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ASSOCIATION BETWEEN EXCESSIVE SCREEN TIME AND FACIAL ACNE PREVALENCE AMONG UNIVERSITY STUDENTS: A CROSS-SECTIONAL STUDY

(*Original Research*)

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Abstract

Background: Acne vulgaris represents a highly prevalent skin condition in young adult populations, with considerable impact on patient well-being. Emerging research points to modern lifestyle elements, including extensive use of digital screens, as possible factors influencing acne, though population-based studies are scarce, especially within South Asia.

Objective: To assess whether prolonged screen exposure is associated with higher prevalence and severity of facial acne among university students.

Methods: A cross-sectional design was implemented over a five-month period in Islamabad, involving 115 university students between 18 and 28 years of age. Participants completed a structured questionnaire detailing daily screen duration, sleep patterns, dietary habits, and stress levels. Clinical assessment of acne severity was conducted using the Global Acne Grading System (GAGS). Screen time exceeding six hours daily was classified as high exposure. Data were analyzed with the chi-square test, independent samples t-test, analysis of variance (ANOVA), and multivariable logistic regression, adopting a significance threshold of $p < 0.05$.

Results: The mean age of participants was 21.6 ± 2.1 years, with nearly equal gender distribution. The average daily screen time was 6.8 ± 2.3 hours. Acne prevalence was significantly higher in students with excessive screen exposure (68.3%) compared to those with lower screen time (43.6%). Mean GAGS scores were also elevated in the high screen-time group (20.8 ± 7.4 vs. 14.2 ± 6.1, $p < 0.01$). Logistic regression analysis confirmed excessive screen time as an independent predictor of acne (OR = 2.65, 95% CI: 1.30–5.42), along with high stress (OR = 2.12, 95% CI: 1.01–4.45).

Conclusion: Excessive screen exposure was significantly associated with increased prevalence and severity of acne among university students. These findings highlight the importance of considering digital lifestyle factors in acne assessment and preventive strategies for young adults.

Keywords: Acne Vulgaris, Cross-Sectional Studies, Pakistan, Prevalence, Risk Factors, Screen Time, Students.

Introduction

Acne vulgaris is one of the most prevalent dermatological conditions worldwide, affecting an estimated 9.4% of the global population and ranking among the top ten most common diseases globally (1). Although acne is most frequently associated with adolescence due to hormonal surges, it remains a significant health concern well into adulthood, particularly among university students. This group is uniquely vulnerable, not only because of their age but also because of lifestyle factors that often exacerbate dermatological conditions. Stress, irregular sleep, dietary patterns, and, increasingly, prolonged screen exposure contribute to the complexity of acne pathophysiology (2). With the rapid digitization of education and the growing dependence on smartphones, tablets, and computers, screen time has become a ubiquitous element of student life. Understanding whether excessive screen exposure has a tangible impact on acne prevalence is therefore both timely and clinically relevant (3). The etiology of acne is multifactorial, involving follicular hyperkeratinization, increased sebum production, colonization by *Cutibacterium acnes*, and the resulting inflammatory response. However, environmental and behavioral factors are increasingly recognized as aggravators of acne severity and persistence (4). Prolonged screen use may influence acne development through several plausible mechanisms. Blue light emitted from digital devices has been shown in some experimental models to penetrate the skin and generate reactive oxygen species, potentially contributing to oxidative stress and inflammation (5). In addition, extended use of screens often correlates with sedentary behavior, altered circadian rhythms, poor sleep quality, and dietary imbalances, all of which are independently linked with acne exacerbations. Furthermore, physical habits associated with screen use, such as frequent touching of the face, accumulation of heat, and occlusion from devices, may worsen local skin conditions (6). These mechanisms, while biologically plausible, remain under-investigated, creating a gap in the literature that warrants closer examination.

University students represent an important demographic in this context. Their reliance on technology for academic activities, social interaction, and leisure leads to prolonged daily screen exposure, often exceeding recommended limits (7). At the same time, this age group is at peak risk for acne development, with prevalence estimates ranging between 50% and 80% depending on population and diagnostic criteria (8). Acne in university students carries not only physical implications but also profound psychosocial effects, including diminished self-esteem, social withdrawal, and impaired quality of life. These consequences underline the importance of identifying modifiable lifestyle risk factors, such as screen time, that may offer opportunities for intervention and prevention. Despite these considerations, relatively few epidemiological studies have directly assessed the association between screen exposure and acne prevalence, leaving a gap in both clinical knowledge and public health guidance (9). Existing literature suggests that environmental factors linked with modern lifestyles, such as digital screen use, may be underestimated contributors to dermatological conditions. For instance, some preliminary studies have reported a correlation between prolonged exposure to digital devices and worsening of acne lesions, though methodological limitations and inconsistent definitions of “excessive screen time” limit the generalizability of these findings. Other studies have emphasized the role of disrupted sleep due to late-night screen use in modulating hormonal pathways, such as cortisol and insulin-like growth factor-1 (IGF-1), which are known to exacerbate acne (10). While these findings are suggestive, they are far from conclusive, underscoring the need for well-designed studies focusing on this potential link. Moreover, given the widespread digital dependency among students in the post-pandemic era, the question of whether excessive screen time independently contributes to acne prevalence has become more urgent than ever.

From a public health perspective, clarifying the relationship between screen time and acne could inform preventative strategies and health education initiatives targeted at young adults. If excessive screen exposure is found to significantly increase acne prevalence, simple behavioral modifications, such as screen time regulation, improved screen hygiene, or structured breaks, could serve as non-pharmacological interventions to reduce acne burden (11). Furthermore, understanding this association may encourage dermatologists, general practitioners, and health educators to incorporate screen time assessment into clinical consultations with acne patients, thereby adopting a more holistic approach to management. In light of the gaps in current evidence and the clinical importance of acne among university students, this study aims to assess whether prolonged screen exposure is linked with higher acne occurrence in this population. By adopting a cross-sectional design, the research seeks to establish whether an observable association exists between excessive screen time and facial acne prevalence, providing a foundation for future longitudinal studies (12). The objective is therefore to evaluate the potential role of digital screen use as a lifestyle-related risk factor for acne in university students, with the ultimate aim of contributing to improved dermatological care and preventive health strategies.

Methods

This investigation was conducted as a cross-sectional study over a period of five months in Islamabad with the primary aim of evaluating whether excessive screen exposure was associated with a higher prevalence of facial acne among university students. The cross-sectional design was selected as it is particularly suited to determining prevalence and exploring associations between exposures and outcomes at a single point in time. Participants were recruited from multiple public and private universities in Islamabad through a combination of purposive and convenience sampling strategies. Flyers, student group announcements, and classroom invitations were used to invite volunteers. The target population consisted of male and female students aged 18 to 28 years who were currently enrolled in undergraduate or postgraduate programs. Inclusion criteria required participants to have been regular users of digital devices such as smartphones, tablets, or computers for academic or recreational purposes. Individuals with a pre-existing dermatological condition other than acne, those on systemic medications known to affect skin health (such as corticosteroids or isotretinoin), and those with chronic medical illnesses were excluded to minimize confounding factors. The required sample size was calculated using the World Health Organization sample size calculator for a single proportion. Assuming an expected acne prevalence of 50% among university students, a 95% confidence level, and a 10% margin of error, the estimated sample size was 96 participants. To increase statistical power and account for possible incomplete responses, the sample size was inflated by 20%, yielding a final target enrollment of 115 students.

Data collection was carried out using a structured questionnaire and a clinical assessment. The questionnaire consisted of three sections. The first section gathered demographic information, including age, gender, year of study, and socioeconomic background. The second section assessed digital device usage, where students reported their average daily screen time in hours, differentiated into academic and recreational use. For analytic purposes, excessive screen time was defined as more than six hours per day, based on international health recommendations and prior studies evaluating digital exposure. The third section was related to lifestyle factors, including sleep duration, dietary habits, and stress levels, which were considered as potential confounders. Acne prevalence and severity were determined through direct clinical examination performed by trained medical personnel using the Global Acne Grading System (GAGS), a validated tool for quantifying acne severity based on lesion type and anatomical distribution. Scores were categorized into mild, moderate, severe, and very severe acne. This clinical evaluation minimized reliance on self-reported acne, which can be subjective and prone to under- or overestimation. The primary outcome was the presence of acne, while secondary outcomes included acne severity in relation to screen time categories. All participants were informed about the objectives and procedures of the study, and written informed consent was secured prior to enrollment. Confidentiality was maintained by assigning unique identification codes to each participant, and data were stored in password-protected files accessible only to the research team. Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were calculated for demographic and clinical variables. Continuous variables such as age and daily screen time were expressed as mean ± standard deviation, while categorical variables such as gender, screen time category, and acne severity were presented as frequencies and percentages. The normal distribution of continuous variables was verified using the Kolmogorov–Smirnov test.

The primary analysis involved testing the association between screen time and the presence of acne. For this purpose, the chi-square test was employed to compare proportions of acne occurrence across different screen time categories. To further evaluate the relationship between screen time and acne severity (measured by GAGS scores), an independent samples t-test was used for comparisons between two groups (≤6 hours vs >6 hours), while one-way analysis of variance (ANOVA) was applied where multiple screen time categories were analyzed. Post-hoc testing with Bonferroni correction was conducted to identify pairwise differences where applicable. A multivariable logistic regression model was also constructed to adjust for potential confounding factors, such as sleep duration, dietary patterns, and stress levels. Adjusted odds ratios (OR) with 95% confidence intervals were reported to quantify the strength of associations. A p-value of less than 0.05 was considered statistically significant. Throughout the study, care was taken to maintain methodological rigor, ensuring both internal validity and reproducibility. The use of validated outcome measurement tools, clearly defined screen time thresholds, and standardized clinical assessment of acne strengthened the reliability of the results. This methodological framework was designed to provide a transparent, replicable, and ethically sound basis for examining the relationship between excessive screen exposure and facial acne prevalence among university students.

Results

A total of 115 university students participated in the study, with a mean age of 21.6 ± 2.1 years. The sample comprised 58 males (50.4%) and 57 females (49.6%). The average daily screen time across the cohort was 6.8 ± 2.3 hours, while the mean sleep duration was 6.4 ± 1.2 hours. Socioeconomic status distribution indicated that 29.6% of students were from low-income households, 50.4% from middle-income groups, and 20.0% from higher-income backgrounds (Table 1). When acne prevalence was analyzed according to screen time, a marked difference was observed between categories. Among students reporting ≤6 hours of daily screen use, 24 individuals (43.6%) presented with acne, compared to 41 students (68.3%) in the >6 hours category. Conversely, the absence of acne was more frequent in those with shorter screen time (56.4%) than those with prolonged exposure (31.7%) (Table 2). The chi-square test confirmed a statistically significant association between higher screen exposure and acne occurrence ($p = 0.01$). Figure 1 illustrates the percentage difference in acne prevalence between the two groups.

Acne severity, measured through the Global Acne Grading System (GAGS), also demonstrated variation across screen time categories. The mean GAGS score among participants with ≤6 hours of screen exposure was 14.2 ± 6.1, whereas those exceeding 6 hours reported higher scores of 20.8 ± 7.4 (Table 3). Independent samples t-test revealed this difference to be statistically significant ($p < 0.01$). The distribution of acne severity scores is displayed in Figure 2, which shows a wider range and higher median values in the prolonged screen use group. To further explore predictors of acne prevalence, multivariable logistic regression was performed with acne presence as the dependent variable and screen time, sleep duration, diet, and stress levels as independent factors. Excessive screen time (>6 hours/day) was associated with an adjusted odds ratio (OR) of 2.65 (95% CI: 1.30–5.42, $p = 0.007$), indicating a significant independent association. High stress was also identified as a significant factor, with an adjusted OR of 2.12 (95% CI: 1.01–4.45, $p = 0.04$). Short sleep and unhealthy dietary habits, though positively associated, did not reach statistical significance (Table 4).

Overall, these findings demonstrated that prolonged screen time was linked with both increased prevalence and greater severity of acne among university students. The combined analysis of descriptive characteristics, prevalence comparisons, severity scores, and regression modeling consistently indicated excessive screen exposure as a significant factor in acne occurrence within this population.

Table 1: Demographic characteristics of participants (n = 115)

Variable	Mean ± SD / n (%)
Age (years)	21.6 ± 2.1
Gender (Male/Female)	58 (50.4%) / 57 (49.6%)
Mean daily screen time (hours)	6.8 ± 2.3
Sleep duration (hours)	6.4 ± 1.2
Socioeconomic status (Low/Middle/High)	34 (29.6%) / 58 (50.4%) / 23 (20.0%)

Table 2: Acne prevalence by screen time category

Screen time category	Participants (n)	Acne present (n, %)	Acne absent (n, %)
≤6 hours/day	55	24 (43.6%)	31 (56.4%)
>6 hours/day	60	41 (68.3%)	19 (31.7%)

Table 3: Mean acne severity (GAGS scores) by screen time

Screen time category	Mean GAGS ± SD
≤6 hours/day	14.2 ± 6.1
>6 hours/day	20.8 ± 7.4

Table 4: Logistic regression analysis of predictors of acne prevalence

Variable	Adjusted OR (95% CI)	p-value
Excessive screen time (>6h)	2.65 (1.30–5.42)	0.007
Short sleep (<6h)	1.84 (0.92–3.66)	0.08
Unhealthy diet	1.49 (0.72–3.05)	0.26
High stress	2.12 (1.01–4.45)	0.04

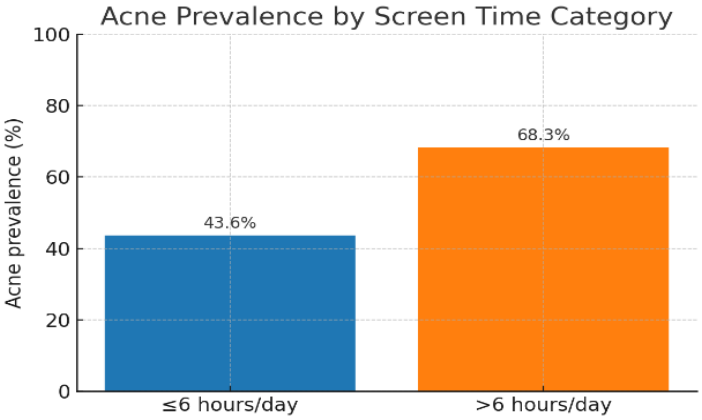

Figure 1 Acne Prevalence by screen Time Category

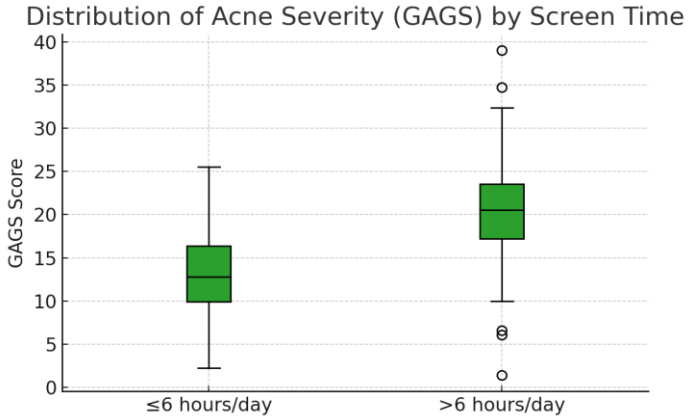

Figure 2 Distribution of Acne Severity (GAGS) by Screen Time

Discussion

The findings of this study demonstrated a clear association between prolonged screen exposure and both the prevalence and severity of acne among university students in Islamabad. Students with more than six hours of daily screen time were significantly more likely to present with acne compared to those with lower exposure, and they also exhibited higher Global Acne Grading System scores (13). These results align with emerging literature suggesting that lifestyle factors related to modern digital habits may play a meaningful role in dermatological health. Several studies have proposed that blue light emitted from digital devices contributes to oxidative stress and inflammatory changes in the skin, mechanisms that can exacerbate acne pathophysiology (14). The present findings further reinforce this biological plausibility by showing higher acne burden in those with prolonged exposure, although causality cannot be firmly established within the cross-sectional design (15). Previous research examining the relationship between digital screen use and acne has been limited and often heterogeneous in its methodologies. Some studies reported associations between late-night device use and worsening acne lesions, attributing these changes to disrupted sleep patterns and altered hormonal regulation, particularly of cortisol and IGF-1. The current study complements these observations by showing that, even after adjusting for confounders such as sleep duration, diet, and stress, screen time itself remained an independent predictor of acne prevalence (16). This suggests that screen exposure may not only act indirectly through lifestyle disruption but may also have a more direct role in acne exacerbation, consistent with laboratory evidence of blue light–induced oxidative damage.

The psychosocial context of these findings should also be considered. University students are a vulnerable group for both acne and prolonged screen dependence. Acne during early adulthood often has significant psychological repercussions, including impaired self-esteem, social withdrawal, and diminished quality of life (17). Simultaneously, the digital demands of academic work, coupled with recreational screen habits, lead to sustained exposure that may be difficult to mitigate. This interplay underscores the importance of addressing screen time in health promotion strategies targeted at young adults, as even modest reductions could potentially improve dermatological and psychological well-being (18). The strengths of this study lie in its use of a validated clinical tool for acne severity assessment and its adjustment for relevant confounding variables in regression analyses. By relying on direct examination rather than self-reported acne, the risk of misclassification was minimized. The inclusion of lifestyle variables such as sleep, diet, and stress further strengthened the analysis by ensuring that the observed associations were not solely attributable to these known contributors (19). Moreover, the study adds to a scarce body of epidemiological evidence in a South Asian population, where digital dependence among students is rapidly increasing yet understudied in dermatological research.

Nevertheless, certain limitations must be acknowledged. The cross-sectional design restricted the ability to infer causal relationships (20). While excessive screen time was associated with acne prevalence and severity, it cannot be confirmed whether screen exposure directly led to acne development or whether students with acne were more inclined to prolonged digital use, perhaps due to social withdrawal. The reliance on self-reported screen time also introduced the possibility of recall bias, and no objective measures such as digital usage logs were employed (21). Additionally, while the sample size was adequate to demonstrate statistical significance, it was limited to students in Islamabad, and findings may not be generalizable to broader populations with different cultural or environmental exposures. Other potential confounders, including genetic predisposition, use of cosmetic products, and hormonal influences, were not fully explored. Future research should aim to overcome these limitations by employing longitudinal designs that can better clarify temporal relationships between screen exposure and acne onset (22). Objective monitoring of digital use through device tracking would strengthen the reliability of exposure measurement. Expanding studies across diverse geographic and cultural settings would provide a more comprehensive understanding of how screen habits intersect with dermatological outcomes globally. In addition, mechanistic studies exploring the effects of blue light on skin physiology in real-life exposure settings could offer valuable insights into causation. Intervention-based trials that evaluate whether reducing screen exposure leads to measurable improvement in acne severity would also provide important practical evidence for clinicians and health educators.

Conclusion

Excessive screen exposure was significantly associated with both increased prevalence and severity of acne among university students. These results underscore the relevance of digital lifestyle factors in dermatological health and suggest that addressing screen time may form part of holistic strategies for acne prevention and management in young adults.

AUTHOR'S CONTRIBUTIONS

Author	Contribution
Jahanzaib Ali*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Aiman Zahra	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.
Bilal Khan	Significantly contributed to data collection and analysis. Reviewed and approved the final manuscript for publication.

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