

# Prevalence and clinical presentation of adenoid hypertrophy among children attending at pediatric outpatient department of a tertiary care general hospital of Dhaka

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## ABSTRACT

**Background:** Adenoid hypertrophy (AH) and its consequences are common in the entire childhood period. This study was aimed to estimate the prevalence, to enumerate the presence of risk factors and pattern of presentations of AH among children attending at pediatric outpatient department.

**Methods:** This cross-sectional study was conducted at the general pediatric outpatient department (OPD) of BIRDEM General Hospital-2 (Women and Children), Dhaka from January 2017 to December 2020. All the children aged 1-18 years attending the OPD who had known risk factors or sign-symptoms of AH were underwent a lateral nasopharyngeal x-ray to confirm the presence of enlarged adenoid. Those children who had enlarged adenoid were analyzed in this study.

**Results:** A total of 20234 children attended the general pediatric OPD during the study period, of them, 463 had evidences of enlarged adenoid on lateral nasopharyngeal x-ray, giving a prevalence of 2.3%. The mean age of presentation was 100.6±58 months. Among the AH cases 86% had allergic sensitivity to house dust, 60% had allergic rhinitis, 55.5% had history of recurrent tonsillitis and 55.3% children were exposed to cigarette smoke especially at home. Most common presentation of AH was mouth breathing especially during sleep time (90.5%). Other common presenting features were nasal obstruction (83.6%), nasal discharge (73%), drooling of saliva (72.4%), daytime somnolence (65.2%) and snoring during sleep (61.8%). According to our study AH may be asymptomatic in 5% cases. However, it may be presented with complications such as OSA (obstructive sleep apnea) (26.6%), adenoid facies (13.8%) and otitis media with effusion with or without hearing impairment (12.5%). Eighty two (17.7%) need referral to ENT OPD for adenoidectomy. Most common indication for adenoidectomy was obstructive sleep apnea (41.5%).

**Conclusion:** Prevalence of adenoid hypertrophy among children attending at pediatric outpatient department was 2.3%, of them 17.7% had indication for adenoidectomy. Allergic sensitivity to house dust was the most common risk factors. Most common two clinical presentations were mouth breathing and nasal obstruction and most common complication was obstructive sleep apnea.

**Key words:** adenoid hypertrophy, children.

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## INTRODUCTION

The adenoids, also called the nasopharyngeal tonsils, are part of the Waldeyer's Ring of lymphatic tissues situated on the postero-superior wall of the nasopharynx.<sup>1</sup> These lymphoid tissues are the first line of defense against ingested or inhaled pathogens.<sup>2</sup> The adenoids become evident due to physiological hyperplasia by about six months to one year of life, then gets larger in size during the first 6–10 years of life and generally shrinks by physiological atrophy by the age of 16 and is rare beyond this age.<sup>3-6</sup> The persistence

of enlarged adenoids and even more swelling or proliferation of regressed tissue which is generally termed as adenoid hypertrophy (AH) is associated with chronic persistent inflammation.<sup>7, 8</sup> Frequent infections in the head, throat, or ears including chronic sinusitis and tonsillitis; allergic conditions such as bronchial asthma (BA), atopic dermatitis (AD), atopic conjunctivitis (AC) and specially atopic rhinitis (AR); allergic sensitivity to house dust, pollen, cockroach and more important cigarette smoke exposure specially at home are known causes (risk factors) for chronic persistent inflammation and symptomatic AH.<sup>4,9,10</sup> Once inflamed, the adenoids may enlarge sufficiently to entirely block airflow through the nasal passages. And even if the enlargement is not substantial enough to physically block the nose, it can obstruct airflow sufficiently to induce primarily mouth breathing and affect voice pitch and tone.<sup>11, 12</sup> AH is presenting with multiple signs and symptoms ranging from nasal obstruction to obstructive sleep apnea (OSA).<sup>13</sup> The absolute size of the adenoid and the available space in the nasopharynx are the major factors which determine the severity of symptoms.<sup>14</sup> Most common symptom, ordinarily, is nasal airway obstruction leading to mouth breathing, snoring, difficulty in eating, drooling of saliva and toneless voice.<sup>13</sup> An untreated AH may lead to develop craniofacial anomalies (adenoid facies), OSA, ear problems (otitis media with effusion and hearing impairment due to eustachian tube obstruction), failure to thrive, pulmonary hypertension and cor-pulmonale.<sup>13,15</sup> Defective speech may develop which is effect of articulation error and hearing impairment developed by long term enlarged adenoid.<sup>16</sup>

Prevalence of symptomatic AH is ranging from 1.3% in outdoor patient of 6 months to 18 years old<sup>17</sup> to 7.7% in school going children.<sup>18</sup> It is one of the most frequent indications for surgery in childhood.<sup>19</sup>

Data regarding the prevalence and clinical profile of AH in children is scanty in our country. This study is therefore aimed to estimate the prevalence, to enumerate the presence of risk factors and pattern of presentations and complications of AH among children attending at pediatric outpatient department.

## METHODS

This cross-sectional study was conducted at the general pediatric outpatient department (OPD) of BIRDEM General Hospital-2 (Women and Children), Dhaka. Duration of the study was 4 years; January 2017 to December 2020. All the children aged 1-18 years attending the OPD were searched for history or presence of any known risk factors for AH. Risk factors considered in this study were frequent infections in the head, throat, or ears including chronic sinusitis and tonsillitis; allergic conditions such as bronchial asthma, atopic dermatitis, atopic conjunctivitis and atopic rhinitis; allergic sensitivity to house dust, pollen, cockroach and cigarette smoke exposure. Sign-symptoms arising from AH were documented. All the symptomatic patients and asymptomatic but had history or presence of any risk factor was advised to do a lateral nasopharyngeal x-ray to confirm the presence of enlarged adenoid. As these asymptomatic children might have AH not large enough to produce symptoms, they were evaluated. Children whose diagnoses were not proven by lateral nasopharyngeal x-ray were excluded from the study. Children who had enlarged adenoid were analyzed to estimate the incidence and to evaluate of pattern of presentations. All diagnosed patients were treated as per current guidelines. The cases that had at least one indication (Otitis media with effusion of at least 3 months duration, Chronic adenoiditis, OSA lasting 3 months or greater, and Recurrent upper respiratory infections)<sup>20</sup> for adenoidectomy were referred to ENT OPD of same hospital for evaluation and management. OSA was diagnosed clinically by the occurrence of daytime sleepiness, loud snoring, witnessed breathing interruptions, or awakenings due to gasping or choking in the presence of at least 5 obstructive respiratory events (apneas, hypopneas or respiratory effort related arousals) per hour of sleep. The presence of 15 or more obstructive respiratory events per hour of sleep in the absence of sleep related symptoms was also diagnosed as OSA.<sup>21</sup>

## Statistical analysis

Data collection was done with structured data collection sheet which included demographic variables, necessary history and examination as well as investigation findings. Data was analyzed with SPSS version 23 by

IBM Inc., (USA). Mean was determined with standard deviation. Rates and proportions were calculated and expressed as percentage.

### Ethical consideration

The purpose and procedure of the study were properly explained to the parents/guardian and informed written consent was taken from them. The study did not involving any additional burden to the patients. All participants in a research study had a right to have the information that they provided to be kept confidential.

### RESULTS

A total of 20234 children aged 1-18 years attended the general pediatric OPD over 4 years of the study period, of them, 463 had evidences of enlarged adenoid on lateral nasopharyngeal x-ray, giving a prevalence of 2.3%. Among the 463 radiologically proved AH cases, 440 (95%) were symptomatic and 23 (5%) were asymptomatic having risk factors only. The peak age of diagnosis of AH in this study was between 12-72 months (43.4%). The mean age of presentation was 100.6±58 months. There was a male predominance with male to female ratio 1.6:1. AH was more common in rural children than urban (57.2% vs 42.8%) (Table-I).

**Table I** Distribution of the demographic variables of the AH cases (N=463)

Variables	Number of children	Percentage
Age (months)		
12-72	201	43.4
73-156	149	32.2
157-216	113	24.4
Gender		
Male	284	61.3
Female	179	38.7
Resident		
Urban	218	42.8
Rural	265	57.2

Eighty six percent children of diagnosed AH showed allergic sensitivity to house dust, 60% had AR, 55.5 % had history of recurrent tonsillitis with or without pharyngitis and 55.3% children were exposed to cigarette smoke specially at home (Table II).

**Table II** Distribution of risk factors among the diagnosed AH cases (N=463)

Risk factors <sup>4, 9, 10</sup>	Number of children	Percentage
No risk factor	37	8.0
Frequent infections in the head, throat, or ears		
Chronic sinusitis	52	11.2
Recurrent tonsillitis ± Pharyngitis	257	55.5
Allergic conditions		
Bronchial asthma (BA)	104	22.5
Atopic rhinitis (AR)	278	60.0
Atopic dermatitis (AD)	89	19.2
Atopic conjunctivitis (AC)	11	2.4
Allergic sensitivity to house dust	398	86.0
Cigarette smoke exposure specially at home	256	55.3

\*One patient might have more than one risk factor.

Most common presentation of AH in children detected in the study was mouth breathing especially during sleep time (90.5%). Other common presenting features were nasal obstruction (83.6%), nasal discharge (73%), drooling of saliva (72.4%), Daytime somnolence (65.2%) and snoring during sleep (61.8%). AH may be presented without symptom in 5% cases or may be presented with complications such as OSA (26.6%), adenoid facies (13.8%) and otitis media with effusion with or without hearing impairment (12.5%) (Table III).

Among the total 463 AH cases 82 (17.7%) were referred to ENT OPD for adenoidectomy with or without tonsillectomy as they had at least one indication for this surgery (Table IV).

**Table III** Clinical presentations of AH (N=463)

Clinical presentations	Number of children	Percentage
Asymptomatic (with risk factors)	23	5
Symptomatic (with or without risk factors)		
• Mouth breathing	419	90.5
• Snoring	286	61.8
• Drooling of saliva	335	72.4
• Nasal discharge	338	73.0
• Nasal obstruction	387	83.6
• Sneezing	111	24.0
• Hyponasal speech	244	52.7
• Cough	265	57.2
• Daytime somnolence	302	65.2
• Deterioration of school performance	256	55.3
• Defective speech	158	34.1
• Obstructive sleep apnea (OSA)	123	26.6
• Adenoid facies	64	13.8
• hearing impairment (speech)	58	12.5
	13	15.9
Complications		
• Otitis media with effusion with or without		

\*One patient might presented with more than one clinical feature

**Table IV** Children with AH who were referred for adenoidectomy (N=82)

Indications for adenoidectomy <sup>20</sup>	Number of children	Percentage
Otitis media with effusion of at least 3 months duration ( $\pm$ hearing impairment $\pm$ defective		
OSA lasting 3 months or greater	34	41.5
Chronic adenoiditis	23	28.0
Recurrent upper respiratory infections	27	32.9

\*One patient might had more than one indication

## DISCUSSION

AH had great negative influences on physical as well as mental health; Childhood sleep-disordered breathing (SDB) is the most important one. Children with SDB are suffering from behavior problems, intelligence quotient deficits, school performance problems, a high prevalence of abnormal neuropsychological diagnosis, poor quality of life, impaired growth, cardiovascular insults and increase in health care utilization.<sup>22, 23</sup>

We noted the prevalence of AH as 2.3%. This is at variance with the prevalence of 1.3% in general populations,<sup>17</sup> 3% in non-allergic patient<sup>9</sup> and 7.7% in patient with nasal diseases.<sup>24</sup> The difference in the prevalence of these studies are probably due to different sample size, study places and diagnostic methods. Racial and geographical variability and seasonal as well as environmental influences may also cause differences in results. Ezyi et al. used a small sample size compare to us. We had done our study over a longer period of time which might reduce seasonal and environmental influences. We diagnosed our cases clinically with the help of lateral nasopharyngeal x-ray and not with nasoendoscopy as used by others.<sup>5,9,10</sup>

The peak age of diagnosis of AH in this study was between 12-72 months (43.4%) with mild male predominance which is more or less similar to other studies.<sup>9,17</sup> AH was little more common in rural children according to our study.

Allergic sensitivity to house dust was the leading risk factors for AH in our study. The most common sensitivity to allergens among patients with AH was exposure to house dust in other study also.<sup>9</sup> More than half had AR, recurrent tonsillitis, cigarette smoke exposure especially at home. Cigarette smoke exposure at home and presence of AR was significantly more frequent in the group of patients with AH observed by logistic model investigation in other study also.<sup>9</sup> Presence of other risk factors are also showed as significant in other studies.<sup>4,10</sup> Most common presentation of AH in children detected in our study was mouth breathing especially during sleep time (90.5%) which is consistent with other study<sup>13,15,17</sup> Other common presenting features were nasal obstruction (83.6%), nasal discharge (73%), drooling of saliva (72.4%), daytime somnolence (65.2%) and snoring during sleep (61.8%). It is important to note that 55.3% child may present with deterioration of school

performance. All these symptoms are also common presentation showed in other study also.<sup>13, 15, 17</sup> AH may be presented without symptom in 5% cases as shown in our study. On the other hand an untreated AH may presented with severe complications. In our study we found OSA in 26.6% cases. Another study concluded their study with statement that AH was a major risk factor for OSA in normal-weight children.<sup>25</sup> Adenoid facies were observed in 13.8% cases, otitis media with effusion with or without hearing impairment in 12.5% cases, but we could not detect any case of pulmonary hypertension or cor-pulmonale as routine echocardiography was not feasible. In our study 17.7% children were needed to refer for adenoidectomy. Wide variability in percentage of indications were found in different studies.<sup>17, 20</sup>

### Strength and limitations of the study

As the study done in a tertiary care general hospital, wide variability of the diagnoses of the study subjects and less chance of overt number of AH were our strength. Moreover a long duration of study period reduces the probability of alteration in prevalence due to seasonal and environmental variations. But it was done only in one OPD which did not represent the whole country. Diagnosis was made clinically with help of x-ray findings; results may differ if nasoendoscopy could be done. Many risk factors and symptoms were subjective; we depended on parents or patients. Allergic prick test and echocardiography could not be done due to lack of feasibility.

### Conclusion

Prevalence of adenoid hypertrophy among children attending at pediatric outpatient department was 2.3%, of them 17.7% had indication for adenoidectomy. Allergic sensitivity to house dust was the most common risk factors. Most common two clinical presentations were mouth breathing and nasal obstruction and most common complication was obstructive sleep apnea.

**Authors' contribution:** ALH: Concept and designed the study, analyzed data and drafted the manuscript. SSB: Helped in patient management, data collection, data analysis and review of the whole process. All authors read and approved the final manuscript.

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