

# Hearing Loss in Tympanosclerosis

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**Abstract:** ***Objectives:** To study hearing loss in tympanosclerosis with intact membrane. **Materials and Methods:** 30 cases of tympanosclerosis with intact tympanic membrane in age 15-50 year. Clinical and audiological evaluation done. The involvement of tympanic membrane and degree of hearing loss noted. **Results:** 30 patients 16 male and 14 female. Age wise 15-20 yrs, 21-30 yrs, 31-40 yrs, 41-50 yrs was 5, 17, 5, 3 cases respectively. According to the site, anterosuperior -4, anteroinferior - 6, posterosuperior - 5, posteroinferior - 4, anterior 04, posterior 3, inferior 03, and whole tympanic membrane- 1 Tuning fork test : 20 had conducting hearing loss and 10 had normal hearing. On PTA, anterosuperior 18-20 db, anteroinferior 20-30 db, posterosuperior 20-40 db, posteroinferior 20-30 db, anteriorly 20-30 db, posteriorly 30-40db, inferiorly 20-30db and whole tympanic membrane 40db conducting hearing loss. **Conclusion:** Conductive hearing loss occur with myringosclerosis. common age group is 21-30 years. tympanosclerosis maximum in anteroinferior quadrant, maximum hearing loss with posterosuperior, posterior and whole tympanic membrane.*

**Keywords:** tympanosclerosis, hearing loss, tympanic membrane, pure tone audiogram

## 1. Introduction

Tympanosclerosis is an abnormal condition of the middle ear cleft in which there are calcareous deposits in the tympanic membrane, tympanic cavity, ossicular chain and occasionally in the mastoid. It is a clinico-anatomical entity which can also be defined as the irreversible end-result, though not immutable, of any unresolved inflammatory process in the ear that has produced anatomical injury and almost always functional impairment. Tympanosclerosis affects the tympanic membrane either alone, in which case it is given the name myringosclerosis (Doyle, 1975) or in association with other parts of the middle ear cleft.

## 2. Objectives

To study the hearing loss in tympanosclerosis cases with intact membrane according to site of tympanosclerotic patch

## 3. Materials and Methods

30 cases of tympanosclerosis with intact tympanic membrane in the age group of 15-50 who attended outpatient department of S S Institute of Medical Science and research centre were taken for the study. Ethical clearance and patient consent were taken. Study period was from January 2015 to June 2015. For all patients clinical and audiological evaluation was done. The quadrants of tympanic membrane affected by tympanosclerosis were noted and compared with the degree of hearing loss which was assessed by tuning fork tests and pure tone audiometry.

## 4. Results

Out of 30 patients 16 were male and 14 were female (fig :1). age 15-20 years 5 patients, 21-30 yrs-17 cases, 31-40 years-5 cases, 41 to 50 yrs - 3 cases (fig :2). According to the site of tympanosclerotic patch; anterosuperior quadrant - 4 patient, anteroinferior quadrant- 6 patient, posterosuperior

quadrant- 5 patient, posteroinferior quadrant- 4 patient, anterior 04, posterior 3, inferior 03, and all quadrant 1 in pars tensa.

According to tuning fork test, 20 patients had conducting hearing loss and 10 patients had normal hearing. On audiological evaluation (fig :3) anterosuperior quadrant tympanosclerosis had a conducting hearing loss about 18-20 decibel, anteroinferior about 20-30 decibel, posterosuperior quadrant 20-40 decibel and posteroinferior 20-30 decibel, anteriorly 20-30 db, posteriorly 30-40db, inferiorly 20-30db and whole tympanic membrane 40db.

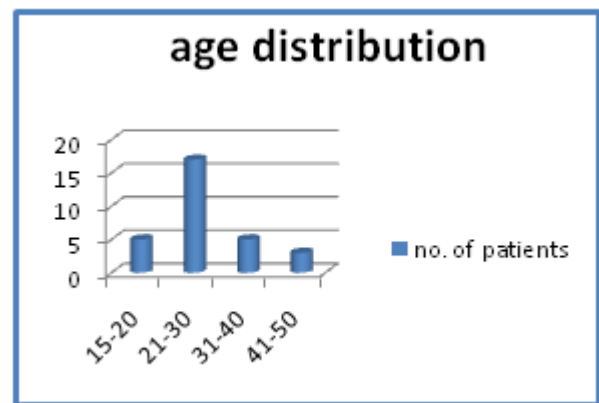


Figure 1: Age wise distribution of Tympanosclerosis patch.

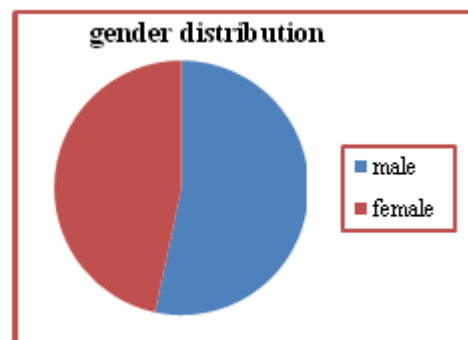


Figure 2: Gender distribution of tympanosclerosis patch

<i>Tympanic membrane quadrant involved</i>	<i>No of Patients</i>	<i>Conducive HL in dB</i>
Antero-superior	04	18-20db
Antero-inferior	06	20-30db
Postero-superior	05	20-40 db
Postero –inferior	04	20-30 db
Anterior	04	20-30 db
Posterior	03	30-40db
Inferior	03	20-30 db
whole tympanic membrane	01	40 db
	30	

**Figure 3:** Tympanosclerosis and hearing loss

## 5. Discussion

Tympanosclerosis was described by Von Troltsch in 1869 as the irreversible consequence of inflammation and/or chronic infection of the middle ear.<sup>1, 2</sup>

According to Gibb (1976), tympanosclerosis was described by Cassebohm as 'chalky patches' in the tympanic membrane as early as in 1734. Von Troltsch (1873) first created the term 'Taukensklerose' to describe sclerotic changes in the middle ear mucosa. The term tympanosclerosis was then introduced by Zollner (1955) into the English literature (Ferlito, 1979).<sup>30</sup> It is usually regarded as a healed inflammation or a particular form of scar tissue following recurrent otitis media (Friedmann, 1971). Miller (1984) opined that post-inflammatory factors due to the associated edema and inflammation in the submucosa in cases of long-standing effusion lead to degeneration of the fibrous layer.

Wielinga et al (1988) postulated that the damage to the lamina propria of tympanic membrane occurs due to the direct action of hydrolytic enzymes in serous fluid. Both sterile and infective effusions resulted in comprehensive irreversible changes in the lamina propria of the pars tensa. They also postulated that mechanical injury and compromised vascularization of the lamina propria were likely to be important etiological factors in the development of tympanosclerosis. Large masses of tympanosclerosis not only produce severe impedance to sound transmission but may also affect the probability of a satisfactory hearing result following surgery.<sup>2</sup>

Tympanosclerosis is a consequence of inflammation of the middle ear often resulting in conductive hearing loss. Collagen of the fibrous tissue loses its structure and merges with homogeneous mass. By the progression of the process calcium deposits causing ossification of the changes. Depending on the extent of calcification and localization of the process there comes to ossicular chain fixation and conductive hearing loss of various levels and, in rare cases, to deafness.<sup>3</sup>

According to our study, incidence of tympanosclerosis was found to be almost same in males and females. This was comparable to the study by Kamaljit Kaur et al and Indranil Pal where male: female ratio was 1.23:1 and 1:15. Kinney

(1978) and Asiri et al (1999) also did not report any predominance of tympanosclerosis in a particular sex.

In our study the maximum incidence was found in the age group of 21-30 years. According to Indranil Pal (2005), maximum incidence was in 21-40 years age group<sup>5</sup>

Maximum hearing loss was seen where tympanosclerotic patch was found in the posterosuperior quadrant of tympanic membrane. In our study maximum patients had tympanosclerotic patches in anteroinferior quadrant. But in a study by Indranil Pal, majority of patients, 26% of patients had tympanosclerotic patch in posterosuperior quadrant.<sup>5</sup> According our study, anterosuperior tympanosclerosis was found to have minimal hearing loss. Hearing loss was found in 64% of cases according to our study which was comparable to study by Indranil where 60% had conductive hearing loss<sup>5</sup>.

## 6. Conclusion

Tympanosclerosis is an irreversible process affecting the tympanic membrane and middle ear. Hearing loss can occur with myringosclerosis mainly conductive hearing loss. More common age group is 21-30 years. It can affect any quadrant of tympanic membrane. According to our study, maximum number of patients had tympanosclerotic patches in anteroinferior quadrant and the maximum hearing loss was seen with tympanosclerotic patches in posterosuperior quadrant of tympanic membrane.

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