Original Research Article

Clinico-demographic study of otitis media with effusion in different age groups

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Abstract

Background: Otitis Media with Effusion is mainly a disease of childhood. But it can also occur in adults. It can present with various symptoms like difficulty in hearing, blocked sensation in the ear, earache, tinnitus etc. Young children are often diagnosed late due to their inability to express hearing difficulty, and are often diagnosed accidentally. Appearance of the tympanic membrane can also be varying among patients. There may be retraction, dull appearance and change in colour, or reduced mobility. Fluid level or air bubble can also be present in the middle ear behind the tympanic membrane.**Aim:** To study the demographic profile of the patients diagnosed with OME and to determine the variations in the signs and symptoms of OME in different age groups.**Method:** This is an observational study. It was conducted on all the patients attending the OPD at a tertiary hospital, and diagnosed with OME over the course of one year. The diagnosis was made after proper history taking and clinical examination and with the aid of audiometry and tympanometry. An effort was made to map out the demographic profile of all the patients diagnosed with OME, and to study the variations in the signs and symptoms of OME across different age groups.**Result:**In the analysis of parameters it was found that statistically significant higher number of cases were children (< 10 years of age). Number of male was more than female in children but it was equal in adult. Significantly more number of children in the study had bilateral involvement, but in adolescent and adult there was no statistical difference between the incidence of bilateral and unilateral involvement. Difficulty in hearing and heaviness in ears were the two most common presenting symptoms with addition of tinnitus in adult group. Most common appearance of the tympanic membrane was dull in all the ages.**Conclusion:**In the present study it is evident that the Otitis media with media (OME) is much more common in pediatric population and has a little male preponderance, which corroborates the consensus of the word literature. The present study also corroborates the existing knowledge on some aspect the disease like presenting symptoms (difficulty in hearing and block sensation being the commonest) appearance of tympanic membrane or degree of hearing loss.An effort was made in the present study to compare some aspect of the disease among the patients of different age group.While corroborating most of the issues regarding OME with the existing literature, present study indicates some differences in presentation and diagnostic features in different age groups.

Keywords: Otitis Media with Effusion (OME); Demography; Signs and Symptoms.

Introduction

Otitis Media with Effusion (OME) is the commonest cause of hearing difficulty and one of the most frequent reasons for elective admission to the otolaryngology departments for surgery during childhood[1].A reasonable definition of the condition is the presence within the middle ear cleft of an effusion which may be serous or mucoid but not frankly purulent[1]. An

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alternative definition is the presence of fluid behind an intact eardrum without signs and symptoms of acute infection (otalgia, fever and irritability)[2]. The time that the fluid has to be present for the condition to be chronic is usually taken as 12 weeks[3]. In children, OME usually presents because of the associated hearing impairment and sometimes with a preceding history of illness and otalgia consequent on an episode of acute otitis media. A variety of synonyms describe the condition. It has been termed catarrhal, exudative, sero-mucinous, serous, secretory, or non-suppurative oitis media and glue ear. Though this condition usually affects infants and young children, it also occurs in adolescents and adults. The diagnosis of OME is done by otoscopic findings of dull tympanic membrane, loss or distortion of cone of light in tympanic membrane, fluid level or air bubble in middle ear, reduced mobility of the tympanic membrane determined with pneumatic otoscopy. In spite of the established fact that the disease mainly affects the pediatric population, it is not uncommon in other age groups. An effort has been made in this study to establish the difference in clinical features and diagnostic investigation results of OME in different age groups.

Materials and methods

The present observational study has been conducted in the department of Otorhinolaryngology of a tertiary care hospital and teaching institute, between the periods of May 2019 to April 2020.A total number of 90 patients diagnosed as 'Otitis Media with Effusion' were selected from the outpatient department (OPD) of Otorhino-laryngology. Informed consents were taken from the patients or the guardians (in case of minor).Detail history taking and clinical examinations were performed in all the patients screened for the study. Pure tone audiometry and tympanometry were done in all the patients. (in case of children less than 6 years play audiometry was used for evaluation of hearing level.)

Inclusion criteria for the study:

1) Age and Sex distribution

Clinical appearance of tympanic membrane:-

i) Cone of light:- Absent
ii) Color of the tympanic membrane:- dull, bluish, yellowish, pinkish or clear
iii) Retraction of the tympanic membrane:- Grade I,II and III retraction of the pars tensa according to Sade's classification
iv) Visible fluid level or visible air bubble seen through the tympanic membrane

Audiometric criteria: - Cases with air conduction threshold (pure tone average) 25dB or more were included in the study.

Tympanometric criteria: - Patients with B or C type curves on tympanometry were included in the study.

Exclusion criteria:-

i) History of any previous ear surgery
ii) Any clinically suspected neoplasm in nose or nasopharynx
iii) History of any neoplastic disease of face or head neck requiring Radiotherapy in that region.
iv) Presence of any congenital abnormality involving the face (i.e. cleft lip, cleft palate etc.)
v) Any degree of sensorinural hearing loss.
vi) Grade IV retraction of pars tensa according to Sade's classification.
vii) Any retraction of pars flaccida.

Parameters studied:

a) Distribution of Cases according to age, sex, laterality of the disease.
b) Frequency of occurrence of different signs and symptoms of OME in different age group.

Result and analysis

Ninety patients diagnosed to have Otitis media with effusion are included in the study and the different epidemiological parameters as well as the varying signs and symptoms are studied. These are described below –

Table 1:Age and sex distribution

Age group	Male	Female	M: F	χ2, df, p value ; OR(95%CI)
Children (< 10 years)	36	20	1.8:1	1.13, 1, 0.2868273; 1.60(0.62-4.17)73
Adolescent (10-19 years)	12	10	1.2:1	
Adult (> 19years)	6	6	1:1	
Total	54	36	1.5:1	

Table 1B:Age group and number of patients

Age group	No. of patients	$\chi 2$(goodness of fit), df,, p value
Children (< 10 years)	56 (62.22%)	35.46, 2, <0.001
Adolescent (10-19 years)	22 (24.44%)	
Adult (> 19years)	12 (13.33%)	
Total	90	

Most of the patient, 62.22%, in the study are children (< 10 years), 24.44% are adolescent (10-19 years) and only13.33% are Adult (>19years) (Table 1A). Male: female ratios in these age groups are 1.8: 1, 1.2: 1 and 1: 1 respectively.(Table 1B) Male: female ratio among the whole study group is 1.5: 1. So the male female ratio is gradually decreasing with increased age.In this study the mean age of the patient is 10.38 years (range 3-38, Standard deviation 7.5) and the median age is 7.5 years.

2) Laterality of disease

Table 2:Laterality of disease

Age group	Unilateral involvement			$\chi 2$,df,pl;OR (95% CI)	Bilateral involvement	$\chi 2$, df, pl; OR (95% CI)
	Left	Right	Total			
Children (< 10 years)	06	09	15	0.82,1, 0.3655916; 0.52 (0.10-2.70)	41	3.85,1, 0.0497261; 0.41(0.15-1.11)
*Adolescent (10-19 years)	06	05	11		11	
*Adult (> 19years)	03	02	05		07	
Total	15	16	31		59	

*****Merge during statistical testing

Bilateral involvement is more than the unilateral involvement in children, but in case of adolescent and adult there is little difference between the number of unilateral and bilateral involvement.Table 2 reveals that there was no statistical difference in involvement of ears in across the age groups of the participants

3) Duration of symptoms

Table 3:Duration of symptom

Age group	Duration of symptoms(months) Mean ± sd (Range)	*ANOVA, F, p	Post-Hoc
Children (< 10 years) [n_1= 56]	2.11±1.14 (0.5-4.5)	1.776,2,0.175	NA
Adolescent (10-19 years) [n_2=22]	2.83±2.00 (0.5-7)		
Adult (> 19years) [n_3=12]	2.75±1.31 (1-5)		
Total [N=90]	2.42±1.46 (0.5-7)	--------	

* sd=Standard deviation

Mean duration of symptoms is least in children and maximum in adolescent group, but no statistical significant difference found in this regard. The mean duration of the symptoms before presentation in total study group is 2.42 months (range 0.5 – 7 months and standard deviation 1.46).

4) Different presenting symptoms

Table 4:Different presenting symptoms

Age groups	Presenting symptoms					$\chi 2$(goodness of fit),df,,p
	Difficulty in hearing (No.)	Heaviness in ear(No.)	Ear ache(No.)	Tinnitus(No).	Nasal obstruction(No.)	
Children(<10 years)[n_1=56]	41	42	18	8	28	31.5,4,<0.001
*Adolescent(10-19years)[n_2=22]	16	19	11	11	7	6.93,4,>0.10

*Adult(≥19years) [n_3=12]	9	7	4	8	4	3.32,4,>0.50
Total[N=90]	56	68	33	27	39	31.35,4,<0.001
Statistical test across the rows except the total [χ2,df,p;OR(95%CI)]	0.00,1, 0.9738529; 0.98(0.34-2.85)	0.02,1, 0.8749367; 0.92(0.30-2.77)	1.31,1, 0.2530583; 0.60(0.23-1.58)	17.43,1,0 .0000298 ; 0.13(0.04 -0.4)	2.68,1, 0.1014 250; 2.09(0. 79-5.62)	--------

*Clubbed together for test of significance

The table 4 shows that in the lowest age group, the tinnitus and earache were significantly low compared to the higher age group reveals. It is also evident that tinnitus was significantly more in the higher age group compared to the lowest one. The reason may be due to inability of younger ones to express the symptoms. From table 4 it can also be said that that the predominant presenting symptoms of OME in all ages are Difficulty in hearing and Heaviness in ears. Apart from the ear symptoms, nasal obstruction is present in half of the children presenting with OME, but only about one third of the cases in adolescent and adult group have nasal obstruction at the time of presentation. The variation of symptoms are statistically significant in children and also when the whole study group is considered, but the present study fails to prove statistical significance when in variation of symptoms when adolescent and adult population is considered due to less number of patient in these groups.

5)Appearance of tympanic membrane

Table 5: Appearance of tympanic membrane

Age group	Color of the tympanic membrane					χ^2(Kruskal-Wallis test),df,p
	Clear	bluish	pinkish	yellowish	dull	
Children (< 10 years) N_1= 97(involved ears)	02	11	15	14	55	1.702, 2, 0.427
Adolescent (10-19 years) N_2= 33(involved ears)	02	07	05	01	18	
Adult (> 19years) N_3= 19(involved ears)	00	01	03	03	12	
Total N= 149	04	19	23	18	85	

From table 5 it can be said that the most common appearance of tympanic membrane is dull tympanic membrane. In children and adult pinkish and yellowish membrane come next followed by bluish and clear appearance. In adolescent group second most appearance is bluish tympanic membrane. The relative number of different appearance of tympanic membrane is statistically significant in all the age groups, but table 5 reveals no statistical difference in colour of tympanic membrane across the age groups of the study subjects.

Discussion

The present study was done with the objectives to determine the variations in symptoms and sings of OME in different age groups. The results of the study is compared with some published literature on this topic and with the information recorded in some standard text books.

Discussion of epidemiological parameters

Age-In the present study the mean age of the patients is 10.38 years (range 3-38, Standard deviation 7.5) and the median age is 7.5 years. 62.22% of the patients in this study were children (<10 years of age). Zielhuis*et al*[4] stated that the prevalence is bimodal with first and larger peak of 20% at two years, and second peak of 16% is found at around five years of age. Williamson *et al*.[5] found 17%, 10%, 7% and 6% prevalence rates in five, six, seven and eight years old

children respectively. Watson and Harrison[6]& Birch and Elbrond[7] also found the similar age incidence for OME. Mean age in the study by Daly *et.al*[8] was 5.5 years, and Maw[9] reported the mean age to be 5.25 years. Abdullah *et al*[10] reported the mean age to be 7.08 years and median age to be 7 years. A comparison with some study is given below-

Table 6:Age incidence

Study	Age incidence
Tay *et al*[11]	Mean age 4.7 years , range 1-11
Ahmed *et al*[12]	Mean age 7.3 years ± 1.2
Abdullah *et al*[10]	Mean age 7.08 years ± 2.5, and median 7.00
Richard Maw[9]	Mean age 5.25 years, range 2-11 years
Present study	Mean age 10.38 years±7.5, range 3-38, median 7.5

Sex-Overall sex ratio in this study was 1.5:1, highest among children with 1.8:1. But in adult age group the sex ratio was equal, 1:1. 61% 0f the patients in the study of Daly *et al*[8]was male, 72% male in study of Abdullah *et al*[10] but Yousaf*et al*[13] found equal sex distribution. Some other studies also found male predominance among the patients of OME[14,15] but Yung *et al*[16] found female predominance in adult patients.

Table 7:Sex ratio study

Study	Sex ratio (male: female)
Daly *et al*[8]	1.6: 1
Abdullah *et al*[10]	2.6: 1
Ahmed *et al[12]*	1.27: 1
Yousaf*et al*[13]	1: 1
Yung et al[16]	0.66: 1 (in adult age group)
Lee et al[17]	1.14: 1
Present study	Overall 1.5:1, Children 1.8: 1, adolescent 1.2: 1, adult 1:1

The finding regarding the sex ratio of the present study goes with the findings of the most publications.

Laterality of the disease-Incidence bilateral OME is significantly higher than unilateral disease in the present study, though in adolescent and adult patient ratio of bilateral and unilateral involvement is not significant. In children this ratio is statistically significant. As the majority of the present in the study are children, the ratio became significant when the whole study group is considered. Yung et al[16] found bilateral disease to be more than unilateral in adult population. In study by Ahmed et al[12]. 42% cases have unilateral disease and 58% cases had bilateral disease. Balram et al. found equal no. of patients to have unilateral and bilateral disease[18]. 42 to 69% of adult OME are bilateral in different study,[19] whereas most of the study among children found more bilateral disease than unilateral[20].The present study corroborate the findings of most of the studies.

Discussion of the clinical features

Duration of symptoms-The mean duration of the symptoms before presentation to the health care in the present study is 2.42 months with range of 0.5 to 7 months and standard deviation 1.46. There is no significant difference between different age groups. Blustone[21] termed the disease as chronic OME when the duration is more than 12 weeks. Zielhiuset al[22] reported the median duration of OME in children under three years of age to be 3 months or less, but the 95th percentile was at 12 months. Louset al[23] reported the overall duration of OME in children over three years of age to be 1.8 months with 12% lasting more than 6 months. Lee et al[17]found the mean duration to be 38.7 days.

Presenting symptoms-In the present study difficulty in hearing and heaviness in ears are the two leading symptoms in all the age groups. Earache was present in one third patients in children and adult groups but in half of the adolescent patients. Tinnitus was found a common symptom in adult, present in two third of the patients, but only one fifth of the children complained

of that symptom. According to Blustone[24]the symptoms in OME are neither sensitive nor specific and half of the patients are asymptomatic. Yousaf*et al*[13] found deafness to be the universal symptom (present in 100%) of OME, and among other symptoms blocking of ears, earache and tinnitus coming in order of frequency. Abdullah *et al*[10] also find hearing loss to be the most common presenting symptom of OME, followed by otalgia, ear block and tinnitus. 98% of the patients in the study by Ahmed *et al[12]*had hearing difficulty at the time of presentation. The present study corroborates the findings of these studies.

Appearance of the tympanic membrane, grade of retraction and presence of air bubble and fluid level-The most common appearance of the tympanic membrane is dull appearance in the present study, others being pinkish, yellowish and bluish or rarely clear appearance. A comparison with two other studies regarding presence of fluid level and air bubble is given below.

Table 8: Percentage of ears has fluid level and ear bubble.

Study	Percentage of ears has fluid level and ear bubble.
Ahmed *et al*[12]	6.8% fluid level and 2% air bubble
Abdullah *et al*[10]	40% fluid level
Present study	14.79% fluid level and 14.09% air bubble

This study corroborates the finding of Yousaf*et al*[13] who found 81% of the tympanic membrane with OME to be appeared dull.

Conclusion

In the present study it is evident that the Otitis media with media (OME) is much more common in pediatric population and has a little male preponderance, which corroborates the consensus of the word literature. The present study also corroborates the existing knowledge on some aspect the disease like presenting symptoms (difficulty in hearing and block sensation being the commonest) appearance of tympanic membrane or degree of hearing loss.An effort was made in the present study to compare some aspect of the disease among the patients of different age group. In the present study it was found that the male preponderance became less in adolescent and adult population as the incidence of bilateral disease over unilateral. Tinnitus was found second most common presenting symptom after difficulty in hearing in both the adolescent and adult population. But there was not much difference in appearance of the tympanic membrane, degree of the retraction or degree of hearing loss. But the presence of fluid level and air bubble both were highest in adolescent patients.This study confers the need of much larger and extensive studies on variations among the people of different ages in epidemiological aspects of the otitis media with effusion.

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