Prevalence and Risk Factors of Otitis Media with Effusion among Children

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Original Research Article

ABSTRACT

A Cross Sectional study of 2 months was carried out at Tertiary Health Care Hospital. With aim to determine the prevalence and associated risk factors of Otitis Media with Effusion in school going children. 200 children of age group 4 to 18 years coming for non-otological problem or accompanying to patients attending ENT and Paediatric Out Patient Departments without any obvious systemic disease were included in the study. B type of curve on tympanometry was considered as diagnostic criteria for Otitis Media with Effusion. Parents of these children were interviewed about sociodemographic factors. Clinical examination, including otoscopic examination and tympanometry was performed for each child. The prevalence of Otitis Media with Effusion was 19%. There was no statistically significant relationship between OME and gender, child's place during day, exposure to passive smoking and asthma. The relationship between OME and age, socioeconomic status, number of siblings, allergy, recurrent episodes of Upper Respiratory tract infection, adenoid and/or tonsillar hypertrophy were found to have statistically significant relationship ($p<0.05$)

KEY WORDS: otitis media with effusion; prevalence; risk factors

INTRODUCTION:

Otitis Media with Effusion (O.M.E.) is the commonest ear problem among preschool and school children. It is defined as inflammation of the middle ear with accumulation of non-purulent effusion or exudates either mucous or serous fluid within the middle ear [1,2]. It is insidious in onset and diagnosis is usually delayed. It is a major cause of hearing impairment in children leading to delayed speech development, learning and behavioral difficulties.

It has a bimodal age distribution. The first and largest peak occurs at the age of 2 years at a prevalence of approximately 20% [1]. The second peak occurs at the age of 5 years with prevalence of about 16% when most children start attending a primary school [1]. These differences may be due to genetic and anatomical variations in the skull base and eustachian tube. Environmental factors such as pollution and recurrent upper respiratory tract infections are usually associated with high incidence. Seasonal relationships are confirmed with a peak in winter.

Various risk factors such as gender, race, premature delivery, passive smoking, allergy, asthma, family size, bottle feeding, socioeconomic status, cleft palate, adenoid hypertrophy have been studied by researchers to find out their association with OME but still remained controversial [3-6].

The aim of this study was to determine the prevalence and associated risk factors of OME in school going children.

MATERIALS AND METHODS:

It was a cross sectional study of 2 months carried out at N.K.P. Salve Institute of Medical Sciences, Nagpur from 1st April 2017 to 31st May, 2017 after approval from Institutional Ethics Committee. All the children of age group 4 to 18 years coming for non-otological problem or accompanying patients attending ENT and Paediatric Out Patient Departments without any obvious systemic disease were included in the study. Those children having wax in External Auditory Canal, perforated ear drum or with ear discharge, pain in ear and those with congenital anomalies of Head, Neck and Face were excluded from the study. Along with demographic and environmental data including age, gender, the number of siblings, Tobacco smoke exposure, child's location during day time were noted. The socioeconomic status

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of child's family was determined by using Modified B. G. Prasad Socioeconomic Status Scale.[7,8] Other questions asked to Parents or guardians were regarding features of allergy, asthma, recurrent Upper Respiratory Tract Infection like itching of the nose or eyes, watery eyes, rhinorrhea, nasal obstruction, snoring, sneezing, breathlessness, Throat pain etc. After detailed history, routine ear, nose, and throat examination and detail Otoscopic examination of Ear was done. Impedance Audiometry was done in all children using Interacostics AT 235. Type B curve was considered as indicator of Otitis Media with Effusion. The data was collected and analyzed using SPSS version 20. P </= 0.05 was considered significant and confidence interval was set at 95%.

RESULTS:

Total 200 school going children of age between 4 to 18 years fulfilling inclusion criteria were screened during two months of study period. Type B curve on Tympanogram was considered as diagnostic criteria for OME. Thirty eight children were found to have OME with prevalence of the disease of 19%. Unilateral OME was found in 26 children (Right ear affected in 16, Left ear in 10 children) and bilateral involvement was seen in 12 children. Normal Tympanogram i.e Type A curve was seen in 120 children, Type C curve suggestive of Eustachian tube dysfunction) in 34, Type Ad curve (suggestive of Ossicular discontinuity) in 6 and Type As curve (suggestive of probability of Otosclerosis) in 2 children (Table 1).

Table 1: Distribution of Children according to Types of Tympanogram (n=200).

Type of Tympanogram	No. of Patients	Percentage
A	120	60
As	2	1
Ad	6	3
B	38	19
C	34	17
Total	200	100

Mean age of study population was 8 years, 5 months. The youngest child in this series was of 4 years while the oldest was of 17 years, 6 months. The prevalence of OME was found to be more in younger age children. 32.5% of children of age group 4-8 years (13 out of 40), 21.05% children of age group 9-13 years (16 out of 76) and 10.71% children of age group 14-18 years (9 out of 84) were having OME. This relationship of OME with age was found to be statistically significant with Chi- Square of 8.69 and p value 0.013. The Male to Female ratio was 1:1.17 with 92 males and 108 females. There was no significant statistical relationship between OME and gender (χ^2 = 0.29, p >0.05, Odds Ratio= 0.82).

Maximum Children were from Lower Class (80) followed by Lower Middle Class (40) and Middle Class (38). 32 children were from Upper Middle Class and 10 from Upper Class. The prevalence of OME was more in children belonging to Lower Class which was 25% (20 out of 80) and 22% (9 out of 40) in Lower middle class. None of the child of Upper Class was found to have OME. To analyze the relationship of OME with Socioeconomic status statistically, we merged the Lower Class and Lower middle class in one cell and Middle, Upper middle and Upper class in another cell and association was found to be statistically significant (χ^2=5.2, p= 0,02 Odds Ratio= 2.51).

Relationship of OME with number of Siblings in the family was studied. The prevalence of the disease was more in those who had $\geq$ 4 siblings (28.05%) followed by 3 siblings (25.61%) as compared to the 2 siblings (10.45%) and only child (10.71%). This difference was statistically significant (χ^2= 8.44, p-value 0.003, Odds Ratio= 0.32). There was no statistically significant relationship of location of child during day time with OME. Children at Home during daytime were equally affected to that of children at school. (χ^2=0.22, P-value= 0.63, Odds Ratio=1.29). Likewise, exposure of a child to passive tobacco smoking was also had no statistically significant relation with OME (χ^2=2.24, p=0.13, Odds Ratio=1.758).

Factors like Adenoid and /or Tonsillar Hypertrophy, Allergy and recurrent episodes of Upper Respiratory tract infection studied and found to have statistically significant relationship with OME. However, OME had no statistically significant relation with Asthma (χ^2 =2.73, p=0.09, Odds Ratio= 2.27). 25% children (29 out of 116) having Adenoid and or Tonsillar hypertrophy had OME (χ^2 = 6.46, p=0.01, Odds Ratio= 2.78). The prevalence of OME in children with Allergy was 38.23% (13 out of 34) (χ^2= 9.85, p=0.001, Odds Ratio= 3.49). While 24.28% (31 out of 128) children suffering from recurrent episodes of Upper respiratory tract infection were having OME (χ^2 = 6.29, p=0.01, Odds Ratio= 2.97) (Table 2).

DISCUSSION:

Otitis media with effusion is a common health problem in children and is multifactorial disease. Infection and Eustachian tube (ET) dysfunction are

Table 2: Relationship between Otitis Media with Effusion and Risk Factors (n=200).

Risk Factors		No. of Children	OME Present* N (%)	Chi Square Test	Odd's Ratio	p-value
Age (in Years)	4-8	40	13 (32.5%)	8.69	-	0.01 (S)
	9-13	76	16 (21.05%)			
	14-18	84	9 (10.71%)			
Gender	Male	92	16 (17.39%)	0.29	0.82	0.59 (NS)
	Female	108	22 (20.37%)			
No. of Siblings	1	28	3 (10.71%)	8.44	0.32	0.003 (HS)
	2	67	7 (10.45%)			
	3	82	21(25.61%)			
	≥4	23	7 (30.63%)			
Socioeconomic Status	Lower Class	80	20 (25%)	5.2	2.51	0.02 (S)
	Lower middle Class	40	9 (22.5%)			
	Middle Class	38	7 (18.5%)			
	Upper middle Class	32	2 (6.25%)			
	Upper Class	10	-			
Child's Location during Day	Home	22	5 (22.73%)	0.22	1.29	0.63 (NS)
	School	178	33 (18.54%)			
Exposure to Passive Tobacco Smoking	Yes	59	15 (25.42%)	2.24	1.75	0.13 (NS)
	No	141	23 (16.31%)			
Symptoms of Allergy	Yes	34	13 (38.24%)	9.85	3.49	0.001 (S)
	No	166	25(15.06%)			
Asthma	Yes	14	5 (35.17%)	2.73	2.27	0.09 (NS)
	No	186	33 (17.74%)			
Adenoid &/ or tonsillar Hypertrophy	Yes	116	29 (25%)	6.46	2.78	0.01 (S)
	No	84	9 (10.71%)			
Recurrent Upper Respiratory Tract Infection	Yes	128	31(24.21%)	6.29	2.97	0.01 (S)
	No	72	7 (9.72%)			

*OME was diagnosed in 38 children out of Total 200 children.

the most widely accepted contributory factors. Frequent infections like common cold, mechanical obstruction or craniofacial malformations that interfere with the proper ET function, increases susceptibility of accumulation of fluid within the middle ear cavity. If it is left untreated or inadequately treated, sequelae and complications, such as permanent hearing loss and hearing or speech impairment may occur [9-11].

The prevalence of OME is rather variable, ranging from 1.3 to 31.3%, depending on the methods used, population characteristics like race, countries and environmental factors[12–14]. The prevalence of the disease in children of age group 4-15 years in a study done by Erdivanli OC et al[15] (n=2960) in Turkey was 9.9% and that in Qassim region of Saudi Arabia it was 7.5% in the study of Al- Humaid HI et al[16] (n=1488, Age= 6-12 years)). In a study conducted by Kumari MS et al[17] in South Indian population, prevalence rate

was 16.6% (n=2602). The prevalence rate in the study done by Chibuike N et al[18] was 25.2% (n=226) and that in Sanli A et al[19] study, it was 12.2% (n=1165) and 2.2% in Tog MC et al study (more than 6,000 children aged from 6 to 7)[20]. Prevalence rate in our study in children of age group 4-18years was 19% (n=200). The result matches with the study done by Tikaram A et al in Malaysia in which prevalence of OME was 18.3% (n=153, Age= 3months to 12 years)[21].

In our study, 4-8 years age group was affected most with OME with prevalence of 32.5% and it was found to decrease with increasing age. Al- Hamaid IH et al found OME significantly higher in 6-7 old children as compared to older children[16]. The peak age prevalence of OME among the school pupils was 2 years (36.2%)[18]. Other studies also concluded that age is one of the most important risk factors in OME[22-24]. In our study we didn't find any significant difference in the prevalence of OME between males and females. Tikaram A et al[21], Essam A et al[25] had same finding in relation to gender and prevalence of OME. Whereas other studies found higher prevalence of the disease in males[26-28], owing to higher incidence of infectious diseases in males. Brook et al[29] found no statistically significant association of OME with Socioeconomic status of the family. In contrast we found low socioeconomic status as a risk factor for OME in children and this result was consistent with Paradise et al[27] and Harvey RM study[30].

Gultekin *et al.* and Sassen M et al showed that higher number of siblings in the family increases the risk of OME[31,32]. Similar was the finding in our study showing significant relationship between number of siblings and the prevalence of OME. Children who attended daycare centers found to have increased risk of OME as compared to those staying at home[3,31]. But in our study, children there was no statistically significant difference in prevalence of OME in children at home and attending school. Our finding was consistent with the findings of Tikaram A et al[21] and Sassen M et al[32] studies.

We could not find any statistical relation between exposure to passive tobacco smoking and development of OME. This is consistent with the findings of previous studies[6, 20,21, 32]. In contrast to this, many studies demonstrated passive smoking as a influential factor in OME in Children[31,34].

No significant association was found between Asthma and OME in children in our study which was consistent with the finding of Tikaram A et al[21] and Saim et al[35] in contrast to the study done by Gultekin E et al[31]. In our study, we found statistically strong relationship between allergy, recurrent episodes of Upper respiratory tract infection and Adenoid and or tonsillar hypertrophy with occurrence of OME in children. Al- Hamaid IH et al[16], Kiris M et al[22] also found association of Snoring and recurrent nasal discharge with OME considering theses as a risk factors for the disease. Gultekin E et al[31] demonstrated the association of allergy with OME. These factors interfere with Eustachian tube function leading to collection of fluid in the middle ear cavity.

In our study, the prevalence of Otitis Media with Effusion in 4-18 years age group children is 19%. It is more common in 4-8 years age than older age group children. Allergy, recurrent episodes of Upper respiratory tract infection, Adenoid and /or Tonsillar hypertrophy have increased risk of OME. Other factors such as gender, socioeconomic status, child's location during day time, exposure to passive smoking and asthma were not statistically related to OME.

CONCLUSION:

Since Allergy, recurrent episodes of Upper respiratory tract infection, Adenoid and or Tonsillar hypertrophy etc are the factors found to be responsible for high prevalence of Otitis Media with Effusion, the preventive measures in the form of avoidance of allergens, early medical intervention and treatment of upper respiratory tract infections and making the parents and school teachers aware of this condition should be taken up. Since early diagnosis of this condition is useful for the prevention of sequelae, regular School Health Check Up with Tests for hearing assessment should be carried out. Such type of School Health Check up Programmes with the help of Government agencies and NGOs can be carried out which will benefit the general population. Whenever the condition is diagnosed, the affected child should be treated with appropriate medical treatment and surgical intervention whenever indicated.

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