

ORIGINAL RESEARCH

Socio-Demographic And Clinical Assessment Of Patients With Tympanic Perforation- A Cross Sectional Study

¹Dr. Vidushee Upadhyay, ²Dr. Ankur Gupta, ³Dr. Digvijay Singh Nargave, ⁴Dr. Lavi Ukawat

¹Medical Officer, ENT Department, Sardar Vallabh Bhai Patel District Hospital, Satna, M.P, India

²Assistant Professor, ENT Department, SRMS, IMS, Bareilly, U.P, India

³ENT, Private Practitioner, Barwani, M.P, India

⁴Assistant Professor, ENT Department, GMC, Haldwani, Uttarakhand, India

Corresponding Author

Dr. Lavi Ukawat

Assistant Professor, ENT Department, GMC, Haldwani, Uttarakhand, India

Email: Lavi_9010@Hotmail.Com

Revised date: 28 December, 2023

Acceptance date: 27 January, 2024

ABSTRACT

Background: Tympanic membrane perforation is a common otological disorder with associated hearing impairment. Despite the high prevalence of chronic otitis media (COM) in low to middle-income countries, there are few studies regarding its associated factors, health-related quality of life, and treatment costs.

Aim: This study aimed at determining the socio-demographic and clinico epidemiological pattern of tympanic membrane perforation in a tertiary hospital, New Delhi.

Methods: This cross sectional observational study was carried out in ENT Department at Jaipur Golden Hospital, New Delhi. Patients of 12 to 45 years of age, central tympanic perforation with intact ossicular chains and conductive deafness ranging from 25dB to 40dB were included in this study. Detailed history was taken and complete general and systemic examination was conducted and any relevant positive finding was recorded. Investigations like tuning fork test and pure tone audiometry was done for assessment of hearing loss.

Results: Majority (46.25%) patients were in the age group of 21-30 years, predominantly male (62.5%). Most of the cases 64 (80%) had unilateral involvement, among that 33 (41.25%) patients had right ear involvement, 31 (38.75%) had left ear involvement and 20% had bilateral ear involvement at the time of presentation. Hearing loss and ear discharge was the most common clinical presentation. Most common (60%) tympanic membrane perforation was medium size central perforation. Majority of cases (55.7%) had a conductive hearing loss between 21-30 db.

Conclusion: Health awareness campaign, improved health education and easy accessibility to health care facilities can reduce the morbidity and mortality due to tympanic membrane perforation.

Keywords: Chronic Otitis Media, Tympanic Membrane Perforation, Clinico-demographic Profile, Hearing loss

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution- Non Commercial- Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non- commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Tympanic membrane (TM) forms the partition between external acoustic canal and middle ear [1]. It is slightly oval in shape and forms an angle of about 55 degree with the floor of meatus [2]. It is divided into two parts- pars tensa, which forms most of the TM and pars Flaccida or the Shrapnel's membrane. It protects the middle ear cleft and amplifies and transmits sound waves from external auditory canal through ossicular chain to oval window and cochlea due to its vibratory characteristic [3]. Tympanic membrane perforation occurs when there is a break in its continuity, resulting

in a hole with direct communication between the external auditory canal and the middle ear cleft. This increases the potential to middle ear cleft infection with a resultant hearing impairment [4]. Tympanic membrane is a membranous partition separating the external auditory meatus from the tympanic cavity, measuring 9-10 mm vertically and 8-9 mm horizontally [5]. It plays a major role in middle ear transformer mechanism. Tympanic membrane perforation is caused by variety of causes, the most common being trauma and infections. Trauma (Barotrauma, temporal bone fracture), Infections (Acute otitis media, chronic otitis

media, TB). Tympanic membrane perforation leads to varying degree of conductive hearing loss. Loss of hearing is a national health problem with significant physical and psychosocial problem. So it is important to diagnose and treat tympanic membrane perforation as early as possible as untreated tympanic membrane perforation leads to ongoing destructive changes in the middle ear, thus adding to further hearing loss. The incidence of otitis media and tympanic membrane perforation is high in our region; so we have undertaken this study. The site and the size of the perforation, whether or not it contacts the manubrium mallei, as well as the volume of the middle ear and of the mastoid are some of the factors that affect the level of the hearing loss [6]. Results obtained in the few previous studies show that large perforations that are posteriorly located and contact the manubrium mallei increase the conductive hearing loss level, especially at lower frequencies [7, 8]. Likewise, severity of the hearing loss increases as the volumes of the air cells in the middle ear and the mastoid bone decrease. In central perforation, the perforation is within the pars tensa or with the annulus intact. However, in marginal perforation, there is destruction of the annulus and the sulcus tympanicus. The attic perforations involve the pars flaccida and usually associated with cholesteatoma [9].

AIMS & OBJECTIVES

Aim of this study to determine the socio-demographic characteristics and clinical presentation of tympanic perforation patients with tympanic membrane perforation.

MATERIALS AND METHODS

This cross sectional observational study was carried out in ENT Department at Jaipur Golden Hospital, New Delhi. The duration of the study was 20 months from January 2017 to August 2018. A total of 80 patients diagnosed with persistent central perforation of tympanic membrane were enrolled in the study.

Inclusion criteria: 12 to 45 years age group patients, central tympanic perforation with intact ossicular chains, conductive deafness ranging from 25dB to 40dB and absence of granulations, edema, hyperemia or polyps of mucus membrane were included in this study

Exclusion criteria: Patients of age <12 years or >45 years, sensorineural hearing loss OR mixed hearing loss or conductive hearing loss >40dB and evidence of cholesteatoma, severe tympanosclerosis, chronic otitis externa, complications of chronic otitis media were excluded. After obtaining the written informed consent

for the study, the detailed socio-demographic, clinical history and examination were carried out as per the pre designed proforma. Patients name, age, sex, address, occupation and hospital registration number were noted. A detailed history regarding presenting complaints, history of present illness, past history, family history, and personal history was obtained from the patients. Assessment of hearing loss was done by audiometry methods by Pure Tone Audiometer which is calibrated for precision and accuracy A detailed otological examination was performed. If any discharge was found preoperatively, the patient was treated medically before taking up for surgery. All the cases were subjected to an otoscopic examination with otomicroscope preoperatively:

1. To identify the type of perforation
2. To find out the condition of middle ear mucosa.
3. To note the condition of the drum remnant, whether adherent to the middle ear mucosa or not.
4. To note the condition and mobility of ossicular chain.
5. To note the condition of the opposite ear.

Tuning fork tests were done in all the patients. These tests included the Rinne's test, Weber's test and the Absolute Bone Conduction test. The findings were recorded and later compared with pure tone audiogram

Statistical analysis: The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 software. Qualitative variables are expressed as frequencies/percentages and evaluated using McNemar Test. Quantitative variables are expressed as Mean±SD and compared across groups using paired t-test, unpaired t-test and ANOVA. Pearson's correlation coefficient is used to assess correlation between a pair of quantitative variables. P value < 0.05 will be considered statistically significant

RESULTS

80 patients having tympanic membrane perforations undergoing for Myringoplasty were analysed in this study.

Maximum numbers of patients i.e. 37(46.25%) were in the age group of 21-30 years followed by 22(27.50%) were in the age group of 31-40. The mean age of study population is 28.54 years ±7.65 SD. Most of the patients, 50 (62.50%) were males and 30 (37.50%) were females. Most of the cases 64 (80.00%) had unilateral involvement of ear while 16 patients (20.00%) had bilateral ear involvement at the time of presentation. Among those with unilateral ear involvement, 33 (41.25%) patients had right ear involvement, 31 (38.75%) had left ear involvement

Table 1: Socio-demographic characteristics of the study participants

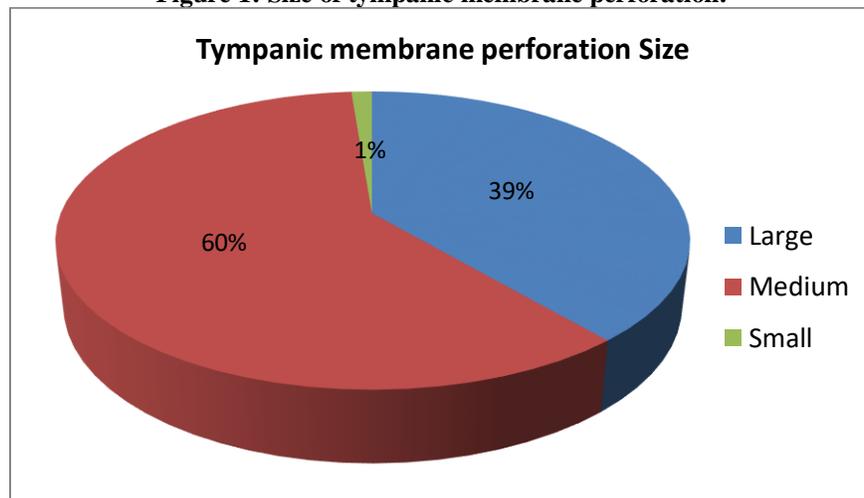
Socio-demographic characteristics		Frequency	Percentage
Age group (in years)	≤ 20	14	17.50%
	21 – 30	37	46.25%
	31 – 40	22	27.50%
	41 – 50	7	8.75%
Mean±SD = 28.54±7.65			
Gender	Male	50	62.5%
	Female	39	37.5%
Ear Involved	Right side	33	41.25%
	Left side	31	38.75%
	Bilateral	16	20%

Table 2: Clinical presentation of study subjects

Clinical presentation	Duration in months (Mean±SD)
Hearing loss	3.61±1.76
Ear Discharge	5.54±3.68

31(38.75%) cases had large central perforation, 48(60.00%) cases had medium size central perforation and 1 case (1.25%) had small central perforation

Figure 1: Size of tympanic membrane perforation:



We have selected patients with conductive hearing loss ranging from 25dB to 40dB. 42 patients (52.50%) had hearing loss in the range 21-30dB while 38 patients (47.50%) had hearing loss in the range 31-40dB

Table 3: Audiological assessment of hearing level among study subjects:

Hearing level in dB(Basis: PTA)	Preoperative status	
	N	%
< 0	0	0.00%
0 - 10	0	0.00%
11 - 20	0	0.00%
21 - 30	42	52.5%
31 - 40	38	47.5%
41 - 50	0	0.00%
TOTAL	80	100%

Out of 80 patients, 64 patients had unilateral involvement of ear and were operated for same. 16 patients had bilateral involvement of ear. Among such cases, in 8 patients, left ear was operated while in 8 patients right ear was operated.

Table 4: Ear operated

Ear operated		N	%
Unilateral	Right	33	41.25%
	Left	31	38.75%
Bilateral	Right	8	10.00%
	Left	8	10.00%
TOTAL		80	100%

In this study, tragal perichondrium is used as grafting material in 2 cases while in rest of the cases, temporalis fascia was used as graft

DISCUSSION

Tympanic membrane perforation is one of the most common otological signs and symptoms encountered in most otorhinolaryngological practice. COM is a preventable cause of acquired hearing loss. Its early detection and timely management are essential to avoid its debilitating sequelae and complications. Though this disease is highly prevalent across the globe, its exact regional prevalence, disease pattern, and treatment challenges often remain underreported [10]. There was male preponderance over female in this study. This is similar to the findings in previous studies; Adegbiyi, et al [11], Raj R, et al [12] and Suneha, et al [13]. Men are highly adventurous group, more outdoor activities, more prone to injuries and exposed to infection in their day-to-day activities. In our study, the commonest age group affected was 21-30 years; the mean age of study population was 28.54 years. Constant finding also reported by Fida HAT et al [14] and Lou ZC, et al [15]. Probably this is the age for jobs and also of marriage which compel the patients for reconstructive surgery. Singh B, et al [16] reported that COM was more common among rural population, it is due to poor education, medical attention and poor socioeconomic status.

Unilateral tympanic membrane perforation recorded a higher prevalence among the studied patients, and right ear was more commonly affected than the left ear, these finding comparable with the many other studied: K. K. Pannu, et al [17] and Asher M, et al [18]. The common presenting symptoms of our patients were hearing loss and ear discharge, similar to previous researchers: Olusola A et al [19] and Orji FT et al [20]. The presenting symptoms may be related to the severity and extent of the injuries as 20.8% of our patients had both TMs affected. Regarding the factors associated with COM, a study conducted by Perez-Herrera, et al [21]; found a statistically significant association between the low socioeconomic status and the development of COM. This association could be explained by the poor nutrition, hygiene conditions, and the healthcare access barriers that mainly affect populations of the low socioeconomic status. Chronic suppurative otitis media was the most common finding associated with tympanic membrane perforation in this study, the most of the COM cases had medium size central perforation, in

agreement to the Maqbool M, et al [22] and Herkal K, et al [23]. In our study hearing loss significantly associated with the size of perforation, hearing loss increased with increase in size of perforation at each frequency, concordance with the Gulati SP, et al [24] and Lerut B, et al [25]. A study conducted by, Voss et al. [26] stated that hearing loss does not depend on the location of perforation.

CONCLUSION

COM is an important preventable cause of hearing impairment and other deleterious symptoms. Evaluating the regional socioeconomic and clinical profile of these patients provides a framework for formulating locally efficient management policies. Patients frequently present with ear discharge and hearing loss. Most common tympanic membrane perforation was medium size central perforation. Frequency of hearing loss increases with the size of perforation.

REFERENCES

1. Dhingra PL, Dhingra S. Diseases of ear, nose and throat, 7th ed. RELX India Private Limited. 2017.
2. Browning GG, Burton MJ, Clarke R, Hibbert J, Jones NS, Lund VJ et al. Scott-Brown's Otorhinolaryngology, Head and Neck Surgery, 7th ed. CRC Press. 2008.
3. Wahid FI, Nagra SR. Incidence and characteristics of Traumatic Tympanic Membrane perforation. Pak J Med Sci. 2018; 34(5):1099.
4. Gulya AJ, Glasscock ME. Glasscock-Shambaugh Surgery of the Ear. 5th ed. Spain: BC Decker Inc.; 2003. p. 400-20.
5. Donaldson JA, Duckert LG (1991) Anatomy of the ear. In: Paparella MM, Shumrick DA (eds) Otolaryngology. Basic sciences and related principles, 3rd edn. WB Saunders Company, Philadelphia, p 26.
6. Park H, Hong SN, Kim HS, Han JJ, Chung J, Suh MW, et al. Determinants of conductive hearing loss in tympanic membrane perforation. ClinExp Otorhinolaryngol 2015; 8; 92-6.
7. Mehta RP, Rosowski JJ, Voss SE, O'Neil E, Merchant SN. Determinants of hearing loss in perforations of the tympanic membrane. Otol Neurotol 2006; 27; 136-43.
8. Gaur S, Sinha ON, Bhushan A, Batni G. Observations on tympanic membrane perforations (safe type) and hearing loss. Indian J Otolaryngol Head Neck Surg 2017; 69; 29-34.
9. Gelfand SA. Essentials of Audiology. 3rd ed. New York: Thieme Medical Publishers; 2009. p. 171-2.
10. Ibekwe TS, Ijaduola GT, Nwaorgu OG. Tympanic

- membrane perforation among adults in West Africa. *Otol Neurotol* 2007; 28:348-52
11. Adebijl WA, Olajide GT, Olajuyin OA, Olatoke F, Nwawolo CC. Pattern of tympanic membrane perforation in a tertiary hospital in Nigeria. *Niger J Clin Pract* 2018; 21:1044-9.
 12. Raj R, Meena SK, Meena DR, Meena M. A study on fate of traumatic tympanic membrane perforation. *Indian J Anat Surg Head Neck Brain* 2016; 2:76-8.
 13. Swati Suneha , Mukesh Kumar, Kranti Bhavana, Clinical and Socio-demographic Profiles of Patients with Chronic Otitis Media Seeking Health Care at a Tertiary Care Center of Bihar: A Prescription-based Analysis, *Otorhinolaryngology Clinics: An International Journal*, Volume 14 Issue 1 (January–April 2022).
 14. Fida HAT, Raghavendra PKU. A clinical study of traumatic tympanic membrane perforation. *Int J Otorhinolaryngol Head Neck Surg* 2021; 7:1668-72.
 15. Lou ZC, Lou ZH, Zhang QP. Traumatic tympanic membrane perforations: a study of etiology and factors affecting outcome. *Am J Otolaryngol*. 2012; 33:549-55.
 16. Singh B, Verma JK. Clinico-demographic profile of tympanic membrane perforation cases in tertiary care hospital in Bundelkhand Region of India. *International Journal of Contemporary Medical Research* 2021;8(1):A1-A4.
 17. Kulwant Kaur Pannu • Snya Chadha, Dinesh Kumar, Preeti, Evaluation of Hearing Loss in Tympanic Membrane Perforation, *Indian J Otolaryngol Head Neck Surg* (July–September 2011) 63(3):208–213; DOI 10.1007/s12070-011-0129-6
 18. Ashier M, Özay H, Gürkan S, Kırkım G, Güneri EA. The Effect of Tympanic Membrane Perforation Site, Size and Middle Ear Volume on Hearing Loss. *Turk Arch Otorhinolaryngol* 2019; 57(2): 86-90
 19. Olusola A Sogebi, Emmanuel A Oyewole and Taofeeq O Mabifah, Traumatic tympanic membrane perforations: characteristics and factors affecting outcome, *Ghana Med J* 2018; 52(1): 34-40 DOI: <http://dx.doi.org/10.4314/gmj.v52i1.7>
 20. Orji FT. Non-explosive blast injury of the tympanic membrane in Umuahia, Nigeria. *Niger J Med*. 2009; 18:365-9
 21. Pe rez-Herrera LC, Peñaranda D, MorenoLo ´pez S, Otoyato AM, Gutie ´rrez- Velasco L, Garcı ´a JM, et al. (2020) Associated factors, healthrelated quality of life, and reported costs of chronic otitis media in adults at two otologic referral centers in a middle-income country. *PLoS ONE* 15(12): e0244797. <https://doi.org/10.1371/journal.pone.0244797>
 22. Maqbool M. Anatomy of the ear. In: Maqbool M, Maqbool S, editors. *Text Book of Ear, Nose and Throat Diseases*. 11th ed. New Delhi: Jaypee Brothers Medical Publishers; 2007. p. 7-22.
 23. Herkal K, Ramasamy K, Saxena SK, Ganesan S, Alexander A. Hearing loss in tympanic membrane perforations: an analytic study. *Int J Otorhinolaryngol Head Neck Surg* 2018; 4:1233-9.
 24. Gulati SP, Sachdeva OP, Kumar P (2002) Audiological profile in CSOM. *Indian J Otolaryngol* 8:24–28
 25. Lerut B, Pfammatter A, Moons J, Linder T. Functional correlations of tympanic membrane perforation size. *Otol Neurotol*. 2012; 33(3):379–86.
 26. Voss SE, Rosowski JJ, Merchant SN, Peake WT (2001) how do tympanic membrane perforations affect middle ear sound transmission. *Acta Otolaryngol* 121(2):169–173