Original Article

Association of Psychological Stress and Sleep Quality with Acne Vulgaris: An Observational Study

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Abstract

Background: Acne vulgaris is a well-known chronic inflammatory skin disease that is associated with a variety of biological and psychosocial factors. It has been proposed that psychological stress and poor sleep quality trigger acne via neuroendocrine and inflammatory pathways. **Material and Methods:** We hypothesized that psychological stress was associated with sleep quality and acne vulgaris severity. The study was done on 100 patients aged between 15-35 years presenting with clinically diagnosed acne vulgaris in the Dermatology OPD of a tertiary care hospital, in the cross sectional observational study design. The severity of acne was evaluated by Global Acne Grading System (GAGS). The Perceived Stress Scale (PSS-10) was used to assess psychological stress and the Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. The analysis of data was done in SPSS version 25.0 and the association was assessed by Chi-square test with $p< 0.05$ considered statistically significant. **Results:** Most of the participants (42%) were in the age range of 21- 25 years with 54% being female. Moderate acne was the most common severity (40%). Moderate stress levels were observed in 52% of participants, while 24% had high stress. Poor sleep quality was present in 60% of subjects. A statistically significant association was found between higher psychological stress and increased acne severity, as well as between poor sleep quality and more severe acne ($p < 0.05$). **Conclusion:** Psychological stress and poor sleep quality are significantly associated with increased severity of acne vulgaris. Addressing these modifiable lifestyle and psychosocial factors through stress management and improved sleep hygiene may help improve acne outcomes and overall patient well-being.

Keywords: Acne vulgaris; Psychological stress; Sleep quality; Perceived Stress Scale (PSS); Pittsburgh Sleep Quality Index (PSQI); Global Acne Grading System (GAGS).

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Introduction

One of the most prevalent chronic inflammatory skin conditions affecting teenagers and young adults globally is acne vulgaris. Acne severity and progression have been found to be significantly influenced by psychological stress. Stress triggers the hypothalamic-pituitary-adrenal (HPA) axis, which increases the release of cortisol, corticotropin-releasing hormone (CRH), and adrenocorticotropic hormone (ACTH). These stress-related hormones promote the development of acne lesions by increasing sebum production and stimulating sebaceous gland activity. In addition, psychological stress may alter immunological functions, and activate inflammatory pathways in the skin, both of which could aggravate pre-existing acne lesions.[1,2]

There have been many epidemiological studies that have revealed that there is a high correlation between the severity of acne and psychological stress. For instance, a study conducted on medical students found that those who felt more stressed had much more severe acne lesions than those who felt less stressed. These findings support the notion of a 'brain–skin axis' that is facilitated by immunological and neuroendocrine mechanisms, and thus suggests that psychological and emotional states have an impact on dermatological disorders.[3,4]

Sleep quality is another lifestyle factor that has been a focus of studies into acne. Getting sufficient sleep is essential for hormonal regulation, immune function and skin healing. Inadequate sleep or inadequate sleep quality can disrupt the circadian rhythms, leading to increased androgen and stress hormone production and increased activity of the sebaceous glands which can exacerbate acne. Sleep disturbances are associated to oxidative stress, inflammation and hormone imbalance, which are all contributing factors for acne pathophysiology according to studies.[5,6]

Furthermore, new research indicates stress – acne – sleep disturbances are connected in both directions. There is psychological stress and esthetic concern associated with acne,

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and a lack of sleep increases the severity of acne both by hormonal and inflammatory pathways. Observational studies indicate that increases in stress and sleep disturbance are significant factors in worsening acne, particularly in young adults and students living under lifestyle and academic stress.[5,7]

Although psychosocial factors have been clearly demonstrated to be important in acne, their effects together with psychological stress and sleep on acne vulgaris have not been sufficiently examined in many populations. A working knowledge of the connection between these modifiable factors and the severity of acne might help develop comprehensive management techniques, which combine dermatological and lifestyle management. Understanding the relationship between these modifiable factors and acne severity may help in developing the comprehensive management techniques, which combine dermatological and lifestyle management.[8]

Therefore, the present observational study aims to estimate the correlation between acne vulgaris and psychological stress and sleep quality.

Aims: The study aimed to evaluate the association between psychological stress, sleep quality, and acne vulgaris among patients attending the outpatient clinic.

Materials and Methods

This observational cross-sectional study was conducted in the Dermatology outpatient department of a tertiary care teaching hospital in north India. The study duration was six month from July 2025 to December 2025.

Study population: A total of 100Patients diagnosed clinically with acne vulgaris who attended the dermatology outpatient department during the study period were considered for inclusion in the study.

Inclusion criteria

- Patients aged 15–35 years diagnosed with acne vulgaris.
- Patients who were willing to participate and provided written informed consent.

Exclusion criteria

- Patients with other chronic dermatological diseases affecting the face.
- Patients with systemic illnesses or endocrine disorders known to influence acne.
- Patients receiving systemic corticosteroids, hormonal therapy, or psychiatric medications.
- Patients with diagnosed sleep disorders or psychiatric illnesses.

Data collection: A standardized questionnaire was used to gather comprehensive demographic and clinical data following informed consent. Age, gender, length of acne, lifestyle factors, and pertinent medical history were among the data gathered.

Assessment of acne severity: Acne severity was assessed clinically by a dermatologist using the Global Acne Grading System (GAGS). Based on the total score, acne severity was categorized as:

- Mild
- Moderate
- Severe
- Very severe

Assessment of psychological stress: Psychological stress was assessed using the Perceived Stress Scale (PSS-10) questionnaire. The scale consists of 10 questions that evaluate the perception of stress during the previous month. The total score ranges from 0–40 and is categorized as:

- Low stress (0–13)
- Moderate stress (14–26)
- High stress (27–40)

Assessment of sleep quality: Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. The PSQI assesses sleep quality over the previous month and includes seven components such as sleep duration, sleep disturbances, and daytime dysfunction. A global PSQI score ≤5 indicates good sleep quality, while a score >5 indicate poor sleep quality.

Statistical analysis: The Statistical Package for the Social Sciences (SPSS) version 25.0 was used to evaluate the data. The data was summarized using descriptive statistics including mean, standard deviation, frequency, and percentage. The Chi-square test was used to evaluate the relationship between psychological stress, acne severity, and sleep quality. Statistical significance was defined as a p-value of less than 0.05.

Ethical considerations: The institution's Institutional Ethics Committee examined and approved the study procedure. Before being included in the study, each subject provided written informed consent, and participant information was kept private at all times.

Results

Among the 100 participants included in the study, the majority of patients belonged to the 21–25 years age group (42%), followed by 15–20 years (28%). Females constituted 54% of the study population, while males accounted for 46% [Table: 1].

Table 1: Demographic characteristics of the study participants (n = 100)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	15–20	28	28
	21–25	42	42
	26–30	20	20
	31–35	10	10
Gender	Male	46	46
	Female	54	54

Based on the Global Acne Grading System (GAGS), moderate acne was the most common form (40%), followed by mild acne (32%), severe acne (22%), and very severe acne (6%) among the study participants [Table 2].

Table 2: Distribution of acne severity according to Global Acne Grading System (GAGS)

Acne severity	Frequency (n)	Percentage (%)
Mild	32	32
Moderate	40	40
Severe	22	22
Very severe	6	6

Assessment of psychological stress using the Perceived Stress Scale (PSS) showed that 52% of participants had moderate stress, while 24% had high stress and 24% had low stress levels [Table 3].

Table 3: Distribution of psychological stress levels among study participants (PSS scale)

Stress level	Frequency (n)	Percentage (%)
Low stress	24	24
Moderate stress	52	52
High stress	24	24

A higher proportion of severe and very severe acne was observed among participants with high stress levels compared to those with low stress levels. Statistical analysis using the Chi-square test showed a significant association between psychological stress and acne severity ($p < 0.05$) [Table 4].

Table 4: Association between psychological stress and acne severity

Stress level	Mild	Moderate	Severe	Very severe	Total
Low stress	14	7	3	0	24
Moderate stress	15	24	11	2	52
High stress	3	9	8	4	24
Total	32	40	22	6	100

Among the participants, 60% had poor sleep quality according to the PSQI score, while 40% had good sleep quality. Severe forms of acne were more common among individuals with poor sleep quality, and the association between sleep quality and acne severity was found to be statistically significant ($p < 0.05$).

Table 5: Association between sleep quality and acne severity

Sleep quality	Mild	Moderate	Severe	Very severe	Total
Good sleep quality	20	14	6	0	40
Poor sleep quality	12	26	16	6	60
Total	32	40	22	6	100

Discussion

The most prevalent type of acne in this study was moderate, and there was a strong correlation found between greater psychological stress, poor sleep, and more severe acne. These results corroborate the mounting evidence that lifestyle and psychosocial variables contribute significantly to the onset and aggravation of acne vulgaris.[9]

Moderate acne was observed in the majority of the cases in the present study followed by mild and severe acne. In a series of epidemiological studies, moderate severity of acne was found to be the most common acne severity among teenagers and young adults. The multifactoriality of acne includes increased sebum production, hyperkeratinization of the follicles, overgrowth of Cutibacterium acnes and inflammatory responses. These biological mechanisms have been shown to be significantly affected by the psychological and social environment, such as stress, lifestyle and diet factors in acne severity.[9,10]

The results of the current study showed there is a significant correlation between psychological stress and the severity of acne, with higher psychological stress level associated with high acne severity. This result also agrees with other studies that have indicated that psychological stress may exacerbate acne through activation of the hypothalamic-pituitary-adrenal (HPA) axis.[11] When this neuroendocrine pathway is stimulated, they result in an increase of cortisol and other stress hormones, which leads to increased activity of the sebaceous glands and inflammatory mediators, worsening acne lesions. Several studies have found a link between higher stress levels and an increase in the presence of acne, or worsening of existing acne.[11,12]

The results also agree with the study of Putri et al,[13] which showed that there was a significant correlation of stress level and acne severity on applying Chi-square test, and most people who suffer from acne was at moderate stress level. In addition to hormonal pathways, psychological stress may also experience changes in immunological responses and heightened inflammatory cytokines within the skin, which may also impact acne.

In the present study, there was a significant correlation between acne severity and sleep quality besides stress. The percentage of moderate to severe acne was more in poor sleep quality subjects compared to adequate sleep quality. Similar findings were found in a number of observational studies that linked greater acne to poor sleep quality as determined by the Pittsburgh Sleep Quality Index (PSQI).[14,15]

A reciprocal association between stress, sleep quality, and acne

severity has also been shown in recent research. A vicious cycle that exacerbates dermatological diseases can occur when stress disrupts sleep patterns and insufficient sleep raises stress levels. Higher stress levels and poor sleep quality are important indicators of acne severity, especially during times of academic pressure, according to studies conducted among students.[16]

Overall, the results of this study corroborate earlier studies showing that psychological stress and poor sleep quality are significant modifiable factors linked to the severity of acne vulgaris. Patients' quality of life and acne control may be improved by addressing these issues through stress management techniques, lifestyle changes, and better sleep hygiene.[14,17]

Limitations: The study does have some drawbacks, though. Establishing a causal association between stress, sleep quality, and acne severity is limited by the cross-sectional methodology. Additionally, self-reported questionnaires, which may be prone to reporting bias, were used to measure stress and sleep quality. To gain a better understanding of the causal association between psychological factors and acne vulgaris, further long-term research with bigger sample numbers are needed.

Conclusion

The current study found a strong correlation between the severity of acne vulgaris, sleep quality, and psychological stress. Participants with moderate to severe acne were more likely to report moderate to high levels of psychological stress and poor sleep quality. These results imply that lifestyle choices and psychosocial variables are significant contributors to acne aggravation.

By activating the hypothalamic-pituitary-adrenal axis, psychological stress can exacerbate acne by increasing sebum production and inflammatory reactions in the skin. In a similar vein, inadequate sleep can interfere with immunological and hormonal balance, which exacerbates the onset and development of acne.

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Conflicts of interest

There are no conflicts of interest.

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