

## Original Article



# Correlation of Adenoid Hypertrophy on Nasoendoscopy and Audiological Parameters in Children

Muntasir Mahbub<sup>1</sup>, Md Mahbubur Rahman<sup>2</sup>.

### Abstract

**Background:** Hypertrophy of the adenoid is a common finding in children under 12 years of age, which commonly leads to impairment of hearing. Nasoendoscopy and audiological tests are frequently included in the workup of these patients. **Objectives:** Aim for this study was to find out whether any correlation exists between the size of adenoids on nasoendoscopy and the audiological parameters. **Materials & Methods:** This is cross-sectional study conducted from Jan 2019 to Jan 2020 in Khwaja Yunus Ali Medical College Hospital, Enayetpur, Shirajganj. Total 50 patients were included in this study. In all patients, Flexible nasoendoscopy, Pure tone audiometry and Tympanometry was done. Findings were evaluated to assess the correlation of degree of adenoid hypertrophy to the severity of hearing impairment. **Results:** In this study, mean age of participants was 7.46 (3.62) years. Findings of hypertrophy were – Grade I 7(13%), Grade II 24(47%), Grade III 14(28%), Grade IV 6(12%). Findings of hearing status were – upto 25 dB 14(28%), Between 26–40 dB 32(64%), Above 40 dB 4(8%). Mean hearing loss according to adenoid hypertrophy were – Grade I –19.42dB, Grade II –30.41dB, Grade III – 35.64dB, Grade IV – 38.60dB. Type B curve percentage on adenoid groups were – Grade I – 3(43%), Grade II – 16(67%), Grade III – 11(79%), Grade IV – 6(100%). **Conclusion:** Adenoid hypertrophy as seen on nasoendoscopy correlates well with the expected audiological parameters in children.

**Key words:** Adenoid Hypertrophy, Pure Tone Audiometry, Tympanometry, Hearing loss in Children, Otitis Media with Effusion, Nasoendoscopy

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### Introduction

Hypertrophy of the nasopharyngeal tonsillar tissue or adenoids is a common finding in children below 12 years. Adenoids are part of the Waldeyer's ring and lie in the posterior wall of the roof of the nasopharynx, in close proximity to the opening of eustachian tube. Adenoids follow a specific growth curve and with increasing age, they tend to undergo atrophy. The adenoid is at its relative largest in relation to the volume of the nasopharynx in the 7-years old age group.<sup>1</sup> Similarly Otitis Media with Effusion (OME) is found more commonly between 5–8 years of age.<sup>2</sup> Enlarged adenoids have been classically associated with Eustachian tube dysfunction which leads to Otitis Media with Effusion and recurrent Acute Otitis Media in children. As a result enlarged adenoids and hearing impairment

in children are very frequently found together. This is largely due to the mechanical obstruction of the eustachian tube by adenoids.<sup>3</sup> On the other hand several studies indicate that rather than the mechanical obstruction, presence of adenoid facilitates formation of a biofilm in the nasopharynx leading to decreased muco-ciliary clearance with eventual middle ear effusion.<sup>4,5,6</sup> In patients presenting with adenoid enlargement, a novel tool for evaluation is naso-endoscopy.<sup>7</sup> It is a highly accurate method to assess adenoidal status in an outpatient setting.<sup>8,9</sup> Based on nasoendoscopy adenoid size is graded from Grade I to Grade IV.<sup>10</sup> In addition to naso-endoscopy, Pure-tone audiometry and Tympanometry are also commonly done to check hearing status.<sup>11,12</sup> The aim of our study is to evaluate the correlation of the size of adenoids with the severity of hearing impairment and presence of middle ear effusion.

1. Assistant Professor, Department of ENT & Head-Neck Surgery, Khwaja Yunus Ali Medical College Hospital, Enayetpur, Shirajganj, Bangladesh.
2. Professor, Department of ENT & Head-Neck Surgery, Sher-E-Bangla Medical College Hospital, Barisal.

**Correspondence:** Dr. Muntasir Mahbub, Assistant Professor, Department of ENT & Head-Neck Surgery, Khwaja Yunus Ali Medical College Hospital, Enayetpur, Shirajganj, Bangladesh. Email: [muntasirmahbub91@gmail.com](mailto:muntasirmahbub91@gmail.com). Mobile: 01717 757 757

## Materials and Methods

This was a cross-sectional study to assess the correlation between the size of adenoids with the severity of hearing impairment and presence of middle ear effusion in children. The study was conducted at the department of otolaryngology and Head-Neck surgery, Khwaja Yunus Ali Medical College Hospital, Enayetpur, Shirajganj from January 2019 to January 2020. Total 50 patients were included in this study. Inclusion criteria were Children of 4–12 years of age visiting the otolaryngology OPD with hearing impairment and nasal obstruction. All the patient volunteered and from their guardians informed written consent was taken. This study involved interviewing all patients (an/or his/her guardians). Detailed history was taken, nasal and aural examination was done. Nasoendoscopy was done using paediatric flexible naso-endoscope. Pure tone audiometry and Tympanometry were also done. A-B gap of both ears were measured and averaged for a mean conductive hearing loss measurement. Thus this mean was independent of whether the patient had unilateral or bilateral middle ear effusion. All the information were recorded and analyzed using SPSS (Statistical Package for Social Sciences) version 21.

## Result

**Table I** – Age distribution of the study group (n=50)

Age range	Number of Patients	Percentage (%)
4-7 years	20	40
8-10 years	16	32
11-12 years	14	28

20(40%) of the study population were in the age group of 4-7 years, 16(32%) in 8-10 years and 14(28%) between 11-12 years. Majority of the study population were in the age group of 4–7 years. Mean age was 6.5 years.

**Table II** – Grading of the size of adenoids (n=50)

Grade	Number of Patients	Percentage (%)
Grade I	7	14
Grade II	24	48
Grade III	14	28
Grade IV	6	12

In this study, Findings of hypertrophy were – Grade I 7(13%), Grade II 24(47%), Grade III 14(28%), Grade IV 6(12%). Grade I indicates – Adenoid tissue filling one-third of the vertical portion of the choanae, Grade II indicates – Adenoid tissue filling from one-third to two-thirds of the choanae, Grade III indicates – From two-thirds to nearly complete obstruction of the choanae and Grade IV indicates – Complete choanal obstruction.

**Table III** – Hearing status among the study group (n=50)

Grade	Number of Patients	Percentage (%)
Below 25 dB	14	28
Between 25 – 40 dB	32	64
Above 40 dB	4	8

In our study, hearing loss was below 25 dB in 14 patients (28%). Between 25–40 dB were 32 patients (64%) and above 40 dB were 4 patients (8%).

**Table IV** – Mean hearing loss according to grading of adenoid size (n=50)

Grade	Mean Hearing Loss
Grade I	19.42dB
Grade II	30.41dB
Grade III	35.64dB
Grade IV	38.60dB

**Table V**– Presence of Middle Ear Effusion according to adenoid size (n=50)

Grade	Total Number of Patient	Patients with Type B curve
Grade I	7	3(43%)
Grade II	24	16(67%)
Grade III	14	11(79%)
Grade IV	6	6(100%)

## Discussion

In the current study, we followed the criteria set by Clemens et al<sup>10</sup> for endoscopic grading of adenoid. Findings of hypertrophy were – Grade I 7(13%), Grade II 24(47%), Grade III 14(28%), Grade IV 6(12%). A study done by Acharya et al,<sup>13</sup> found that among 60 patients of both case and control group findings of hypertrophy were – Grade I 19(31%), Grade II 9(15%), Grade III 18(30%), Grade IV 14(23%). This dissimilarity is due to the fact that in the study group all the patient had middle ear effusion and 40% had grade IV hypertrophy. Also in the control group who were asymptomatic, 54% of patients had Grade I hypertrophy. But if we consider the grade III hypertrophy, then rates are similar in both studies 28% & 30%. In this study we assessed the hearing status of the patients against the size of the adenoids. We found that mean hearing loss in Grade I was 19.42dB, Grade II 30.41 dB, Grade III 35.64 dB and Grade IV 38.60 dB. Ren et al,<sup>14</sup> in his study with 207 children with adenoid found middle ear effusion in 75.4% and mean hearing loss was >30 dB. Sarwar et al,<sup>15</sup> in their study with 60 children with enlarged adenoid found all patients with OME with enlarged adenoids had a hearing loss between 26-55dB. Els et al,<sup>16</sup> in his retrospective study of 109 patient who underwent adeno-tonsillectomy mean hearing loss (SD) was 19.8 dB. And there was no statistically significant correlation between the presence of OME and adenoid hypertrophy. Bhat et al,<sup>17</sup> in a study with 100 patients, found 56% had grade 3 and 44% had grade 4 adenoid hypertrophy, mean hearing loss in patients with effusion was around 24 dB. Hearing status of the patients in the study of Syed et al,<sup>18</sup> in his study with children with hearing loss, found statistically significant association between adenoid hypertrophy with choanal obstruction and abutment of eustachian tube opening seen on endoscopy with hearing loss (p = 0.025). The children with hearing loss also had speech and language delay (p = 0.004). Children with enlarged adenoids obstructing the >50% of the choanae or abutting the eustachian tube opening are more likely to have hearing loss and may develop speech and

language delay. Durgut et al,<sup>19</sup> conducted a study on 55 children and graded the adenoids according to size into groups A-C. After doing audiometric tests, found no significant correlation between the groups and relevant hearing loss. Acharya et al,<sup>13</sup> were Grade I 29 dB, Grade II 28.5 dB, Grade III 31.25 dB, Grade IV 37.25 dB. The findings of our study were similar to most of the studies. Current study showed among 50 patients, 36 had type B curve on tympanogram. According to the grading of adenoid size, the distribution were Grade I 3(43%), Grade II 16(67%), Grade III 11(79%), Grade IV 6(100%). Ren et al,<sup>14</sup> found middle ear effusion in 75.4% Sarwar et al<sup>15</sup> found middle ear effusion in 58.33%. Bhat et al<sup>17</sup> found 36% had either unilateral or bilateral middle ear effusion.

## Conclusion

After considering all the variables related to this study and comparing them to other contemporary studies, we can conclude that –size of the adenoids as seen on endoscopy, correlates well with the expected audiological findings in children. Although some contemporary studies give slightly different statement, we feel further studies with larger sample sizes are required to eliminate this bias.

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