

Awareness of hearing loss, vocal hygiene and vocal abuse among autorickshaw drivers in Mumbai

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Abstract

Introduction: Auto-rickshaw drivers spend significant amount of time in an environment that is noisy and polluted with toxic gases which seems to affect the systems involved in speech production and hearing. Moreover, harmful lifestyle, stressful occupational conditions and improper vocal hygiene during working hours act as contributing factors.

Aim: To determine the awareness of hearing loss, vocal hygiene and vocal abuse with associated risk factors like exposure to continuous noise, air pollution and smoking respectively among auto-rickshaw drivers in Mumbai.

Study Design: Survey

Materials and Methods: This questionnaire-based study included 56 randomly selected auto-rickshaw drivers from different areas of Mumbai whose age ranged between 22 to 72 years with a mean age of 42.34 years.

Results: 20% participants reported a decrease in hearing sensitivity since they had started driving an auto-rickshaw. About 29.09% of participants agreed that background noise has an impact on voice quality.

Conclusion: Majority of auto-rickshaw drivers are unaware about noise induced hearing loss, permanent threshold shift and vocal misuse.

Keywords: Noise induced hearing loss, Occupational noise induced hearing loss, Vocal abuse, Vocal hygiene, Auto-rickshaw drivers.

Introduction

Long hours spent driving on road accompanied by urban noise pollution in today's time pave way for several health hazards. Hearing loss caused due to noise exposure at the workplace is referred to as occupational noise-induced hearing loss (ONIH).¹

NIHL is the second most common form of acquired hearing loss after age-related loss (presbycusis), with studies showing that people who are exposed to noise levels higher than 85db suffered from NIHL.¹ A typical NIHL is of a sensory neural type involving injury to the inner ear. It is bilateral and symmetrical, usually affecting the higher frequencies (3,4,6 kHz) and then spreading to the lower frequencies (0.5, 1, 2 kHz).² Impairment of hearing at high frequencies will initially cause a loss of clarity in perceived speech and then interfere with daily activities as hearing loss progresses. Hearing loss related symptoms, such as trouble in normal and telephone conversation, turning up the radio/ television

volume and tinnitus, usually occurs in the early stages of NIHL.³

Sensory/neural shifts in pure tone thresholds resulting from chronic noise exposure are referred to as noise-induced permanent threshold shift which progresses at a rate proportionate to the exposure conditions.

The primary site of lesion in the gradually developing NIHL is the death of outer hair cells (OHCs)⁴ and with further exposure inner hair cells (IHCs) and auditory nerve fibers are damaged. Decrease in speech recognition and reduced temporal processing skills is a result of noise induced affected connections between inner hair cells. Additional injuries associated with NIHL include tinnitus, hyperacusis, and abnormal pitch perception.⁵

Environmental pollutants, non-pollutant in nature, such as noise may also be responsible for voice abnormalities. Vocal effort, defined as a physiological entity that accounts for changes in voice production

when loading increases, is affected by speaker-listener distance; background noise level; and other acoustic characteristics of the environment. Dryness, air pollution, dust and pollen, excessive consumption of alcohol and caffeine, and smoking leave the larynx and vocal cords dry.

With a gradual onset, NIHL may be well advanced by the time that it leads to a considerable impairment. Furthermore, auto-rickshaw drivers spend a significant amount of time in an environment that is noisy and polluted with toxic gases which seems to affect nasopharynx (nasal cavity and soft palate), sinuses and respiratory system, speech and voice due to continuous exposure for a longer period. Moreover, harmful lifestyle, stressful occupational conditions and improper vocal hygiene during working hours act as contributing factors.

Need for the study

With urbanization, there has been a rapid increase in transport vehicles over the past few decades resulting in a marked increase in environmental noise levels, and accompanying air pollution. The population at large is unfamiliar with the magnitude of the adverse effects of noise and air polluted environment, prevention and management of these problems.

City traffic from inside of closed vehicles are about 85-90dB(A) which is within permissible limits as long as one hears it for 8 hours per day, but honking creates the noise of 110dB(A) which cannot be tolerated by human beings for more than half & hour. If the noise level is above 115dB(A) then exposure should not be more than 15 minutes. Exposure to longer duration leads to gradual hearing loss.⁶

Susceptibility is also affected by the noise exposure history: repeated intermittent noise exposures produced progressively smaller hearing losses.⁷

Habitual exposure to occupational noise damages the hair cells in the cochlea causing a sensory hearing loss. Ultimately, some of the nerve fibres supplying the damaged hair cells may also become damaged from many causes and result in a neural hearing loss as well.

Continuous exposure to dust, chemical inhalants, cigarette smoke, etc may result in drying of the delicate tissue lining the vocal tract, resulting in dry

mouth, throat tightness, irritated throat, or if lodged in lungs, may affect respiratory function essential for voicing.

Wide reaching negative effects include, sleep interference, stress and anxiety reactions, changes in heart rate and breathing pattern, vestibular disturbances with intense sound and increased incidences of cardiovascular, vestibular and ear-nose-throat disorders.⁸

In spite of increasing risk of hearing loss and/or tinnitus, poor vocal hygiene and vocal abuse among auto-rickshaw drivers, it has hardly been studied.

Materials and Methods

Research design

Survey

The survey was conducted on auto-rickshaw drivers in various localities of Suburban Mumbai. The researchers approached the participants and briefly explained about the objective and the procedure of the study. No inclusion criteria, other than them being auto-rickshaw drivers, were considered. After seeking consent, responses to the questions were obtained from the auto-rickshaw drivers. The information obtained from the participants was kept confidential as per the ethical point of view.

Participants

A convenience sample of 55 auto-rickshaw drivers was used for the study. All participants included in the sample were male whose age ranged between 22 to 72 years with a mean age of 42.34 years.

Tool

A self-developed questionnaire consisting of 23 questions drafted in English, validated by 5 professionals, who considered them as highly appropriate, and translated in Hindi using a standard procedure was used as a research tool in the study. The questions were close-ended (56.53 % yes/no type and 43.47 % multiple-choice options) and were designed under 3 sections viz. A) Years of working, exposure time, exposure to irritants, details regarding smoking and alcohol B) hearing sensitivity and symptoms of hearing loss, C) vocal hygiene, vocal abuse and misuse.

Statistical analysis used

All statistical analysis was done using percentage analysis method. Every question's responses were calculated separately by taking into account choice of response selected by the participants and finding out the percentage of that response choice.

Results

Section A

10.9% of participants had been driving for <2 years, 2-5 years, 5-10 years each respectively with a majority of 67.27% had been driving for >10 years. (Fig. 1)

A total of 10.9% of participants drove the auto-rickshaw for 4-8 hours at a stretch with 58.18% driving for 8-12 hours and 29.09% driving for more than 12 hours. (Fig. 2) About 30.9% of participants consume >5 cups of caffeine and 12.7% consume 1-2 alcoholic drinks daily. Regular smoking was reported by 27.27% of participants whereas 9.09% were occasional smokers. Irritants in the working environment have an impact on the voice quality of 40% of participants, while 9.09% are unsure.

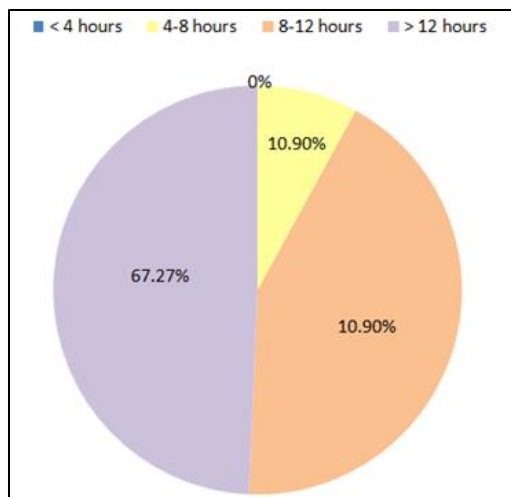


Fig. 2: How many hours in a day do you spend driving an auto-rickshaw?

Section B

38.18% agreed and 50.90% disagreed that continuous and/or excessive exposure to noise can impair their hearing while 9.09% were unsure and 1.81% had no idea how noise exposure was linked to hearing impairment (Fig. 3). 20% reported a decrease in hearing sensitivity since they had started driving an auto-rickshaw (Fig. 4). Continuous tinnitus in 3.63% and intermittent tinnitus in 32.72% of participants was reported (Fig. 5). Only 12.72% of participants knew persons with hearing loss due to excessive noise exposure. About 94.54% have not undergone any hearing evaluation.

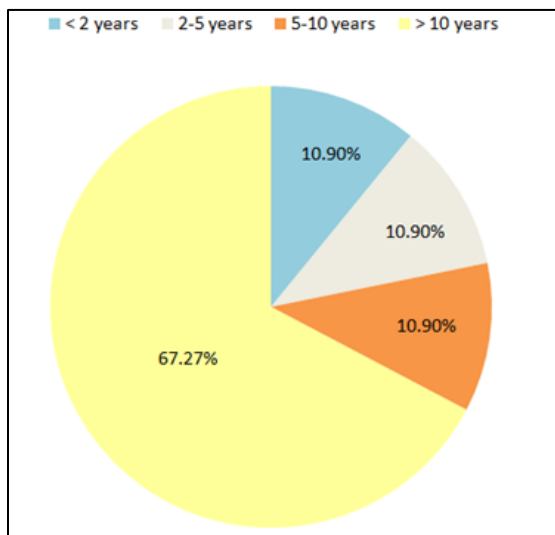


Fig. 1: Since how many years have you been driving on auto-rickshaw?

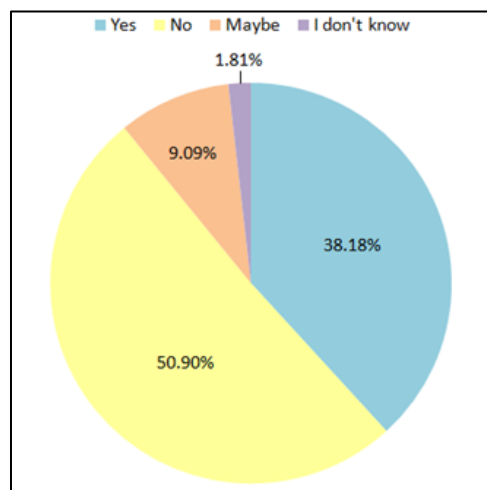


Fig. 3: Do you think that excessive noise exposure is damaging your hearing ability?

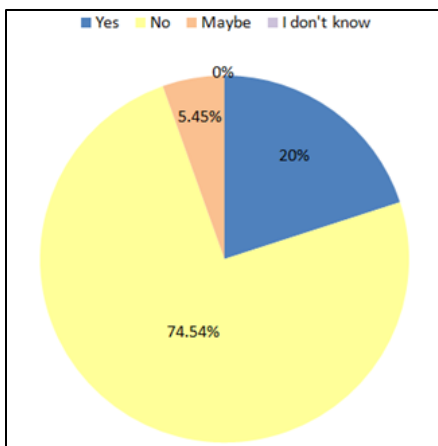


Fig. 4: Do you feel that your hearing has decreased since you have started driving an auto-rickshaw?

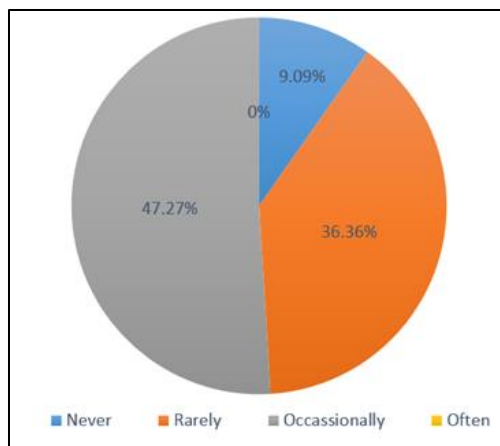


Fig. 6: How frequently do you talk while driving an auto-rickshaw?

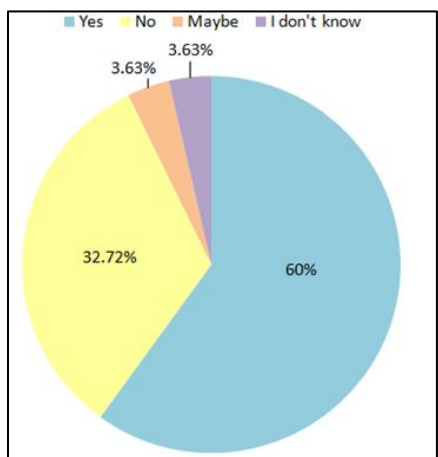


Fig. 5: Have you ever heard a ringing/hissing/whistle like sound in either/both of your ears?

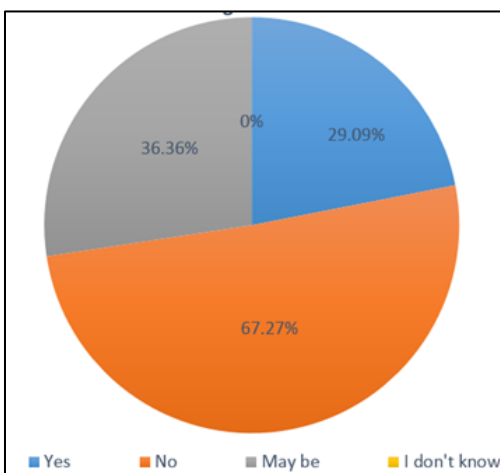


Fig. 7: Do you feel the to speak a little loudly or in an unnatural pitch in your working environment?

Section C

About 36.36% of participants consumed 2-3 litres and 27.27% consumed 1-2 litres of water daily. Abusive habits like frequent throat clearing (40%), shouting/screaming (30.9%), and frequent talking (25.45% spend 9-12 hours talking, while 7.27% speak for >12 hours) (Fig. 6) were also reported.

47.27% & 7.27% of participants talked occasionally and often respectively while driving. 29.09% spoke loudly or in an unnatural pitch whereas 36.36% were uncertain (Fig. 7). About 29.09% of participants agreed that background noise has an impact on voice quality. Even so, 14.54% participants admitted that their voice quality deteriorated at the end of the day (Fig. 8).

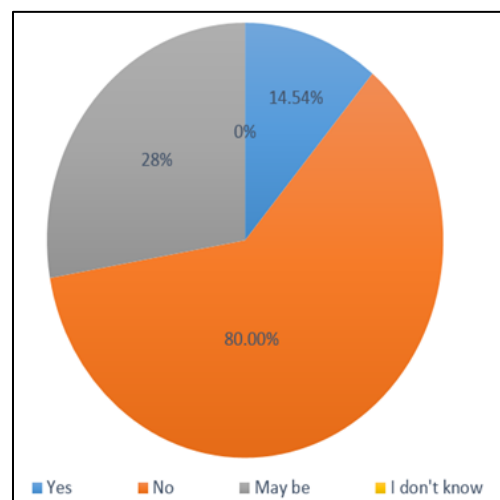


Fig. 8: Do you that you voice quality deteriorates as the day progresses?

Table 1: Awareness of various parameters categorized according to years of exposure to noise.

Parameters	< 2 Years	2 - 5 Years	5 - 10 Years	> 10 Years
Decreased hearing after starting to drive an auto- rickshaw.	No: 100%	No:100%	Yes: 33.3% No: 66.6%	Yes: 24.3% No: 67.5% Maybe:8.1%
Excessive noise exposure affects hearing.	Yes: 66.6% No: 33.3%	Yes: 16.6% No: 66.6% Maybe: 16.6%	Yes: 16.6% No: 83.3%	Yes: 32.4% No: 54.05% Maybe: 10.81%
Hearing ability in noise interferes in communication	Yes: 33.3% No: 66.6%	Yes: 33.3% No: 66.6%	Yes: 33.3% No: 50% Maybe: 16.6%	Yes: 21.6% No: 78.37%
Tinnitus	Never: 83.3% Sometimes: 16.6%	Never: 83.3% Sometimes: 16.6%	Never: 50% Sometimes: 50%	Never: 54.04% Sometimes: 35.13% Don't Know: 5.40% Continuous: 5.40%
Irritants have an impact on voice quality	Yes: 50% No: 50%	Yes: 66.6% No: 16.6% Maybe: 16.6%	Yes: 66.6% No: 33.3%	Yes: 32.4% No:56.7% Maybe: 10.8%
Talking in unnatural pitch	Yes: 66.6% No: 33.3%	Yes: 50% No: 33.3% Maybe: 16.6%	Yes: 50% No: 50%	Yes: 21.6% No: 2.70% Maybe: 75.6%
Background noise has an impact on voice quality	Yes: 33.3% No: 66.6%	Yes: 16.6% No: 83.3%	Yes: 33.3% No: 66.6%	Yes: 24.3% No: 72.97% Maybe: 2.70%

Discussion

The study reflects towards lack of awareness among the majority of auto-rickshaw drivers concerning the detrimental effects that noise and air pollutants can have on their aural and vocal health, respectively. It indicates that auto-rickshaw drivers are not well aware of the occupational health hazard which is ultimately reducing the capability of their work efficiency over some time. It also highlights the ill-effects of continuous exposure to noise and air pollutants.

In this study, participants exposed to noise for less than 2 years feel that excessive noise exposure significantly affects their hearing and hinders communication, but the same awareness is not observed in participants exposed for longer periods which could be due to habituation to noise. Decreased hearing, is observed in few participants exposed to noise for more than 5 years. As the number of years of exposure to noise increases, a significant increase in presence of tinnitus in participants is observed. Majority of the participants across all categories of exposure duration feel that irritants affect their voice

quality. Fewer participants, in all categories feel that background noise affects their voice quality. However, majority of the participants reportedly speak in an unnatural pitch in all four categories.

Continuous exposure to loud sound can produce hearing loss. Drivers of auto-rickshaw face louder sound levels than car drivers. This hearing loss can affect their personal life or even socially. This could also affect their professional life.

High-frequency speech sounds are used for sound localization, and especially for resolving front-back confusions;⁹ Sometime when several people are talking at once, the listener may hear many speech sounds but may have difficulty in deciding which sounds come from which talker¹⁰ This is called 'informational masking'.¹¹

Consumption of alcohol, smoking cigarettes, inadequate water intake and long hours of exposure to irritants in the atmosphere may further cause or elevate voice-related problems in auto-rickshaw drivers. Increased loudness during a conversation in noise also demonstrates the masking effects of background noise.

Conclusion

Majority of auto-rickshaw drivers are unaware about noise induced hearing loss, permanent threshold shift and vocal misuse. Although the most simple and desirable solution is to limit two-stroke engines and the environment to intensities below damaging levels, audiometric and voice screening and monitoring are extremely effective in preventing hearing loss and voice disorders.

Improvising the traffic regulations, vehicle maintenance, avoidance of adulterated fuel and altered silencers for vehicles, awareness amongst public and strict implementation of pollution control rules will decrease the harmful effects. Preventive measures should be taken to prevent hearing loss among auto-rickshaw drivers through awareness of ill effects of noise, ensuring the availability of viable earplugs, and induction of low noise producing auto-rickshaws.

Implications

The data contributed in determining and developing awareness about ill-effects of continuous exposure to noise and air pollutants and associated risk factors on an individual's hearing and voice. The survey highlighted the role of an audiologist and speech-language pathologist in counselling about hearing and vocal health. The overall findings and results can be used as a database for future studies related to awareness of occupational NIHL and voice disorders.

Limitations

Clinical evidence couldn't be obtained to show progressive threshold shift due to occupational noise-induced hearing loss and acoustic and aerodynamic voice parametric measurements because of time constraints. An elaborated open-ended questionnaire needs to be administered upon a larger sample for implementable results.

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Conflicts of Interest

None.

References

1. Rabinowitz P, Rees T. Occupational hearing loss. In: Rosenstock L, Cullen M, Brodtkin C, Redlich C, editors. Textbook of clinical occupational and environmental medicine. 2nd ed. Philadelphia, USA: Elsevier Saunders. 2005; 426-436.
2. National institute of health. Consensus conference-noise and hearing loss. *JAMA* 1990; 263:3185-3190.
3. Dobies RA. Prevention of noise induced hearing loss. *Arch Otolaryngol Head Neck Surg* 1995;185:385-91.
4. Hu BH, Henderson D, Nicotera TM. Extremely rapid induction of outer hair cell apoptosis in the chinchilla cochlea following exposure to impulse noise. *Hear Res* 2006.
5. Katz, Jack. Handbook of Clinical Audiology. 7th ed. Baltimore: Walters Kluwer Health. 2015.
6. Gelfand, S.A. Essentials of Audiology. 4th ed. New York: Thieme Publishers. 2016.
7. Nita. Exposure to honking can ruin your hearing. Nitawriter [Internet]. 2008 July 10; Available from: <https://nitawriter.wordpress.com/2008/07/10/exposure-to-honking-can-ruin-your-hearing/>
8. Best V, Carlile S, Jin C. & van Schaik A. The role of high frequencies in speech localization. *J Acoust Soc Am* 2005;118:353-63.
9. Brungart D.S. & Simpson B.D. Effect of target-masker similarity on across-ear interference in a dichotic cocktail-party listening task. *J Acoust Soc Am* 2007;122:1724-34.
10. Brungart D.S, Simpson B.D, Ericson M.A. & Scott K .R. Informational and energetic masking effects in the perception of multiple simultaneous talkers. *J Acoust Soc Am* 2001; 110: 2527-38.
11. Moore, Brian. A review of the perceptual effects of hearing loss for frequencies above 3 kHz. *Int J Audiol* 2016;700-714.

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