

A Cross-Sectional Study of Acne Vulgaris and Associated Risk Factors Among Adolescents

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Received: 10-02-2026 / Revised: 17-03-2026 / Accepted: 27-04-2026

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Conflict of interest: Nil

Abstract:

Background: Acne vulgaris is a common chronic inflammatory disorder of the pilosebaceous unit that frequently affects adolescents and can significantly impact physical appearance and quality of life. Various genetic, dietary, and lifestyle factors contribute to its development and severity.

Aim: To assess the clinical profile of acne vulgaris and identify associated risk factors among adolescents.

Methodology: A hospital-based cross-sectional observational study was conducted among 80 adolescents aged 10–19 years attending the Department of Skin & VD, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar. Data were collected using a structured questionnaire and clinical examination. Associations between risk factors and acne severity were analyzed using appropriate statistical tests, with $p < 0.05$ considered significant.

Results: The majority of participants were aged 14–16 years (42.5%), females (55.0%), and urban residents (57.5%). Mild acne was the most common presentation (45.0%), and facial involvement was observed in 60.0% of cases. Frequent fast-food consumption (65.0%), high screen time (62.5%), inadequate sleep (57.5%), and high stress levels (52.5%) were common. Positive family history was present in 42.5% of participants. Significant associations were found between moderate-to-severe acne and fast-food consumption ($p = 0.021$), high screen time ($p = 0.032$), inadequate sleep ($p = 0.027$), high stress ($p = 0.015$), and positive family history ($p = 0.018$).

Conclusion: Acne vulgaris among adolescents is significantly associated with unhealthy lifestyle habits and genetic predisposition. Early identification of risk factors and lifestyle modification may help reduce disease severity and prevent complications.

Keywords: Acne vulgaris, Adolescents, Risk factors, Family history, Lifestyle factors, Cross-sectional study.

DOI: 10.25258/ijpqa.17.4.50

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Introduction

Acne vulgaris is one of the most prevalent skin diseases of adolescence in the world, and is a major public health problem because of its high prevalence, severe effects on appearance, psychological health, and impact on quality of life [1]. A chronic inflammatory disease of the pilosebaceous unit (hairs and sebaceous glands). It is caused when the combination of excess sebum production, abnormal follicular keratinization, Cutibacterium acnes colonization and inflammation cause typical skin lesions. Acne is more often seen in adolescence due to the hormonal changes that take place during puberty, which cause increased sebum production and sebum gland activity. While acne is not a life-threatening disease, its prevalence and the damage it can

cause due to scarring means it is an important health concern in young people.

The clinical features of acne vulgaris are very different from one acne sufferer to another. Characterized by comedones, papules, pustules, nodules and cysts either singly or in combination. Acne can either be mild or moderate, or it can be severe, depending on the number and severity of the lesions. Acne is mostly non-inflammatory (open comedones and closed comedones) in mild cases and inflammatory (papules, pustules, nodules and cysts) in moderate and severe cases. In severe cases of acne, the extent of tissue damage may lead to scarring, possibly for life, that can have a negative impact on a person's self-esteem and social interactions [2].

Adolescent is a very important period of development when significant hormonal, physical and psychological changes take place in the body [3]. In this phase, more androgens are made which stimulate the sebaceous glands which, in turn, causes the glands to secrete excess sebum, creating an environment that is conducive to the formation of acne. Acne is one of the most common disorders seen in adolescents ranging from 70% to 95% in various populations. Although acne is so common, the severity and distribution of acne differ based upon individual susceptibility and environmental factors [4]. It typically involves the sebaceous-rich areas of the face, chest, shoulders and back and can cause considerable embarrassment when it comes to social confidence during a time when physical appearance is an important factor.

Several factors have been suspected of playing a role in the etiology/recurrence of acne vulgaris. Aside from the predisposition, there is a significant genetic component; that is, adolescents with a family history of acne are more likely to develop the condition and have more severe acne. Enhanced androgen activity in puberty is thought to be a basic factor in acne pathogenesis. Other factors that are correlated with an increased risk for acne occurrence include: obesity, high body mass index (BMI), oily skin type and certain endocrine disorders. These can affect sebaceous gland activity and inflammatory reactions, which can be associated with the formation of lesions [5].”

It has also been a ‘revelation that lifestyle and diet factors play a role in determining the occurrence of acne. There are recent studies indicating that higher consumption of high-glycemic-index foods (sugary drinks, dairy products, fast foods and diet high in saturated fats) is likely to worsen acne by raising insulin-like growth factor-1 (IGF-1), which increases the activity of androgens (a type of hormone) [6]. In contrast, a diet high in fruits and vegetables and/or foods containing antioxidants may be protective. Lack of sleep, academic pressures, sedentary lifestyle, and low fluid intake have also been linked to the severity of acne in adolescents. These are risk factors which could be modified that underlines the fact that acne is a multifactorial disease and preventive health measures are important.

The psychological and environmental factors also play a role in the burden of acne vulgaris. Adolescents with acne often experience emotional distress, low self-esteem, anxiety, depression and social withdrawal. Facial lesions may have an impact on social interactions and school achievement. Other environmental factors like humidity, pollution, cosmetic products and occupational exposure to greases can also worsen acne. In addition, incorrect skin care practices, over cleaning the face and self-medication can exacerbate the problem and lead to further com-

plications, such as scarring and post-inflammatory pigmentation [7].

Although acne vulgaris is a very common condition, it has a multifactorial aetiology and the knowledge of the risk factors associated with adolescent acne will help to develop effective prevention and management strategies. A cross sectional study would allow an evaluation of the prevalence of acne and ascertain any demographic, genetic, dietary, lifestyle or environmental factors that may be related to the prevalence of acne in a particular population. Healthcare professionals can use such information to design targeted educational interventions, encourage healthy lifestyles and guide the early diagnosis and treatment. Hence, the current study was conducted to determine the prevalence of acne vulgaris and to identify the risk factors associated with acne vulgaris among adolescents, which will help to understand this common dermatological condition and its risk factors.

Methodology

Study Design: The present study was a hospital-based cross-sectional observational study designed to assess the prevalence of acne vulgaris and identify the associated risk factors among adolescents attending the dermatology outpatient department.

Study Area: The study was conducted in the Department of Skin & VD, Anugrah Narayan Magadh Medical College and Hospital, Gaya ji, Bihar, India.

Study Duration: The study was conducted over a period of 9 months from March 2025 to November 2025.

Study Participants: The study population was comprised adolescents attending the Dermatology Outpatient Department (OPD) during the study period.

Inclusion Criteria

- Adolescents aged 10–19 years attending the Dermatology OPD.
- Both male and female participants.
- Participants diagnosed clinically with acne vulgaris.
- Adolescents willing to participate in the study.
- Participants (and parents/guardians where applicable) providing informed consent/assent.

Exclusion Criteria

- Individuals aged below 10 years or above 19 years.
- Adolescents with severe systemic illnesses affecting skin health.
- Patients receiving treatment for acne vulgaris for less than four weeks before enrollment.
- Patients with other dermatological conditions that may mimic acne lesions.

- Individuals unwilling to provide informed consent/assent.
- Participants with incomplete clinical or questionnaire data.

Sample Size: A total of 80 adolescents meeting the eligibility criteria was enrolled in the study using a convenient consecutive sampling technique during the study period.

Procedure: Eligible adolescents attending the Department of Skin & VD was approached and informed about the objectives and procedures of the study. Written informed consent was obtained from participants aged 18 years and above, while assent along with parental/guardian consent was obtained for participants below 18 years of age.

A pre-designed and pre-tested structured questionnaire was administered by the investigator to collect relevant information regarding sociodemographic characteristics, including age, gender, residence, educational status, and socioeconomic background. Detailed information related to potential risk factors for acne vulgaris was also be collected, such as family history of acne, dietary habits (consumption of fast foods, dairy products, chocolates, and sugary beverages), personal hygiene practices, cosmetic use, sleep duration, physical activity, stress levels, screen time, smoking exposure, and menstrual history in female participants.

A thorough dermatological examination was conducted by a qualified dermatologist. The diagnosis of acne vulgaris was made clinically based on the presence of comedones, papules, pustules, nodules, or cysts. The severity of acne was assessed using a standard clinical grading system and categorized as mild, moderate, or severe. The distribution of lesions over different body sites, including the face, chest, and back, was also be recorded. Information regarding the duration of acne, previous treatment history, recurrence, and presence of acne scars or post-inflammatory hyperpigmentation were documented.

All collected data were recorded in a structured case record form and subsequently entered into a computerized database. Confidentiality and anonymity of participants were strictly maintained throughout the study. The collected information was analyzed to determine the prevalence of acne vulgaris and its association with various demographic, lifestyle, dietary, and familial risk factors among adolescents.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize demographic and clinical characteristics of the study participants. Associations between acne vulgaris and various risk factors were evaluated using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables will be compared using the independent sample t-test. A p-value of less than 0.05 were considered statistically significant. The results were presented in the form of tables, charts, and graphs for better interpretation and understanding."

Result

Table 1 shows the distribution of 80 participants according to their demographic characteristics. The majority of participants belonged to the 14–16 years age group, accounting for 34 (42.5%) individuals, followed by the 17–19 years age group with 28 (35.0%) participants, while the 10–13 years age group comprised 18 (22.5%) participants. Regarding gender, females constituted a slightly higher proportion with 44 (55.0%) participants compared to 36 (45.0%) males. Based on residence, most participants were from urban areas, representing 46 (57.5%) individuals, whereas 34 (42.5%) were from rural areas. In terms of socioeconomic status, the middle socioeconomic class predominated with 42 (52.5%) participants, followed by the lower class with 22 (27.5%) and the upper class with 16 (20.0%) participants.

Table 1: Distribution of Participants According to Demographic Characteristics (n = 80)		
Variable	Frequency (n)	Percentage (%)
Age Group (Years)		
10–13	18	22.5
14–16	34	42.5
17–19	28	35
Gender		
Male	36	45
Female	44	55
Residence		
Urban	46	57.5
Rural	34	42.5
Socioeconomic Status		
Lower	22	27.5
Middle	42	52.5
Upper	16	20

Table 2 presents the clinical characteristics of acne vulgaris among the 80 study participants. The majority of participants, 38 (47.5%), had acne for a duration of 6–12 months, followed by 24 (30.0%) with a duration of less than 6 months and 18 (22.5%) with acne persisting for more than 12 months. Regarding the site of involvement, most participants, 48 (60.0%), had lesions confined to the face, while 18

(22.5%) had involvement of the face and back, and 14 (17.5%) had lesions on the face, chest, and back. Mild acne was the most common severity grade, observed in 36 (45.0%) participants, followed by moderate acne in 30 (37.5%) and severe acne in 14 (17.5%). Acne scars were present in 26 (32.5%) participants, whereas 54 (67.5%) had no scarring.

Table 2: Clinical Characteristics of Acne Vulgaris Among Participants (n = 80)		
Variable	Frequency (n)	Percentage (%)
Duration of Acne		
< 6 Months	24	30
6–12 Months	38	47.5
> 12 Months	18	22.5
Site of Involvement		
Face Only	48	60
Face and Back	18	22.5
Face, Chest and Back	14	17.5
Severity of Acne		
Mild	36	45
Moderate	30	37.5
Severe	14	17.5
Presence of Acne Scars		
Yes	26	32.5
No	54	67.5

Table 3 shows the distribution of lifestyle and dietary risk factors among the 80 study participants. Frequent fast-food consumption was the most common risk factor, reported by 52 (65%) participants, followed by high screen time exceeding 4 hours per day in 50 (62.5%) participants. Inadequate sleep of less than 7 hours per day was observed in 46 (57.5%) participants, while high perceived stress was reported by 42 (52.5%). High dairy product intake was

present in 38 (47.5%) participants, and a positive family history of acne was noted in 34 (42.5%). Regular physical activity was reported by only 28 (35%) participants, whereas cosmetic use among females was observed in 20 (25%) participants. These findings indicate that unhealthy lifestyle habits and dietary factors were common among the study population.

Table 3: Distribution of Lifestyle and Dietary Risk Factors Among Participants (n = 80)		
Risk Factor	Frequency (n)	Percentage (%)
Frequent Fast-Food Consumption	52	65
High Dairy Product Intake	38	47.5
Inadequate Sleep (<7 Hours/Day)	46	57.5
High Screen Time (>4 Hours/Day)	50	62.5
High Perceived Stress	42	52.5
Regular Physical Activity	28	35
Cosmetic Use (Females)	20	25
Positive Family History of Acne	34	42.5

Table 4 shows the association between family history of acne and severity of acne among 80 adolescents. Among the 34 participants with a positive family history of acne, 10 (29.4%) had mild acne, 14 (41.2%) had moderate acne, and 10 (29.4%) had severe acne. In contrast, among the 46 participants without a family history of acne, the majority 26 (56.5%) had mild acne, while 16 (34.8%) had mod-

erate acne and only 4 (8.7%) had severe acne. The proportion of severe acne was considerably higher among participants with a family history of acne compared to those without. The association was found to be statistically significant ($p = 0.018$), indicating that a positive family history is significantly associated with increased severity of acne.

Table 4: Association Between Family History and Severity of Acne (n = 80)

Family History of Acne	Mild n (%)	Moderate n (%)	Severe n (%)	Total	p-value
Present (n=34)	10 (29.4)	14 (41.2)	10 (29.4)	34	0.018
Absent (n=46)	26 (56.5)	16 (34.8)	4 (8.7)	46	
Total	36	30	14	80	

Table 5 shows the association between selected risk factors and the severity of acne among the study participants (n=80). A significantly higher proportion of adolescents with frequent fast-food consumption had moderate-to-severe acne (65.4%) compared to mild acne (34.6%) (p=0.021). Similarly, high screen time exceeding 4 hours per day was associated with moderate-to-severe acne in 64.0% of cases (p=0.032). Inadequate sleep of less than 7 hours per day was observed among 65.2% of

participants with moderate-to-severe acne (p=0.027). High stress levels showed a significant association, with 66.7% having moderate-to-severe acne (p=0.015). A positive family history demonstrated the strongest association, with 70.6% of affected participants experiencing moderate-to-severe acne (p=0.018). Overall, all selected risk factors were significantly associated with increased acne severity.

Table 5: Association Between Selected Risk Factors and Moderate-to-Severe Acne (n = 80)

Risk Factor	Moderate-to-Severe Acne n (%)	Mild Acne n (%)	p-value
Frequent Fast-Food Consumption (n=52)	34 (65.4)	18 (34.6)	0.021
High Screen Time >4 hrs/day (n=50)	32 (64.0)	18 (36.0)	0.032
Inadequate Sleep <7 hrs/day (n=46)	30 (65.2)	16 (34.8)	0.027
High Stress Level (n=42)	28 (66.7)	14 (33.3)	0.015
Positive Family History (n=34)	24 (70.6)	10 (29.4)	0.018

Discussion

In the present paper, epidemiological profile, clinical characteristics and related risk factors of acne vulgaris in adolescents were evaluated. The results showed that in acne prevalence, the 14-16 group (42.5%) had the highest number of participants, followed by the group aged 17-19 (35.0%). Wei et al. (2010) [8] reported similar findings, stating that the prevalence of acne was highest during the middle part of adolescence, with the majority of Chinese adolescents (51.3%) suffering from acne. Similarly, Wu et al. (2007) [9] found that 53.5% of adolescents in China suffer from acne, indicating that hormonal changes associated with puberty play an important role in the onset of acne. The larger percentage of adolescents in the midteenage years of this study agrees with the established role of androgenic stimulation in acne pathogenesis during puberty.

In the present study, the number of females was 55.0% and males were 45.0%. This is similar to the results of Lynn et al. (2016) [10] as they found that adolescent females had a slightly higher prevalence of acne because of hormonal changes and increased concern over the appearance of their face. The GBDR study also showed a slight female excess in the prevalence of acne. But there was no significant difference in the prevalence of acne between both sexes in Heng and Chew 2020 [11]. Even with this, it was observed that boys tend to suffer from more severe acne than girls, as observed in some previous studies, but it was only 55.0% in this study because moderate to severe acne was found in more women than men.

In the current study, 57.5% of the respondents were from urban areas. Hogewoning et al. (2009) [12] also reported urban predominance with higher acne prevalence among school children in urban areas when compared to the prevalence in rural areas. There are many factors associated with urban life that can affect acne occurrence, such as living in an area where people are more likely to be exposed to pollution, more likely to change their diet, more likely to be stressed, and more likely to be inactive. A similar study by Wolkenstein et al. (2018) [13] showed that the prevalence of acne in adolescents and young adults in Europe was influenced by modern lifestyle behaviors. Thus, our results confirm those found internationally, where a higher percentage of respondents come from an urban setting.

As for clinical features, 47.5% of respondents had acne of 6 to 12 months duration and a significant number reported that their acne lasted longer than 1 year. Bhate and Williams (2013) [14] noted that acne is a chronic inflammatory disorder that can last for a long period of time during the adolescent and early adult years. The longer duration we have observed in our study could be attributed to the delay in seeking care from health professionals and self-medication prior to formal health care.

The most common site was the face (60.0%). The finding is also consistent with Ghodsi et al. (2009) [15] who reported that over 70% of the adolescents with acne had facial involvement. The face is especially prone to acne lesions because it has more pilosebaceous units. The prevalence of facial acne has

been consistently reported from all epidemiological studies.

According to acne severity assessment, 45.0% of the study participants had mild acne, 37.5% had moderate acne, and 17.5% had severe acne. The results are similar to those of Ghodsi et al (2009) who found around 14–20% of adolescents had severe acne. Likewise, 17.6% of people had moderate-to-severe acne, according to Heng and Chew (2020). This rate of severe acne is in line with the worldwide observations. In addition, 32.5% of participants had acne scars. Layton et al. (1994) [16] found that about 30–40% of acne patients ended up with some degree of permanent scarring, similar to what we found in our study. A third of those who participated had scars, which indicates the need for early diagnosis and treatment.

Unhealthy lifestyle behaviors were among the most interesting results of the present study. Sixty-five.0% of participants reported eating fast food several times a week and moderate-high consumption of fast food was strongly linked to moderate-severe acne. A similar prevalence was reported by Aksu et al. (2012) [17] who reported a significantly higher prevalence of acne among adolescents who consumed high-fat and fast-food diets. Claudel et al. (2018) also proposed that the diets low in fiber and high in refined carbohydrates and saturated fats could increase insulin and insulin-like growth factor-1 activity, which could lead to worsening acne. The strong correlation found in our study is consistent with other reports of a connection between the western diet and acne disease.

“62.5% of participants had over four hours of screen time daily and this was significantly associated with moderate to severe acne. This finding aligns with the results presented by Wolkenstein et al. (2018), who found more acne in adolescents who had sedentary behaviors and used digital devices for extended periods of time. Heng and Chew (2020) also found that the use of a computer and television were important lifestyle factors that were linked to acne occurrence. Too much screen time can have indirect effects, such as decreased physical activity, sleep disturbances, and stress.

In the current study, sleep deprivation, psychological stress emerged as important determinants of acne severity. 57.5% of participants reported inadequate sleep, and 52.5% reported high perceived stress. Yosipovitch et al. 2007 [17] showed that acne severity and stress among adolescents were positively correlated. They concluded that their results indicated that acne lesions might be worsened by stress-induced hormonal and inflammatory reactions. Recent epidemiological studies have corroborated the strong association between emotional stress and acne progression, which is similar to what has been observed.

The factor with the most significant association was family history, which was present in 42.5 % of the participants and was the most significant. Among those who had a positive family history, severe acne occurred significantly more often than among those who did not have a family history. This finding was similar to that of Heng and Chew (2020), who found a pooled odds ratio of 2.91 for acne in participants with a positive family history in their meta-analysis. In the same way, Karciauskiene et al. (2014) [18] and Ghodsi et al. (2009) found that family history of acne was one of the most significant risk factors for acne severity. The present results thus corroborate the importance of genetic susceptibility in the pathogenesis and progression of acne.

The present study concluded that acne vulgaris in adolescents is influenced by the demographic, genetic and lifestyle factors. The strong relationships found with fast food, high screen time, lack of sleep, stress, and family history are consistent with recent literature. The results show the importance of an integrated management strategy comprising both pharmacological treatment and lifestyle changes, diet advice, stress reduction and early intervention to prevent disease progression and scarring.”

Conclusion

The present study concludes that acne vulgaris is a common dermatological condition among adolescents, particularly in the 14–16-year age group, with a slight predominance among females and urban residents. Most participants exhibited mild to moderate acne, with facial involvement being the most frequent clinical presentation. Unhealthy lifestyle and dietary habits, including frequent fast-food consumption, excessive screen time, inadequate sleep, and high stress levels, were highly prevalent among affected adolescents. A positive family history was also identified as a significant determinant of increased acne severity, highlighting the role of genetic predisposition. The study demonstrated statistically significant associations between these modifiable and non-modifiable risk factors and moderate-to-severe acne. These findings emphasize the importance of early identification of risk factors, lifestyle modification, health education, and timely dermatological intervention to reduce disease severity, prevent scarring, and improve the overall quality of life among adolescents.

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