inflammatoire chronique des glandes pilo-sébacées, très fréquente chez les adolescents et associée à des complications, notamment des répercussions psychosociales. Les études sur la prévalence de l'acné en milieu urbain et rural dans le sud-est du Nigéria sont rares, et celles portant sur les facteurs déclenchants de l'acné varient dans ces deux environnements. Ce manque de données souligne l'importance de la présente étude.

Objectifs : Déterminer la prévalence de l'acné vulgaire chez les élèves du secondaire en milieu urbain et rural dans l'État d'Ebonyi et identifier ses facteurs de risque.

Méthodes : Cette étude transversale a été menée dans quatre établissements d'enseignement secondaire

(deux urbains et deux ruraux) auprès de 500 participants répartis dans l'État d'Ebonyi. Des questionnaires structurés, préalablement testés et administrés par un enquêteur, ont permis de recueillir les données. La gravité de l'acné a été évaluée cliniquement à l'aide du système mondial de classification de l'acné (GAGS). Les données ont été analysées à l'aide du logiciel SPSS (Statistical Package for the Social Sciences), version 22.

Résultats : La prévalence globale de l'acné vulgaire était de 67,9 %, avec un ratio femmes/hommes de 1,4/1. Elle était plus élevée chez les participants vivant en milieu rural (79,4 %) que chez ceux vivant en milieu urbain (59,4 %). L'âge d'apparition était significativement plus précoce en milieu urbain (13,24 ± 1,52 ans) qu'en milieu rural (13,88 ± 1,70 ans), $p < 0,05$. Les hommes présentaient un risque plus élevé de développer une acné sévère (OR en milieu urbain = 0,14, $p = 0,015$; OR en milieu rural = 0,76, $p = 0,73$) que les femmes. D'autres facteurs étaient positivement associés à la gravité de l'acné chez les participants, notamment l'âge (OR en milieu urbain = 0,75, p = 1,07 vs OR en milieu rural = 0,17, p = 1,49), la consommation de lait (p = 0,69 en milieu urbain, p = 1,00 en milieu rural), les antécédents familiaux et le poids corporel ; cependant, ces associations n'étaient pas statistiquement significatives.

Conclusion : L'acné vulgaire est plus fréquente chez les élèves du secondaire en milieu rural qu'en milieu urbain dans l'État d'Ebonyi. Plusieurs facteurs de risque potentiels ont été identifiés, mais la plupart n'étaient pas statistiquement significatifs. Des mesures préventives ciblées sont recommandées pour les adolescents, tant en milieu urbain que rural.

Mots-clés : Acné Vulgaire, Prévalence, Adolescents, Facteurs de risque, Nigéria

Introduction

Acne vulgaris is the 8th most prevalent disease internationally, affecting an estimated 9.4% of the global population.(1) Its prevalence is exceptionally high in developed countries, with about 31% to 95% of the adolescent population affected.(2) However, recent evidence suggests that the disorder is becoming increasingly common in developing countries, a trend that was not previously observed.(3) Although the pathogenesis of acne vulgaris is attributed mainly to increased sebaceous gland secretion, follicular hyperkeratinization, follicular microbial colonization, and chronic inflammation,[4,5] several external factors, such as industrialization, dietary changes, the use of cosmetics, and environmental influences may explain the higher prevalence of acne vulgaris observed in urban areas compared to rural areas. Consequently, it is plausible that, despite similar genetic backgrounds, individuals residing in urban areas are more likely to develop acne vulgaris than those in rural areas.

Hagenström et al. found an acne prevalence rate of 6.49% in a nationwide survey in Germany.(4) While in China, a higher prevalence of 8.1% was reported, with nineteen-year-old adolescents being the most affected.(5) Pre-pubertal and adolescent-based research further revealed higher prevalence rates of 10.6% in Mexico,(6) 93.2% in Iran(7) and 62.7% in Cameroon.(8)

An acne prevalence rate of 90.7% was noted by Husain(9) among school children in Kaduna, Nigeria. Benson et al.(10) reported an acne prevalence rate of 37.3% in Benin City in 2016, while in the same year, at Ibadan, Okoro et al. reported a rate of 64.4%.(11) These different rates lend credence to the assertion that the incidence of acne vulgaris varies with geographical locations. In Cross River State, Eshan et al. reported an acne prevalence of 35%,[12] but in South-East Nigeria, Onyekonwu et al.[13] reported a prevalence rate of 7% in a hospital-based study. The environment appears to influence acne prevalence, with higher rates observed among migrants from rural to urban areas.(14) A plausible explanation other than genetics could be the intake of foods with high glycemic index, smoking, drugs, comedogenic cosmetics, and corticosteroids, some of which could be more available in urban areas.(3,15) Acne prevalence rates of 0.1% to 38% in rural and 65% to 97% in urban communities have also been recorded,(9,16) but the respondents' duration of residence in those areas was not clearly stated and may have contributed to the observed difference in the prevalence rates in the study.

There appears to be a paucity of studies on the

prevalence of acne vulgaris in Ebonyi State, South-East Nigeria. In this study, we aimed to elucidate the prevalence and predictors of acne vulgaris among urban and rural secondary school students in Ebonyi State.

Subjects, Materials, and Methods

This study was a community-based comparative cross-sectional study conducted among 10–19-year-old students in two randomly selected public and two private co-educational secondary schools, each in the Ezza (rural) and Abakaliki (urban) areas of Ebonyi State, Nigeria, from September 2020 to October 2020. A total of 736 students were screened, of which 500 had active acne lesions.

Ethical approval was obtained from the Research and Ethics Committee of the University of Nigeria Teaching Hospital, Enugu, and permission from the Ebonyi State Ministry of Education and the Principals of the participating schools. Written consent was obtained from parents/guardians of participants under 18 years and from participants over 18 years.

The participants were examined by the principal researcher and two trained resident doctors under natural daylight. Acne diagnosis was based on visible comedones, papules, and pustules, assessed using the Global Acne Grading System (GAGS). Those with acne vulgaris were then consecutively recruited for further data collection.

A pre-tested, structured, interviewer-administered proforma was used to collect data on socio-demographic characteristics, acne onset, body parts affected, family history of acne, influence of exam stress, diet type, sleep duration, and menstrual cycle on acne flares. Clinical examination was performed to determine body weight, height, and acne grade using a Hana™ bathroom weighing scale, a meter-calibrated wall, and GAGS, respectively.

The data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Categorical variables were summarised as percentages and graphically represented using graphs, tables, and charts. Continuous variables (age, weight, height, sebum levels, global acne grading system scores) were summarised as means and standard deviations, and the level of statistical significance was set at $P<0.05$.

Results

Five hundred of the 736 students who took part in the study had acne vulgaris, including 250 from urban and 250 from rural secondary schools. There were significantly more females than males in the urban study group ($p <0.05$), as shown in Table 1. Conversely, there were nearly an equal number of males and females in the rural study group. Most participants in both study groups (30.8% urban, 38.2% rural) were aged 15-19 years, with a higher proportion in the rural area. [Table 1]

The mean age of onset of acne vulgaris was significantly higher among participants from urban areas than among those from rural areas. [Table 1] The study revealed a total prevalence of 67.9% for acne vulgaris; in the urban area, 59.4% of 421 screened students had acne vulgaris, while 79.4% of 315 screened students in the rural area had acne vulgaris. (Figure 1)

In both the urban and rural study populations, similar proportions of participants had mild, moderate, and severe acne (48.2%, 1.6%, and 0% in urban, and 48.6%, 1.4%, and 0.2% in rural, respectively). Acne severity was reclassified using GAGS scores into mild (1-30) and severe (≥31) categories. Severe nodulocystic acne (GAGS >39) was observed exclusively in the rural population.

Comedones were the most common lesion observed on the forehead, right cheek, left cheek, nose, chin, and chest of participants in both the urban (66.4%, 67.5%, 60%, 90.8%, 71.2%, and 12%, respectively) and rural (40.2%, 44.6%, 44%, 86.9%, 47.2%, and 6%, respectively) study groups (Figure 2), with the T-zone (forehead, nose, and chin) having more lesions than the U-zone (right and left cheeks), and the nose being particularly affected.

In the urban area, milk consumption and a family history of acne were found to increase the risk of developing acne vulgaris by about 20% (odds ratios of 1.4 and 1.2, respectively). In the same vein, age and body weight showed an almost equal and direct proportional relationship with the risk of acne. [Table 2]

Also, among urban participants, males had significantly higher odds (p=0.015) of developing severe acne than females, with males approximately 7 times more likely to have severe acne. [Table 2] Conversely, logistic regression analysis of the rural study group showed that males had about 1.31 times higher odds (1/0.762 = 1.31) of severe acne than females, although this difference was not statistically significant. (p=0.73) [Table 3]

Similarly, the analysis of the rural study group showed that milk intake or a family history of acne was associated with a lower chance of developing acne. However, this observation (negative association) was not statistically significant (p>0.05) [Table 3]

The severity of acne was cross-tabulated with milk intake among both urban and rural participants. This study found no statistically significant association between milk intake and acne severity in either population. [Table 4]

Table 1: Socio-demographic characteristics of the study population

Socio-demographic features	**Urban** n (%)	**Rural** n (%)	**X^2**	**P value***
Gender(n=500)			15.16	<0.001
Male	84 (16.8)	127(25.4)		
Female	166(33.2)	123 (24.6)		
Age in years(n=500)			12.80	<0.001
10-14years	96 (19.2)	59 (11.8)		
15-19years	154(30.8)	191(38.2)		
Age at onset of acne	n=244 13.24±1.52	n=230 13.88±1.70		<0.05
School category			492.06	<0.001
Private	125(25)	125(25)		
Public	125(25)	125(25)		
Weight in Kg	n=250 52.46±8.29	n=250 48.65±7.11	23399	<0.05
Height(m)	n=250 1.64± 0.08	n=250 1.61±0.08	25030	<0.05
BMI (Kg/m^2)	n=250 19.45±2.76	n=250 18.67±2.22	26151	<0.05

n = number of responses % = percentage X^2 = Chi square.

*P is significant if <0.05

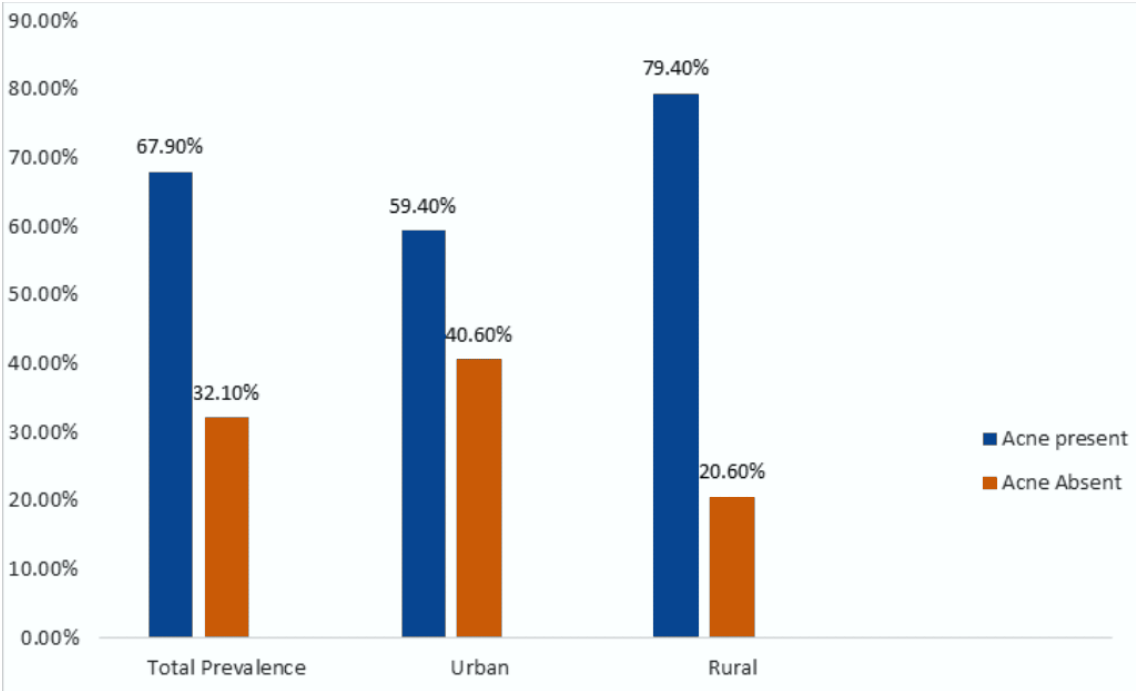

Figure 1: Prevalence of Acne vulgaris in the study population

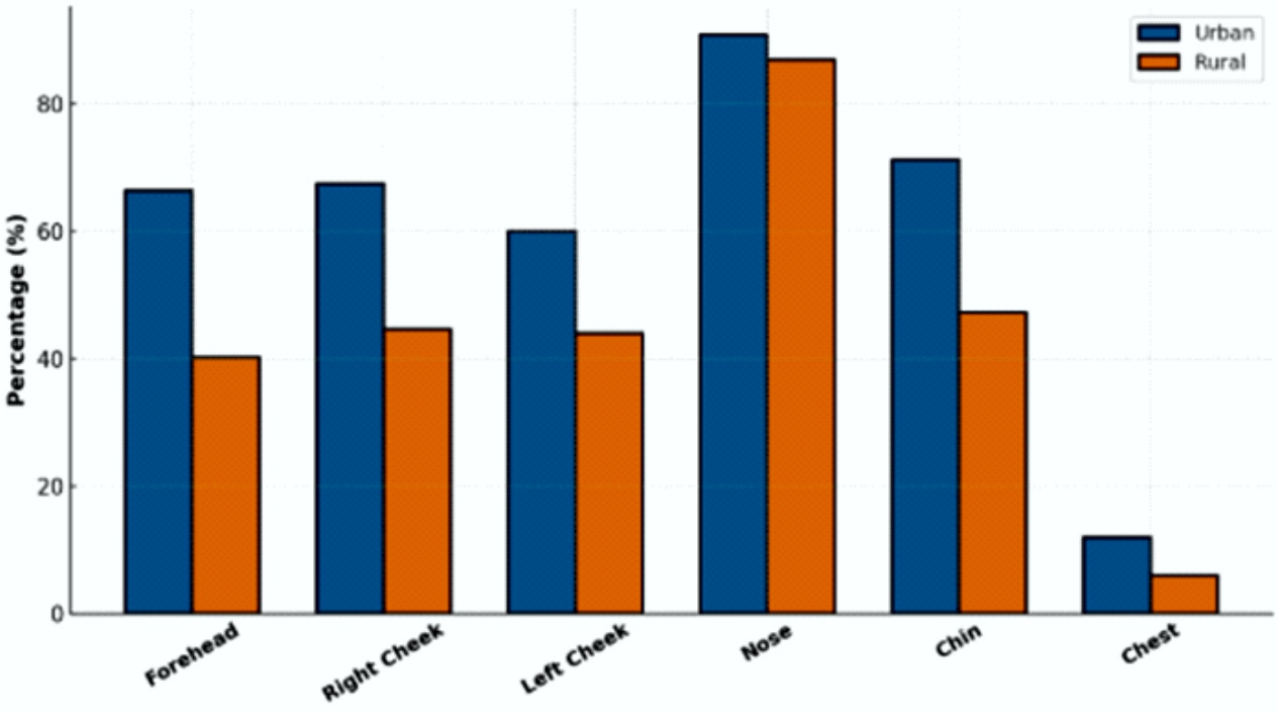

Figure 2: Distribution of comedones on different body parts among Urban versus Rural school students

Table 2: Logistic regression of predictors of acne vulgaris among urban secondary school students in Ebonyi State

Variable	P-value**	Odds Ratio	95% C.I.
Age	0.75	1.07	0.70-1.64
Gender	0.015	0.14	0.03-0.71
Milk intake*	0.69	1.40	0.27-7.28
Sleep duration	0.28	2.21	0.52-9.35
family history	0.77	1.24	0.30-5.13
Weight	0.18	1.04	0.98-1.11

C.I.: Confidence Interval *See table 4 for Fisher's exact test
**P is significant if <0.05

Table 3: Logistic regression of predictors of acne vulgaris among rural secondary school students in Ebonyi State

Variable	**P-value	Odds Ratio	95% C.I
Age	0.17	1.49	0.84-2.62
Gender	0.73	0.76	0.17 -3.48
Milk intake*	1.00	0.00	0.00
Sleep duration	0.39	2.56	0.30-21.66
Family history	0.47	0.57	0.12-2.63
Weight	0.50	1.04	0.93-1.16

* See Table 4 for Fisher's exact test. **P is significant if <0.05

Table 4: Cross-tabulation of Milk Intake and Acne Severity in Rural and Urban Populations

	Milk intake	Mild Acne	Severe Acne	Total	χ^2(p-value)	Fisher's exact (*p-value)
Rural(n=250)	No milk	225	7	232	χ^2=0.59, p=0.44	P=1.00 (2-sided)
	Milk	18	0	18		
	Total	243	7	250		
Urban(n=250)	No milk	194	7	201	χ^2=0.05, p=0.82	P=0.69 (2-sided)
	Milk	47	2	49		
	Total	241	9	250		

***P is significant if <0.05**

Discussion

This study examined the prevalence, pattern, and predictors of acne vulgaris in secondary schools in urban and rural areas of Ebonyi State, Nigeria.

Acne vulgaris was common in Ebonyi State, affecting 67.9% of the population studied. This value was higher than observed in Jos (55%)[17] and Ibadan (64.4%),[11] but lower than the prevalence in Kaduna (90.7%).(9)

The variations in prevalence compared to previous studies by Yahaya [9] and Ayanlowo [18] may be due to geographical differences, including humidity, sunlight intensity, and differences in participant age demographics.

Contrary to previous research, our study found a slightly lower prevalence of acne in urban areas than in rural areas. This unexpected outcome may be attributed to enhanced dermatological care access in urban areas,[7] differential skincare product utilization patterns, [14] population-specific dietary variations, and increased use of comedogenic preparations, such as corticosteroids, petroleum jelly, and shea butter, in rural populations. However, specific topical product use patterns were not evaluated in this study, a limitation that warrants further investigation.

Although access to dermatological services was not formally assessed, only two consultant dermatologists and one dermatology registrar in the urban tertiary hospital were serving the entire state during this research. This limited specialist availability may contribute to the observed urban-rural differences in acne prevalence.

Acne vulgaris was more common in urban females (32.8%) than males (16.8%), similar to Skroza's finding of 53% and 47%, respectively.[19] Could gender differences in enrollment of students in urban versus rural schools also account for this difference in our study? Further research may help shed more light on this.

The urban area had an earlier onset of acne (mean age 13.24±1.52) than the rural area (mean age 13.88±1.70), likely due to the significantly higher mean body weight and height in urban participants. (Table 1) It is known that body mass index is inversely proportional to the age of puberty commencement, which is usually signalled by acne.(20)

The Global Acne Grading System showed a predominance of mild non-inflammatory acne in both study populations, with both having similar proportions of mild, moderate, and severe cases of acne vulgaris; a finding consistent with other studies in Nigeria(11) and Egypt. [21] An acne grading tool, such as GAGS, is easy to use in the community setting. It helps identify mild disease, aid early diagnosis, and enable the timely commencement of therapy to prevent complications.(22)

In this study, acne lesions occurred on the facial regions of the study population in both the rural and

urban groups. Plausible factors accounting for this observation include heightened exposure to ultraviolet radiation, the use of comedogenic facial skincare products, or increased frequency of hand-to-face contact. These results are similar to those of Anaba et al., who observed a high prevalence (53.2%) of facial acne in the students they studied, with similar counts of closed and open comedones.(23)

Our study demonstrates that milk consumption showed a non-significant trend toward increased acne prevalence in the urban group, mirroring previous research linking milk intake to acne vulgaris.[1—(2427)] It is proposed that potent molecules present in milk fat can increase insulin secretion and insulin-like growth factor-1 synthesis, which, in turn, can lead to the proliferation of sebum and keratinocytes.(28,29)

In the urban area, milk intake was associated with an increased risk of acne, whereas no such association was observed among rural secondary school students. The quantity and type of milk taken, however, were not considered and may have influenced the results.

We did not find any rural-urban comparative study of acne vulgaris in Nigeria; instead, there were isolated studies conducted across different geographical groups.

The study, to the best of our knowledge, is the first in Southeastern Nigeria and has brought to the fore variations in the prevalence and determinants of acne vulgaris severity among adolescents living in urban versus rural areas.

It is recommended that proper skin care practices be included in the health education curriculum of secondary schools in Ebonyi State to educate young people about acne and help them avoid practices that could worsen disease outcomes.

The provision of increased psychological and educational support to adolescents who have acne through the setting up of health support groups will greatly enhance self-image among this group of young people.

Conclusion

Acne vulgaris remains a significant skin disorder in adolescents, not only globally but also in Ebonyi State. Although some variations were observed in the prevalence and predictors of the disorder between urban and rural areas of Ebonyi State, further studies are needed to validate these findings. Health education and policies targeted at adolescents would help mitigate the disorder's impact.

List of Abbreviations

– BMI: body mass index;
– CADI: Cardiff Acne Disability Index;
– cm: centimeters;
– GAGS: Global Acne Grading System;
– HADS: Hospital Anxiety and Depression Scale;
– Kg: kilogram;
– m^2: square meter;
– ml: milliliters;
– Vs: versus

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