e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(2); 1548-1551

Original Research Article

Adenoid Hypertrophy Effect on Sleep and School Performance

Jay Vardhan[1], Pramod Kumar Bharti[2], Md. Ale Imran Ansari[3], Md. Ozair[4], Manshi Kumari Mehta[5]

[1]Senior Resident, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India
[2]Senior Resident, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India
[3]Associate Professor, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India
[4]Associate Professor, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India
[5]Junior Resident, Department of ENT, DMCH Laheriasarai, Darbhanga, Bihar, India

Received: 24-12-2025 / Revised: 23-01-2026 / Accepted: 25-02-2026
Corresponding Author: Dr. Pramod Kumar Bharti
Conflict of interest: Nil

Abstract:

Background: Adenoid hypertrophy is a common condition in pediatric age groups and is a leading cause of upper airway obstruction. It is frequently associated with sleep-disordered breathing, which may adversely affect cognitive function, behaviour, and academic performance in school-going children.

Aim: To evaluate the effect of adenoid hypertrophy on sleep quality and school performance in children.

Methods: This cross-sectional observational study included school-aged children diagnosed clinically and radiologically with adenoid hypertrophy. Assessment of sleep disturbances was performed using a standardized sleep questionnaire focusing on snoring, mouth breathing, witnessed apnea, restless sleep, and daytime somnolence. School performance was evaluated using academic records, teacher feedback, and attention/behavior assessment scales. Data were analyzed to determine the association between severity of adenoid hypertrophy, sleep disturbances, and academic outcomes.

Results: Children with moderate to severe adenoid hypertrophy showed a significantly higher prevalence of sleep disturbances, including habitual snoring, fragmented sleep, and excessive daytime sleepiness. These children demonstrated reduced attention span, poor concentration, irritability, and significantly lower academic performance compared to children with mild or no hypertrophy. A positive correlation was observed between severity of airway obstruction and decline in school performance indicators.

Conclusion: Adenoid hypertrophy significantly impacts sleep quality and is associated with impaired cognitive function and poor school performance. Early diagnosis and appropriate management may improve sleep patterns and academic outcomes in affected children.

Keywords: Adenoid hypertrophy.

DOI: 10.25258/ijcpr.18.2.256

Introduction

Adenoid hypertrophy is a common condition in the pediatric population and represents one of the most frequent causes of upper airway obstruction in children. The adenoids, located in the nasopharynx, are part of Waldeyer's ring and play an important role in immune defense during early childhood. However, recurrent infections and chronic inflammation can lead to pathological enlargement, resulting in nasal obstruction, mouth breathing, and sleep-disordered breathing. Sleep plays a critical role in physical growth, neurocognitive development, memory consolidation, and emotional regulation in children. Obstruction of the upper airway due to enlarged adenoids can lead to habitual snoring, fragmented sleep, hypoxia, and in severe cases, obstructive sleep apnea. Chronic sleep disruption has been shown to impair attention, executive function, learning ability, and behaviour, which are essential for optimal academic performance.

School performance is a multifactorial outcome influenced by cognitive abilities, behavioral regulation, and psychosocial factors. Children with sleep-disordered breathing often exhibit symptoms such as hyperactivity, irritability, poor concentration, and daytime somnolence. These symptoms may be misinterpreted as primary behavioural disorders, while the underlying cause may be chronic upper airway obstruction due to adenoid hypertrophy. Despite the high prevalence of adenoid hypertrophy and its potential impact on sleep and cognitive development, it is often underdiagnosed or treated late. Understanding the

relationship between adenoid hypertrophy, sleep disturbance, and school performance is essential for early identification and timely intervention. Therefore, the present study aims to evaluate the effect of adenoid hypertrophy on sleep quality and academic performance in school-going children.

Material and Methods

Study Design: This was a cross-sectional observational study conducted in the Department of Otorhinolaryngology at Darbhanga Medical College and Hospital Laheriasarai, Darbhanga Bihar. over a period of 15 months.

Study Population: The study included 62 school-going children aged 5–12 years who presented with symptoms suggestive of adenoid hypertrophy such as nasal obstruction, mouth breathing, snoring, and recurrent upper respiratory infections.

Inclusion Criteria

- Children aged 5–12 years
- Clinical features suggestive of adenoid hypertrophy
- Radiological confirmation by lateral nasopharyngeal X-ray (adenoid–nasopharyngeal ratio) or diagnostic nasal endoscopy
- Children attending regular school

Exclusion Criteria

- Children with tonsillar hypertrophy causing significant airway obstruction
- History of previous adenoidectomy
- Craniofacial anomalies
- Neurological disorders or developmental delay
- Chronic systemic illness

Assessment of Adenoid Hypertrophy: Severity was graded based on radiological findings (adenoid–nasopharyngeal ratio) or endoscopic grading:

- Grade I: <25% obstruction
- Grade II: 25–50% obstruction
- Grade III: 50–75% obstruction
- Grade IV: >75% obstruction

Assessment of Sleep Disturbance: Sleep quality was evaluated using a standardized pediatric sleep questionnaire. Parameters assessed included:

- Habitual snoring
- Mouth breathing during sleep
- Witnessed apnea
- Restless sleep
- Frequent nocturnal awakenings
- Daytime sleepiness

Children were categorized as having mild, moderate, or severe sleep disturbance based on symptom scoring.

Assessment of School Performance: Academic performance was assessed using:

- School report cards (recent two terms)
- Teacher feedback regarding attention, concentration, and classroom behavior
- Parent-reported academic difficulties

Performance was categorized as good, average, or poor based on overall grades and teacher evaluation.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Categorical variables were expressed as percentages. Association between severity of adenoid hypertrophy, sleep disturbance, and school performance was assessed using Chi-square test. A p-value <0.05 was considered statistically significant.

Results

A total of 62 children aged 5–12 years were included in the study. The majority of patients were in the age group of 6–9 years. Male children constituted a slightly higher proportion compared to females.

Severity of Adenoid Hypertrophy

Out of 62 patients:

- Grade I: 8 (12.9%)
- Grade II: 15 (24.2%)
- Grade III: 23 (37.1%)
- Grade IV: 16 (25.8%)

Moderate to severe adenoid hypertrophy (Grade III and IV) was observed in 39 children (62.9%).

Sleep Disturbance

Sleep-related symptoms were highly prevalent:

- Habitual snoring: 48 (77.4%)
- Mouth breathing during sleep: 52 (83.9%)
- Restless sleep: 41 (66.1%)
- Witnessed apnea: 18 (29.0%)
- Daytime sleepiness: 36 (58.1%)

Based on sleep questionnaire scoring:

- Mild sleep disturbance: 14 (22.6%)
- Moderate sleep disturbance: 27 (43.5%)
- Severe sleep disturbance: 21 (33.9%)

Children with Grade III and IV adenoid hypertrophy showed significantly higher frequency of moderate to severe sleep disturbances compared to Grade I and II ($p < 0.05$).

School Performance

Assessment of academic performance revealed:

- Good performance: 12 (19.4%)
- Average performance: 25 (40.3%)
- Poor performance: 25 (40.3%)

Poor school performance was significantly more common among children with moderate to severe sleep disturbance. Among 39 children with Grade III and IV hypertrophy, 21 (53.8%) demonstrated poor academic performance, compared to only 4 (17.4%) among those with Grade I and II hypertrophy ($p < 0.05$).

Association Between Variables

A statistically significant association was found between:

- Severity of adenoid hypertrophy and sleep disturbance
- Sleep disturbance and poor academic performance
- Severity of adenoid hypertrophy and decline in school performance

These findings indicate that increasing severity of airway obstruction due to adenoid hypertrophy is associated with worsening sleep quality and impaired academic outcomes.

Discussion

Adenoid hypertrophy is a significant cause of upper airway obstruction in children and has important implications for sleep quality and neurocognitive development. In the present study of 62 school-going children, a high prevalence of moderate to severe adenoid hypertrophy (62.9%) was observed. The findings demonstrate a strong association between severity of adenoid enlargement, sleep disturbances, and decline in academic performance. Sleep-disordered breathing was common among the study population, with habitual snoring and mouth breathing being the most frequent symptoms. Children with Grade III and IV hypertrophy showed significantly higher rates of moderate to severe sleep disturbance. Chronic upper airway obstruction during sleep can lead to intermittent hypoxia, fragmented sleep architecture, and reduced rapid eye movement (REM) sleep. These disturbances impair memory consolidation, attention, and executive functioning, which are essential for learning and classroom performance. In our study, 40.3% of children demonstrated poor academic performance, and this was significantly associated with moderate to severe sleep disturbance. Children with severe airway obstruction were more likely to exhibit poor concentration, irritability, hyperactivity, and daytime somnolence. These behavioral manifestations may mimic attention-deficit disorders, potentially leading to misdiagnosis if underlying sleep pathology is not identified. The observed relationship between adenoid hypertrophy and academic decline highlights the importance of early diagnosis and timely intervention. Previous research has shown that appropriate management, including adenoidectomy when indicated, can result in improvement in sleep quality, behavior, and cognitive function. Therefore, untreated adenoid hypertrophy may have long-term consequences on a child's educational achievement and psychosocial development.

The strengths of the present study include objective grading of adenoid hypertrophy and multi-source assessment of school performance. However, limitations include relatively small sample size and the absence of polysomnography for objective assessment of sleep-disordered breathing. Overall, the findings of this study reinforce the clinical significance of adenoid hypertrophy beyond nasal obstruction alone. Early recognition and management may not only improve respiratory symptoms but also enhance sleep quality and academic outcomes in affected children.

Conclusion

The present study demonstrates that adenoid hypertrophy has a significant negative impact on sleep quality and school performance in children. Moderate to severe adenoid enlargement was strongly associated with sleep-disordered breathing symptoms such as habitual snoring, mouth breathing, restless sleep, and daytime somnolence. Children with significant sleep disturbances showed impaired attention, reduced concentration, behavioral changes, and poorer academic performance compared to those with mild or no obstruction. A statistically significant correlation was observed between severity of adenoid hypertrophy, degree of sleep disturbance, and decline in scholastic achievement. Early identification and appropriate management of adenoid hypertrophy are essential to prevent long-term cognitive and academic consequences. Timely intervention may improve sleep patterns, behavioral outcomes, and overall educational performance in school-going children.

References

1. Guilleminault C, Winkle R, Korobkin R, Simmons B. Children and nocturnal snoring: evaluation of the effects of sleep-related respiratory resistive load and daytime functioning. Pediatrics. 1982;69(5):614–619.
2. Ali NJ, Pitson DJ, Stradling JR. Snoring, sleep disturbance, and behaviour in 4–5 year olds. Archives of Disease in Childhood. 1993;68(3):360–366.
3. Blunden S, Lushington K, Kennedy D. Cognitive and behavioural performance in children with sleep-related obstructive breathing disorders. Sleep Medicine Reviews. 2001;5(6):447–461.
4. Beebe DW. Neurobehavioral morbidity associated with disordered breathing during sleep in children: a comprehensive review. Sleep. 2006;29(9):1115–1134.

5. Mitchell RB. Adenotonsillectomy for obstructive sleep apnea in children: outcome evaluated by pre- and postoperative polysomnography. Laryngoscope. 2007;117(10):1844–1854.
6. Owens JA. The clinical diagnosis and management of sleep disorders in children and adolescents. Pediatric Clinics of North America. 2004;51(1):135–159.
7. American Academy of Pediatrics. Clinical practice guideline: diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics. 2012;130(3):576–584.