Original Research Article

# Prevalence of ossicular chain abnormalities in patients with chronic suppurative otitis media: A hospital-based study

Chethan Kumar G[1*], Gopakumar K P[2], Niaz Fakhruddin[3], Praseeda Prasad R[4], Adhavan E[5]

[1]Associate Professor, [2]Professor and HOD, [3]Assistant Professor, [4,5]Jr. Resident, Department of ENT, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu, INDIA.
**Email:** meetchethu2007@gmail.com

## Abstract

**Background:** The management of chronic suppurative otitis media (CSOM) had witnessed a profound change over the last 100 years, from the early attempts at surgical exposure of the middle ear in 1889 to the present-day techniques of tympanoplasty. This present study was planned and conducted to find the commonest ossicular pathology in CSOM. **Materials and Methods:** This study was conducted in the department of ENT, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Tamil Nadu from the period October 2015 to February 2017. This study was ethically cleared from Institutional Human Ethical Committee. A total 40 patients were included in this study based on the inclusion and exclusion criteria. Inform consent was obtained from each patient. All the patients' demographic and clinical data was collected. **Results:** Maximum number of patients with age between 21-30 years. Males (28) were more compared to females (12). 52.5% patients had problem with left ear. All the patients had otorrhoea. 37 patients had hearing loss. Maximum number patients had symptoms past 3 years compared to others. Patients with central perforation (28) were more compared to others. 35 patients had air bone gap above 30 dB. **Conclusion:** CSOM is common condition. Central perforation is the most common symptom was observed in this study. This study gave idea about prevalence of ossicular chain abnormalities in patients with chronic suppurative otitis media in the population. This data may be useful for better diagnosis and identification of pathology.

**Key Words:** Chronic suppurative otitis media, ossicular chain abnormalities, otorrhoea, perforation.

[*]**Address for Correspondence:**
Dr. Chethan Kumar G., Associate Professor, Department of ENT, Sree Mookambika Institute of Medical Sciences, Kulasekharam Kanyakumari (Dist), Tamil Nadu, INDIA.
**Email:** meetchethu2007@gmail.com
Received Date: 20/09/2018 Revised Date: 14/10/2018 Accepted Date: 03/11/2018
DOI: https://doi.org/10.26611/1016821

| Access this article online | |
|---|---|
| Quick Response Code: | Website: www.medpulse.in |
| | Accessed Date: 08 November 2018 |

## INTRODUCTION

Hearing is one of the vital senses of human beings. Deafness upsets the tranquility of life. When such a great vital sensation is lost, life naturally loses its charm. In India, the incidence of CSOM is very high. About 30% of patients who attend ENT Outpatient Department suffer from CSOM[1,2]. The common pathological conditions affect sound conduction is tympanic Membrane Perforation: Two factors combine to affect the conductive system when a perforation of the tympanic membrane is present. The first is due to the entrance of in phase sound energy through the perforation, which interferes with the vibration of the remaining drumhead and with the stapes by reaching the round window directly. This factor affects chiefly low-frequency transmission and becomes less significant in larger perforations[3-5]. The major factor influencing hearing loss with tympanic membrane perforations is the loss of areal ratio due to the reduction of drumhead area. The hearing loss associated with a perforation is directly proportional to the size of perforation[6]. Perforation with Ossicular Interruption: Approximately 60% of patients undergoing surgery for

How to cite this article: Chethan Kumar G, Gopakumar K P, Niaz Fakhruddin, Praseeda Prasad R, Adhavan E. Prevalence of ossicular chain abnormalities in patients with chronic suppurative otitis media: A hospital-based study. *MedPulse International Journal of ENT.* November 2018; 8(2): 20-23. https://www.medpulse.in/ENT/

chronic ear disease have perforation with ossicular interruption. The typical hearing loss is worse at the lower frequencies and averages 38 dB. Larger perforations cause slightly worse hearing, but this difference is variable. The components of this hearing loss are believed to be assignable as follows: loss of hydraulic lever 26.5 dB, loss of ossicular-catenary lever 7.3 dB, and phase cancellation, 5.0 dB, for and total of 38.3 dB[7,8]. Total Loss of Tympanic Membrane and Ossicles: Much less frequent is this form of pathology. As reported by Austin, the contour of the hearing loss is the same as the previous group but more severe, averaging 50 dB. The greater hearing loss is probably due to increased phase cancellation at the round window. Components of this loss are believed to be assignable as follows: loss of hydraulic lever 26.5 dB; loss of ossicular catenary lever 7.3 dB; phase cancellation 16.2 dB, for a total of 50 dB[9]. Ossicular Interruption with an Intact Tympanic Membrane: interruption of the ossicular chain in the presence of an intact eardrum is seen more often as a consequence of surgery than a disease process. It is most often due to disarticulation of the incudostapedial joint either from a prosthesis problem or from erosion of the long process of the incus. The result is a flat hearing loss averaging 54 dB. The components of this loss are believed to be, first, a loss of the transformer system causing a 38 dB deficit and, second, an added loss caused by the obstruction to the passage of sound of the tympanic membrane. This latter factor reduces the sound pressure by 15 to 20 dB[10]. The etiopathogenesis of CSOM are tubo tympanic disease and attico-antral disease. Clinically tubo-tympanic disease presents as with active disease: When the patient reports to the clinician with a discharging ear and/or deafness. Usually the disease is preceded by either an extension of infection through the eustachian tube from the upper-respiratory tract or by way of the external auditory meatus following swimming[11]. Discharge varies from mucoid to muco-purulent, typically the discharge is non-odorous. The size of the perforation may vary from a pin hole to a large sub-total defect confined to the pars tensa. Inactive disease with dry central perforation with a pale thin middle ear mucosa. Another one is attico-antral disease has cholesteatoma[12]. The major etiological factors are environmental, genetic, previous history of Otitis media, infection, upper respiratory tract infections, allergic mediators and eustachian tube malfunction. CSOM can affect in any age group. With this background the present study was conducted to evaluate the prevalence of Ossicular Chain Abnormalities in patients with CSOM coming to the Department of ENT in this hospital.

## MATERIALS AND METHODS

This is a prospective study done in the year 2015 to 2017 in the Department of ENT, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari (Dist), Tamil Nadu. This study was ethically cleared from Institutional Research Committee and Institutional Human Ethics Committee.

**Inclusion Criteria**

- Both gender
- Patients with CSOM

**Exclusion Criteria**

- Congenital ear abnormalities
- Recent ear surgery
- Deaf
- Pregnant women
- On aminoglycoside, diuretic medication

The patients fulfill the inclusion and exclusion criteria were included in the study. A total of 40 patients were included in the study. The inform consent was taken from the all the patients before initiation of study. All the selected patients demographic data (Age, gender) and clinical data (perforated ear, type of symptom, type of perforation, air bone gap) and ear involved were noted in the case sheet.

**Statistical Analysis:** The data was expressed in number and percentage. Statistical Package for Social Sciences (SPSS 16.0) version was used for analysis. Chi square test applied to find the statistical significant. P value less than 0.05 ($p<0.05$) considered statistically significant at 95% confidence interval.

## RESULTS

A total of 40 patients with CSOM data were collected. Maximum number of patients was with age between 21-30 years (30). No patients had above age 50. Minimum number of patients had age between 11-20 (2) and 41-50 (2). Only 6 patients were age between 31-40 y (Table-1).

**Table 1:** Distribution of patients based on the age

| Age group (Years) | Number | Percentage (%) |
|---|---|---|
| 11-20 Y | 2 | 5.00 |
| 21-30 Y | 30 | 75.00* |
| 31-40 Y | 6 | 15.00 |
| 41-50 Y | 2 | 5.00 |
| Above 50 Y | 0 | 00.00 |
| **Total** | **40** | **100.00** |

(*$p<0.05$ significant 21-30 Y compared to others)

70% was males only 30% were females (Graph-1).

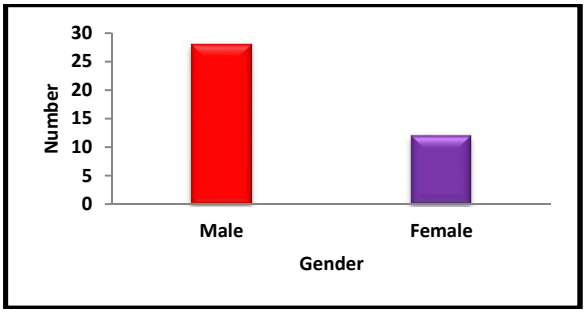


**Figure 1:** Distribution of patients based on the gender

The 21 patients had perforation in left ear and 12 with right ear. 7 patients showed perforation in both ears (Graph-2).

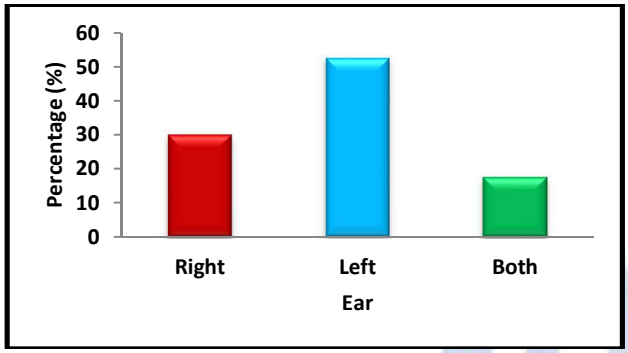


**Figure 2:** Distribution of patients based on perforation in the ear

Commonest presenting complaint was otorrhoea (100%) followed by hearing loss (92.5%) and tinnitus (10%), later earache (5%) and vertigo (2.5%) in descending order. One patient got relived of tinnitus after making external auditory canal free of discharge (Table-2).

**Table 2:** Distribution of patients based on symptoms

| Symptoms | Number | Percentage (%) |
|---|---|---|
| Otorrhoea | 40 | 100.00 |
| Hearing loss | 37 | 92.50 |
| Earache | 2* | 5.00 |
| Vertigo | 2* | 5.00 |
| Tinnitus | 4* | 10.00 |
| **Total** | **40** | |

(p<0.05 significant compared otorrhoea, hearing loss with others)

The minimum and maximum duration of presenting symptoms: otorrhoea are (8 months) and (45 years) and hearing loss (2 months) and (20 months) respectively. The overall mean duration hearing impairment is 2.8 years and Otorrhoea is 7.25 years (Table-3).

**Table-3:** Distribution of patients based on symptoms duration

| Years | Otorrhoea | | Hearing loss | |
|---|---|---|---|---|
| | Number | Percentage (%) | Number | Percentage (%) |
| 0-3 Y | 19 | 38.00 | 27 | 72.97 |
| 3.6-6 Y | 6* | 12.00 | 6* | 16.22 |
| 6.1-9 Y | 14 | 28.00 | 0 | 0.00 |
| 9.1-12 Y | 6* | 12.00 | 3* | 8.11 |
| Above 12 | 5* | 10.00 | 1* | 2.70 |
| **Total** | **50** | **100.00** | **37** | **100.00** |

(p<0.05 significant compared 0-3 Y, 6.1-9 Y with others)

On microscopic examination of the operating ears, the presence of central perforation was the commonest finding (70%) (Table-4).

**Table 4:** Distribution of patients based on type of perforation

| Type of perforation | Number | Percentage (%) |
|---|---|---|
| Central | 28 | 70.00 |
| Postero superior marginal | 5* | 12.50 |
| Attic | 7* | 17.50 |
| **Total** | **40** | **100.00** |

(*p<0.05 significant compared central with others)

Attic perforation seen in 17.5% cases and Postero Superior Marginal perforation in 12.5%. In our study we observed that 87.5% patients had hearing threshold more than 30 db (Table-5).

**Table 5:** Distribution of patients based on hearing threshold

| Air bone gap (dB) | Number | Percentage (%) |
|---|---|---|
| 0-10 dB | 0* | 0.00 |
| 11-20 dB | 1* | 2.50 |
| 21-30 dB | 4* | 10.00 |
| Above 30 dB | 35 | 87.50 |
| **Total** | **40** | **100.00** |

(*p<0.05 significant compared above 30 dB with others)

## DISCUSSION

CSOM is a stage of ear disease in which there is chronic infection of muco periosteal lining of the middle ear cleft with a non-intact tympanic membrane. There is no consensus on the duration of otorrhoea to be termed chronic. This study was conducted to know the prevalence and commonest ossicular pathology in

patients suffered with CSOM. This study included 40 patients clinically diagnosed as CSOM both safe and unsafe types are included in this study. There were 28 males and 12 females. Left ear (52.5%) was more commonly involved than right ear (30%). 17.5% patients had bilateral ear disease. The similar results were observed in the Saurabh V *et al* study[13]. Shreshtha S *et al*, Singh RK *et al,* Ajalloueyan M *et al* studies showed that the most commonly affected age group was between 16-25 years. In this study also most of the patents were aged between 20-30 years[14-16]. Gautam Kumar Nayak *et al* study showed that most of patients were presented with otorrhoea and hearing loss compared to other symptoms. In the present study also otorrhoea (100%) and hearing loss was 92.5 %. This indicates otorrhoea is the most common symptom in CSOM[17]. Roberto A *et al* observed that maximum perforation was observed in posterior (30%). In this study maximum patients showed posterior perforation compared to others[18]. These study observations showed that the most common age is 20-30 years to develop CSOM. Males more prone compared to females. CSOM can develop in the middle-aged males than females.

## CONCLUSION

This present study was conducted to evaluate the prevalence of Ossicular Chain Abnormalities in Patients with CSOM patients coming to the Department of ENT in the hospital. Prevalence studies gives idea about the commonest cause for disease. The idea about disease prevalence in the area useful for fast diagnosis and better patient care and treatment.

## REFERENCE


1. Rupa V, Jacob A, Joseph A. Chronic suppurative otitis media: prevalence and practices among rural south Indian children. Int J Pediatr Otorhinolaryngol 1999; 48(3):217-21.
2. Biswas AC, Joarder AH, Siddiquee BH. Prevalence of CSOM among rural school going children. Mymensingh Med J 2005;14(2):152-5.
3. Jose A. Chronic suppurative otitis media. BMJ Clin Evid 2007; 2:507-27.
4. Verhorff M, Van Der V, Rover MM. Chronic suppurative otitis media: A review. IJPOL 2006; 70:1-12.
5. Rahul M. Christopher VL, Robert G, Jeenu M, Kalai M, Giri N *et al*. Current concepts in the pathogenesis and treatment of chronic suppurative otitis media. JMM 2015; 65:1103-16.
6. Ritvik PM, John JR, Susan EV, Ellen O, Saumil NM. Determinants of hearing loss in perforations of the tympanic membrane. Otol Neurotol 2006;27(2):136-43.
7. Voss SE, Rosowski JJ, Merchant SN, Peake WT. How do tympanic membrane perforations affect human middle ear sound transmission. Acta Orolaryngol 2001; 121:169-73.
8. Lindeman P, Holmquist J. Measurement of middle ear volume using the impedance audiometer. Am J Otol 1981; 2:301-3.
9. Austin DF. Sound conduction of the diseased ear. J Laryngol otal 1978; 2:367-93.
10. Voss SE, Rosowski JJ, Merchant SN, Thornton AR, Shera CA, Peake WT. Middle ear pathology can affect the ear canal sound pressure generated by audiologic earphones. Ear Hear 2000; 21:265-74.
11. Manas RR, Pakeer D, Deeganta M, Venkatewar Rao, Karri S, Bolla ESJ. Ossicular chain defects in safe type of chronic suppurative otitis media. IJO 2014; 20(3):102-5.
12. Thomsen J, Bretlau P, Jorgensen MB. Bone resorption in chronic otitis media: the role of cholesteatoma, amust or an adjunct. Clin Otolaryngol 1981; 6:179.
13. Saurabh V, Ashutosh N, Bist SS, Singh RK, Gupta N, Bhagat S. Ossicular chain status in chronic suppurative otitis media in adults. Indian J Otolaryngol Head Neck Surg 2010; 62(4):421-6.
14. Shreshtha S, Sinha BK. Hearing results after myringoplasty. Kathmandu Univ Med J 2006;4(4):455-9.
15. Singh RK, Safaya A. Middle ear hearing restoration using autologus cartilage graft in canal wall down mastoidectomy. Indian J Otol 2005; 11:10-14.
16. Ajalloueyan M. Experience with surgical management of cholesteatomas. Arch Otolaryngol Head Neck Surg 2006; 132:931-3.
17. Gautam Kumar Nayak, Diazy B, Pritam C, Priyam S. Ossicular Chain status in chronic suppurative otitis media. JDMS 2016; 15(3):20-3.
18. Roberto A, Federico D, Claudia F, Andrea A, Andrea C. Ossicular chain lesions in tympanic perforations and chronic otitis media without cholestetoma. J Int Adv Otol 2015; 11(2):143-6.


Source of Support: None Declared
Conflict of Interest: None Declared