(e) ISSN Online: 2321-9599
(p) ISSN Print: 2348-6805

# ORIGINAL ARTICLE

# EVALUATION OF DEMOGRAPHIC PROFILE AND SYMPTOMATOLOGY OF TYMPANIC MEMBRANE PERFORATION IN PATIENTS REPORTING TO GGS HOSPITAL FARIDKOT, PUNJAB

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**ABSTRACT:**

**Background:** Negligence towards health, poor medical awareness, poor hygiene, socio-economic status, climate, lack of resources to avail medical facilities, are the factors affecting hearing loss and there is paucity of data evaluating these factors in hearing deficient patients. Thus, the present study was undertaken to study the various demographic factors and effect of duration of tympanic membrane perforation on hearing loss. **Material and Methods:** The study comprised of 200 patients randomly selected from the Outdoor & Indoor ENT Department of Hospital. A detailed history, clinical examination and investigations were done. Pure tone audiometry was done in audiometry room and hearing loss was calculated in each case of dry tympanic membrane perforation. **Results:** Males 102 (51%) were found to be affected more than females 98 (49%). The ratio being 1.04:1 (Male: Female). Most of the patients belonged to rural area 129 (64.5%) and 71 (35.5%) belonged to urban area. 156 (78%) patients had unilateral ear involvement with 88 (44%) left ear and 68 (34%) right ear. 44 (22%) patients had bilateral ear involvement. Chronic otitis media (82%) was found to be the most common cause of perforation, with trauma (18%) being the second. The most common symptom was hearing loss in 84.5% followed by episodic discharge in 82%, itching in 52% and tinnitus in 45%. 31.14% patients had disease for ≥5 years, 44.26% patients had disease for 1-5 years and 24.59% patients had disease for <1 years. **Conclusion:** The mean hearing loss at all the frequencies increased as the duration of disease increased and the difference was significant statistically. Delay in diagnosis attributes to a variety of reasons such as lack of optimum health services, lack of medical knowledge and poor hygienic conditions.

**Keywords:** Hearing loss; Tympanic membrane; Perforation

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This article may be cited as: Kaur M, Davessar JL, Bawa AGS, Singh G, Dhingra R, Prinja S, Dhillon V. Evaluation of demographic profile and symptomatology of tympanic membrane perforation in patients reporting to GGS Hospital Faridkot, Punjab. J Adv Med Dent Scie Res 2016;4(3):21-25.

## INTRODUCTION

Tympanic membrane is a unique structure vital to sound transmission, a key element in impedance matching for sound travelling from air to fluid, and the only true membrane in the fully developed fetus.[1] It is a crucial component for sound transmission from external world to inner ear. Perforation of the tympanic membrane is common in an otologic clinic and can result from various causes such as chronic otitis media and trauma. Perforation of the tympanic membrane can result in conductive hearing loss that ranges from negligible to 50db.[2]

Hearing loss can be physically, socially and psychologically devastating, leading to loneliness and isolation through difficulties in integration into society, anxiety and depression.[3] Negligence towards health, poor medical awareness, poor hygiene, socio-economic status, climate, lack of resources to avail medical facilities, are the factors affecting hearing loss and there is paucity of data evaluating these factors in hearing deficient patients.[4] Thus, the present study was undertaken to study the various demographic factors and effect of duration of tympanic membrane perforation on hearing loss.

## MATERIAL AND METHODS

The study comprised of 200 patients (male and female) of 15 years age and above presenting with perforation of tympanic membrane, unilateral or bilateral, were selected randomly from the ENT Outpatient Department of Guru Gobind Singh Medical College and Hospital, Faridkot. Informed consent was sought from all the patients to be included in the study prior to the commencement of the study. Those patients who refused to participate in the study, patients with multiple perforations & perforations in pars flaccida and patients with age less than 15 years were excluded from the study. A detailed history, clinical examination and investigations were done. Then, the evaluation of hearing loss was done in each case of tympanic membrane perforation on basis of duration of perforation. The perforations were divided into three groups according to duration of disease and hearing loss at each frequency was noted in all the three groups. Hemoglobin, TLC, DLC, Complete urine examination and X-ray of both mastoids lateral/oblique view was carried out. The frequency of hearing loss was determined by Whisper test and pure tone audiometry. Pure tone audiometry was done in audiometry room and hearing loss was calculated in each case of dry tympanic membrane perforation. The association of degree of hearing loss was matched with the duration of disease and result thus obtained was evaluated. Patients with age less than 15 years were not cooperative & were excluded from the study. When ear was discharging a thorough suction cleaning & antibiotics were prescribed to achieve a dry ear.

## RESULTS

**Table I:** Distribution of patients according to demographic profile and ear involved.

| Distribution of patients according to gender | | |
|---|---|---|
| **Sex** | **No. of patients** | **%age** |
| **Male** | 102 | 51.0 |
| **Female** | 98 | 49.0 |
| **Total** | 200 | 100.0 |
| **Distribution of patients according to area** | | |
| **Urban/rural** | **No. of patients** | **%age** |
| **Urban** | 71 | 35.5 |
| **Rural** | 129 | 64.5 |
| **Total** | 200 | 100.0 |
| **Distribution of patients according to ear involved** | | |
| **Ear involved** | **No. of patients** | **%age** |
| **Right** | 68 | 34.0 |
| **Left** | 88 | 44.0 |
| **Both** | 44 | 22.0 |
| **Total** | 200 | 100.0 |

Table I shows that out of 200 patients, 102 were males and 98 were females. 71 (35.5%) patients were from urban area and 129 (64.5%) patients were from rural area. 156 (78%) patients had unilateral disease and 44 (22%) cases were having bilateral involvement. Out of 156 (78%), 68 (34%) had right ear involvement and 88 (44%) had left ear involvement. Total number of patients taken for study was 200 but as 22% cases had bilateral involvement, thus total number of ears involved in our study was 244.

**Table II:** Distribution of patients according to mode of onset, symptoms of disease and radiographic findings

| Distribution of patients according to mode of onset of disease | | |
|---|---|---|
| **Cause** | **No. of patients** | **%age** |
| Chronic otitis media | 164 | 82.0 |
| Trauma | 36 | 18.0 |
| Total | 200 | 100.0 |
| **Distribution of patients according to symptoms** | | |
| **Symptoms** | **No. of patients** | **%age** |
| Hearing loss | 169 | 84.5 |
| Discharge | 164 | 82 |
| Tinnitus | 90 | 45 |
| Itching | 104 | 52 |
| **Distribution of patients according to x-ray findings** | | |
| **X-ray findings** | **No. of patients** | **%age** |
| Sclerotic | 136 | 68.0 |
| Cellular | 64 | 32.0 |
| Total | 200 | 100.0 |

Table II shows that chronic otitis media was found to be the most common cause of tympanic membrane perforation, around 164 (82%). Trauma was the 2nd commonest cause around 36 (18%). The most common symptom was hearing loss in 169(84.5%), 164(82%) had presented with on and off discharge from ear in past. Tinnitus was present in 90(45%) patients and itching was a symptom in 104(52%) patients. X-ray mastoids lateral oblique view of 200 patients revealed sclerosis in 68% patients and cellular mastoid in 32% patients.

**Table III:** Distribution of patients (ears) according to duration of disease

| **Duration of disease** | **No. of patients** | **%age** |
|---|---|---|
| <1year | 60 | 24.59 |
| 1-5year | 108 | 44.26 |
| >5year | 76 | 31.14 |
| Total | 244 | 100.0 |

Table III shows that 60 (24.59%) patients had disease for less than <1 year. In this group most of the patient had trauma as the cause of discharge and hearing loss.

108 (44.26%) patients had disease in the range of 1-5years, and 76 (31.14%) patients had disease for ≥5 years.

**TABLE IV:** Comparison of hearing loss of all the groups (according to duration of disease) at different frequencies

| Duration | Frequency (Hz) | Mean±SD (db) |
|---|---|---|
| <1 year | 250 | 33.00±10.13 |
| (n=60) | 500 | 30.50±8.76 |
| Group A | 1000 | 24.83±6.70 |
| | 2000 | 23.75±8.56 |
| | 4000 | 22.00±8.54 |
| 1-5 years | 250 | 40.79±13.55 |
| (n=108) | 500 | 37.96±11.27 |
| Group B | 1000 | 33.38±9.29 |
| | 2000 | 31.02±8.95 |
| | 4000 | 29.26±9.61 |
| ≥5 years | 250 | 42.76±11.67 |
| (n=76) | 500 | 40.99±9.59 |
| Group C | 1000 | 36.38±11.12 |
| | 2000 | 34.47±11.24 |
| | 4000 | 32.76±11.61 |

Table IV shows that all the perforations were divided into three groups according to duration of disease and hearing loss at each frequency was noted in all the three groups. Hearing loss at 250 Hz in group A (<1 year) was 33.00±10.13 and in group B (1-5 years), it was 40.79±13.55 and in group C (≥5 years), it was 42.76±11.67.

Table V shows that hearing loss was more in group C, followed by group B and group A in decreasing order. Hearing loss decreased as the frequency increased in each group. Hearing loss was conductive type. Average hearing loss of group A (<1 year) was compared with group B (1-5 years) and the difference was found to be statistically significant i.e. ($p<0.05$). Similarly group B was compared with group C and group A with group C, difference was found to be significant statistically.

**Table V:** Comparison of average hearing loss of all the groups (according to duration of disease)

| Groups | Average hearing loss (mean±SD) |
|---|---|
| <1 year (n=60) Group A | 26.36±7.12 |
| 1-5 year (n=108) Group B | 34.12±8.84 |
| ≥5 years (n=76) Group C | 37.28±9.17 |
| Statistical comparison between groups | |
| Groups | p-value |
| A v/s B | <0.001 (Highly Significant) |
| A v/s C | <0.001 (Highly Significant) |
| B v/s C | 0.043 (Significant) |

## DISCUSSION

Perforation of tympanic membrane results in varying degree of conductive hearing loss. Loss of hearing is a national health issue as it leads to significant physical problem and psychosocial trauma. Thus, it is of utmost importance to diagnose at the initiation of the perforation and early therapeutic management as untreated tympanic membrane perforation causes ongoing destructive changes in the middle ear, thus leading to further hearing loss.[5]

In the present study, 200 patients were enrolled, 102 patients were male and 98 were females. Male to female ratio was found to be 1.04:1. The presentation of male patients slightly outnumbers the females. This could be due to the male sex being more aware of their disease and the incapacity produced because of the disease, as they are the main working members of our society. Nevertheless, as patients have been randomly selected, this minor difference could be only pertaining to random case selection. In a study conducted by Thomasen C et al[6], male to female ratio was 1.36 in a study conducted over 26 patients. [64] Similarly, in a study carried out by Kurian CA et al[7] over 120 patients, male and female percentage was 55% and 45% respectively. Vertiainen E[8] in his study on 382 patients found that 55% males and 45% females. Hence, the results of present study shows the similar patterns of sex based prevalence of the disease.

Most of the patients (64.5%) in the present study belonged to rural area. This difference could be due to illiteracy, poor sanitary conditions, poor personal hygiene in rural population leading to more incidence of disease in rural people. The variation could be due to lack of awareness about the disease among rural population. Limited health care facilities, limited access to them and lack of proper referal services to specialised centre. Ramanuj B et al[9] observed that most patients with Chronic suppurative otitis media (CSOM) were from rural areas. Mac D et al[10] also observed that most of the patients of CSOM were from rural and remote areas.

In our study, 78% patients had unilateral disease with 34% having right ear and 88 (44%) left ear. 44 (22%) patients had bilateral involvement. Shah S et al[11] in his study found 75% patients were having unilateral disease and 25% having bilateral involvement. Juvekar MR et al[12] studied 200 patients found that right ear was perforated in 54% and left ear was perforated in 46% cases. Chronic otitis media was found to be the most common cause followed by trauma being the second

common cause. Chopra H et al[13] in a study found the cause of perforation was infection and eustachian tube dysfunction in 62% cases, trauma in 28% and cholesteatoma in 10% cases. The most common symptoms were hearing loss in 84.5%, followed by episodic discharge in 82%, itching in 52% and tinnitus in 45% patients. Gulati SP et al[14] in their study reported that main symptoms were hearing loss and discharge. Michael C et al[15] in his study reported that patients presented with hearing loss (100%), discharge (90%) and pain (10%).

In our study 24.59% patients had disease for <1 year, 44.26% patients had disease duration in the range of 1-5 years, and 31.14% patients had disease for ≥5 years. Maximum patients were having disease of 1-5 years; this was because patients came to hospital only when they had appreciable amount of hearing loss which increased as duration of disease increased. Sakagami M et al[16] observed 87 ears of 70 patients with otitis media with tympanic membrane perforation without an operation. The mean follow-up period was 10.7 years (5-22 years). All 87 ears tended to show deterioration of hearing gradually under long observation. In 23 patients, hearing deterioration was 0.13 db/year in the control side and 0.61 dB/year in COM side ($p<0.02$). Air conducting hearing levels deteriorated with the passage of time and surgery is recommended at the early stage of COM to prevent progress of hearing loss.

Whisper test and pure tone audiometry were used to assess hearing loss in the present study. Groen JJ[17] carried out a comparative study on the hearing abilities of pre-school children in order to investigate conformities and differences obtained by test results with pure tone audiometry and the whispered voice test and found that the whispered voice test was far simpler for screening purposes and more adequate because it also provides information on intelligence, mental attitude for listening and thus on educability.

The present study found that hearing loss increased as the duration of disease increased at all the frequencies and was conductive type. Comparison of average hearing loss in all the three groups showed that average hearing loss increased, statistically significantly as the duration of disease increased. Sakagami M et al[16] observed 87 ears of 70 patients with otitis media with tympanic membrane perforation without an operation and found that the mean follow-up period was 10.7 years (5-22 years), all ears tended to show deterioration of hearing gradually under long observation. Air conducting hearing levels deteriorated with the passage of time and surgery is recommended at the early stage of COM to prevent progress of hearing loss. Mahajan M et al[18] in his study showed that majority of patients with larger air bone gap were found to have perforations for longer duration as compared to those with lesser degree of hearing loss. Thus, air conduction hearing levels deteriorates with the passage of time.

**CONCLUSION**: The mean hearing loss at all the frequencies increased as the duration of disease increased and the difference was significant statistically. Thus, the study showed that average hearing loss increased, statistically significantly as the duration of disease increased. A very early age is important because an early diagnosis determines the efficacy of methods used for the correction of the hearing loss. Delay in diagnosis attributes to a variety of reasons such as lack of optimum health services, lack of medical knowledge and poor hygienic conditions.[4] Utilization of mass media to educate the people about long term effects of ear disease should be done.

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**Source of support:** Nil

**Conflict of interest:** None declared