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Screening of Children with Upper Respiratory Tract Infection for Otitis Media with Effusion

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[1,4]Drafting the work or revising it critically for important intellectual content, [2,5]Substantial contributions to the conception or design of the work; or the acquisition, [3]analysis, or interpretation of data for the work, data collection, [6]Final approval of the version to be published.

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ABSTRACT

Objective: To determine the recurrence rate of Otitis Media with Effusion (OME) among children without hearing loss, in relation to different upper respiratory tract infections.

Methodology: This cross-sectional study was conducted at the Shifa Foundation Community Health Centre (SFCHC) in Islamabad from February 2020 to February 2021, this study involved otoscopic examinations by a blinded team member. Tympanometry was performed on patients displaying OME signs. Both the examiner and performer were unaware of the child's study status to minimize bias.

Results: The study included children with a mean age of 7.35 ± 2.30 years, predominantly males (59.4%). Common symptoms were nasal obstruction (98%), mouth breathing (97%), and sore throat (98%). Physical examination revealed no Deviated Nasal Septum (DNS), nasal polyps, or tender sinuses. Mucopurulent nasal discharge (94.1%), adenoid hypertrophy (98%), and congested tonsils (96%) were prevalent. Dull/opaque tympanic membranes were present in 22.8% of children, while 74.3% displayed a light reflex, and 26.7% had a prominent short process of malleus.

Conclusion: Otitis media with effusion is frequent in children with recurrent upper respiratory tract infections, non-specific ear symptoms, and poor school performance. Although typically benign with a high rate of spontaneous resolution, it often leads to parental anxiety, unnecessary investigations, and sometimes unwarranted medication.

Key Words: Otitis Media with Effusion, Recurrent Upper Respiratory Tract Infection, Hearing Loss.

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Introduction

Otitis media with effusion (OME) is defined as the collection of sterile or non-purulent fluid in the middle ear for more than 3 months with no symptoms or signs of acute inflammation and an intact tympanic membrane.[1] Persistent middle-ear fluid leads to decreased compliance or mobility of the tympano-ossicular system and hence decreased sound conduction.[2] OME is the most common aetiology of acquired hearing loss in children. About 2.2 million cases of OME are diagnosed in the United States annually.[2,3] Recurrent upper respiratory tract infection and hence the poor Eustachian tube function is the most common cause of this silent hearing impairment among children.[4]

Young age, bottle fed infants, poor socioeconomic status, day care attendance, allergy, adenoid tissue hypertrophy, presence of cleft palate and mucocilliary dysfunction are different factors that lead to upper respiratory tract infections (URTI) and therefore, inadequate eustachian tube function. The sequel of OME like tympanosclerosis, retraction pockets, and adhesive otitis media lead to

hearing loss.[5] First 3-4 years of life are important for the development of sensory system and hence the acquisition of speech and language. Screening for hearing allows hearing impairment detected at an early age.[4]

The American Academy of Paediatrics suggested Tympanometry to confirm the diagnosis of OME. The sensitivity of tympanometry in detection of OME in the middle ear is 90%-94%.[6] The tympanometer is a portable instrument that provides numerical data on the functioning of the middle ear and Eustachian tube structures and the presence of fluid in the middle ear. The information is presented as a tympanogram, a type of graph. Tympanometry is unreliable in infants under 7 months old because to the infants' relatively flexible ear canals. Type A (normal), Type B (flat, diagnostic for OME), and Type C (indicates Eustachian tube dysfunction) tympanogram tracings are the three categories.[7]

Hunaid et al found the prevalence of OME in Qassim region of the Kingdom of Saudia Arabia to be 7.5% [[8]]. Ali et al found the prevalence of OME among the school going children in Lahore to be 14.4%.[9]

Most of the data till date is taken from the western studies. Limited studies have been done in our country and that too are mostly done in school children and upper RTI has not been taken into consideration. This study was planned to identify the cases of OME in patients with recurrent upper RTI by performing tympanometry in our setup. Early identification of cases of OME will lead to early treatment and prevention of consequences of OME.

Methodology

This cross sectional study was conducted in the department of ENT at Shifa Foundation Community Health Centre (SFCHC). The study was conducted in a period of one year from February 2020 to February 2021. The study was started after taking approval from institutional review board (IRB). An informed consent form was signed from the child's parents/guardian which would clearly state that the test to be performed on the patient has no adverse effects and is free of cost. By using WHO sample size calculator, taking alpha 0.05, 95% confidence interval, and anticipated population proportion of 7.5%, the estimated sample size was turned out to be 101. The study sample was collected by using non-probability convenient sampling technique.

Children of both genders having age of 6 months to 12 years, presenting with recurrent upper respiratory tract infections including acute or chronic rhinitis, sinusitis, adenoiditis and tonsillitis (more than 2 episodes of upper respiratory tract infection in the last 12 weeks), children with poor performance in school, and with speech and language abnormalities were included in the study. Children with craniofacial abnormalities that predispose to OME due to poor Eustachian tube function, with discharging ears or with tympanic membranes perforations, having any congenital deafness (mostly sensorineural) were excluded from the study.

Otoscopic examination was performed by one of the team members who were unaware of the child's history and study status. The patients in whom tympanic membranes showed signs of OME i.e. dull and opaque tympanic membrane, loss of light reflex and a prominent lateral process of Malleus were subjected to tympanometry. Tympanometry was done by a staff member who were unaware of the study status of the child. The examiner and performer of the test were kept unaware of the study status of the child to minimize the biasness. All the information regarding demographics of the child, detailed ENT history, physical examination and signs of OME were noted in a predesigned performa.

With SPSS version 25, all of the acquired data was input and examined. Quantitative factors were provided as mean standard deviation, whereas qualitative variables were reported as frequency and percentages. For both quantitative and qualitative data, the independent sample t-test and Chi-square test were used. P-values under 0.05 were considered significant.

Results

In this study a total of 101 children were included having mean age of 7.35 ± 2.30 years. Most of the children included in the study were males (59.4%) and presented with nasal obstruction (98%). Almost all the children presented with mouth breathing (97%) and sore throat (98%) as given in table I.

On physical examination of the children it was observed that almost all the children had no Deviated nasal septum (DNS) (98%), nasal polyps (100%) or tender sinuses (100%) in the study sample. Almost all the children presented with Mucopurulent Discharge in Nose (94.1%), Adenoid Hypertrophy (98%) and Congested Tonsils (96%). Similarly, Turbinate Hypertrophy was seen in only 1 (1%) child as elaborated in table II.

The distribution of signs of OME showed that Dull/Opaque tympanic membrane was present in 23 (22.8%) children, light reflex was noted in 75 (74.3%)

children and prominent short process of malleus was present in 27 (26.7%) children. In this whole sample of children, 24 (27.6%) children showed Tympanometry Graph of Type B as given in table III.

Table I: Distribution of demographic and presenting history

Characteristics	Categories	N	%
Age	(Mean ± SD)	7.35 ± 2.30	
Gender	Male	60	59.4
	Female	41	40.6
Nasal Obstruction	Present	99	98.0
	Absent	2	2.0
Nasal Discharge	Present	94	93.1
	Absent	7	6.9
Headache	Present	1	1.0
	Absent	100	99.0
Facial Pain	Present	0	0.0
	Absent	101	100.0
Mouth Breathing	Present	98	97.0
	Absent	3	3.0
Sore Throat	Present	99	98.0
	Absent	2	2.0

Table II: Distribution of the variables assessed for physical examination

Characteristics	Categories	N	%
DNS	Present	2	2.0
	Absent	99	98.0
Nasal Polyps	Present	0	0.0
	Absent	101	100.0
Tender Sinuses	Present	0	0.0
	Absent	101	100.0
Mucopurulent Discharge in Nose	Present	95	94.1
	Absent	6	5.9
Turbinate Hypertrophy	Present	1	1.0
	Absent	100	99.0
Adenoid Hypertrophy	Present	98	97.0
	Absent	3	3.0
Congested Tonsils	Present	97	96.0
	Absent	4	4.0

Table III: Distribution of signs of OME.

Characteristics	Categories	N	%
Dull/Opaque tympanic membrane	Present	23	22.8
	Absent	78	77.2
Light Reflex	Present	75	74.3
	Absent	26	25.7
Prominent Short Process of Malleus	Present	27	26.7
	Absent	73	72.3
Tympanometry Graph: Type B	Yes	24	27.6
	No	63	72.4

Discussion

Otitis media with effusion is a common childhood otological disorder that frequently goes undetected due to ignorance about the problem and failure to seek prompt medical assistance for minor illnesses. Untreated OME may have major side effects, including anatomical problems in the middle ear cleft, delayed speech and cerebral development, and impaired speaking. Poor eustachian tube function may cause OME to develop spontaneously, or it may result from an inflammatory reaction to acute otitis media. 90% of children have OME at some point before entering school, most frequently between the ages of 6 months and 4 years.[10,11]

The high prevalence of OME, challenges with diagnosis and assessment, duration, increased risk of conductive hearing loss, potential effects on language and cognition, and significant practise variations in management make OME an important condition for the use of current evidence-based practise guidelines. Proper management of OME depends on accurate diagnosis. To avoid overusing antibiotics, OME must also be distinguished from acute otitis media.[12]

An acute illness affecting the nose, paranasal sinuses, pharynx, and larynx that is caused by a combination of microbial load (viral and bacterial) and immune response is known as an upper respiratory tract infection (URTI). Infants and young children are more likely to get upper respiratory tract infections, which frequently lead to bacterial problems, especially acute otitis media. This is because germs can enter the middle ear through the Eustachian tube after colonizing the nasopharynx.[13,14]

In this present study it was noted that the mean age of children in study sample was 7.35 ± 2.30 years with a male (59.4%) dominance. Most of the children presented with nasal obstruction (98%), mouth breathing (97%) and sore throat (98%). The physical examination of children showed that almost no child had nasal septum (DNS) (98%), nasal polyps (100%) or tender sinuses (100%) in the study sample. Almost all the children presented with Mucopurulent Discharge in Nose (94.1%), Adenoid Hypertrophy (98%) and Congested Tonsils (96%). These findings on presentation and physical examination were found to be parallel with other studies on this topic like a study by Hashmi H, et al also found similar results.[15]

Otitis medium is an acute URTI that affects the middle ear's respiratory mucosa. It affects kids under 6 years old commonly, but considerably less frequently in those older

than that.[16] Otitis media is the most typical reason for paediatric surgery and antibiotic prescription in affluent nations. The most typical type of otitis media is OME. In screening studies, the point prevalence for young children is about 20%. OME can happen on its own, as a side effect of rhinosinusitis, or after an episode of AOM. The pathophysiology of OME has been linked to the same respiratory bacterial infections seen with AOM. The majority of kids with OME recover on their own within three months, and complications are rare.[17] OME is typically accompanied with a 25 dB or less hearing loss. Despite numerous research, there is no concrete evidence linking OME to speech and language delays. Otitis media in children typically manifests with symptoms of pain, fever, hearing loss, or ear discharge. Otitis media in some kids is found during a routine checkup.[18]

According to the results of this present study the signs of OME showed that Dull/Opaque tympanic membrane was present in 22.8% children, light reflex was noted in 74.3% children and prominent short process of malleus was observed in 26.7% children. In this whole sample of children, 27.6% children showed Tympanometry Graph of Type B. These findings are consistent with earlier studies' findings that OME with hearing loss is frequent among kids with recurrent upper respiratory infections and vague ear symptoms.[12, 19]

Tympanometry or acoustic reflectometry should be taken into consideration as an addition to pneumatic otoscopy when the diagnosis of OME is unclear. The recommendation to wait and watch for three months in cases of otitis media with effusion is reasonable due to the condition's high rate of spontaneous remission. Depending on the severity and duration of the symptoms, an individual decision about additional treatment should be made.[20]

Conclusion

Children who have a history of upper respiratory infections, general ear problems, and poor academic performance are more likely to develop otitis media with effusion. Though, this is a benign condition with a high rate of spontaneous resolution, yet it leads to parental apprehension, multiple unnecessary investigations and sometimes unjustified medication. OME usually goes away on its own, but in some kids, it can linger. Hearing loss is the main sign of OME. Due to under diagnosis, this illness frequently results in untreated hearing issues, which can impair speech and language development and negatively impact academic performance.

References

1. Siddartha, Bhat V, Bhandary SK, Shenoy V, Rashmi. Otitis media with effusion in relation to socio economic status: a community based study. Indian J Otolaryngol Head Neck Surg. 2012;64(1):56-8. https://doi.org/10.1007/s12070-011-0163-4
2. Kocyigit M, Ortekin SG, Cakabay T, Ozkaya G, Bezgin SU, Adali MK. Frequency of Serous Otitis Media in Children without Otolaryngological Symptoms. Int Arch Otorhinolaryngol. 2017;21(2):161-4. https://doi.org/10.1055/s-0036-1584362
3. Francesco RC, Barros VB, Ramos R. Otitis media with effusion in children younger than 1 year. Rev Paul Pediatr. 2016; 34(2): 148-53. https://doi.org/10.1016/j.rppede.2016.01.003
4. Sharma K, Pannu MS, Arora A, Sharma V. Preventive Audiology: Screening for Hearing Impairment in Children Having Recurrent URTI. Indian J Otolaryngol Head Neck Surg. 2016;68(2):163-6. https://doi.org/10.1007/s12070-015-0937-1
5. Erdivanli OC, Coskun ZO, Kazikdas KC, Demirci M. Prevalence of Otitis Media with Effusion among Primary School Children in Eastern Black Sea, in Turkey and the Effect of Smoking in the Development of Otitis Media with Effusion. Indian J Otolaryngol Head Neck Surg. 2012;64(1):17-21. https://doi.org/10.1007/s12070-011-0131-z
6. Rosenfeld RM, Shin JJ, Schwartz SR, Coggins R, Gagnon L, Hackell JM, Hoelting D, Hunter LL, Kummer AW, Payne SC, Poe DS, Veling M, Vila PM, Walsh SA, Corrigan MD. Clinical Practice Guideline: Otitis Media with Effusion (Update). Otolaryngol Head Neck Surg. 2016;154(1 Suppl):S1-S41. https://doi.org/10.1177/0194599815623467
7. Chan J, Najafi A, Baker M, Kinsman J, Mancl LR, Norton S, Bly R, Gollakota S. Performing tympanometry using smartphones. Commun Med (Lond). 2022;2:57. https://doi.org/10.1038/s43856-022-00120-9
8. Hunaid AH, Ashraf AS, Masood KA et al. Prevalence and risk factors of otitis media with effusion in school children in Qassim region of Saudi Arabia. Int J Health Sci. 2014;8(4):325-34. https://doi.org/10.12816/0023990
9. Ali L,Baloch GR,Khan MA et al. Screening Tympanometry in school children: criteria for detection of middle ear effusion. Pak Paed J Mar 2004;28(1):21-4
10. Chang FL, Chen CH, Cheng HL, Chang CY, Leong JL, Chang YT, et al. Efficacy of Ventilation Tube Insertion with Palatal Repair for Otitis Media in Cleft Palate: Meta-Analysis and Trial Sequential Analysis. J Pers Med. 2022;12(2):255. https://doi.org/10.3390/jpm12020255
11. Saad K, Abdelmoghny A, Abdel-Raheem YF, Gad EF, Elhoufey A. Prevalence and associated risk factors of recurrent otitis media with effusion in children in Upper Egypt. World J Otorhinolaryngol Head Neck Surg. 2020;7(4):280-4. https://doi.org/10.1016/j.wjorl.2020.08.002
12. Raza M, Jalil J, Shafique M, Ghafoor T. Frequency of Otitis Media with Effusion in Recurrent Upper Respiratory Tract Infection in Children. J Coll Physicians Surg Pak. 2008;18(4): 226-9.
13. Bentivegna D, Salvago P, Agrifoglio M, Ballacchino A, Ferrara S, Mucia M, et al. The linkage between upper respiratory tract infections and otitis media: evidence of the 'united airways concept. Acta Medica Mediterranea. 2012;28:287.
14. Thomas M, Bomar PA. Upper Respiratory Tract Infection. [Updated 2022 Jun 27]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532961/

15. Hashmi H, Sasoli NA, Sadiq A, Raziq A, Batool F, Raza S, Iqbal Q, Haider S, Umer Jan S, Mengal MA, Tareen AM, Khalid A, Saleem F. Prescribing patterns for upper respiratory tract infections: a prescription-review of primary care practice in Quetta, Pakistan and the implications. Front Public Health. 2021;9:787933. https://doi.org/10.3389/fpubh.2021.787933
16. Morris PS. Upper respiratory tract infections (including otitis media). Pediatr Clin North Am. 2009;56(1):101-17. https://doi.org/10.1016/j.pcl.2008.10.009
17. Jamal A, Alsabea A, Tarakmeh M. Effect of ear infections on hearing ability: a narrative review on the complications of otitis media. Cureus. 2022;14(7):e27400. https://doi.org/10.7759/cureus.27400
18. Ciprandi G, Passali FM, Passali D. The impact of infections in the otolaryngologist's practice. Acta Biomed. 2022 Oct 26;93(5):e2022215.
19. Zhu Z, Zheng GX, Li Q, Shi QL, Zhou HG, Fang RP. [Analysis of related factors of recurrent otitis media with effusion in children]. Lin Chuang Er Bi Yan Hou Tou Jing Wai Ke Za Zhi. 2017;31(15):1168-73.
20. 20. Abbott P, Rosenkranz S, Hu W, Gunasekera H, Reath J. The effect and acceptability of tympanometry and pneumatic otoscopy in general practitioner diagnosis and management of childhood ear disease. BMC Family Practice. 2014;15:181. https://doi.org/10.1186/s12875-014-0181-x