

An analytical study of prevalence of ear disorders and their risk factors among children in a resettlement colony of Delhi.

Kalika Gupta¹, Gourav Kumar Goyal², Akshay Berad³

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1. Assistant Professor, Department of Community Medicine, Ananta Institute of medical Sciences and Research Centre, Rajasthan

2. Assistant Professor, Department of Paediatrics, Ananta Institute of Medical Sciences and Research Centre, Rajasthan

3. Assistant Professor, Department of Physiology, Government Medical college, Nagpur

corresponding author:

Dr. Kalika Gupta,

Email: kalikagupta007@gmail.com Phone: 9868677619

Assistant Professor, Department of Community Medicine, Ananta Institute of medical Sciences and Research Centre, Rajasthan

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ABSTRACT

Background: The world has more than 360 million population (almost 5% of world's population) with disabling hearing loss and among them, 32 million are children. It is estimated that over 166 million people in the developing world face a severe lack of intervention services for hearing loss. There is a need to estimate the magnitude of various ear morbidities in school age children as well as to identify the various risk factors that play a role in the emergence of these morbidities.

Aim: To find prevalence of various ear disorders and their risk factors among children 5-11 years old.

Methodology: It was a cross-sectional, community based study conducted at a resettlement colony named Gokulpuri, in East Delhi. Study was conducted for a period of one year, Jan 2017 – Dec 2017. Children in the age group 5 yrs. to 11 yrs. were included in the study. Results: Total prevalence of ear morbidities in children was found to be 15.8%. Wax impaction in the ears was found to be most prevalent morbidity 10.6%. Educational status of mother and head of the family, immunization status of child, history of slapping trauma and coryza were among the associated risk factors. Exclusive breast feeding was statistically insignificantly associated.

Keywords: Ear disorders, children, preventable, resettlement colony, Delhi

INTRODUCTION

The world has more than 360 million population (almost 5% of world's population) with disabling hearing loss and among them, 32 million are children. According to the latest reports by World Health Organisation, 6% of the Indian population has significant ear disorders.¹ According to Census of India, 2011, of all the people with hearing disability in India, around 8% belong to age group 5-9 years.²

It is estimated that over 166 million people in the developing world face a severe lack of intervention services for hearing loss.³ There is a need to estimate the magnitude of

various ear morbidities in school age children as well as to identify the various risk factors that play a role in the emergence of these morbidities.

Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries.⁴ In India, this figure (children in school going age group) is around 20%.² School age is one of the most appropriate time for screening various morbidities in children since the majority of children gather in academic centres and they all can be examined.⁵ A study of the pattern of ear morbidities in children is very important because, while some ear conditions are just causes of morbidity, others invariably lead to deafness. Also while some conditions such as sensorineural hearing loss or foreign body impaction are treatable, others like acute otitis media and chronic otitis media are largely preventable. Hearing loss also affects a child's social interactions, emotional development, and academic performance.⁶

In line with the above background, the present study was done in Gokulpuri, a resettlement colony in East Delhi to find prevalence of various preventable ear disorders among children. The study also aimed to find out the various risk factors for ear morbidities and the health care seeking behaviour of parents with respect to ear morbidities. The findings of our study would help in developing recommendations for reducing the burden of ear disorders in children that can be easily prevented.

Objectives:

1. To find prevalence of various ear disorders among children 5-11 years old..
2. To find risk factors associated with the ear disorders

Methodology:

It was a cross-sectional, community based study conducted at a resettlement colony named Gokulpuri, in East Delhi. Study was conducted for a period of one year, Jan 2017 – Dec 2017. Children in the age group 5 yrs. to 11 yrs. were included in the

study after taking consent from parents of all children and assent from the children in the age group above 7 years.

At 95% confidence level and taking the prevalence⁷ of ear morbidities among Delhi children to be 21.5% and with a relative error of 20%, the sample size came out to be 365 using the formula $n = Z^2pq / L^2$

Where n = sample size

Z = 1.96 value of the standard normal variate corresponding to level of significance alpha 5%

p = prevalence (prevalence of ear morbidities among Delhi children is 21.5%)⁷

q = 1-p

L= allowable error= 20%

Hence, 367 children were enrolled into the study. A predesigned and pretested questionnaire was used in Hindi and English languages. The questionnaire had questions covering demographic and socio-economic information, risk factors for hearing disorders and health seeking behavior of subject's parents with respect to ear care of their child. Simple random sampling was used to select subjects. The investigator was trained in ENT examination by the ENT specialists at Lok Nayak hospital, Delhi for doing ear examination.

Case definitions:

Cerumen impaction: In cases where wax was encountered in the ear canal, attempt was made to remove it using wax dissolving ear drops or water or sterile probe, only after taking consent from the parents. If the wax could not be removed and it was obstructing the view of the tympanic membrane, it was considered as morbidity.⁸

Chronic suppurative otitis media (CSOM): History of ear discharge lasting for more than 2 weeks (with or without complications) with presence of a TM perforation.⁸

Acute otitis media (AOM): Diagnosis of AOM was made on the basis of congestion, bulging or acute discharging (discharging <2 weeks) perforation of the tympanic membrane, mostly with a history of acute ear pain and/or fever.⁸

Acute otitis externa: Acute inflammation of the external ear canal is commonly caused by bacterial or fungal infections. Signs of inflammation with or without ear discharge and fungal debris were indicative of otitis externa.⁸

Foreign body impaction: It is the impaction of any external object (living or non-living) into the ear.⁸

Children suspected or diagnosed with ear morbidity and/or hearing impairment were given a prescription and were referred to ENT department of Lok Nayak hospital, Delhi. The collected data was coded, compiled and entered in the Microsoft-Excel and then analyzed and statistically evaluated by using SPSS-PC-17 version. Institutional ethical permission was sought before commencement of the study.

Results :

The subjects belonged to age group 5-11 years old. Mean age among subjects was 8.1 years. Out of all the subjects surveyed, 51.2% were males and rests were females.

Maximum number of children [54.5%] belonged to lower middle socio-economic class. About half of the subjects belonged to joint family (54.5%). A good percentage of children (78.5%) were found to be completely immunized till date.

On enquiring about the educational status of head of the family, 6.3% were illiterate, 38.4% had head who had studied below high school and in rest of the families, the head was educated high school or above. In comparison, 12.5% of the mothers were illiterate and 44.4% had studied below high school and rest had educational level till high school or above. [Table 1]

Table 1: Socio-demographic profile of study population

Gender	Rural N=367 (%)
Male	188 (51.2)
Female	179 (48.8)
Socio-economic classes	
Lower	3 (0.8)
Upper lower	97 (26.4)
Lower middle	200 (54.5)
Upper middle	67 (18.3)

Type of family	
Nuclear	167 (45.5)
Joint	200 (54.5)
Educational status of head of family	
Illiterate	23 (6.3)
Below high school	141 (38.4)
High school and above	203 (55.3)
Educational status of mother	
Illiterate	46 (12.5)
Below high school	163 (44.4)
High school and above	158 (43.1)
Immunization status of the child	
Fully immunized	288 (78.5)
Partial/incomplete immunized	79 (21.5)

Prevalence of ear disorders:

Total prevalence of ear morbidities in children was found to be 15.8%. Wax impaction in the ears was found to be most prevalent morbidity 10.6%. Second most common morbidity was CSOM, 3%.

Figure 1: Prevalence of various ear morbidities among children

Risk factors :

There was no significant difference in the prevalence of various ear disorders among male and female children. We found that in the families whose head had education level above high school, those children had lower prevalence of infective ear disorders [Table 2]. This analysis was found to be statistically significant.

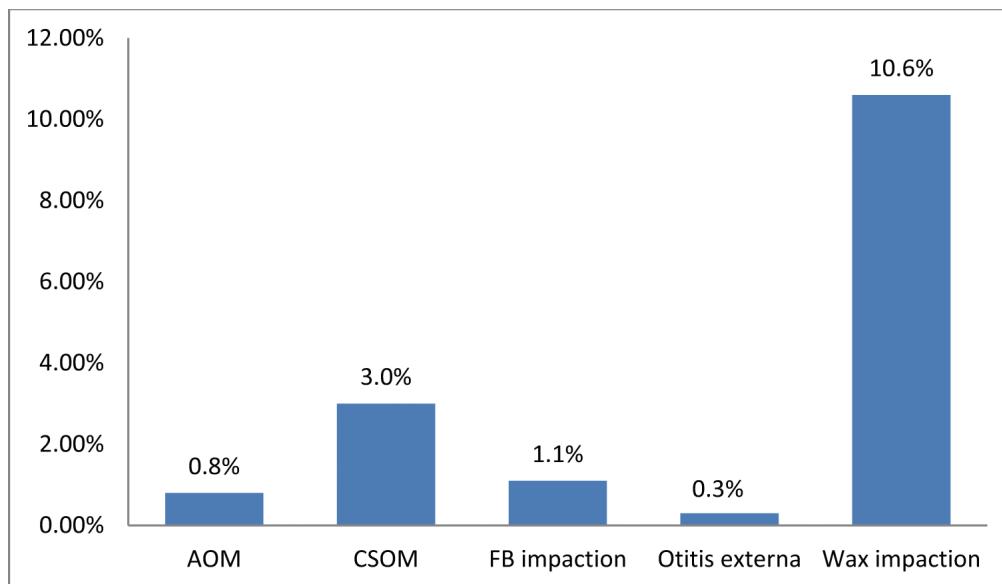


Table 2: Educational status of head of family and ear disorders in children

	Illiterate N (%)	Below high school N (%)	High school and above N (%)	Total N (%)	Chi-square value (?2), degree of freedom (df), p value
	23	141	203	367	
AOM	1 (4.3)	2 (1.4)	0	3 (0.8)	5.8, 2, 0.05
CSOM	7 (30.4)	3 (2.1)	1 (0.5)	11 (3)	64.3, 2, 0.001
Otitis externa	1 (4.3)	0	0	1 (0.3)	14.95, 2, 0.001
Foreign body impaction	1 (4.3)	0	0	1 (0.3)	14.95, 2, 0.001
Cerumen impac- tion	6 (26.1)	24 (17)	9 (4.4)	39 (10.6)	20.05, 2, 0.001

On analyzing the educational status of mother and the ear disorders in the child, we found higher the educational status of mothers, lower the prevalence of infective ear diseases among their children [$p < 0.05$] [Table 3]. Cerumen impaction was found more among children of lower socio-economic

classes [a risk factor] than among children of upper socio-economic class. [$p < 0.01$]. On the identical scale, cerumen impaction was found to be more among children belonging to nuclear families, in comparison to joint families [$p < 0.01$].

Table 3: Educational status of mother and prevalence of ear disorders

	Illiterate N (%)	Below high school N (%)	High school and above N (%)	Total N (%)	Chi-square value (X2), degree of freedom (df), p value
	46	163	158	367	
AOM	2 (4.3)	1 (0.6)	0	3 (0.8)	8.4, 2, 0.01
CSOM	8 (17.4)	3 (1.8)	0	11 (3)	38.4, 2, 0.001
Otitis externa	1 (2.2)	0	0	1 (0.3)	7.15, 2, 0.02
Foreign body impaction		1 (0.6)		4 (1.1)	14.6, 2, 0.001
Cerumen impac- tion	9 (19.6)	25 (15.3)	5 (3.2)	39 (10.6)	16.94, 2, 0.001

When we compared the immunization status of children, then children with partial or incomplete immunization had higher rate of ear disorders [$p < 0.01$]. In children who had frequent episodes of coryza, reported to have higher incidence of ASOM, CSOM and cerumen impaction [$p < 0.05$] [Table 4]. Among the other biological factors affecting prevalence of ear diseases,

breast feeding was found to be protective for infectious ear disorders like ASOM and CSOM, though statistically non significant. History of slap trauma on the face of the child was statistically significantly associated with presence of CSOM in the child [$p < 0.002$].

Table 4: Comparing Cerumen Impaction and coryza in children

	Frequent episodes of coryza		Total N (%)	Chi-square value (?2), degree of freedom (df), p value
	Yes N (%)	Yes N (%)		
	74	293	367	
AOM	3 (4.1)	0	3 (0.8)	11.9, 1, 0.001
CSOM	10 (13.5)	1 (0.3)	11 (3)	35.2, 1, 0.001

Otitis externa	1 (1.4)	0	1 (0.3)	3.95, 1, 0.20
Cerumen impaction	20 (27)	19 (6.5)	39 (10.6)	26.25, 1, 0.001

Discussion:

In the current study, 367 children, 5-11 years old were included. According to Aggarwal A.K. et al⁷, tympanic membrane abnormality was present in 6.2% of the children in <1 year old, 14.7% in 1-5 years old, 39.4% in 5-10 years old and 39.8% in more than 10 years old. Hence, doing the present study in the age group 5-11 years was logical, as this population is at high risk for various preventable ear morbidities.

In our study, 93.7% of the subjects had literate head of the family (father was head in around 90% of the families) and 87.5% had literate mother. These results are consistent with those of the Census of India, 2011 for Delhi (91% and 80% male and female literacy rates, respectively).⁹

In the present study, the overall prevalence of ear morbidities came out to be 15.8%. According to a Turkish study done in 2012 by Erdivanli OC et al¹⁰, prevalence of ear morbidities was 14.7% in 4-6 years old and 13.9% in 7-9 years old. This prevalence is less compared to current study because small age groups were studied in the Turkish study. Mishra A et al¹¹ found the prevalence of hearing impairment due to correctable ear morbidities, in rural school children to be 15.14%, as compared to 5.9% in urban area based children. Bandhopadhyay R et al¹² stated prevalence of 55.8% in rural primary school children and 43% in urban primary school children. The higher prevalence among rural based children can be attributable to their low socio-economic status, reduced accessibility to health care providers, more number of quacks running clinics successfully in rural area, poor awareness about ear morbidities and unhealthy health seeking behavior.

Prevalence of CSOM was found to be 3% among subjects, ASOM 0.8%, foreign body impaction 1.1%, otitis externa 0.3% and cerumen impaction 10.6%. Chadha S K et al¹³ in 2013, in their study on 5-12 years old kids found prevalence of wax impaction to be 7.93%, CSOM 4.79%, ASOM 0.65% and foreign body 0.34%. These findings are similar to the findings of present study. In 2008, Adhikari et al¹⁴ did similar study in urban parts of Nepal and the results were, wax impaction 60.6%, CSOM 5.7%, ASOM 1.4%, otitis externa 1% and foreign body impaction 0.4%.

In the present study, prevalence of ear diseases among females was found to be more (16.8%) as compared to boys (14.1%). Upadhyay et al¹⁵ in Nepal in 2001, prevalence of ear diseases were reported more among females than males. The finding of the present study is in contrast to the findings by Absalan A et al¹⁶, who reported conductive hearing loss of 8.8% in males and lesser (7.1%) in females in 2013 among primary school children of Iran.

In the present study, as the educational status of head of the family (mostly father) or mother increased, the prevalence of ear diseases decreased among students. Taneja M K et al¹⁷ and Yiengprugsawan V et al¹⁸ found that prevalence of ear morbidities in children decreased as educational status of father or mother increased.

We found that, ear morbidities were more prevalent among children who came from nuclear families as compared to those from joint families. In line with these findings, Srikanth et al¹⁹ stated that caregivers from nuclear families were less aware about risk factors for OM and hence increased prevalence was seen. The low prevalence seen in the current study among joint family children can be explained as more number of care givers like grandparents are present in joint families.

We found that prevalence of preventable ear morbidities like ASOM, CSOM were less in children who were exclusively breast fed in first 6 months of life. This finding was statistically not significant. Duncan B et al²⁰ found that infants exclusively breast-fed for 4 or more months had half the mean number of acute otitis media episodes than did those not breast-fed at all and 40% less than those infants whose diets were supplemented with other foods prior to 4 months. Dewey K G et al²¹ stated that the percentage of ASOM was 19% lower and CSOM was 80% lower in breast fed compared with formula fed infants.

For CSOM, higher prevalence was seen among those who were slapped [30%] than among those who were not 2.2%] and was statistically significant. In a study by Obiedi S H²², 27.5% of traumatic ear perforations were due to slap on face.

In the present study, completely immunized children were significantly protected against infective ear morbidities. Blanchard R D et al²³ found that vaccination among children reduced acute otitis media by 77%. On the contrary, Amusa Y B et al²⁴ reported that there was no statistical association between the occurrence of otitis media and immunization (p>0.05).

In the present study, it was observed that children, whose parents reported frequent episodes of coryza in their children, had higher prevalence of ear morbidities than among those who did not. These results are in line with the conclusions given by Jacob et al²⁵ and Gultekin E et al²⁶. Rupa V et al²⁷ stated upper respiratory tract infection as risk factor for acute OM [OR 2.43, 95% CI 1.43-4.51, P = 0.005].

Conclusion:

ear morbidities are one of the important causes of morbidities among children. Moreover, majority of the ear morbidities among children are preventable. Keeping ear hygiene, good educational status of mother or head of the family, complete immunization of child and many more factors decrease the prevalence of infectious ear diseases among children.

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