RESEARCH PAPER | Medical Science | Volume : 3 | Issue : 4 | April 2013 | ISSN - 2249-555X

Study of ENT Problems in School Children with Special Reference to Otitis Media and its Bacteriology

KEYWORDS: Otitis media, bacteriology, school children

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ABSTRACT *Background and objectives: Anthropometry and general checkups are done in routine school health services but adequate attention is not paid to vital aspects. Different population based studies have indicated that ENT problems are more common in school going children and can lead to various complications. Deafness is a disturbing complication due to Otitis media. In view of this, the following study was undertaken to assess the prevalence of ENT problems with special reference to Otitis media. The study was carried out in urban slum of Nagpur as slum children are most neglected one and can be examined properly in school premises.*
Methods: The present cross sectional study was conducted in school children of an urban slum area, Nagpur. Nine hundred and fifty six children from primary, middle and high school were included in this study. Detailed ENT examination was done with special reference to Otitis media. Ear swab was taken from active cases of Otitis media for culture.
Results: Wax was the commonest problem in male while tonsillitis was commonly found in females in the present study. Prevalence of Otitis media was found in 23(2.4%) children with female preponderance 14(60.9%). The association of predisposing Upper respiratory tract infection as well as hearing impairment with Otitis media was statistically highly significant. (2=122.22,df=1,P<0.001and 2=19.57,df=1,p<0.001). Monobacterial growth was found in 60% and polybacterial growth in 40% cases of Otitis media. Pseudomonas aeroginosa was the commonest organism grown (44.7%).
Interpretation & Conclusions: The present study successfully highlighted the need for focused health check up for ENT in school children. The upper respiratory tract infection in school children is an important cause of Otitis media which ultimately leads to hearing impairment. Hence symptoms pertaining to ENT should not be neglected and should be properly treated to avoid complication.

INTRODUCTION

Infections of the respiratory tract are common human ailment. They cause morbidity and mortality in young children. Discharging ears and deafness are the major otolaryngeal problems faced in India. Otitis media represents a diseases continuum that ranges from asymptomatic middle ear fluid to recurrent infection and middle ear fluid that persists for weeks and months. Otitis media may be involved in the development of bacterial meningitis and other central nervous system infections and it often constitute the basis for undertaking one or more of the most frequently performed operations of infancy and childhood, namely myringotomy with or without tympanostomy tube insertion, adenoidectomy and tonsillectomy,[1].

Almost 1/3rd of ENT outpatient department attendance is accounted by the pediatric subjects. In pediatrics around 1/5th of the problems are accounted by the ear, nose and throat [ENT) disorders,[2].Chronic suppurative Otitis media is the result of an initial episode of acute Otitis media and is characterized by persistent discharge from middle ear through a tympanic perforation. It is important cause of preventable hearing loss particularly in the developing world,[3].Infection is usually, polymicrobial and secondary in nature derived from the external auditory canal or commensal flora of nasopharynx.

Hence, in the present study, study of ENT problems with special reference to Otitis media was done in urban slum of Nagpur as slum children are most neglected one and can be examined properly in school premises. The present study highlighted the need for a focused ENT check up in school health survey.

Methods

The present cross sectional study was undertaken in school children in urban slum of Nagpur, from July 2012 to December 2012 in Zilla Parishad School, Joginagar, Nagpur. Ethical committee of Government Medical College, Nagpur approved the study. Pilot study was carried out in 50 students in the same school. Prevalence of ENT morbid condition was 31 and prevalence of Otitis media was 5 in 50 students, so sample size was calculated as 900 according to the formula $4pq/e^2$ where p=0.10,q=0.90 and e=0.20 x 0.10(20% maximum allowable error). Informed consent was taken from the Principal of the school. The study subjects constituted all the children from primary, middle and high school. Out of 1123 enrolled children, 956 children present at the time of examination were included. The students were in the age group of 5 to 18 years of both sexes. The timing of study was adjusted to suit school schedule and accordingly class teachers were informed prior to the examination. Arrangement was made through class teacher, so that parents of children up to fourth class having complaints related to ENT could be present at the time of examination. Information regarding personal habits was obtained from the students. They were subjected to detail clinical examination including general and systemic examination. Irrespective of the presence or absence of symptoms, detail ENT examination was carried out in each study subject . Training for one month in the Department of ENT, GMCH, Nagpur was undertaken for clinical examination and diagnosis of ENT problems by the first author. The standard field procedure was used for ENT examination. The various instruments used for the examination were electric otoscope, tuning forks, thudicum speculum, tongue depressor, torch etc.Hearing assessment was done by using tuning forks of frequency of 256 Hz,512Hz and 1024 Hz for performing Rinne test and Weber test in a quiet room. All the school children with abnormal TFT underwent the pure tone audiometry in the Department of ENT, Government Medical College, Nagpur. Expert opinion of ENT surgeon was sought whenever required.

The external ear canal was cleaned of cerumen and pus and it was swabbed with Betadine and 70% alcohol solution consecutively and allowed to dry for 2-3 minutes. Ear swab was taken from active cases of Otitis media for culture with the

Volume : 3 | Issue : 4 | April 2013 | ISSN - 2249-555X

help of sterile stick which is moistened with normal saline and immediately sent to Department of Microbiology ,GMCH ,Nagpur in a sterile container.For aerobic organism Mac Conkey and Blood agar culture media were used and for anaerobic organism blood agar culture media with neomycin, yeast extract, hemin and vitamin K was used. Plates were incubated at 37°c in an aerobic jar with 10% CO2.Plates were examined after 24 and 48 hours and all the isolates were confirmed by standard biochemical reaction.

The data of the study was statistically analyzed by chi square method using software, Epi Info 7 version .

Results

It is observed that wax was the commonest condition found in males, whereas tonsillitis was common in females as shown in Table no.1.

Table-1: Sexwise distribution of ENT morbid conditions

ENT morbid conditions	School children with ENT problems		Total n=966(%)
	Male n=490(%)	Female n=466(%)	
Wax (Impacted)	24(4.9)	25(5.4)	49(5.1)
Otitis media	09(1.8)	14(3.0)	23(2.4)
Otitis media externa	4(0.8)	7(1.5)	11(1.1)
Hearing impairment	5(1.0)	6(1.3)	11(1.1)
Rhinitis	18(3.7)	21(4.5)	39(4.1)
Sinusitis	05(1.0)	4(0.8)	09(0.9)
DNS	14(2.8)	15(3.2)	29(3.0)
Epistaxis	02(0.4)	2(0.4)	04(0.4)
Nasal polyp	-----	2(0.4)	02(0.2)
Pharyngitis	16(3.3)	13(2.8)	29(3.0)
Tonsilitis	21(4.3)	33(7.1)	54(5.6)

On otoscopic examination, in Acute suppurative otitis media tympanic membrane appear as red bulging initially and small perforation in anteroinferior quadrant of pars tensa with relief of symptoms in later stage. While in chronic suppurative Otitis media on otoscopy, central or marginal perforation is visible in tubotympanic and atticoantral type. As seen in Table no.2, majority of the study subjects with Otitis media were from 8- 10 years age group (1%) and very few (0.2%) were from 5 -7 years age group.

Table-2: Distribution of otitis media according to age and sex

Age group in years	Otitis media cases		Total n=956(%)
	Male n=490(%)	Female n=466(%)	
5-7	1(0.2)	1 (0.2)	2(0.2)
8 -10	5(1.0)	5(1.1)	10 (1.0)
11 -13	2(0.4)	4(0.8)	6(0.6)
≥14	1(0.2)	4(0.8)	5(0.5)
Total	9(1.8)	14(3.0)	23(2.4)

In the present study, Otitis media was more prevalent in lower (class V) socioeconomic status that is 3.3% and least prevalent in upper middle (class II) socioeconomic status that is 2(1.8%). But the association was not statistically significant χ^2(linear trend) =0.055, df=1, P=0.9436; χ^2(overall) =0.5214, df=3, P=0.914

The present study shows bilateral ear involvement was more common in 12 (52.2%) study subjects than unilateral ear involvement that is 11(47.8%). Duration wise distribution of Otitis media cases shows that acute Otitis media was present in 4 (17.4%) and chronic Otitis media in 19 (82.6%) cases.

Acute suppurative Otitis media was present in 3(13%) students, chronic suppurative otitis media in 17 (74%), MEE in 2(8.7%) and acute Otitis media in 1(4.3%) students. Out of 17 cases of CSOM, 1 (4.3%) student had recurrent Otitis media and 1(4.3%) had healed Otitis media.

Amongst 17 cases of CSOM, 2(11.7%) were unsafe and 15(88.3%) were safe. URI was present in 18(78.3%) and the association of the Otitis media with URI was statistically highly significant (P<0.001) as shown in Table no.3.

Table-3: Distribution of Otitis media cases in relation to URI

URI	Otitis media cases		Total
	Present (%)	Absent(%)	
Present	18 (18.9)	77 (81.1)	95
Absent	05 (0.6)	856 (99.4)	861
Total	23 (2.4)	933 (97.6)	956

χ^2=122.22, df=1,P<0.001

Out of 11 cases of hearing impairment, Otitis media was present in 3 (27.3%) cases and all were having mild conductive hearing loss. (χ^2=19.57, df=1, P<0.001). Most common personal habit was putting oil in ear and observed in 14 (60.9%) otitis media cases. Cleaning ear with water was the next common personal habit, 9 (39.1%) otitis media cases.

Table-4: shows bacterial isolates in otitis media cases.

Bacterial isolates	Otitis media cases		Total (%)
	Monobacterial (%)	Polybacterial (%)	
Aerobes Pseudomonas aeroginosa	11(45.8)	6(42.8)	17(44.7)
Kebsiella species	5(20.8)	3(21.4)	8(21)
Proteus species	3(12.5)	1(7.1)	4(10.5)
E coli	2(8.3)	2(14.3)	4(10.5)
Coagulase +ve staph	1(4.2)	1(7.1)	2(5.2)
Coagulase-ve staph Anaerobes	1(4.2)	1(7.1)	2(5.2)
Bacteroides fragilis	1(4.2)	-	1(2.6)
Total	24	14	38

No growth-1,Dry tap-3

Pseudomonas +klebsiella-3

Pseudomonas+E coli-1

Pseudomonas+coagulase+ve staph-1

Pseudomonas+coagulase –ve staph-1

E coli+Klebsiella-1

Monobacterial isolates were observed in 60% cases and polybacterial isolates in 40.0% cases. Pseudomonas aeroginosa was commonest organism .Out of 35 ear swabs collected from 23 otitis media cases (11 unilateral and 12 bilateral), bacterial growth was found in 31 swabs, 2 organisms in 7 cases dry tap 3 cases and no growth in 1 case. So total was found as 38.

DISCUSSION

Out of total 956 study subjects, Otitis media was found in 23(2.4%) study subjects. A literature survey shows similar prevalence; was found by Gupta (1989)[4] 2.5%. However low prevalence of Otitis media was noted by Muhameid et al

Volume : 3 | Issue : 4 | April 2013 | ISSN - 2249-555X

(1993) [5] 1.5% and Hatcher et al (1995)[6] 1.1%. On the other hand,prevalence of Otitis media was high in studies of Sophia et al. (2010)[7], Adhikari et al (2009) [8] 5%, Caylan et al (2006)[9] 11.14%, Holmquist et al (1987)[10] 30% and Howie et al (1983)[11] 18%.

It may be noted that majority of study subjects with Otitis media were from 8- 10 years age group (1%) and very few (0.2%) from 5 -7 years age group. Handa et al (1976)[12] found cases of Otitis media equally in children and adults. In the given population Otitis media was more prevalent in females. This may be attributed to fact that the people residing in the slums are poor and illiterate and hence pay less attention to female child. Female preponderance for Otitis media was also observed by Gupta et al (1989)[4]. Higher prevalence for males was reported by Teele et al (1989) [13]. No sex difference in Otitis media was reported by Holmquist et al (1987)[10].

In present study, no significant statistical association was found between socio- economic status and otitis media. Similarly Stewart et al (1984)[14] and Teele et al (1989)[13] have reported no relation between socioeconomic status and Otitis media. Chadha et al (2006)[15] ,Lasisi et al (2007)[16], Stahlberg et al (1986)[17] have reported, Otitis media to be more prevalent in lower socioeconomic status whereas Tos et al (1979) [18] have reported Otitis media as least prevalent in lower socioeconomic status.

The upper respiratory tract infection is important cause of Otitis media which ultimately leads to hearing impairment .Bhagwat et al (2004)[19]also mentioned upper respiratory tract infection is found to be a common precursor condition for Otitis media, so it is important that they must be detected early. In the present study, Otitis media was found in 27.3% cases of hearing deficit. This goes to prove that it is possible to miss many cases of hearing deficit if special care is not exercised.

Bilateral ear involvement (52.2%) was common in the present study, however Nwokoye et al, (2012)[20] observed unilateral infection of left ear was predominant (66.8%). De et al (2002) [21],Ballal et al (1992)[22], Antony et al (1996)[23] , Osazuwa et al. (2011)[24] and Hatcher et al(1995)[6] found Pseudomonas aeroginosa as commonest organism which is similar to the finding of our study. Pelton et al (2009)[25], noted Streptococcus pneumoniae, Haemophilus influenzae as frequently found organisms for acute otitis media, whereas Asher et al (2008)[26] found H.influenzae (45%) as most common organism and Nikakhlagh et al (2008)[27] isolated Staphylococcus aureus (32.4%) followed by Pseudomonas aeroginosa (21.6%) as commonly found organism.Due to time constraint,seasonal trend could not be studied in the present study. This is the limitation of the study.

CONCLUSION

Apart from routine general checkups and anthropometry in school health services, this study successfully highlighted the need for focused health check up for ENT. It is possible to miss many cases of hearing deficit due to Otitis media if special care is not exercised. Through actual involvement or through increasing the awareness of the staff and the students, school health services should be made more fruitful and useful.

Acknowledgement:
Author sincerely thanks the management of the school for supporting to carry out the present study.

Conflict of interest:
None

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