

# FREQUENCY OF HEARING LOSS AND OTITIS MEDIA IN CHILDREN WITH ADENOID HYPERTROPHY

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## ABSTRACT

**Objective:** To determine the frequency of hearing loss and otitis media with effusion in patients with adenoid hypertrophy.

**Methodology:** An observational study was performed in the Department of Pediatrics, Children Hospital/Institute of Child health, Lahore, from January 20, 2016 to July 19, 2016. A total of 100 patients with adenoid hypertrophy and 1-16 years of age were included in the study. Frequency of hearing loss and otitis media with effusion were determined. Data was collected on pre designed profarma and analyzed using SPSS version 20.

**Results:** Mean age of the patients was  $7.32 \pm 3.26$  years. Majority of the patients were aged between 5-8 years (60%). There were 64 (64%) males in the study. The duration of adenoid hypertrophy ranged from 4 months to 12 months with a mean of  $7.90 \pm 2.51$  months. Otitis media with effusion (OME) was detected in 74 (74%) patients. It increased significantly with increasing duration of adenoid hypertrophy; 4-6 months vs. 7-9 months vs. 10-12 months (56.3% vs. 72.2% vs. 93.8%;  $p=0.003$ ). Hearing loss was observed in 56 (56.0%) patients. The frequency of hearing loss increased with increasing duration of adenoid hypertrophy; 4-6 months vs. 7-9 months vs. 10-12 months (12.5% vs. 27.8% vs. 37.5%;  $p=0.248$ ), however, the difference was statistically insignificant.

**Conclusion:** Increased frequency of otitis media with effusion and hearing loss was found in patients suffering from adenoid hypertrophy. Frequency of otitis media with effusion increased significantly with increasing duration of adenoid hypertrophy.

**Key Words:** Adenoid hypertrophy, Otitis media with effusion, Hearing loss

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## INTRODUCTION

The adenoid (pharyngeal tonsil) is a triangular-shaped mass of lymphoid tissue located on the posterior aspect of the nasopharynx. Together with the lingual tonsils anteriorly and palatine tonsils laterally, form a ring of lymphoid tissue known as Waldeyer's tonsillar ring<sup>1</sup>. Hypertrophy of the adenoid can lead to a number of respiratory problems and sleep disorders<sup>2</sup>. Although there is controversy in the relationship of enlarged adenoids and otitis media, it is hypothesized that enlarged adenoid may directly obstruct the pharyngeal ostia of the auditory tube, thus predisposing children to otitis media with effusion<sup>3</sup>.

Otitis media with effusion (OME), a middle ear disease, with many denominations is a subacute or chronic inflammation by multifactorial etiology, characterized by the presence of serous, mucous, or mixed, non-infected secretion, persistent for more than three months

in the middle ear. Inflammation of the middle ear and tubal dysfunction are found to be the most important etiopathogenic factors in OME<sup>4,5,6</sup>. Another proposed mechanism is ciliary dysfunction which predisposes patients with chronic adenoiditis to OME<sup>7,8</sup>. OME can cause impaired hearing and decreased quality of life<sup>9</sup>.

Children with adenoid hypertrophy going for adenoidectomy were studied for hearing loss and OME. 54.4% were having confirmed hearing loss and 73.4% were having OME, thus yielding a strong relationship of adenoid hypertrophy with OME and hearing loss<sup>10</sup>. Adenoidectomy is being increasingly used for the treatment of OME. In the pediatric population, adenoidectomy can prevent hearing loss. The improvement in hearing and tympanogram post adenoidectomy at 3<sup>rd</sup> and 6<sup>th</sup> months was statistically significant<sup>11</sup>. Khayat et al<sup>9</sup> showed OME in 48 (4.6%) of the studied children. Adenoid hypertrophy was mainly seen among patients having unilateral and bilateral otitis media with effusion,

accounting for 16% and 37% of all cases of otitis media with effusion accordingly. In another study, patients were divided according to the degree of adenoid hypertrophy, into three groups: the normal group, middle-grade and high-grade groups of adenoid hypertrophy. There was no difference in the incidence rate of secretory otitis media between the normal and middle-grade groups. The incidence rates of secretory otitis media were significantly different between the normal and high-grade groups ( $p < 0.01$ ).

Interestingly, about half of the children with adenoid hypertrophy with OME are unaware of their hearing impairment, highlighting the importance of ear examination in patients with adenoid hypertrophy<sup>12</sup>. In this study, we looked for OME and hearing impairment in patients who present with symptoms of hypertrophied adenoids. It will be helpful in highlight the importance of ear examination and audiological studies in patients with adenoid hypertrophy.

### METHODOLOGY

An observational study was performed in the Department of Pediatrics, Children Hospital/Institute of Child health, Lahore, from January 20, 2016 to July 19, 2016. A total of 100 patients with adenoid hypertrophy, of either gender and 1-16 years of age were included in the study. Patients having craniofacial anomalies, nasal septal deviation and active ear discharge were excluded from the study. Written informed consent was taken from every patient and approval from ethical committee was taken. Frequency of hearing loss and otitis media with effusion were determined. Sampling was done through consecutive non-probability technique. Patients were evaluated at out-patient department of ENT or at pediatric medical ward. Detailed history, including demographic details and past history of documented adenoidectomy was obtained. X-ray adenoid view was obtained and adenoid hypertrophy and degree of nasopharyngeal obstruction was measured.

All the patients with adenoid hypertrophy were assessed with otoscopy to diagnose OME and audiometry

to assess hearing loss. Presence of positive otoscopic findings for OME and hearing loss on audiometry were the major outcome variables. These were recorded. These patients were referred to ENT Department for adenoidectomy.

All the collected data was entered and analyzed through SPSS version 20. Numerical variables (age and duration of adenoid hypertrophy) were presented by mean  $\pm$ SD. Categorical variables (gender, hearing loss and OME) were presented by frequency and percentage. Data were stratified for age, gender and duration of adenoid hypertrophy to address effect modifiers. Post-stratification chi-square test was applied taking  $p < 0.05$  as significant.

### RESULTS

The age of the patients ranged from 1 year to 16 years with a mean of  $7.32 \pm 3.26$  years. Majority of the patients were aged between 5-8 years (60%), followed by 9-12 years (18%), 1-4 years (14%) and 13-16 years (8%). There were 64 (64%) male and 36 (36%) female patients in the study group. The duration of adenoid hypertrophy ranged from 4 months to 12 months with a mean of  $7.90 \pm 2.51$  months. Majority of the patients had adenoid hypertrophy for 7-9 months (36%).

Otitis media with effusion was detected in 74% patients and hearing loss in 56% patients as shown in Table 1.

There was no significant difference in the frequency of OME across various age ( $p=0.978$ ) and gender ( $p=0.761$ ) groups. However, it increased significantly with increasing duration of adenoid hypertrophy ( $p = 0.003$ ) as shown in Table 2.

There was no significant difference in the frequency of hearing loss across various age ( $p=0.999$ ) and gender ( $p=0.922$ ) groups. The frequency of moderate hearing loss increased with increasing duration of adenoid hypertrophy ( $p = 0.248$ ), however, the difference was statistically insignificant as shown in Table 3.

**Table 1: Frequency of otitis media and hearing loss in patients with adenoid hypertrophy (n=100)**

Variables		Frequency	Percentage
Otitis Media with Effusion	Yes	74	74
	No	26	26
	Total	100	100
Hearing	Mild Loss	30	30
	Moderate Loss	26	26
	Normal	44	44
	Total	100	100

**Table 2: Frequency of otitis media with effusion across duration of adenoid hypertrophy groups**

Duration Groups	Otitis Media with Effusion		Total	P value
	Yes	No		
4-6 months (n=32)	18 (56.3%)	14 (43.8%)	32 (100%)	0.003
7-9 months (n=36)	26 (72.2%)	10 (27.8%)	36 (100%)	
10-12 months (n=32)	30 (93.8%)	2 (6.3%)	32 (100%)	
Total	74 (74%)	26 (26%)	100 (100%)	

**Table 3: Frequency of hearing loss across duration of adenoid hypertrophy groups**

Duration Groups	Hearing			Total	P value
	Mild loss	Moderate loss	Normal		
4-6 months (n=32)	12 (37.5%)	4 (12.5%)	16 (50.0%)	32 (100%)	0.248
7-9 months (n=36)	10 (27.8%)	10 (27.8%)	16 (44.4%)	36 (100%)	
10-12 months (n=32)	8 (25%)	12 (37.5%)	12 (37.5%)	32 (100%)	
Total	30 (30%)	26 (26%)	44 (44%)	100 (100%)	

## DISCUSSION

The mean age of our patients was 7.32 ±3.26 years. Satish et al<sup>11</sup> observed a similar mean age of 7.48 ±0.62 years in Indian pediatric patients with adenoid hypertrophy and otitis media. A relatively higher mean age of 9.7 ±2.5 years has been reported by Khayat et al<sup>9</sup> in Iraqi patients<sup>9</sup> with adenoid hypertrophy. This difference can be attributable to population differences. Majority of our patients were aged between 5-8 years (60%). A similar age distribution has been observed previously by Khan et al<sup>13</sup> who reported the age group 5-8 years being the most frequent (62%) followed by 9-12 years (14.94%).

There were 64% male and 36% female patients in the study group. A similar male predominance has also been observed by Khan et al<sup>13</sup> (66.6% vs. 33.3%), Raza et al<sup>14</sup> (55.1% vs. 44.9%) and Khan et al<sup>15</sup> (65% vs. 35%) in local population. Khayat et al<sup>9</sup>, however, observed female predominance (45.8% vs. 54.2%) in Iraqi patients.

In our study, otitis media with effusion was detected in 74% patients. Our results match with those of Ren et al<sup>10</sup> who observed OME in 73.4% of Chinese children having adenoid hypertrophy. There was no significant difference in the frequency of OME across various age (p=0.978) and gender (p=0.761) groups. However, it increased significantly with increasing duration of adenoid hypertrophy; 4-6 months vs. 7-9 months vs. 10-12

months (56.3% vs. 72.2% vs. 93.8%; p=0.003). Thus otitis media with effusion is related to duration of adenoid hypertrophy and early adenoidectomy can help in reducing the incidence of OME.

Hearing loss was observed in 56% patients. A similar frequency of hearing loss (54.4%) has been reported previously by Ren et al<sup>10</sup> in Chinese population. It was mild in 30% patients while moderate in 26% patients. There was no significant difference in the frequency of hearing loss across various age (p=0.999) and gender (p=0.922) groups. The frequency of moderate hearing loss increased with increasing duration of adenoid hypertrophy; 4-6 months vs. 7-9 months vs. 10-12 months (12.5% vs. 27.8% vs. 37.5%; p=0.248), however, the difference was statistically insignificant. Though observed difference was statistically insignificant, yet duration of adenoid hypertrophy also appears attributable to frequency of hearing loss similar to otitis media with effusion. The results of the present study suggest duration of adenoid hypertrophy as an attributing factor for the development of OME and hearing loss and thus advocate early adenoidectomy in such patients.

## CONCLUSION

Increased frequency of otitis media with effusion and hearing loss was found in patients suffering from adenoid hypertrophy. Frequency of otitis media with effu-

sion increased significantly with increasing duration of adenoid hypertrophy. The frequency of moderate hearing loss increased with increasing duration of adenoid hypertrophy, however, the difference was statistically insignificant.

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## CONTRIBUTORS

IK conceived the idea, planned the study, and drafted the manuscript. AB helped acquisition of data, did statistical analysis and critically revised the manuscript. All authors contributed significantly to the submitted manuscript