

# Frequency of Sensorineural Hearing Loss in Patients with Drug Resistant Pulmonary Tuberculosis

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## ABSTRACT

**Aim:** To examine the frequency of sensorineural hearing loss in patients presented with drug resistant pulmonary tuberculosis.

**Study Design:** Prospective/Observational

**Place and Duration:** Department of ENT Unit-2 and Head & Neck Surgery Civil Hospital Quetta and Department of Pulmonology, Fatima Jinnah General & Chest Hospital Quetta from 1<sup>st</sup> July 2019 to 31<sup>st</sup> December 2019.

**Methodology:** Eighty patients of both genders with ages 18 to 60 years presented with drug resistant pulmonary tuberculosis were enrolled in this study. Patients detailed demographics including age, sex, residence and comorbidities were recorded after taking written consent. ASHA criteria were applied to examine the sensorineural hearing loss. Pure-tone averages were used to examine the degree of sensorineural hearing loss.

**Results:** There were 52 (65%) males and 28 (35%) females with mean age 36.42±11.54 years. Sensorineural hearing loss was found in 54 (67.5%) patients. 53 (66.25%) patients had 3 frequency average and 50 (62.5%) had 5-frequency average.

**Conclusion:** Frequency of sensorineural hearing loss was high in drug-resistant tuberculosis patients.

**Keywords:** Drug-resistant pulmonary tuberculosis, Sensorineural hearing loss

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## INTRODUCTION

Tuberculosis is one of the leading infectious diseases in the world and is responsible for more than two million deaths and nine million were cases annually. World Health Organization statistics for 2013 giving an estimated incidence figure of 2.1 million cases of TB for India out of a global incidence of 9 million. The estimated TB prevalence figure for 2013 is given as 2.6 million.<sup>1</sup> In the 2018 update of the World Health Organization treatment guidelines for multidrug and rifampicin-resistant tuberculosis (MDR-/RR-TB),<sup>2,3</sup> some medicines of the anti-TB injectable group (kanamycin and capreomycin) were deleted from the list of recommended DR-TB drugs, and only amikacin and streptomycin were retained. These latter drugs have been placed lower in the hierarchy (to Group C from Group B previously) to be considered only if drug susceptibility test (DST) results confirm susceptibility and if high-quality audiology monitoring for sensorineural hearing loss can be ensured. Streptomycin is to be considered only if amikacin cannot be used (due to suspected or documented resistance or unavailability) and if phenotypic DST results confirm susceptibility. As anti-TB injectables remain among the options for DR-TB treatment, it is important to have guidance on the detection and management of sensorineural hearing loss during their use in DR-TB treatment. Hearing is a vital function for every individual and must be preserved. It is important to diagnose sensorineural hearing loss as early as possible as it has a potential impact on children's learning and development, and, among adults, it has an impact on employment, education, general well-being and quality of life<sup>4</sup>.

The adverse effects of anti-tuberculosis treatment include skin rashes, gastrointestinal disturbances, and hepatotoxicity, whereas aminoglycosides can cause nephrotoxicity and ototoxicity.<sup>5</sup> Sensorineural hearing impairment has been noted as the most common form of manifestation of ototoxicity<sup>6</sup>. This is detected by monitoring hearing threshold parameters in patients on antituberculosis drugs as part of the DR-TB management protocol. Hearing impairment resulting from ototoxicity is detected by comparing hearing threshold measurements during treatment with an initial hearing assessment obtained from the patient on admission prior to the commencement of therapy (baseline audiometry). However, tuberculosis can affect the ears in other ways as part of its extrapulmonary manifestations, causing infections, such as tuberculous otitis media, facial nerve paralysis, and various types and degrees of sensorineural hearing loss<sup>7,8</sup>.

The present study was conducted aimed to examine the frequency of sensorineural hearing loss in patients with drug-resistant pulmonary tuberculosis.

## MATERIALS AND METHODS

This prospective/observational study was conducted at Department of ENT Unit-2 and Head & Neck Surgery Civil Hospital Quetta and Department of Pulmonology, Fatima Jinnah General & Chest Hospital Quetta from 1<sup>st</sup> July 2019 to 31<sup>st</sup> December 2019. A total of 80 patients of both genders with ages 18 to 60 years presented with drug resistant pulmonary tuberculosis were enrolled. Patient's detailed demographics including age, sex, residence and body mass index were recorded. Patients who had used the aminoglycoside for a month or more in the past six months prior to the start of study, renal failure,

Received on 03-01-2020

Accepted on 21-05-2020

sensorineural hearing loss prior to the start of the study, concomitant administration of other ototoxic drugs, ear pathology like otitis media which can affect hearing of a patient and uncooperative patients were excluded. ASHA (American Speech-Language Hearing Association, 1994) criteria were used to describe changes in hearing, and pure-tone averages (3-[3, 6 & 8 kHz] and 5-frequency [2, 3, 4, 6 & 8 kHz]) to describe the degree of loss. All the data was analyzed by SPSS 24.

**RESULTS**

Fifty two (65%) were males while 28 (35%) were females with mean age 36.42±11.54 years. Mean BMI was 23.45±2.62kg/m<sup>2</sup> (Table 1). Sensorineural hearing loss was found in 54(67.5%) patients, in which 30(37.5%) had right side sensorineural hearing loss while 24 (30%) had left side sensorineural hearing loss (Table 2). According to the audiometry assessment 53 (66.25%) patients had 3 frequency average and 50 (62.5%) had 5-frequency average (Table 3).

Table 1: Demographic information of the patients

Variable	No.	%
Age (years)	36.42±11.54	
BMI (Kg/m <sup>2</sup> )	23.45±2.62	
<b>Gender</b>		
Male	52	65.0
Female	28	35.0

Table 2: Frequency of sensorineural hearing loss

Variable	No.	%
<b>Sensorineural hearing loss</b>		
Yes	54	67.5
No	26	32.5
<b>Side</b>		
Right	30	37.5
Left	24	30.0

Table 3: Frequency of assessment of audiometry

Assessment of audiometry	No.	%
3 Frequency PTA	53	66.3
5 Frequency PTA	50	62.5

**DISCUSSION**

Drug Resistant pulmonary tuberculosis is one of the commonest life threatening disorders associated with high rate of morbidity and mortality around the world<sup>9</sup>. Sensorineural hearing loss is the most frequent complication in patients receiving treatment for DR-TB and affected patient’s quality of life.<sup>10</sup> Majority of patients 65% were males while 35% were females with mean age was 36.42±11.54 years. These results were similar to many of previous studies in which male patients population was high 65% to 80% and the average age of patients was 40 years<sup>11,12</sup>.

In present study the sensorineural hearing loss was found in 54 (67.5%) patients, in which 30 (37.5%) had right side sensorineural hearing loss while 24 (30%) had left side sensorineural hearing loss. A study conducted by Petersen et al<sup>13</sup> reported the overall incidence of sensorineural hearing loss in multi-drug resistant tuberculosis patients was 79%. Another study conducted by Sogebi et al<sup>14</sup> in which 132 patients of multidrug resistant tuberculosis were

examine for the sensorineural hearing loss and they reported that sensorineural hearing loss was identified in 104 (78.8%), the two most common configurations being ascending, in 54 (40.9%), and sloping, in 26 (19.7%). Pure-tone averages at low frequencies (0.25-1.0 kHz) and high frequencies (2.0-8.0 kHz) were 33.0dB and 40.0 dB respectively.

According to the pure tone assessment, we found that 53(66.25%) patients had 3 frequency average and 50(62.5%) had 5-frequency average. These results showed similarity to many of previous studies in which 25% to 35% patients had moderate to severe sensorineural hearing loss and majority 60% had mild degree of sensorineural hearing loss<sup>15-18</sup>.

**CONCLUSION**

The frequency of sensorineural hearing loss in drug-resistant pulmonary tuberculosis was very high found in 67.5% patients. Auditory assessment should be performed at every patient of drug resistant tuberculosis to improve the quality of life of these patients.

**REFERENCES**

1. Harries AD, Dye C: Tuberculosis. *Ann Trop Med Parasitol* 2006; 100(5-6): 415-31.
2. World Health Organisation. Tuberculosis. Geneva: 2018.
3. Guidelines for management of drug resistant tuberculosis. 2006, WHO/TB/Geneva, 361.
4. Sharma SK, Alladi M: Multidrug resistant T B: a menace that threatens to destabilize tuberculosis control. *Chest* 2006; 130: 261-72.
5. Singh N, Sidiq Z, Bhalla M, Myneedu VP, Sarin R. Multi-drug resistant tuberculosis among category I treatment failures - a retrospective study. *Indian J Tuberc* 2014; 61(2):148-51.
6. Zhang HQ, Xi XE, Wang YL, Han W, Zhang CX, Jiao JH. Side effects of tuberculosis treatment with fixed-dose combinations. *J Biol Regul Homeost Agents* 2015;29(2):379-88.
7. Vasconcelos KA, Lima MA, Frota S, RuffinoNetto A, Kritski AL. Audiometric evaluation of patients treated for pulmonary tuberculosis. *J Bras Pneumol* 2012;38(1):81-7.
8. Harris T, Bardien S, Schaaf HS, Petersen L, Aminoglycoside-induced hearing loss in HIV-positive and HIV-negative multidrug-resistant tuberculosis patients. *South Afr Med J* 2012; 102(6), 363-6.
9. Horton KC, MacPherson P, Houben RMGJ, White RH, Corbett EL. Sex differences in tuberculosis burden and notifications in low- and middle-income countries: a systematic review and meta-analysis. *PLoS Med* 2016; 13(9):e1002119.
10. Guidelines on programmatic management of drug-resistant Tuberculosis in India, 2017- Chapter7/ table 7.5/ page 71.
11. Ghosh S, Gayen P, Halder A, Bandyopadhyay. Clinical Profile of MDR-TB patients with special reference to kanamycin induced ototoxicity in a tertiary care hospital of eastern India. *IJMRR* 2017; 20:
12. Hong H, Budhathoki C, Farley JE. Increased risk of aminoglycoside-induced hearing loss in MDR-TB patients with HIV coinfection. *Int J Tuberc Lung Dis* 2018;22(6):667-74.
13. Petersen L, Hlaysi VG, del fava L, Joko J. Prevalence and incidence of hearing loss in DR-TB patients. 2014.
14. Sogebi OA, Fadeyi MO, Adefuye BO, Soyinka FO. Hearing thresholds in patients with drug-resistant tuberculosis: baseline audiogram configurations and associations. *J Bras Pneumol* 2017;43(3): 195-201.
15. Adejumo OA, Olusola-Faleyeh B, Adepoju VA, Gidado M, Onoh MO, Adegboye O, et al. The pattern of comorbidity and its prevalence among drug-resistant tuberculosis patients at treatment initiation in Lagos, Nigeria. *Royal Soc Trop Med Hyg* 2020; 114(6): 415-23.
16. Duggal P, Sarkar M. Audiologic monitoring of multi-drug resistant tuberculosis patients on aminoglycoside treatment with long term follow-up. *BMC Ear Nose Throat Disord* 2007; 7L 5.
17. Nizamuddin S, Khan FA, Khan AR, Kamaal CM. Assessment of Hearing Loss in multi-drug resistant tuberculosis (MDR-TB) patients undergoing Aminoglycoside treatment. *Int J Res Med Sci* 2015;3:1734.
18. Mwansasu CS, Siziya S, Mpondo BCT. Hearing loss among multi-drug resistant tuberculosis patients on kanamycin in Ndola Teaching Hospital, Zambia: Study of ototoxicity and practice. *Health Press Zambia Bull* 2017;1(4):