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Research Article

NOCTURNAL OXYGEN SATURATION IN CHILDREN WITH ADENOTONSILLAR HYPERTROPHY AND ITS IMPROVEMENT AFTER ADENOTONSILLECTOMY

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Abstract

Background: Adenotonsillar hypertrophy is an important cause of upper-airway obstruction and sleep-disordered breathing in children. Nocturnal oxygen desaturation may accompany obstructive events during sleep. This study evaluated nocturnal oxygen saturation before and after adenotonsillectomy in children with adenotonsillar hypertrophy.

Methods: This prospective descriptive study included 75 children aged 5-10 years with clinically confirmed adenotonsillar hypertrophy who underwent adenotonsillectomy at AIMSR, Chittoor, between November 2023 and August 2025. Clinical symptoms, tonsillar grade, adenoid grade and oxygen saturation were recorded. Overnight pulse oximetry was performed before surgery and postoperative oxygen saturation was monitored for approximately 5 hours on room air. Pre- and postoperative oximetric variables were compared statistically.

Results: Seventy-five children completed the study. Snoring was the commonest presenting symptom (48%), followed by recurrent nasal discharge, mouth breathing, daily sleeplessness and apnoeic attacks. The thesis reports a preoperative mean SpO2 of 88.6% (SD 3.62) and postoperative mean SpO2 of 92.7% (SD 4.19), with a mean difference of 3.72% and a statistically significant paired comparison (p & lt;0.001). Symptom burden also decreased after surgery.

Conclusion: Adenotonsillar hypertrophy in children with sleep-disordered breathing was associated with impaired nocturnal oxygenation. Adenotonsillectomy was associated with significant improvement in oxygen saturation and clinical symptoms. Pulse oximetry may provide a useful objective adjunct in the assessment and postoperative evaluation of children with suspected obstructive sleep-disordered breathing.

Keywords: Adenotonsillar hypertrophy; Adenotonsillectomy; Children; Nocturnal oxygen
saturation; Obstructive sleep apnoea; Pulse oximetry.

INTRODUCTION

Adenoid and tonsillar enlargement is a

common cause of upper-airway obstruction during childhood. Progressive enlargement of lymphoid tissue in the nasopharynx and oropharynx can increase airway resistance and contribute to sleep-disordered breathing and obstructive sleep apnoea. During sleep, particularly when upper-airway muscle activity decreases, airway narrowing may become more pronounced and intermittent obstructive events may occur.

Clinical history alone may not reliably identify the severity of sleep-related obstruction because obstructive events can occur predominantly during sleep and may not always be witnessed. Objective assessment of oxygenation can therefore provide additional information. Pulse oximetry is a simple, non-invasive method for recording oxygen saturation and can be useful when evaluating children with suspected sleep-disordered breathing.

Adenotonsillectomy is commonly performed for clinically significant adenotonsillar obstruction. The present study was undertaken to assess changes in oxygen saturation and clinical symptoms following adenotonsillectomy in children with adenotonsillar hypertrophy.

AIM AND OBJECTIVES

To evaluate nocturnal oxygen saturation in children with adenotonsillar hypertrophy and to assess the change in oxygen saturation and clinical symptoms following adenotonsillectomy.

MATERIALS AND METHODS

Study design and setting: A prospective descriptive study was conducted at AIMSR, Chittoor, between November 2023 and August 2025.

Participants: The study included 75 children aged 5–10 years with clinically confirmed

adenotonsillar enlargement who presented with symptoms including snoring, nasal obstruction, mouth breathing, breathing difficulty or swallowing difficulty.

Inclusion criteria: Children aged 5–10 years with clinically confirmed adenotonsillar enlargement.

Exclusion criteria: Infants; children with comorbid illness; neurological, genetic or craniofacial abnormalities; chronic medical illness related to lower respiratory tract infection or anaemia; and children who had previously undergone adenoidectomy or tonsillectomy.

Clinical assessment: Clinical history and physical examination were performed. Tonsillar enlargement was graded according to the Brodsky criteria. Diagnostic nasal endoscopy was used to assess adenoid hypertrophy. The study recorded clinical symptoms and oxygen saturation.

Oximetry: A CONTEC CM50D fingertip pulse oximeter with memory capacity was used. Children were admitted one day before surgery and oxygen saturation was monitored overnight. After adenotonsillectomy, postoperative SpO2 was monitored for approximately 5 hours on room air. Patients were observed for postoperative complications.

Surgical procedure and follow-up: Adenotonsillectomy was performed under general anaesthesia. Patients were monitored for bleeding and other complications for at least 24 hours and were subsequently evaluated during a four-week follow-up period.

Statistical analysis: Pre- and postoperative oximetric variables were analysed using paired Student's t-test or Wilcoxon test as appropriate. Pearson correlation was used for correlations between variables. Statistical analysis was performed using SPSS. A p value & lt; 0.05 was considered statistically significant.

Ethics and consent: The thesis states that parents or guardians were informed about the study and provided written informed consent. The manuscript should include the institutional Ethics Committee approval number/date from the original study records before submission; this information was not identifiable in the supplied thesis text and has therefore not been invented.

RESULTS

The study included 75 children aged 5-10 years. The age distribution was 14 children (18.67%) aged 5–6 years, 25 (33.33%) aged 7–8 years and 36 (48%) aged 9-10 years.

The thesis records 37 males (49.33%) and 38 females (50.67%). Tonsillar hypertrophy was graded as grade 1 in 6 children (8.0%), grade 2 in 15 (20.0%), grade 3 in 28 (37.33%) and grade 4 in 26 (34.67%). Among the 60 children for whom adenoid grading was recorded, adenoid hypertrophy was grade 1 in 15 (20.0%), grade 2 in 25 (33.33%), grade 3 in 28 (37.33%) and grade 4 in 7 (9.33%).

The common presenting symptoms were snoring in 36 children (48%), recurrent nasal discharge in 25 (33.3%), mouth breathing in 21 (28%), daily sleeplessness in 19 (25%) and apnoeic attacks in 15 (20%). Postoperatively, the corresponding symptom counts recorded in the thesis were 8, 4, 6, 5 and 2, respectively.

The thesis reports mean preoperative SpO2 of 88.6% (SD 3.62) and postoperative SpO2 of 92.7% (SD 4.19). The mean paired difference was 3.72% (SD 3.13), with a paired t statistic of -10.92 and p & lt; 0.001. These findings indicate a statistically significant improvement in oxygen saturation after adenotonsillectomy.

When tonsillar grade was considered, the recorded pre- and postoperative oxygen saturation values were 96.8% and 97.0% for grade 1, 91.6% and 95.13% for grade 2, 88.5% and 92.67% for grade 3, and 84.9% and 90.77% for grade 4. For adenoid grades, the corresponding values were 93.11% and 95.57% for grade 1, 89.6% and 93.34% for grade 2, 87.04% and 91.72% for grade 3, and 84.8% and 88.65% for grade 4.

The thesis also reports that 75/75 children had symptoms preoperatively, whereas 50 (66.6%) were symptom-free postoperatively and 25 (33.3%) had persisting symptoms. The reported Pearson chi-square test was statistically significant (p & lt; 0.001).

Table 1. Demographic characteristics

Variable	n	%
Age 5–6 years	14	18.67
Age 7–8years	25	33.33
Age 9–10years	36	48.00
Male	37	49.33
Female	38	50.67

Table 2. Tonsillar hypertrophy

Brodsky grade	n	%
Grade 1	6	8.00
Grade 2	15	20,00
Grade 3	28	37.33
Grade 4	26	34.67

Total	75	100.00

Table 3. Mean oxygen saturation before and after surgery Parameter Preoperative Postoperative

Brodsky grade	n	%
Grade 1	6	8.00
Grade 2	15	20,00
Grade 3	28	37.33
Grade 4	26	34.67
Total	75	100.00

DISCUSSION

The present study demonstrates an objective improvement in oxygen saturation following adenotonsillectomy in children with adenotonsillar hypertrophy. The clinical profile was dominated by snoring, nasal symptoms, mouth breathing, disturbed sleep and apnoeic attacks, consistent with upper-airway obstruction during sleep.

The preoperative oxygen saturation findings support the presence of impaired nocturnal oxygenation in a proportion of children with symptomatic adenotonsillar hypertrophy. The improvement after surgery was statistically significant. The relationship between increasing tonsillar and adenoid grades and lower recorded preoperative saturation also supports the clinical relevance of the degree of upper-airway lymphoid enlargement.

The postoperative reduction in symptoms was substantial. Although some children continued to have symptoms, the thesis notes that persistent symptoms may have been related to other causes such as nasal allergy or infection, which were not specifically assessed in the study.

These findings are clinically relevant because pulse oximetry is non-invasive, readily available and can provide objective information in children suspected of sleep disordered breathing. However, pulse oximetry alone does not provide the full physiological information obtained from polysomnography, and the present study should therefore be interpreted as an assessment of oxygenation rather than a definitive diagnostic study for obstructive sleep apnoea.

LIMITATIONS

The study was conducted at a single centre with a relatively small sample size and a short follow-up period. Polysomnography and detailed oxygen desaturation indices

were not used as the primary outcome measures. The study also did not systematically evaluate other causes of persistent postoperative symptoms. These limitations should be considered when generalising the findings.

CONCLUSION

Children with symptomatic adenotonsillar hypertrophy demonstrated reduced nocturnal oxygenation, and adenotonsillectomy was associated with significant improvement in oxygen saturation and clinical symptoms. Objective pulse-oximetry assessment may therefore be a useful adjunct in children with suspected sleep-disordered breathing related to adenotonsillar obstruction. Longer-term and polysomnography-based studies would help determine the durability and broader physiological significance of these improvements.

Ethics Statement

Written informed consent was obtained from parents or guardians according to the study thesis.

Conflict of Interest

The authors declare that they have no conflict of interest.

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