Section: ENT

Original Research Article

ASSESSMENT OF CLINICAL PRESENTATIONS OF ADENOID HYPERTROPHY BASED ON THE DEGREE OF CHOANAL OBSTRUCTION IN CHILDREN WITH CHRONIC ADENOID HYPERTROPHY

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ABSTRACT

Background: The adenoid forms a part of Waldeyer's ring of lymphoid tissue in the upper respiratory tract at the junction of roof and posterior wall of nasopharynx. Physiological hypertrophy of adenoid occurs between 2 and 14 years of age and its regression occurs rapidly after 15 years. Chronic stimulation caused by recurrent infection or allergy can cause adenoid hypertrophy. This results in obstruction of nasopharyngeal airway and consequent recurrent sinonasal infections, otitis media or maldevelopment of face (adenoid facies). Evaluation of a patient with adenoid hypertrophy includes a detailed history, physical examination, X ray nasopharynx and flexible nasopharyngoscopy. The aim and objective are to assess the clinical presentations of adenoid hypertrophy based on the degree of choanal obstruction by flexible nasopharyngoscopy in children with chronic adenoid hypertrophy attending a tertiary care hospital. **Materials and Methods:** This is a cross-sectional observational study conducted in 90 children who attended ENT outpatient department (OPD) of Sree Uthradom Thirunal Academy of Medical Sciences with symptoms of chronic adenoid hypertrophy and met the inclusion criteria. Convenient sampling was done. Detailed history regarding the symptoms were taken from their guardians. Complete ENT examination was done. Flexible nasopharyngoscopy was done to assess the degree of choanal obstruction and percentage of obstruction was calculated using Image J software. The data was coded and entered in Microsoft Excel and analysed using Jamovi software. **Result:** The most frequently reported symptoms were nasal obstruction (90%) and snoring (90%), followed closely by recurrent upper respiratory infections (URI) (88.9%) and mouth breathing (80%). Other symptoms included sleep disturbances (45.6%), attention deficit hyperactive disorder (ADHD) (17.8%), inadequate weight for age (62.2%), hyponasal voice (46.7%), recurrent ear symptoms (35.6%) and allergic rhinitis (50%). **Conclusion:** The findings of the present study show a significant impact of adenoid hypertrophy on various aspects of children's health. The observed associations between severity of choanal obstruction and clinical symptoms such as sleep disturbances, hyponasal speech, and middle ear dysfunction reinforce the need for early diagnosis and intervention.

INTRODUCTION

The adenoid is a lymphoid tissue located in the upper respiratory tract, at the junction of roof and posterior wall of the nasopharynx.[1] It serves as the initial immunological defence against inhaled antigens during early childhood. The adenoid becomes distinguishable by the third month of gestation.[1] Physiological hypertrophy of the adenoid takes place between 2 and 14 years of age, with rapid regression occurring after the age of 15. Its primary function is to produce antibodies. Chronic stimulation caused by recurrent infection/ allergy can cause adenoid hypertrophy. This results in obstruction of nasopharyngeal airway and consequent recurrent sinonasal infections, otitis media, or maldevelopment of face (adenoid facies). If not promptly treated it may lead to obstructive sleep apnoea, failure to

thrive, ear problems, pulmonary hypertension, and craniofacial anomalies.[2] On physical examination children with chronic adenoid hypertrophy may have adenoid facies such as pinched nose, malar hypoplasia, elongated face, flat nasal arch, short protruding upper lip, high arched palate or crowding of teeth. They may also show other features like deafness, growth retardation, recurrent upper respiratory infections, apnoeic episodes in sleep etc. This can lead to chronic oedema and / or obstruction of eustachian tube orifice causing eustachian tube dysfunction (ETD), recurrent acute otitis media, otitis media with effusion (OME) or chronic otitis media (COM).[3]

Polymerised chain reaction (PCR) technique is useful for identifying slow-growing pathogens that are challenging to culture in a diagnostic laboratory4. Evaluation of a patient with adenoid hypertrophy includes a detailed history, physical examination, X ray nasopharynx and flexible nasopharyngoscopy. Medical treatment for adenoid hypertrophy is limited to antibiotics, antihistamines, nasal decongestants and saline douching. Recently topical steroid nasal sprays have been used for reduction in adenoid size and symptomatic improvement. Surgical management is by adenoidectomy under general anaesthesia. The current study is to assess the clinical presentation of adenoid hypertrophy in children based on the degree of choanal obstruction in children with adenoid hypertrophy attending ENT department of Sree Uthradom Thirunal Academy of medical sciences.

Aims and Objectives

To assess the clinical presentations of adenoid hypertrophy based on the degree of choanal obstruction by flexible nasopharyngoscopy in children with chronic adenoid hypertrophy attending a tertiary care hospital and to assess the ear findings using otoscope and tympanogram.

MATERIALS AND METHODS

It was a hospital based cross sectional study conducted during a period of 18 months from in the ENT out patient department of our hospital after obtaining clearance from Institutional Ethical committee (No. 14/IEC/SUTAMS/2023).

Sample Size

n = Zα2 PQ/d2

p - proportion of hearing loss in children with adenoid hypertrophy

q- 100-p

where Zα = 1.96, P = 69.4, Q = 30.6, d = 10=(1.96)(1.96)x(69.4)x(30.6)/(10)x(10)

= 8158.17542/(10)x(10)

= 82

This is calculated in reference to study of clinical profile chronic adenoiditis in paediatric age group (0-12yrs), done by Sandip Kautik Sathe et al. in Bkl Walawalkar rural medical college, Ratnagiri in Jan 2020- Dec 2021, where P is taken as proportion of hearing loss in children with adenoid hypertrophy.5

Inclusion Criteria

The study included children aged 3 – 12 years with any of the symptoms of adenoid hypertrophy attending ENT outpatient department during the study period.

Exclusion Criteria

- History of adenoidectomy
- Children with cleft palate and submucous cleft palate
- Children who are not cooperating for flexible nasopharyngoscopy

All the required information was collected from patients who met the inclusion criteria in a predesigned proforma. Symptoms of adenoid hypertrophy include nasal obstruction, snoring, mouth breathing, recurrent URI, sleep disturbance and hyponasal voice. Detailed history about clinical presentations was taken from the guardians of children recruited in study on an individual basis. Questions were also asked regarding frequent night awakenings, unusual sleep positioning and significant disruption of bed coverings as a sign of increased nighttime movements. After taking a detailed history, a symptom score of 1 each was given for nasal obstruction, snoring, mouth breathing, recurrent URI, sleep disturbance and hyponasal voice. Recurrent URI involve 3 or more episodes of infection in 6 months or 6-8 episodes of established acute infection in a year.[6]

The total symptom score was 6 and the patients were divided into 4 groups.

Table 1: symptom score grouping
GROUP SYMPTOM SCORE

Group	Symptom score
1	Only 1 symptom
2	1 to 3
3	3 to 5
4	5 to 7

Physical examination included general examination and ENT examination. In general examination features of adenoid facies were noted and weight for age was calculated using Weech's formula for calculating weight for age.[7]

In children with poor scholastic performance DSM V criteria was used to diagnose ADHD. ENT examination including cold spatula test, anterior rhinoscopy and otoscopy were done. Oropharyngeal examination includes grading of tonsillar hypertrophy according to Friedman et al grading.[7]

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Flexible nasopharyngoscopy was done to assess the degree of choanal obstruction.

Table 2: Grading of adenoid hypertrophy based on nasopharyngoscopy

Grade	Percentage of choanal obstruction
1	Adenoid filling <50% of choana
2	Adenoid filling 50 to 60% of choana
3	Adenoid filling 60 to 70% of choana
4	Adenoid filling 70 to 80% of choana
5	Adenoid filling 80 to 90% of choana
6	Adenoid filling >90% of choana

Data collected was tabulated using Microsoft Excel and analyzed with the help Jamovi software version 2.6.25.(2) Categorical variables were expressed in frequency and percentage. Continuous variables were expressed as mean and standard deviation.

RESULTS

The study included children aged 3 to 12 years, categorized into three age groups. The largest proportion of participants were in the 6–9 years (41.1%), followed by 3– 6years (22.2) and 9–12-years (36.7%). Among the 90 children assessed, males (68.9%) outnumbered females (31.1%).
Weight for age was calculated for all children and 62.2% of them had inadequate weight for age. 3.3% children had previous medical history of bronchial asthma 21.1% had history of allergic rhinitis and 2.2% had hypothyroidism. Adenoid facies, characterized by specific facial features due to chronic mouth breathing, was present in 32.2% of the children.

The table presents the distribution of symptom score grouping among children (n = 90). The symptom score grouping ranges from 1 to 4.
Symptom score grouping
Only 1 symptom - group 1
1 - 3 symptoms – group 2
3 - 5 symptoms – group 3
5 - 7 symptoms – group 4.

Table 3: Distribution of children according to chief complaints

Chief complaints	Frequency	Percentage
Nasal obstruction	81	90
Snoring	81	90
Mouth breathing	72	80
Recurrent upper respiratory infection	80	88.9
Sleep disturbance	41	45.6
Poor scholastic performance	16	17.8
Inadequate weight gain	56	62.2
Hyponasal voice	42	46.7
Recurrent ear symptoms	75	83.3
Recurrent nasal allergy symptoms	45	50

Table 4: Distribution of children according to symptom score grouping

Group	Frequency	percentage
1	3	3.3
2	7	7.8
3	31	34.4
4	49	54.4

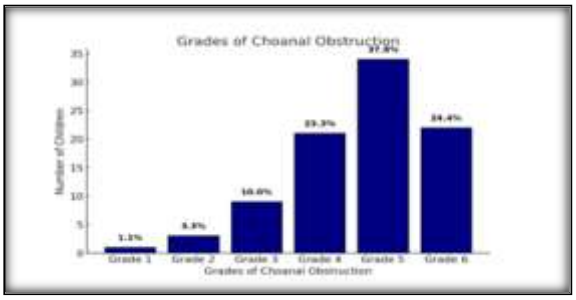

Figure 1: Frequency distribution of grades of choanal obstruction by flexible nasopharyngoscopy

Score group 4 was the most common, observed in 54.4% of participants (49 out of 90). Score group 1, the least frequent, was recorded in only 3.3% (3 participants).
Otoscopy findings revealed that 53.3% of children had normal tympanic membranes (TM). However, 34.4% had otitis media with effusion, and 22.2% had retracted TM.
Distribution of children according to Tympanometry Findings
15.6% of children had unilateral B curve whereas 12.2% had B/L B curve. 17.8% of children had U/L C curve whereas 11.1% had B/L C curve. 33.3% of children had B/L A curve (frequency -30).

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Table 5: Association of Recurrent URI with grades of choanal obstruction.

Grades of choanal obstruction								
Recurrent URI	**1**	**2**	**3**	**4**	**5**	**6**	**Total**	**P**
Present	0 (0.0%)	3 (3.3%)	6 (6.7%)	19 (21.1%)	31 (34.4%)	21 (23.3%)	80 (88.9%)	0.015
Absent	1 (1.10%)	0 (0.0%)	3 (3.3%)	2 (2.2%)	3 (3.3%)	1 (1.10%)	10 (11.10%)	

Our study showed significant association between recurrent upper respiratory infection and grades of choanal obstruction p value = 0.015.

The study showed a statistically significant association (p=0.008) between sleep disturbance and grades of choanal obstruction. The highest prevalence of sleep disturbance (18.9%) was observed in children with Grade 5 (80 –90%) obstruction.

A statistically significant association was obtained between hyponasal voice and grades of choanal obstruction (p – 0.002). Among children with grade 5 choanal obstruction, 22.2% had hyponasal voice while it was 16.7% in children with grade 6 choanal obstruction.

A statistically significant association (p=0.001) was observed between the symptom score grouping and the degree of choanal obstruction. A symptom score group of 4, indicating the more number of symptoms, was observed in 20 % of children with grade 6 choanal obstruction.

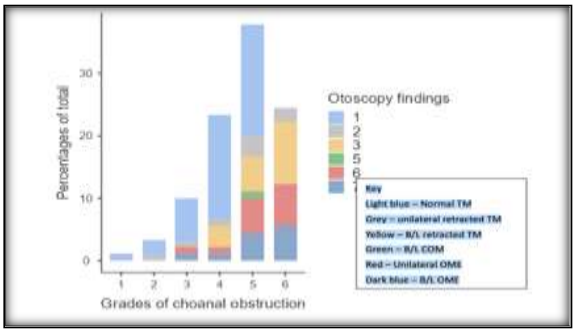

Figure 2: Association between otoscopic findings and grades of choanal obstruction.

DISCUSSION

The present study aimed to assess the clinical presentations of adenoid hypertrophy in children based on the degree of choanal obstruction evaluated using flexible nasopharyngoscopy among 90 children. The data was analysed across various parameters, including demographic distribution, chief complaints, medical history, family history, otoscopic findings, tympanometry, and associations between different clinical variables and the severity of choanal obstruction. The findings provide valuable insights into how adenoid hypertrophy affects children's respiratory function, middle ear status, and overall health.

Demographic Distribution: In this study we included children aged between 3 and 12 years, and the highest proportion belonged to the 6–9-year age group (41.1%), followed by the 9 -12 year group (36.7%) and the 3-6 year group (22.2%). These findings were consistent with a study by Sandip Kautik Sathe et al,[5] indicating that adenoid hypertrophy is most commonly diagnosed between 5-7 years of age.

In our study 68.9% of children were males and only 31.1% were females. However the absence of a statistically significant association between sex and the grade of choanal obstruction in our study suggests that while adenoid hypertrophy is more common in males, its severity is not gender-specific. The demographic distribution of our study population was similar to a study by Anand et al.[9]

In our study the presence of inadequate weight for age was seen in 62.2% of children suggesting that chronic nasal obstruction and associated respiratory infections may impact growth and nutritional status. This was consistent with the study by Ayotunde James Fasunla et.al, which revealed that surgical removal of the anatomic structures causing pharyngeal airway obstruction would improve the growth of the affected children.[10]

In our study the most frequently reported symptoms were nasal obstruction (90%) and snoring (90%) followed closely by recurrent upper respiratory infections (88.9%) and mouth breathing (80%). This was similar to a study by Ungkanont et al, where the most common symptom was snoring (97%) followed by mouth breathing (63.6%).[11]

In our study sleep disturbances were reported in 45.6% of cases, with a statistically significant association (p=0.008) between the grade of choanal obstruction and the presence of sleep disturbances. Among children with > 90% obstruction, 17.8% experienced sleep disturbances, reinforcing the well-established link between adenoid hypertrophy and sleep-disordered breathing. This was consistent with a study by Xiao et al., which revealed a significant association between the severity of choanal obstruction and sleep disturbances (p=0.003).[12] In our study attention deficit hyperactivity disorder (ADHD) symptoms were reported in 17.8% of children, but no significant association was found with increasing grades of choanal obstruction. This finding aligns with a study by Erkan Soylu et al., which demonstrated that attention deficit hyperactivity disorder (ADHD) and sleep disorders were more prevalent in patients with adenotonsillar hypertrophy compared to the control,[13] group Hyponasal voice, a characteristic feature of adenoid hypertrophy, was reported in 46.7% of cases in our study, with a statistically significant association (p<0.002) with increasing grades of choanal obstruction. While children with grade 1-3 choanal obstruction did not have hyponasal voice, the prevalence rose in the grade 4 (7.8%), grade 5 (22.2%) and grade 6 (16.7%) groups. These findings

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confirm that adenoid hypertrophy significantly affects speech resonance due to obstruction of nasal airflow.

Our study revealed recurrent ear symptoms, including ear pain, hearing difficulties, and middle ear infections in 83.3% of children with an increasing trend as grades of choanal obstruction increase. However the association was not statistically significant (p=0.632). The prevalence of recurrent ear symptoms and abnormal tympanometry findings in children with severe obstruction further supports the notion that adenoid hypertrophy contributes to middle ear dysfunction, as documented in studies by Buzatto et al. and Ohuche et al.[14,15]

Adenoid facies was observed in 32.2% of children in our study. The association between adenoid facies and grades of choanal obstruction was not significant, reinforcing that while prolonged airway obstruction could lead to facial structural changes, not all children with severe obstruction develop classic adenoid facies. In a study by Morshed Alam1 et al revealed 14 % of children with chronic adenoiditis had adenoid facies.[16] In our study otoscopy findings showed a significant association (p=0.041) between abnormal ear findings and grades of choanal obstruction. 22.2% had retracted tympanic membranes, 1.1% had chronic otitis media, and 34.4% had features of otitis media with effusion and 42.2% of children had a normal tympanic membrane. A study by Nishanth Savery et al. found that 43% of participants had a dull and retracted tympanic membrane, while 22% exhibited fluid with air bubbles during otoscopic examination. These findings indicate that adenoid hypertrophy directly affects the ventilation and drainage of the middle ear cleft, contributing to the development of otitis media with effusion.[17]

CONCLUSION

The findings of our study underscore the significant impact of adenoid hypertrophy on various aspects of children's health.

- Majority of the children were in the 6-9 year age group (41.1%) with male preponderance.
- Most common symptoms of presentation include nasal obstruction (90%), snoring (90%), recurrent URI (88.9%) and mouth breathing (80%).
- Inadequate weight for age was found in 62.2% of children
- Allergic rhinitis was seen in 21.1% of children
- Adenoid facies was observed in 32.2% of children but the association between adenoid facies and grades of choanal obstruction was not significant, reinforcing that while prolonged airway obstruction can lead to facial structural changes, not all children with severe obstruction develop classic adenoid facies.
- Higher symptom scores group (group 4) were more common in children with higher grades of choanal obstruction (>80%).
- Abnormal otoscopic findings were seen in children with higher grades of choanal obstruction.
- The observed associations between grades of choanal obstruction and clinical symptoms such as sleep disturbances, hyponasal voice and middle ear dysfunction reinforce the need for early diagnosis and intervention.

Limitations of the Study:

- Since this study included children of age group 3-12 years, detailed history was obtained from their parents and hence there is chance of inconsistency. This may have led to discrepancies in the symptom scores.
- The duration of study was 18 months and if the study period was longer, it could have included more cases and given valuable insights into various associations.

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