Section: Dermatology

Original Research Article

ACNE VULGARIS AND ITS ASSOCIATION WITH PERCEIVED STRESS, SLEEP, AND DIETARY INTAKE AMONG UNDERGRADUATE MEDICAL STUDENTS AT A TERTIARY CARE CENTRE IN SOUTH INDIA: A CROSS-SECTIONAL STUDY

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Received : 16/03/2026
Received in revised form : 07/05/2026
Accepted : 22/05/2026

Keywords:
Acne vulgaris; Medical students; Perceived stress; Cross-sectional studies; India; Risk factors.

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DOI: 10.47009/jamp.2026.8.3.267

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (3); 1521-1526

ABSTRACT

Background: Acne vulgaris is common among adolescents and young adults. Medical students face academic pressure, irregular sleep, and shifting dietary habits that may modify acne risk, yet South Indian student data are limited. **Materials and Methods:** A cross-sectional questionnaire-based study was conducted among undergraduate MBBS students and interns at a tertiary care medical college in Tamil Nadu. Two hundred and eighteen participants completed an online form covering demographics, anthropometry, acne history, the 10-item Perceived Stress Scale (PSS-10), self-reported sleep, and a 10-item dietary frequency questionnaire. Acne was self-reported as current, past resolved, or absent. Pearson chi-square tests examined associations between acne (current or past) and stress, sleep, dietary, and demographic variables, with $p<0.05$ considered significant. **Result:** Of 218 respondents (women 150, 68.8%; mean age 21.0 years, SD 1.81), 131 (60.1%) reported acne ever: 80 (36.7%) current and 51 (23.4%) past resolved. Among those with acne, 79 (60.3%) graded severity as mild, 47 (35.9%) as moderate, and 5 (3.8%) as severe; the face was the predominant site (108, 82.4%). Acne was significantly associated with PSS-10 category ($\chi^2=8.27$, $p=0.016$), family history ($\chi^2=10.91$, $p=0.001$), and facial cleanser use ($\chi^2=13.91$, $p=0.008$). Sleep duration, sleep quality, sex, and individual dietary items were not significantly associated with acne. **Conclusion:** Acne affected three in five medical students at this centre. Perceived stress and family history were the most consistent correlates. Targeted stress management and dermatology counselling may benefit this population.

INTRODUCTION

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit, characterised by comedones, papules, pustules, nodules and, in severe cases, cysts and scars.[1] It affects an estimated 9% of the world's population at any given time and is most prevalent during adolescence and young adulthood, with global age-standardised prevalence rates that have continued to rise over the past three decades.[2,3] A systematic review of risk-factor studies has identified family history, body mass index, age, and skin type as consistent epidemiological correlates of acne presentation and severity.[4]

The pathogenesis involves four interacting processes: increased sebum production, follicular hyperkeratinisation, colonisation by Cutibacterium acnes, and inflammation, all modulated by androgens and the insulin/insulin-like growth factor axis.[5,6] Beyond these biological drivers, modifiable lifestyle factors have attracted growing interest. Psychological stress can amplify the production of corticotropin-releasing hormone and androgens, increasing sebaceous gland activity. Sleep restriction disturbs circadian regulation of cortisol and inflammatory pathways. Diets with a high glycaemic load and frequent dairy intake may stimulate hyperinsulinaemia and downstream sebaceous activation, although the strength of these dietary effects varies across populations.[7]

Medical students occupy an environment where these exposures cluster: long hours of academic work, examination cycles, irregular sleep, inconsistent meals, and frequent reliance on convenience foods. A

literature review of 11 cross-sectional studies in medical students reported acne prevalence ranging from approximately 34% to 98%, with consistent associations with stress and lifestyle.[3] A study of 585 Saudi medical students reported an overall acne prevalence of 88.2%, with a significant positive correlation between Perceived Stress Scale scores and acne severity.[8] A Nigerian undergraduate study reported a prevalence of 88.5% with mild quality-of-life impact.[9] Indian data on the same question are sparse, with most published estimates drawn from hospital-based clinico-epidemiological audits rather than student populations.[10]

Local context also matters. Tamil Nadu is a hot, humid coastal state in southern India, where sebum production may be augmented by climate, and where dietary patterns differ from those described in most Western or East Asian datasets. Whether the stress-sleep-diet triad observed in Saudi or Western medical students operates similarly in a South Indian medical school is not well established. Understanding this association is also relevant because medical students themselves are a population at heightened risk of mental-health symptoms during training, and acne contributes measurable psychosocial burden including reduced self-confidence, social withdrawal, and depressive symptoms.[3,11,12]

This study aimed to determine the prevalence of acne vulgaris among undergraduate medical students and interns at a tertiary care medical college in Perambalur, Tamil Nadu, and to examine its association with perceived stress, sleep duration and quality, dietary frequency, family history, and skincare practices.

MATERIALS AND METHODS

Study design and setting: This was a single-centre, descriptive, cross-sectional questionnaire-based study conducted in the Department of Dermatology of Dhanalakshmi Srinivasan Medical College and Hospital, a tertiary care teaching institution in Perambalur, Tamil Nadu, India. Data were collected online between February and April 2026. Institutional Ethics Committee approval was obtained, and participation was voluntary with informed digital consent at the start of the survey.

Participants: This acne-related medical research was conducted within our institution. We enrolled MBBS undergraduate students in their 1st to 3rd years and final year of study, as well as mandatory-rotation medical interns from the same institution. Participants who had initiated systemic acne medication within one month prior to enrollment were excluded, as this type of treatment could mask the true state of acne. All personally identifiable information was removed from the study dataset to meet ethical requirements.

Sample size and recruitment: A convenience sample was recruited through internal class groups and notice boards. The link to a Google Forms questionnaire was circulated to all eligible students. A target of approximately 200 completed responses was set; 218 responses were received and analysed.

Data collection instrument: The structured questionnaire comprised six sections. The first captured demographic and anthropometric data including age, sex, year of study, height, weight, chronic illness, and family history of acne in any first-degree relative. The second section asked respondents whether they currently had acne, had past resolved acne, or had never had acne, together with the affected sites, self-rated severity (mild, moderate, severe), history of medical consultation, and treatment used. The third section assessed skin type and skincare habits including frequency of facial cleanser use and regular sunscreen use. The fourth section recorded average sleep duration per night and self-rated sleep quality on a four-point scale (very good, fairly good, fairly bad, very bad). The fifth section was the 10-item Perceived Stress Scale (PSS-10), the most widely used psychological instrument for measuring the perception of stress, with respondents indicating how often they had felt or thought a certain way during the previous month on a 1 (almost never) to 4 (very often) scale. The sixth section was a 10-item dietary frequency questionnaire covering cow's milk, dairy products, chocolate and sweets, fast food, sugar-sweetened beverages, nuts, fruits, vegetables, fish, and fried food, each rated on a five-level frequency scale ranging from never to more than twice per day.

Statistical analysis: Responses were exported to a spreadsheet and analysed in Python using pandas and SciPy. Continuous variables were summarised as mean and standard deviation, or median and interquartile range where distributions were skewed. Categorical variables were summarised as counts and percentages. Body mass index (BMI) was calculated as weight in kilograms divided by height in metres squared, with implausible values (height <100 cm or >220 cm; weight <20 kg or >200 kg) excluded.

For PSS-10 scoring, the four positively phrased items (items 4, 5, 7, and 8 of the original Cohen scale, corresponding to feeling confident, feeling things were going one's way, controlling irritations, and being on top of things) were reverse-scored. Item scores were summed and rescaled to the standard 0–40 range. The total score was categorised as low (0–13), moderate (14–26), or high (27–40) stress per the conventional cut-points.

The primary outcome was self-reported acne, dichotomised as ever (current or past) versus never. Associations between acne status and categorical covariates were examined using Pearson chi-square tests. Mean PSS-10 scores were compared between acne and no-acne groups using an independent-samples t-test. Dietary frequency for each item was dichotomised as frequent (≥3–4 times per week) versus infrequent (≤1–2 times per week or never) for chi-square testing. A two-tailed p-value of less than 0.05 was considered statistically significant. No

ISSN (O): 2687-5365; ISSN (P): 2753-6556

adjustment for multiple comparisons was applied; results should therefore be interpreted as exploratory.

RESULTS

A total of 218 medical students and interns completed the questionnaire and were included in the analysis. The demographic and clinical characteristics of the sample are summarised in Table 1. The mean age was 21.0 years (SD 1.81, range 18–30 years, valid n=214). One hundred and fifty respondents (68.8%) were women and 68 (31.2%) were men. Most participants were second-year MBBS students (139, 63.8%), followed by third year (36, 16.5%), interns (CRMI, 27, 12.4%), final year (14, 6.4%), and first year (2, 0.9%). The mean BMI was 22.77 kg/m² (SD 3.88, valid n=197).

Acne prevalence and clinical pattern: Acne (current or past) was reported by 131 of 218 respondents, giving a prevalence of 60.1%. Of these, 80 (36.7% of the overall sample) had current active acne and 51 (23.4%) reported past resolved acne. Eighty-seven (39.9%) reported never having had acne. [Figure 1] shows the distribution by status and self-rated severity. Among those reporting acne, 79 (60.3%) graded their condition as mild, 47 (35.9%) as moderate, and 5 (3.8%) as severe. The face was overwhelmingly the predominant site (108, 82.4%), with smaller numbers reporting back involvement (10, 7.6%), multiple sites (10, 7.6%), upper arms (2, 1.5%), or chest (1, 0.8%). The site distribution and the most frequently endorsed perceived aggravators are shown in [Figure 3].

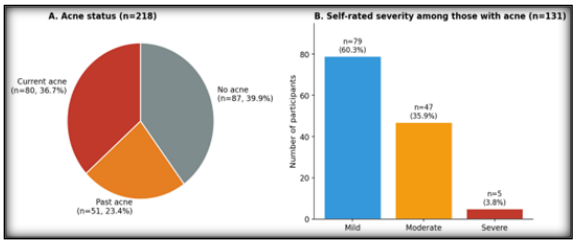

Figure 1. Acne status (panel A) and self-rated severity among those reporting acne (panel B), n=218.

Treatment-seeking and lifestyle profile: Only 52 of 131 respondents with acne (39.7%) had ever sought formal medical consultation. The remaining 79 (60.3%) had not. Among those reporting any treatment, topical agents alone were the most common (53, 40.5%), followed by home remedies (18, 13.7%), combined topical-plus-oral therapy (8, 6.1%), oral therapy alone (6, 4.6%), and laser-based interventions (2, 1.5%); 44 (33.6%) had used no treatment at all. Combination skin (86, 39.4%) and oily skin (72, 33.0%) were the most frequently reported skin types. One hundred and nineteen respondents (54.6%) reported regular sunscreen use. Twice-daily facial cleanser use was reported by 76 (34.9%) and once-daily use by 53 (24.3%); 56 (25.7%) did not use a cleanser at all.

Perceived stress: The mean PSS-10 score was 15.89 (SD 3.83, range 4–28). Fifty respondents (22.9%) fell in the low-stress category, 165 (75.7%) in the moderate-stress category, and 3 (1.4%) in the high-stress category. The distribution of stress category by acne status is shown in Figure 2A. Acne was significantly associated with PSS-10 category (χ^2=8.27, df=2, p=0.016): the moderate-stress group contained a higher proportion of acne sufferers (108 of 165, 65.5%) than the low-stress group (22 of 50, 44.0%). The mean PSS-10 score was numerically higher in the acne group (16.21, SD 3.62) than the no-acne group (15.39, SD 4.09), but the difference did not reach statistical significance on independent-samples t-test (t=1.56, p=0.121).

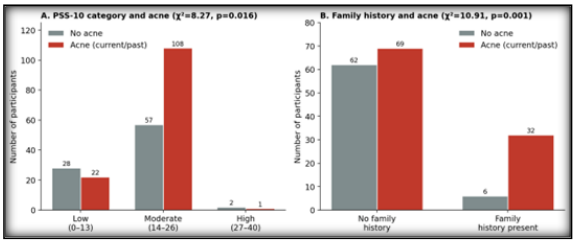

Figure 2: Statistically significant associations with acne. Panel A: PSS-10 category. Panel B: family history of acne. Pearson chi-square tests; n=218.

Sleep: Mean self-reported sleep duration was 6.09 hours per night (SD 1.12). Fifty-six respondents (25.7%) slept less than 6 hours, 141 (64.7%) slept 6–7 hours, and 21 (9.6%) slept more than 7 hours. There was no significant association between sleep duration category and acne (χ^2=0.92, df=2, p=0.633). One hundred and sixty-nine (77.5%) rated their sleep quality as good (very good or fairly good) and 49 (22.5%) as poor; this dichotomy was not associated with acne (χ^2=1.71, df=1, p=0.191).

Family history and skincare

Family history of acne was significantly associated with personal acne (χ^2=10.91, df=1, p=0.001; Figure 2B). Among 38 respondents reporting any affected first-degree relative, 32 (84.2%) had acne themselves, compared with 69 of 131 (52.7%) of those without a positive family history. Frequency of facial cleanser use was also associated with acne status (χ^2=13.91, df=4, p=0.008), driven by lower acne prevalence among those who did not use a cleanser (23 of 56, 41.1%) than among once-daily (37 of 53, 69.8%) or twice-daily users (53 of 76, 69.7%). Regular sunscreen use showed a borderline association (78 of 119, 65.5% versus 53 of 99, 53.5%; χ^2=2.77, p=0.096). Sex was not associated with acne in this sample (χ^2=1.01, p=0.316).

Diet

ISSN (O): 2687-5365; ISSN (P): 2753-6556

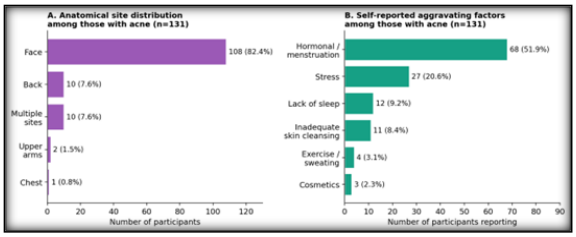

Figure 3: Clinical features among respondents with acne (n=131). Panel A: anatomical site distribution. Panel B: self-reported aggravating factors.

None of the 10 individual food items showed a significant association with acne when frequency was dichotomised at the ≥3–4 times per week threshold. Chocolate and sweet consumption produced a borderline non-significant trend (χ^2=3.38, p=0.066), with all other items returning p-values above 0.10. The detailed χ^2 results are presented in [Table 3].

Table 1: Demographic and clinical characteristics of study participants (n=218).

Characteristic	n	% / value
Age, years (mean, SD; n=214)	21.0	SD 1.81
Sex		
Female	150	68.8%
Male	68	31.2%
Year of study		
1st year MBBS	2	0.9%
2nd year MBBS	139	63.8%
3rd year MBBS	36	16.5%
Final year MBBS	14	6.4%
Compulsory Rotatory Medical Internee	27	12.4%
Body mass index, kg/m² (mean, SD; n=197)	22.77	SD 3.88
Acne status		
Current acne	80	36.7%
Past resolved acne	51	23.4%
Acne ever (current + past)	131	60.1%
Never had acne	87	39.9%

SD = standard deviation; MBBS = Bachelor of Medicine, Bachelor of Surgery. Percentages are calculated against the analytical denominator (n=218 unless stated). Age and BMI denominators reflect valid responses after exclusion of implausible or missing values.

Table 2: Clinical features among respondents reporting acne (n=131).

Feature	n	% (of n=131)
Self-rated severity		
Mild	79	60.3%
Moderate	47	35.9%
Severe	5	3.8%
Affected site		
Face only	108	82.4%
Back	10	7.6%
Multiple sites	10	7.6%
Upper arms	2	1.5%
Chest	1	0.8%
Sought medical consultation		
Yes	52	39.7%
No	79	60.3%
Treatment used		
Topical only	53	40.5%
Home remedies	18	13.7%
Combined topical and oral	8	6.1%
Oral only	6	4.6%
Laser	2	1.5%
None / not reported	44	33.6%

Severity is self-rated. Treatment categories are mutually exclusive within the highest-intensity intervention reported per respondent.

Table 3: Associations between candidate exposures and acne status (n=218).

Variable	Acne (n=131)	No acne (n=87)	χ^2	p
Sex (Female / Male)	94 / 37	56 / 31	1.01	0.316
PSS-10 category (Low / Moderate / High)	22 / 108 / 1	28 / 57 / 2	8.27	0.016*
Family history of acne (Yes / No)	32 / 69	6 / 62	10.91	0.001*
Cleanser frequency (5 levels)	see Methods		13.91	0.008*
Sleep duration (<6 / 6–7 / >7 h)	31 / 88 / 12	25 / 53 / 9	0.92	0.633
Sleep quality (Good / Poor)	106 / 25	63 / 24	1.71	0.191
Sunscreen use (Yes / No)	78 / 53	41 / 46	2.77	0.096
Diet: milk (Frequent / Infrequent)	-	-	0.90	0.342
Diet: dairy (cheese, yoghurt)	-	-	2.40	0.121
Diet: chocolate / sweets	-	-	3.38	0.066

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Diet: fast food	-	-	1.59	0.207
Diet: sugar-sweetened beverages	-	-	0.80	0.372
Diet: fried food	-	-	0.15	0.696

*Statistically significant at p<0.05. PSS-10 = 10-item Perceived Stress Scale (low 0–13, moderate 14–26, high 27–40). Dietary frequency dichotomised as frequent (≥3–4 times per week or daily) versus infrequent. Cleanser frequency cell counts not shown for legibility (twice/day, once/day, 3–4/week, once/week, none); see Results text. All analyses by Pearson chi-square test.

DISCUSSION

This cross-sectional study of 218 undergraduate medical students and interns at a South Indian tertiary care medical college reports a lifetime acne prevalence of 60.1%, with current active acne in 36.7% and past resolved acne in 23.4%. The face was the dominant site, severity was mild in most affected respondents, and only 39.7% of those with acne had sought formal medical consultation. Three correlates stood out: perceived stress category, family history, and frequency of facial cleanser use. Sleep duration, sleep quality, sex, and individual dietary items were not significantly associated with acne.

The 60.1% lifetime prevalence is appreciably lower than the 88.2% reported by Basfar and colleagues in 585 Saudi medical students who also used the PSS,[8] and lower than the 88.5% reported by Ayanlowo and colleagues in Nigerian undergraduates.[9] Several factors may explain this difference. Our outcome relied on self-report rather than dermatologist-graded examination, which can underestimate mild lesions that respondents do not classify as acne. Many of our respondents were drawn from the second-year MBBS cohort, somewhat older than the peak adolescent prevalence of 15–19 years documented in the Global Burden of Disease 2021 analysis.[2] Local skin type, climate, and reporting culture may also play a role. The clinico-epidemiological audit of acne patients at a Tamil Nadu tertiary care hospital by Kothai and colleagues similarly noted female predominance and a young adult age peak, although that study sampled patients presenting for treatment rather than the broader student population.[10]

The most informative finding was the association between PSS-10 stress category and acne (p=0.016). In this study, respondents with acne had an average score of 16.21 on the Perceived Stress Scale (PSS-10), which was higher than the average score of 15.39 among respondents without acne. The t-test conducted on the continuous scores did not reach statistical significance. The observed categorical association only stemmed from an excessively high proportion of people with acne in the moderate stress range; the high-stress subgroup had only 3 cases, which limited inferences related to the upper limit of the scale. The conclusions of this study align with the findings of references which proposed that stress is linked to acne severity via three pathways including activation of the HPA axis. A total of 51.9% of patients believed that hormones or menstruation triggered the worsening of their condition, while 20.6% identified stress as the trigger, which matches the previous conclusions from references.[11] Family history was the strongest factor associated with acne prevalence (p=0.001). The acne prevalence among respondents with a family member who had acne was nearly twice that of respondents with no such family history, with the respective proportions being 84.2% and 52.7%.

This is concordant with the systematic review by Heng and Chew, which reported a pooled odds ratio of 2.91 (95% CI 2.58–3.28) for parental family history, and with the meta-analysis by Liu and colleagues that identified family history as a risk factor for both acne and acne scarring.[12] The signal in our data, despite a relatively small subgroup with reported family history, supports family-history elicitation as a useful first-line prognostic question in young adult acne.

The cleanser-frequency association warrants careful interpretation. The pattern, with lowest acne prevalence among non-users and higher prevalence among regular users, almost certainly reflects reverse causation: respondents who develop acne adopt or intensify a cleansing routine, rather than cleansing producing acne. Cross-sectional designs cannot disentangle this temporal relationship. The borderline sunscreen finding likely reflects the same dynamic.

Sleep showed no significant association in our data, although a case-control study by Zhu and colleagues reported significantly poorer sleep quality in patients with acne and a positive association between acne severity and Pittsburgh Sleep Quality Index scores.[13] The discrepancy may reflect our use of a single-question quality rating rather than a validated multi-item instrument, the relatively narrow distribution of sleep duration in our sample (mean 6.09 hours, SD 1.12), and lack of stratification by acne severity. Recall bias in retrospective sleep estimation is also likely.

The absence of significant dietary associations contrasts with the systematic review by Meixiong and colleagues, which concluded that high glycaemic index and increased glycaemic load have a modest but consistent pro-acnegenic effect, with mixed evidence for dairy. A frequency questionnaire that did not capture portion size, glycaemic load, or total caloric intake is a blunt instrument for detecting moderate effects, and the borderline trend for chocolate and sweet consumption (p=0.066) hints at a signal that a more sensitive dietary assessment might detect. This study observes that only 39.7% of medical students with acne seek formal medical consultation, while most choose to self-medicate or forgo treatment entirely.[14] According to evidence-based guidelines, even mild acne imposes psychological costs; topical medications are recommended for mild to moderate cases, and oral medications are advised for severe cases. Medical

ISSN (O): 2687-5365; ISSN (P): 2753-6556

schools can add on-campus dermatology consultation services.

Limitations: This study has six core limitations: It uses a cross-sectional self-report design, and the prevalence, severity, and family history of acne were not clinically verified, leading to recall bias; the simultaneous administration of the PSS-10 scale and the dermatology questionnaire may introduce common method bias; the single-institution sample is skewed toward second-year female students, which limits its generalizability to other groups; dietary measurement only recorded food intake frequency; no correction was applied for multiple comparisons, so the findings related to family history and perceived stress only serve to reinforce the study's hypotheses; the observed association between facial cleansing frequency and acne may be affected by reverse causality. This study investigated a cohortof medical students in southern India, and 60% of respondents had acne vulgaris. The factors most strongly linked to acne were family history and perceived stress, rather than sleep or any single dietary factor. Most affected participants had not sought formal clinical care for their condition. Future research should carry out longitudinal studies, and establish on-campus dermatology consultation services.

CONCLUSION

This study conducted a survey of acne vulgaris among undergraduate medical students and interns at a tertiary medical college in southern India. The results showed an overall prevalence of 60.1%, with 36.7% being current cases and 23.4% being past cases that resolved spontaneously. Most cases were mild and limited only to the face. The strongest associated factors were family history and perceived stress level. No significant associations were found for sleep parameters or individual dietary items. 60% of affected students did not seek medical care. We propose adding on-campus dermatology services and stress management resources, and large-sample longitudinal studies are needed in the future to clarify the relevant causal relationships.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556