

Original Article

Association of Perceived Stress with Sleep, Physical Activity, and Nutritional Status among Adolescents in Private Schools of Bhopal: A Cross-Sectional Study

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ABSTRACT

Background: Adolescence is a critical developmental period marked by significant physical, psychological, and social changes, making individuals particularly vulnerable to stress. Stress during this phase is associated with adverse lifestyle behaviors and long-term health consequences. This study was done to assess perceived stress among adolescents and its association with sleep duration, physical activity, and nutritional status among school-going adolescents. **Methods:** This school-based cross-sectional analytical study included 180 adolescents aged 12–15 years from private schools of Bhopal, selected using multistage random sampling. Perceived stress was assessed using the Perceived Stress Scale (PSS-10). Anthropometric measurements were recorded, and nutritional status was determined using BMI categories. Sleep duration and physical activity were assessed using a structured questionnaire. Statistical analysis was performed using SPSS version 22, applying the Chi-square test and ANOVA, with $p < 0.05$ considered statistically significant. **Results:** Among participants, 40.6% had low stress, 39.4% had moderate stress, and 20.0% had high stress. The mean PSS score was 18.6 ± 6.4 . Mean sleep duration was 6.9 ± 1.1 hours, and mean BMI was 17.85 ± 1.77 kg/m². Perceived stress showed a statistically significant association with nutritional status, sleep duration, and physical activity ($p < 0.001$). Most adolescents reported suboptimal sleep duration, and moderate physical activity was the most common pattern. **Conclusion:** Perceived stress is common among adolescents and is significantly associated with sleep duration, physical activity, and nutritional status. Early identification and school-based lifestyle interventions may improve adolescent well-being.

Key words: Adolescent, Psychological Stress, Sleep, Motor Activity, Body Mass Index, Life Style.

Adolescence is a critical developmental phase marked by rapid physical, psychological, and social changes, making individuals particularly vulnerable to stress [1–3]. Stress is defined as the body's physiological and psychological response to demands that disrupt homeostasis [1]. While mild stress may enhance performance, chronic stress can adversely affect mental and physical health outcomes [4,5]. Neurobiologically, stress activates the hypothalamic–pituitary–adrenal axis, leading to hormonal changes that influence emotional regulation, sleep, and behavior [5]. In recent years, adolescents have been increasingly exposed to multiple stressors, including academic pressure, social expectations, and lifestyle

changes [4,8]. These stressors significantly influence health-related behaviors such as sleep, physical activity, and dietary patterns. Evidence suggests that stress is closely associated with poor sleep quality and reduced sleep duration, which in turn affect cognitive function and emotional well-being [6,10,11]. Additionally, physical inactivity has been linked to poorer mental health outcomes, while regular physical activity has a protective effect against stress [7,9]. Stress can also alter nutritional status through mechanisms such as emotional eating and metabolic dysregulation [11]. Several studies conducted globally and in India have demonstrated a high prevalence of stress among adolescents and its association with

Access this article online

Received – 2nd July 2026Initial Review – 3rd July 2026Accepted – 5th August 2026

DOI: 10.32677/ijch.v13i8.8368

Quick Response Code



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unhealthy lifestyle behaviors [13–15]. Despite this, region-specific data from Central India, particularly among private school adolescents who may experience unique academic and social pressures, remain limited. Therefore, the present study was undertaken to assess perceived stress and evaluate its association with sleep duration, physical activity, and nutritional status among adolescents in private schools of Bhopal.

MATERIALS AND METHODS

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of RKDF Medical College, Bhopal (IECRKDFMCRC/66/2024). Written informed consent from parents and assent from participants were obtained. Confidentiality and anonymity were maintained.

Study Design and Setting

This school-based cross-sectional analytical study was conducted among adolescents enrolled in selected private schools of Bhopal, Madhya Pradesh, India. The study was conducted over a period of 1.5 years (from May 2024 to November 2025)

Sample Size and Sampling Technique

The sample size was calculated using the formula $4PQ/d^2$ at a 95% confidence level, considering a stress prevalence of 36.5% and absolute precision of 7%, yielding a minimum sample size of 180 participants. A multistage sampling technique was used. Six private schools were selected by simple random sampling, and eligible students were subsequently selected using systematic random sampling. Approximately 30 students were included from each school.

Inclusion and Exclusion Criteria

Adolescents aged 12–15 years enrolled in selected private schools whose parents/guardians provided written informed consent and who gave assent were included. Adolescents with known chronic illnesses, diagnosed psychiatric disorders, long-term medication affecting growth or behavior, or unwillingness to participate were excluded.

DATA COLLECTION

Data were collected using a pre-designed and pre-tested structured questionnaire. Information on demographic characteristics, sleep duration, physical activity, and related lifestyle variables was obtained. Stress was assessed using the Perceived Stress Scale (PSS-10), a validated 10-item instrument scored on a 5-point Likert scale. Stress scores were categorized as low (0–13), moderate (14–26), and high (27–40). Anthropometric measurements were recorded using standardized techniques. Weight was measured using a calibrated digital weighing scale and height using a

stadiometer. Body mass index (BMI) was calculated and used to classify nutritional status (Table 1). Height for age was calculated as < –2 SD (Stunting) and < –3 SD (High stunting).

Table 1. BMI Classification (WHO BMI-for-age Z scores)

< –2 SD:	Thinness
–2 SD to +1 SD	Normal
+1 SD	Overweight
+2 SD	Obesity

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 22. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequency and percentage. Chi-square test and ANOVA were used for inferential analysis. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 180 adolescents participated in the study. The majority belonged to the 14–15-year age group. Girls were more than boys. Table 2 shows the demographic characteristics of the study participants.

Table 2. Demographic characteristics of the study participants

Group	Characteristics	Percentage
Age distribution	15 years	36.7%
	14 years	35.0%
Gender	Girls	50.6%
	Boys	49.4%
	Mean height	154.36 ± 7.40 cm
	Weight	43.04 ± 8.51 kg
	BMI	17.85 ± 1.77 kg/m ²
Nutritional status	Normal	51.7%
	Stunted	6.1%
	Underweight	36.7%
	Overweight.	5.6%

Regarding the age of the participants, most were in the 14–15-year age group, suggesting that findings mainly reflect stress patterns in mid-adolescence, a period known for increased academic and social pressures (Table 3).

Table 3: Age Distribution

Age	Frequency	Percentage
12	32	17.8
13	39	21.7
14	63	35.0
15	66	36.7

The factors affecting Stress

Most adolescents experienced low to moderate stress, indicating that stress is common but generally not severe. However, the presence of high stress in one-fifth of participants highlights a significant vulnerable group requiring attention (Table 4).

Table 4. Distribution of Stress Categories among Study Subjects

Stress Category	Frequency (n)	Percentage (%)
Low	73	40.6
Moderate	71	39.4
High	36	20.0
Total	180	100.0

Stress and nutritional status

Adolescents with higher stress were more likely to have normal or higher BMI, whereas underweight individuals were more common in the low-stress group, indicating a possible link between stress and altered nutritional status.

A statistically significant association was observed between stress and nutritional status ($p < 0.001$). Adolescents with high stress were more likely to have normal or overweight nutritional status, whereas underweight adolescents were predominantly observed in the low-stress group (Table 5).

Table 5: Stress vs. BMI

BMI	Low	Moderate	High	p-value
Underweight	40	20	6	<0.001
Normal	30	40	23	
Overweight	3	11	7	

Stress and Sleep Duration

Sleep duration showed a significant association with perceived stress ($p < 0.001$). Adolescents with high stress more frequently reported shorter sleep duration, particularly 6 hours of sleep, while low-stress participants more commonly reported 7–8 hours of sleep. Higher stress levels were associated with shorter sleep duration, while adolescents with low stress more often achieved adequate sleep. This suggests a negative impact of stress on sleep patterns (Table 6).

Table 6: Stress vs. Sleep Duration

Sleep Duration	Low	Moderate	High	p-value
<6 hrs.	10	18	16	<0.001
6–7 hrs.	25	35	14	
8–10 hrs.	38	18	6	

Stress and Physical activity

Physical activity was also significantly associated with perceived stress ($p < 0.001$). Moderate physical activity was the most common pattern overall; however, adolescents with higher stress levels demonstrated lower engagement in physical activity (Table 7). Higher stress levels were associated with reduced physical activity, while those with lower stress were more engaged in moderate to high activity levels, suggesting that stress may negatively influence active lifestyle behaviors.

Table 7: Stress vs. Physical Activity

Stress	Low	Moderate	High	p-value
High Physical Activity	31 (17.2%)	18 (10.0%)	14 (7.8%)	<0.001
Moderate Physical Activity	42 (23.3%)	40 (22.2%)	9 (5.0%)	
Low Physical Activity	0 (0%)	13 (7.2%)	13 (7.2%)	

DISCUSSION

The present study demonstrates a high prevalence of perceived stress among adolescents in private schools of Bhopal, with nearly 60% experiencing moderate to high stress. This underscores stress as a significant public health concern during adolescence, a phase marked by psychological vulnerability and adaptive challenges [2,3,5]. The study further identified significant associations between stress and lifestyle-related factors, including sleep duration, nutritional status, and physical activity, suggesting that stress influences both behavioral and physiological health outcomes [1,4].

The observed association between stress and BMI is consistent with previous studies indicating that higher stress levels are linked with unhealthy dietary behaviors and increased overweight prevalence among adolescents [12,13]. This may be explained by activation of the hypothalamic–pituitary–adrenal axis, resulting in elevated cortisol levels, increased appetite, and fat accumulation [5]. Similarly, the inverse relationship between stress and sleep duration aligns with existing literature showing that inadequate sleep contributes to higher stress and impaired emotional regulation [7,8,9,14]. Sleep deprivation further exacerbates stress through hormonal imbalances. The negative association between stress and physical activity also supports earlier findings that physically inactive adolescents are more likely to experience higher stress levels, while regular activity helps reduce stress through

endorphin release [10,11,13]. Although these findings largely support prior research, some studies suggest a bidirectional relationship between stress and lifestyle behaviors [4,6].

However, the cross-sectional design of the current study limits causal inference, and the study's focus on urban private school adolescents may restrict generalizability. Self-reported measures may also introduce bias. Future longitudinal studies using objective measures are recommended. Nonetheless, the findings highlight the need for school-based interventions promoting stress management, adequate sleep, physical activity, and healthy lifestyles to improve adolescent well-being.

CONCLUSION

Perceived stress is common among adolescents and is significantly associated with sleep duration, physical activity, and nutritional status. Adolescents with higher stress were more likely to report altered sleep patterns, lower physical activity, and nutritional status abnormalities. Early identification of stress and implementation of school-based interventions is needed to promote mental well-being and healthy lifestyle behaviors among adolescents.

REFERENCES

1. Shahsavarani AM, Azad Marz Abadi E, Hakimi Kalkhoran M. Stress: facts and theories through literature review. *Int J Med Rev*. 2015;2(2):230–41.
2. Östberg V, Almquist YB, Folkesson L, et al. The complexity of stress in adolescents. *Child Indic Res*. 2015; 8:403–423.
3. World Health Organization. Adolescent health. Geneva: WHO; 2020.
4. Pascoe MC, Hetrick SE, Parker AG. The impact of stress on students. *Int J Adolesc Youth*. 2020;25(1):104–112.
5. Romeo RD. The teenage brain: stress and adaptation. *Dev Psychobiol*. 2013;55(7):709–719.
6. Viner RM, Ozer EM, Denny S, et al. Adolescence and health risks. *Lancet*. 2012;379:1641–1652.
7. Lund HG, Reider BD, Whiting AB, et al. Sleep patterns and stress. *J Adolesc Health*. 2010;46(2):124–132.
8. Hirshkowitz M, Whiton K, Albert SM, et al. Sleep duration recommendations. *Sleep Health*. 2015;1(1):40–43.
9. Patel SR, Hu FB. Sleep and health outcomes. *Sleep*. 2008;31(5):619–626.
10. Biddle SJH, Asare M. Physical activity and mental health. *Br J Sports Med*. 2011;45(11):886–895.
11. WHO. Physical activity guidelines. Geneva: WHO; 2020.
12. Sahoo S, Khess CRJ. Prevalence of stress in adolescents in India. *Indian J Psychiatry*. 2010;52:252–256.
13. Singh K, et al. Lifestyle factors and stress in adolescents. *Indian Pediatr*. 2017;54:123–128.
14. Gupta R, et al. Sleep and stress among Indian adolescents. *J Family Med Prim Care*. 2019;8:1234–1239.

How to cite this article: Gupta M.K, Lakhwani S, Vishwas T, Kumar S. Association of Perceived Stress with Sleep, Physical Activity, and Nutritional Status among Adolescents in Private Schools of Bhopal: A Cross-Sectional Study. *Indian J Child Health*. 2026; 13(8):115-118.

Funding: None; Conflicts of Interest: None Stated