

## Hearing Loss in School Age Children

Anil Suri<sup>1</sup>, Gopika Kalsotra<sup>2\*</sup>, Asma Ahmed<sup>3</sup>, Sonika Kotwal<sup>3</sup>

<sup>1</sup>MS, Associate Professor, <sup>2</sup>MS, Lecturer, <sup>3</sup>MBBS, Resident,  
Department of Otolaryngology, Government Medical College, Jammu, Jammu and Kashmir, India.

### ABSTRACT

**Introduction:** The problem of hearing impairment in school age children is often underestimated since it is an invisible disability. It is mostly asymptomatic, and thus easily overlooked. Not many parents, caretakers and teachers understand about the problem and attribute the learning problems of their children to other causes.

**Methods:** The material for the present study were a representative sample constituting 100 children in the age group of 6 – 14 years who attended the Outpatient Department with ear related problems. The children were evaluated for hearing loss and its underlying etiological factors. Children were subjected to detailed ENT examination in our OPD.

**Results:** Hearing impairment in school going children is a prevalent feature. Majority of children were in the age group of 6-10 years and maximum (78%) belonged to the low and middle socio-economic strata. Maximum cases (76%) were seen in rainy and winter season. The hearing loss in majority of cases was of a mild degree of which majority of cases had conductive loss. Wax was found in 22% cases. After excluding wax and fungal debris, the most common cause found was secretory otitis media (50.4%) followed by chronic suppurative

otitis media (27.3%). 90% of the children were found to have some kind of behavioural abnormalities.

**Conclusion:** Proper assessment and diagnosis of hearing impairment in children at a very early age is important because an early diagnosis determines the efficacy of methods used for the correction of the hearing impairment.

**Keywords:** Hearing Impairment, Secretory Otitis Media, Chronic Suppurative Otitis Media.

### \*Correspondence to:

**Dr. Gopika Kalsotra,**  
Lecturer,  
Department of Otolaryngology,  
Government Medical College, Jammu, J & K, India.

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### INTRODUCTION

Hearing loss is a handicap which has been termed as 'the most desperate of all human calamities' by Samuel Johnson. Impaired hearing occurring at any time in life is a handicap in this modern competitive era. The problem is even greater for children, since normal hearing is the main source for the acquisition of language, speech and cognitive abilities.<sup>1</sup> Data in the literature suggest that any undetected hearing impairment, even of a mild degree, can significantly affect the language development and social and emotional development of children, as well as their educational achievements.<sup>2</sup> These children do not achieve the same progress in school as their peers with good hearing, and 40% of school-age children with unilateral hearing loss fail final-year exams and must repeat a class.<sup>3</sup> This may be due to changes in language complexity, the smaller number of visual cues, the greater need for linked auditory information and evocation, in addition to the loss in the development of prerequisite abilities in earlier grades. Most of the earlier works indicate that five per cent of all school going children have hearing losses sufficient to warrant further evaluation. If special efforts are not made to identify these cases, they suffer from the detrimental effects on their educational performance and overall development. Assessment of hearing

loss in school children is of prime importance as most often it remains unnoticed for a long period of time since many a times the parents are unaware of their deteriorating hearing. Most of the causes of impaired hearing in school children are conductive in nature as indicated in many surveys<sup>4</sup> and majority of them recognised early might be amenable to simple medical or surgical intervention. It is well established that secretory otitis media is the most common cause of hearing loss in school children. Factors attributed to this include increased use of antibiotics, increased incidence of viral infections and expansion of the diagnostic tools like advent of impedance audiometry. Studies in various populations show that 76–95% of all examined children had this disease at least once during early childhood.<sup>3</sup> Other causes of hearing loss among children include wax, self-induced trauma, chronic otitis media, foreign bodies, sensorineural hearing loss. The need of the hour is to detect these children with hearing impairment so that appropriate measures can be taken at the right time. In our set up neither the parents nor the teachers may have that keen an observation to be able to detect children having behaviour problems and learning disabilities due to hearing impairment. Their changed behaviour is generally being referred

to as “inattentiveness”. They should maintain a high index of suspicion regarding possible hearing impairment in elementary school children with academic and behavioral problems. It is often observed that some of the children coming to us with various nose and throat problems have mild to moderate hearing loss of which neither the parents nor the patients are aware. It was with these considerations that we embarked upon this project, with the following aims and objectives:- (1) To find out the causes of hearing impairment and their distribution pattern in school going children.(2) To evaluate the type and severity of hearing impairment in school going children.(3) To determine the behavioural effects of hearing impairment on these children.

**MATERIALS AND METHODS**

The study was conducted in the Department of Otolaryngology and Head and Neck Surgery, Government Medical College, Jammu from January 2017 to May 2018. The representative sample included all children in the age group of 6 – 14 years who attended the Outpatient Department with ear related problems. The children belonged to all the strata of society from both sexes. A proper history of any nasal, aural or throat complaints was taken from each child with the assistance of guardian. Child’s history regarding his inattentiveness in school, lack of concentration in

routine activities etc. was taken. Personal history in relation to their socio-economic status in accordance with the scale devised by Kuppuswamy was noted.

To assess the hearing acuity, all the children were subjected to Pure Tone Audiometry. All these children who showed hearing impairment on audiometry (n=100) were included in the study. Children with congenital sensorineural hearing loss, children who had undergone cochlear implant surgery, children on medication for any chronic illness and children not willing to participate in the study were excluded from the study.

These children were then subjected to local examination of ear for any abnormality. External auditory canal was examined for any wax or fungal debris. Otoscopic examination of tympanic membrane was done - whether normal, retracted, dull, bulging and perforated or any other abnormality. Pneumatic otoscopy was done to find out the mobility of tympanic membrane in children with intact tympanic membrane. Pure tone audiometry was again performed on these children after cleaning of external auditory canal. Impedance audiometry was done in children with clinical features of serous otitis media or impaired hearing with intact tympanic membrane. Detailed nasal examination was done to find out any signs of allergic rhinitis, adenoid hyperplasia and other abnormalities.

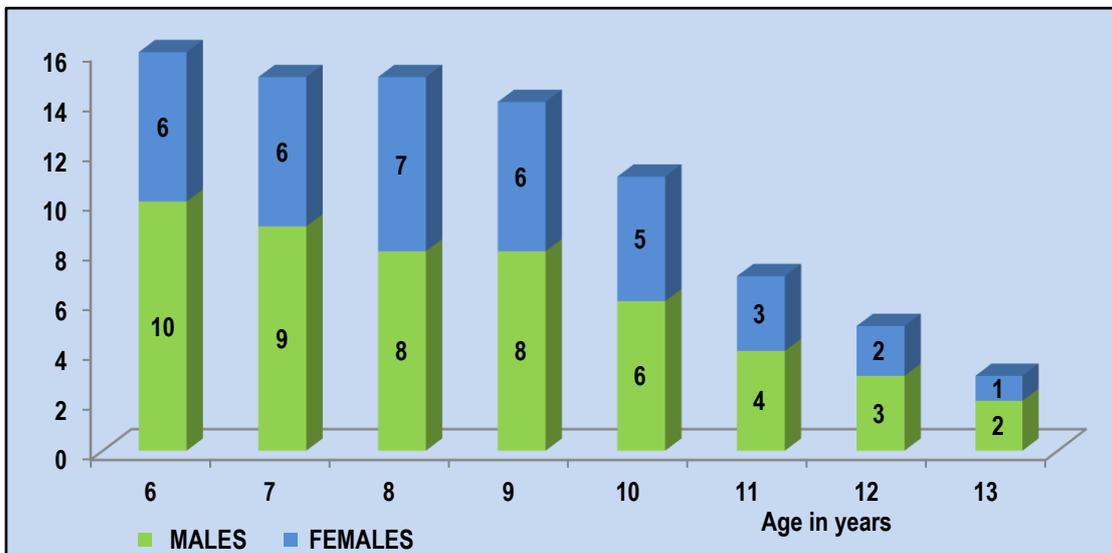


Figure 1: Age and sex distribution of school age children with hearing impairment

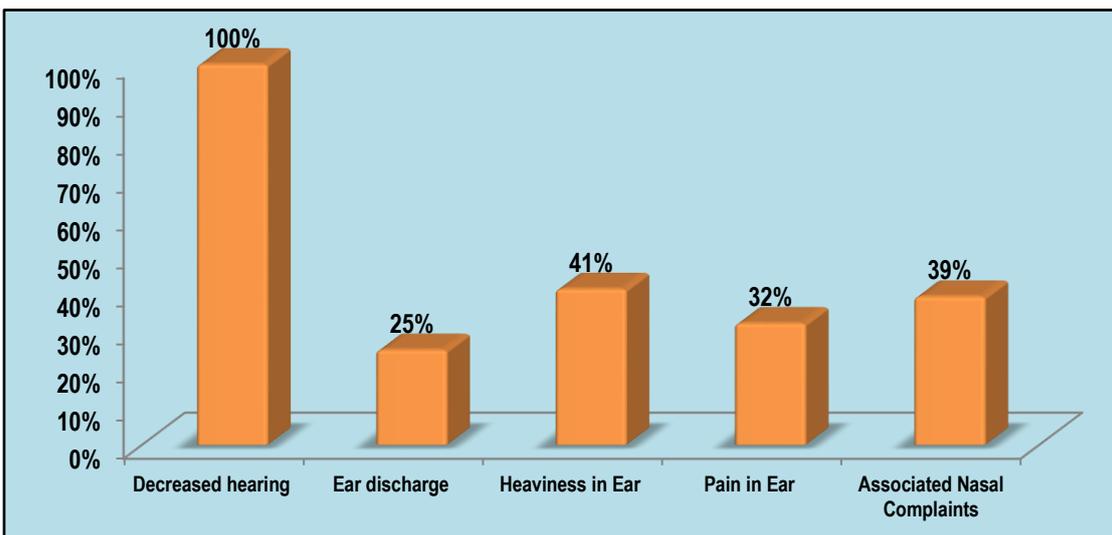


Figure 2: Various symptomatology amongst children with hearing impairment

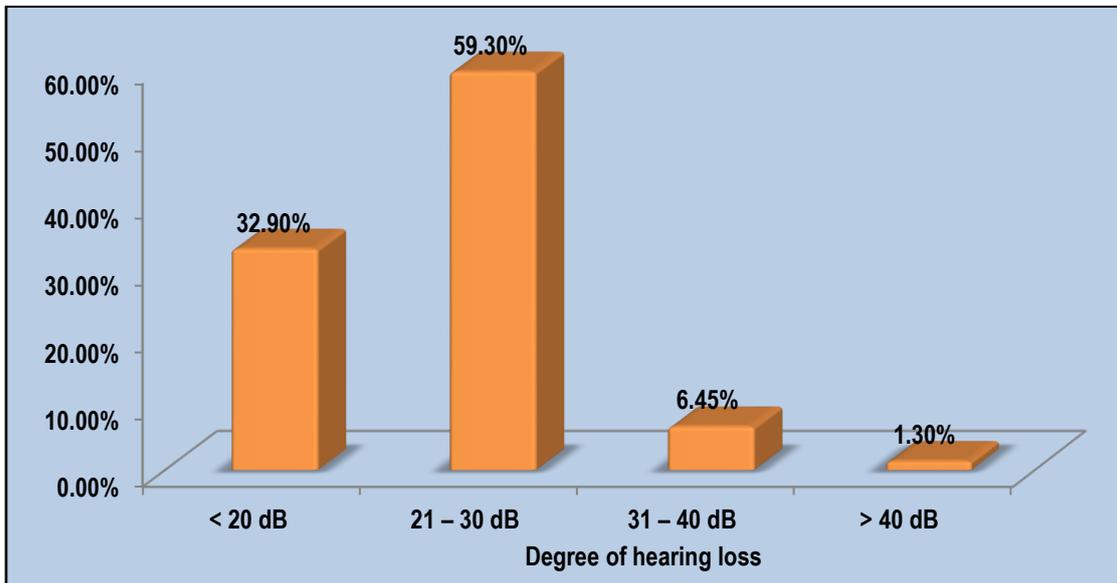


Figure 3: Average hearing loss in 100 children having impaired hearing (155 ears)

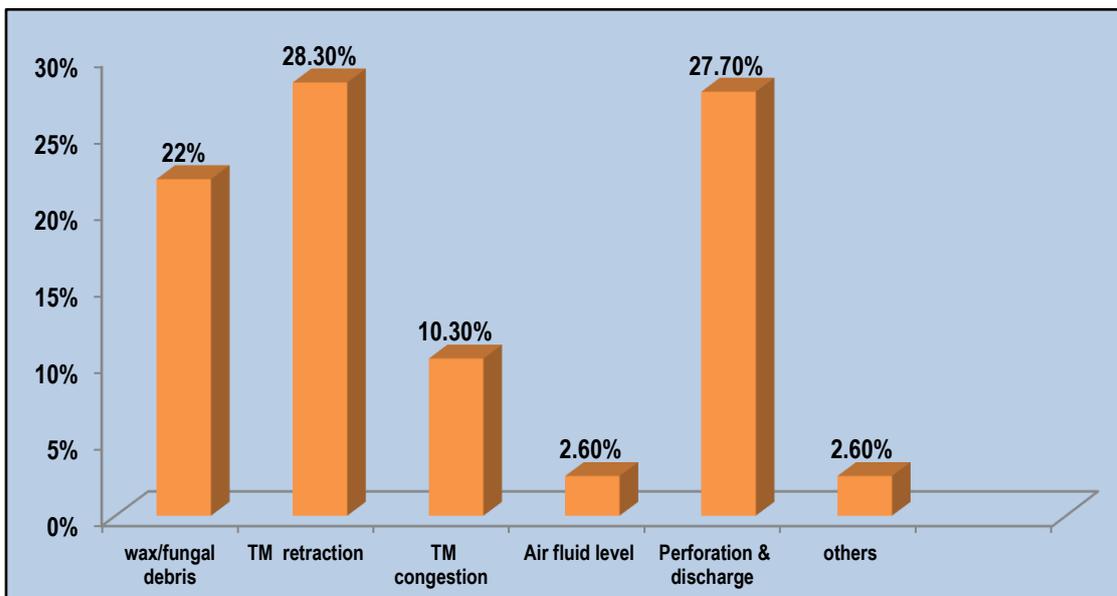


Figure 4: Otoscopic findings in 155 ears

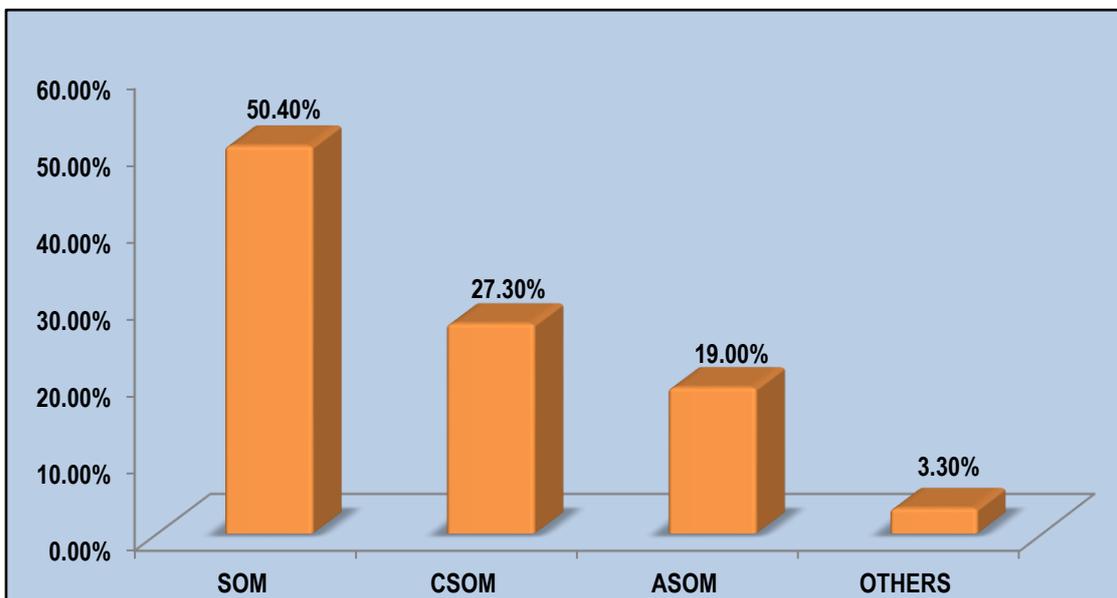


Figure 5: Causes of hearing loss after removal of wax (n= 121 ears)

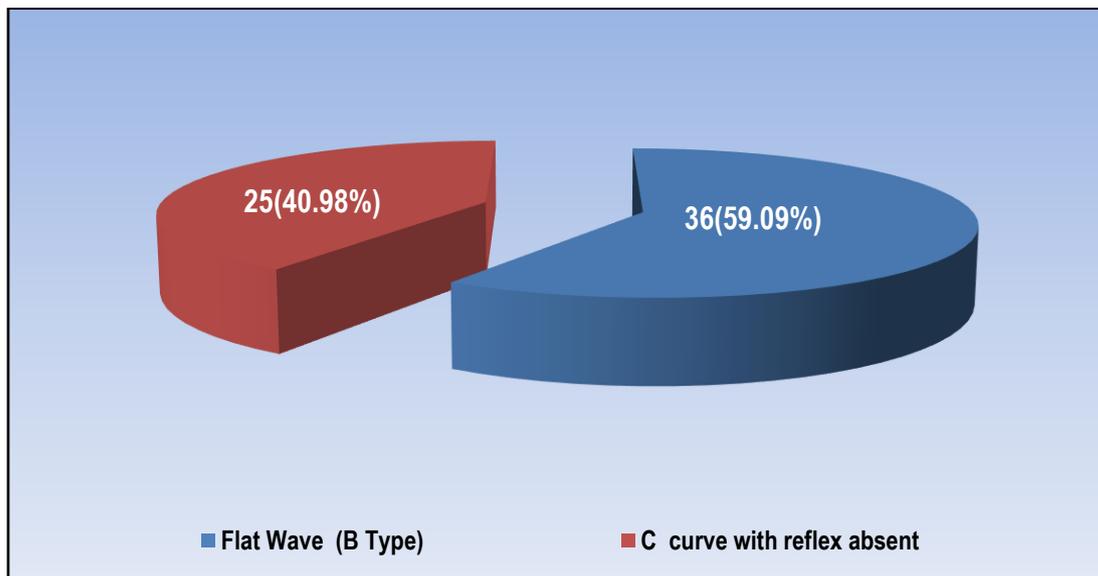


Figure 6: Tympanometric findings in children with SOM

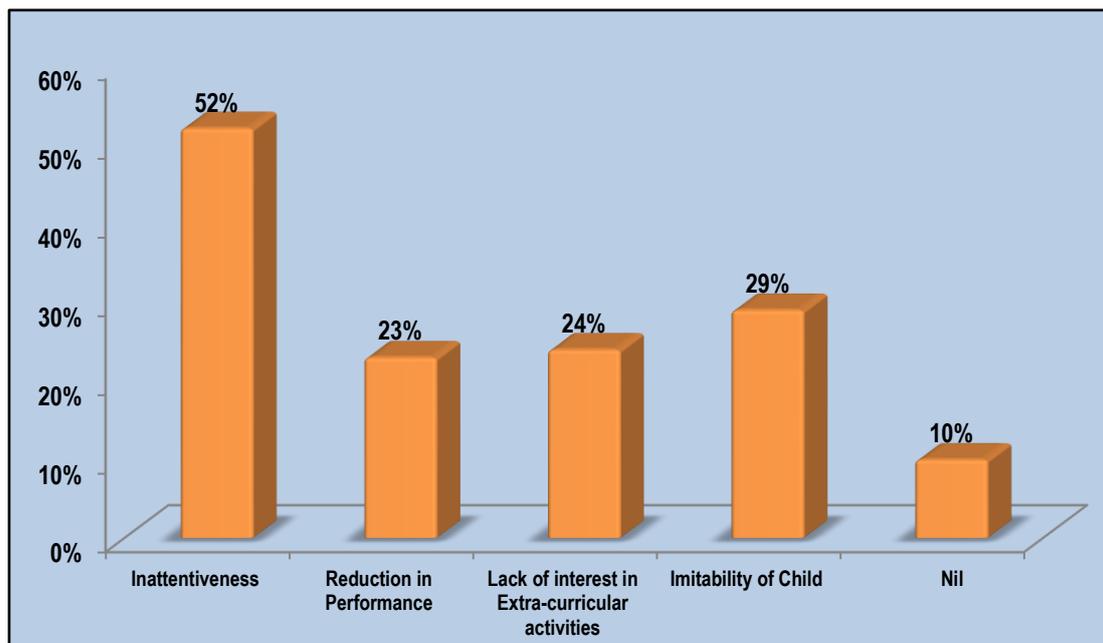


Figure 7: Behavioural effect on hearing impairment in children ( n= 100)

**RESULTS**

100 children in the age group of 6-14 yrs with impaired hearing found on PTA were included in the study. Out of those majority patients were in the age group of 6-10 years (74%) and 59% of the children were males (Figure 1). In our study, maximum children were from lower socioeconomic status (49%) followed by middle (29%). Most of the children presented in rainy and winter seasons (39% and 37%, respectively). 55% of the children had bilateral hearing impairment.

Out of 100 children who had hearing impairment on pure tone audiometry, 41% had history of heaviness of ears, 25 % had history of ear discharge and 32% had history of ear pain. 39% children had associated nasal complaints as well (Figure 2). In 100 children (155 ears) included in the study, maximum children had mild deafness (<30dB). Severe hearing loss of more than 40dB was noticed only in 2 ears [Figure 3]. On otoscopic examination, 22% ears had wax and fungal debris, 28.35% ears showed retraction of tympanic membrane and 27.7% ears showed perforation and discharge (Figure 4).

After exclusion of 34 ears with wax and fungal debris, the most common cause responsible for hearing impairment in children found in our study was secretory otitis media (50.4%) followed by chronic suppurative otitis media (27.3%) [Figure 5]. All the 61 children who had secretory otitis media were subjected to impedance audiometry and the tympanometry findings are depicted in figure 6. We also analyzed the behavioural effect of hearing impairment on these children and we found out that even mild hearing impairment causes behavioural changes in the children in the form of irritability, inattentiveness, reduction in school performance, lack of interest in extracurricular activities etc. (Figure 7).

**DISCUSSION AND CONCLUSION**

Hearing loss in a child which may be due to a very trivial cause can remain unnoticed for long and can lead to serious outcomes in the form of delayed speech and language development, learning disabilities and poor academic performance. In a study by

R Kalpana et al, a deafness prevalence rate of as much as 11% was found in otherwise apparently normal school children.<sup>5</sup> In another study, the overall incidence of hearing impairment in school age children was found to be 9.3%.<sup>6</sup>

In the present study, 100 children in the age group of 6-14 yrs with impaired hearing found on pure tone audiometry were included. Out of those majority patients were in the age group of 6-10 years. Our findings are in close accordance with study by Chishty et al<sup>6</sup> in which 84% children were below 11 years of age. In another study by R Kalpana et al<sup>5</sup>, the prevalence of hearing loss was found to be 8.2% in below 10 years of age and 2.8% in higher age groups. 59% of children in our study were males. These figures are in close agreement with Tuli et al.<sup>7</sup>

In our study, maximum children were from lower and middle class. In another study, it was found that semiurban children and those from lower socio-economic group had higher prevalence rate as compared to urban children and those from upper socio-economic group.<sup>5</sup> Thus it seems that poor hygiene, overcrowding, poor medical awareness and lack of resources to avail medical facilities have a bearing on prevalence of hearing loss. In the present study, more cases were seen in rainy and winter season. This is in close agreement with a study by Harlor AD Jr et al<sup>8</sup> which reports that conductive hearing loss is more frequent in the months of fall and winter due to the weather. This finding may be because during rainy season temperature and humidity are responsible for the high incidence of otomycosis and during winter season upper respiratory catarrh is more common.

The prominent presenting symptoms in our study were heaviness of ears (41%), ear ache (32%), ear discharge (25%) and associated nasal complaints (39%). Our findings are in close agreement with findings of Chisty et al.<sup>6</sup> In our study, 92.2% children had hearing loss of less than 30dB. This is explained by the fact that majority of the cases were either suffering from secretory otitis media or wax/fungus and both of these conditions usually produce hearing loss usually in this range.<sup>9</sup> In a small percentage (7.8%), hearing loss of more than 30 dB was found. This hearing loss is sufficient to cause educational handicap to the child as his ability to follow the teacher is reduced. This is especially important for children in whom both ears are involved. Bilateral hearing loss was observed in as many as 55% of children. These are the children need help and treatment more than the ones with unilateral involvement.

In our study, transient causes of deafness like wax and fungus were found in 22% of the ears. These do not have any permanent effect on hearing once removed. Excessive cerumen has been reported in literature as one of the most frequent alteration on meatoscopy in preschool and school-age children.<sup>10</sup> We also found that repeat audiometry after cleaning the external auditory canal of wax and fungus revealed that 121 ears still had hearing loss due to other causes. This finding further supports the statement of Stewart<sup>11</sup> that expulsion of wax does not always improve the hearing because there may be some other causes of deafness in middle or inner ear. Hence, it is imperative that children presenting with wax and fungus must have their ears re-examined and their hearing retested after cleaning.

After cleaning of wax and fungus, secretory otitis media was found to be the most common cause of hearing impairment in school age children seen in 50.4% of the cases. Chronic suppuratives otitis media was another common cause of hearing impairment

seen in 27.3% of the cases followed by acute suppurative otitis media. One child in the study had bilateral sensorineural hearing loss. This is in accordance with the study by McCandless et al which showed that most causes of hearing loss in school age children are conductive in nature.<sup>4</sup> In another study, it was found out that the most consistent type of lesion responsible for deafness was wax (41.94%). The second most common cause responsible for hearing impairment was chronic suppurative otitis media (21.50%) followed by secretory otitis media (6.45%). Sensori-Neural Deafness (SND) was seen in only one case (1.07%).<sup>6</sup> Leranz also reported the 0.41% incidence of SND in school age children.<sup>12</sup>

In our study, 90% of the children with hearing impairment were found to have some kind of behavioural abnormalities when enquired from the parents and guardian. It has been reported in literature that hearing loss can be noticed by some of the students' behavior, such as: frequently asking to repeat sentences, turning the head towards the speaker, higher or lower intensity in speech, demonstrating effort in trying to listen, looking at and concentrating on the teacher's lips, being inattentive in classroom debates, preferring social isolation, being passive or tense, easily getting tired, no effort in demonstrating capacity, presenting learning difficulties.<sup>10</sup>

Many children that get to school-age without a hearing loss diagnose are wrongly classified as inattentive, hyperactive, with poor academic performance, difficult to adjust to school, among other things, while the actual problem is an undiagnosed hearing loss.<sup>13</sup>

Moreover, most of the causes of hearing impairment in children like otitis media both suppurative and non-suppurative are amenable to treatment. But, these may lead to permanent damage which requires lengthier and cumbersome treatment modalities if early detection is not made. This study thus emphasizes on the importance of prioritizing the identification and early treatment of hearing impairments in school age children.

From our study it is concluded that hearing impairment in school going children is a prevalent feature. Commonest cause of mild to moderate hearing loss in school children is secretory otitis media and not chronic suppurative otitis media as reported in some of the studies.

Reason being, in chronic suppurative otitis media there is discharge from the ear which is easily noticed by the parents of the child and medical treatment is sorted for same. But in cases with secretory otitis media as a cause of impaired hearing parents remain unaware. Even mild to moderate hearing loss is enough to cause behavioural changes in children like inattentiveness which parents of children may attribute to some other reason. Hence it is advisable to impress upon the parents of children with impaired hearing that cause of these behavioural changes in child is hearing impairment and which needs to be treated for normalcy of the child.

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