

Otitis Media with Effusion (OME) in Undiagnosed Children Under the Age of 10 years

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ABSTRACT

Objective: To determine the frequency of Otitis Media with Effusion (OME) in undiagnosed children under the age of 10 years.

Study Design: Cross-sectional study.

Place and Duration of Study: Combined Military Hospital, Sialkot, Pakistan from Feb to March 2023.

Methodology: During study 1589 children aged 2-10 years of both genders were included. Diagnosis of OME was established by type B and type C tympanogram. Data was collected through a validated questionnaire. Frequency and percentage were calculated for each variable.

Results: Tympanometry was performed among 983 children, while among 606 children tympanometry was not performed due wax or foreign body. Among 983 children, 46.8% had Type-A tympanogram in the right ear, 6.2% had Type-B and 8.9% had Type-C tympanogram in the right ear. Likewise, among 983 children, 47.5% had Type-A tympanogram in the left ear, 5.1% had Type-B and 9.3% had Type-C tympanogram in the left ear. Among these children, 24.4% had OME in their right ear while 23.2% in their left ear.

Conclusion: The prevalence of OME among school children was 24.4%. Regular screenings at school level could be helpful in early identification and appropriate management to prevent children from problems such as hearing difficulties, recurrent infection, sleep disturbance and poor academic performance caused by OME.

Keywords: Children, Foreign Body, Otitis Media with Effusion, Tympanometry, Wax.

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INTRODUCTION

Otitis media with effusion (OME) is a persistent inflammatory condition caused by accumulation of sterile fluid behind the intact eardrum without displaying the typical signs and symptoms associated with acute inflammation. This disease frequently affects the younger age groups children.¹⁻⁴ The precise cause and development of middle ear infectivity and effusion remain unknown; nevertheless, investigators posit that it is associated with various virulence factors.⁵ OME can result from infections caused by bacteria, fungi/viruses, tumors, inflammations, big adenoid and sinusitis all cause obstruction of eustachian tube and middle ear inflammation. Severity of tympanic cavity infections is influenced by a combination of socioeconomic, environmental and cultural factors (e.g., living in large sized family and crowded place, smoking and breastfeeding duration), genetic (e.g., craniofacial abnormalities i.e., cleft palate and Down syndrome), medical and nutritional factors.⁶

Correct diagnosis is vital for OME management.⁷ Diagnosis of condition is relatively simple and doesn't require sophisticated gadgets. Pneumatic otoscopy, tympanometry, stapedial reflex loss, pure tone audiography together with clinical suspicion of hearing impairment are sufficient to diagnose this impairment and does not rely on patients' responses.⁸

OME is believed most prevalent otologic disease of childhood.⁹ Approximately 80% children experience this disease at the age of 10 years, while the elevated prevalence is observed at the ages two and five.¹⁰

OME remains a public health dilemma worldwide. In Pakistan, there are limited data about OME among children. Therefore, we conducted this study to determine the frequency of Otitis Media with Effusion (OME) in undiagnosed children under the age of 10 years.

METHODOLOGY

This cross-sectional study was conducted at Combined Military Hospital, Sialkot, Pakistan, and data was collected from Army Public School, Sialkot, Pakistan, from February to March 2023 after approval from Institutional Ethical Review Committee

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(ERC/16/2023). Non-probability convenient sampling methods was used.

Inclusion Criteria: All children aged 2-10 years of either gender were included.

Exclusion Criteria: Children with history or features of ear diseases, tympanic membrane perforation, previous ear surgery and congenital ear deformities were excluded.

All children (1589) from Army Public School were assessed by researcher herself and data was filled on questionnaires. The questionnaire included age, sex, class, category and presence of otitis media with effusion.

All children underwent oral cavity examination, otoscopy, anterior rhinoscopy examinations and tympanometry. Children were subjected to end-aural pressure measurement with a portable tympanometer in a separate room reserved in the school especially for the study purpose. The instrument used was a 102 Hz hand held portable tympanometer with a probe frequency of 102Hz and air pressure range of +200 Pa to -400 Pa. Tympanograms were evaluated according to Fielau-Nikolajsen's modification of Jerger's system; Type-A: peak between +100 to -100 mmH₂O; Type-B: no peak detected and Type-C: peak between -101 to -300 mmH₂O. Diagnosis of OME was established by Type-B and Type-C tympanogram.

Data was analysed using Statistical Package for Social Sciences (SPSS) version 25. For quantitative variable such as age, Mean±SD was calculated and for qualitative variables such as gender, class, category, type of tympanogram, foreign body, ear wax, incidence of otitis media with effusion, frequency and percentages were calculated. Chi-square test was used to estimate the association of OME with age and gender. A p -value ≤ 0.05 was considered significant.

RESULTS

Among 1589 children, 1158(72.9%) were males and the mean age was 5.88±1.57 years (Table-I). Out of 1589 children, 4(0.25%) had foreign body in their right ear and 2(0.12%) had it in their left ear while only 1(0.06%) child had foreign body in both ears. Two hundred and forty-seven (15.5%) children had wax in one ear and 353(22.2%) in both ears, while majority 989(62.3%) of the children had no ear wax (Table-II). Result showed that among 1589 children, tympanometry was performed in 983 children while among 606 children tympanometry was not performed due wax or foreign body. Among 983

children, 743(46.8%) had Type-A tympanogram in the right ear, 99(6.2%) had Type-B and 141(8.9%) had Type-C in their right ear. Likewise, among 983 children, 755(47.5%) had Type-A tympanogram in the left ear, 81(5.1%) had Type-B and 147(9.3%) had Type-C in the left ear (Figure-1). Among 983 children, 240 (24.4%) had OME in their right ear while 743(75.6%) had no OME. Likewise, 228(23.2%) children had OME in their left ear while 755(76.8%) had no OME (Figure-2).

Table-I: Socio-demographic Characteristics of Children (n=1589)

Variables	n (%)
Age	
2-5 years	650(40.9%)
6-10 years	939(59.1%)
Age in years, Mean±SD	5.8±1.5
Gender	
Male	1158(72.9%)
Female	431(27.1%)
Class	
EYS-1	299(18.8%)
EYS-2	285(17.9%)
Prep	453(28.5%)
Class-1	268(16.9%)
Class-2	284(17.9%)
Category	
Civilian	814(51.2%)
Soldier	488(30.7%)
Officer	246(15.5%)
APS employee	41(2.6%)

*EYS=Early year stage; APS=Army Public School

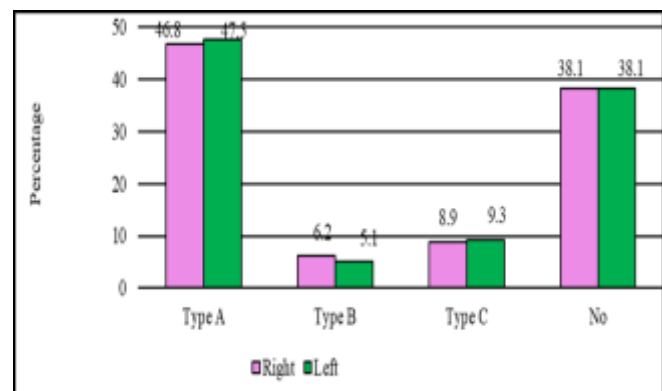


Figure-1: Type of Tympanogram in Ear (n=1589)

Among 401 children who were 2-5 years old, 126 had OME in right ear, and 275 had no OME in their right ear. Among 582 children who were 6-10 years old, 114 had OME in right ear, and 468 had no OME in their right ear. Likewise, among 401 children who were 2-5 years old, 107 had OME in left ear, and 294

had no OME in their left ear. Among 582 children who were 6-10 years old, 121 had OME in left ear and 461 had no OME in their left ear. Among 729 children who were males, 162 had OME in right ear and 567 had no OME in their right ear. Among 254 children who were females, 78 had OME in right ear and 176 had no OME in their right ear. Likewise, among 729 children who were males, 154 had OME in left ear and 575 had no OME in their left ear. Among 254 children who were females, 74 had OME in left ear and 180 had no OME in their left ear. There was significant association of OME in right ear with age and OME in right and left ear with gender. (Table-III).

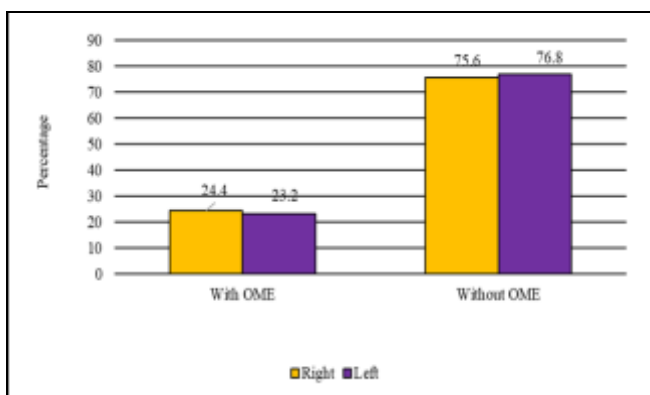


Figure-2: Incidence of Otitis Media with Effusion (n=1589)

Table-II: Presence of Foreign Body and Ear Wax (n=1589)

Variables	n (%)
Foreign body	
Right ear	4(0.2%)
Left ear	2(0.1%)
Bilateral	1(0.0%)
No	1582(99.5%)
Ear wax	
Unilateral	247(15.5%)
Bilateral	353(22.2%)
No	989(62.3%)

Table-III: Association between Incidence of Otitis Media with Effusion and Age and Gender of Children (n=1589)

Age and Gender of Children (N=1557)									
	Incidence of OME					Incidence of OME			
	Right Ear			p-value		Left Ear			p-value
	With OME	Without OME	Total			With OME	Without OME	Total	
Age									
2-5 years	126(12.8%)	275 (28.0%)	401(40.8%)	<0.001	107 (10.9%)	294 (29.9%)	401 (40.8%)	0.065	
6-10 years	114(11.6%)	468(47.6%)	582(59.2%)		121 (12.3%)	461 (46.9%)	582 (59.2%)		
Total	240(24.4%)	743(75.6%)	983 (100.0%)		228 (23.2%)	755 (76.8%)	983 (100.0%)		
Gender									
Male	162(16.5%)	567(57.7%)	729(74.2%)	0.006	154(15.7%)	575(58.5%)	729(74.2%)	0.017	
Female	78(7.9%)	176(17.9%)	254(25.8%)		74(7.5%)	180(18.3%)	254(25.8%)		
Total	240 (24.4%)	743(75.6%)	983(100.0%)		228(23.2%)	755(76.8%)	983(100.0%)		

*OME= Otitis media with effusion

DISCUSSION

Otitis media with effusion is a common ear condition that often affects children. It occurs when fluid builds up in the middle ear, which is the space behind the eardrum. This condition can result from

various factors, including infections, allergies, or problems with the Eustachian tube. Therefore, current study was carried out to determine the otitis media with effusion among undiagnosed children under the age of 10 years. To acquire appropriate results, 1589 children from Army Public School, Sialkot were selected, and it was found that most children were 6-10 years old with a mean age of 5.88 ± 1.57 years. But a most recent study carried out in Pakistan found that the mean age of the children was 8.25 ± 3.22 years.⁸ Another local study demonstrated that mean age of the children was 7.71 ± 2.74 years.³ However, findings of an Egyptian study confirmed that mean age of the children only 3.27 ± 1.53 years.¹¹

Our study revealed that most children (72.9%) were male, and only 27.1% were female. This is comparable with a study carried out in Uganda which reported that majority of the children (60.0%) were male and 40.0% were female.¹² Another study conducted in Pakistan also exhibited similar trend that majority of the children (57.5%) were male while 42.5% were female.¹

Majority (46.8%) respondents in our study had Type-A tympanogram in their right ears, while 6.2% and 8.9% children had Type-B and Type-C tympanogram, respectively. Likewise, most (47.5%) children exhibited Type-A tympanogram in their left ears, while 5.1% and 9.3% children had Type-B and Type-C tympanogram, respectively. However, one study reported that most, children (68.3%) had Type-B tympanogram in their right ears while 12.7% and 19.0% children had Type-A and Type-C tympanogram, respectively. Similar, majority of children (74.6%) had Type-B tympanogram in their left ears, while 4.8% and 20.6% children had Type-A and Type-C tympanogram, respectively.⁷ Sanli *et al.* elucidated that among children who had OME, 89.1% had Type-A tympanogram while, 10.9% had Type-B tympanogram.¹³

In our study, only a minority of children were found to have a foreign body lodged in their ears, however 37.7% children were found to have ear wax. The results of a study done by Mohammed *et al.*, in comparison, showed much better scenario, reporting that only 16.4% of children had wax in their ears.¹¹

When the OME was assessed among children, study revealed that the incidence of OME was 24.4% and 23.2% in the right and left ears of children, respectively. These findings are comparable with another study, which reported a 27.0% prevalence of

OME.1 Comparable results were also reported in local and international studies which showed that the incidence of OME among children was 25.2% and 22.4%, respectively.^{11,14} However, a study carried out in India showed even more favorable results, with an incidence of OME reported at just 7.5%.¹⁵ Numerous studies have shown this incidence to be between 12.5% and 33.0%.¹⁶⁻²⁰

We found a significant association of OME with the right ear ($p < 0.05$), and an insignificant association with left ear ($p > 0.05$). The results of a studies carried out by Riaz et al., and Mohammad et al. showed an insignificant association of OME with age.^{1,11} However, one study found a significant association of OME with age of children.¹⁴

Our study further assessed the association between incidence of OME and gender, significant association of gender was found with right and left ear ($P < 0.05$). However, multiple studies reported an insignificant association of OME with gender.^{1,11,15}

We commend that regular screenings at school level could be helpful in early identification and appropriate management to prevent children from problems such as hearing difficulties, recurrent infection, sleep disturbance and poor academic performance caused by otitis media with effusion.

LIMITATIONS OF STUDY

Our study had certain limitations. The children were only selected from Army Public School, Sialkot, which can impact the generalizability of our findings. We also did not follow-up our study participants for long term complications or resolution of issues. Due to time constraint only children aged less than 10 years were included in the study.

CONCLUSION

Otitis media with effusion is a common and significant problem observed among children, with 24.4% of our study participants being diagnosed with this issue.

Conflict of Interest: None.

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Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

HM & LA: Conception, study design, drafting the manuscript, approval of the final version to be published.

HS & MR: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

SM & BY: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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