



## OCCUPATIONAL HEARING LOSS IN THE WORKERS OF AN AUTOMOBILE INDUSTRY IN MAHARASHTRA: A CROSS-SECTIONAL STUDY

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### ABSTRACT

**Background:** Occupational noise induced hearing loss is an important public health priority because as populations live longer and industrialization spreads. Loss of hearing affects life, employment, education and wellbeing. Occupational hearing loss among industrial workers needed to be studied on priority. **Objective:** To study occupational hearing loss among workers of an automobile industry. **Methodology:** This cross-sectional study was conducted among employees of an automobile industry in Maharashtra from August to September 2022. We used universal sampling method to select respondents for the study. Out of a total of 100 employees, 71 participants were included in the study after obtaining exclusion criteria & written informed consent. Data regarding age, type of work, & years of experience was collected. All underwent ENT examination and audiometry. The data was entered in MS Excel 2010 and analyzed using IBM SPSS software 16 trial version. Frequency, percentage, and proportion were calculated. The Chi-square test was used as a test of significance. **Results:** Out of 71 participants, 6(9%) had noise induced hearing loss & 65(91%) had normal hearing. Those had noise induced hearing loss have exposure of more than 10 years of industrial work & majority of them belongs to more than 45 years of age group. Age was found to be significantly associated with noise induced hearing loss (p value < 0.05). **Conclusion:** The prevalence of noise induced hearing loss (9%) is in accordance with national NIHL prevalence range (7-21%). Occupational noise is significant cause of early onset of noise induced hearing loss in adults. Use of personal protective equipment such as ear muff, ear plugs is essential for prevention.

**KEYWORDS :** Noise Induced Hearing Loss, Factory workers, India.

### INTRODUCTION:

Occupational noise induced hearing loss (ONIHL) is a major cause of disability throughout the world who are continuously exposed to high frequency noise being emitted from industrial machines. <sup>(1)</sup> Occupational hearing loss includes acoustic traumatic injury and noise-induced hearing loss (NIHL), and can be defined as a partial or complete hearing loss in one or both ears as the result of one's employment. Exposure to excessive noise is the major avoidable cause of permanent hearing impairment worldwide. <sup>(2)</sup>

NIHL is an important public health priority because as populations live longer and industrialization spreads, NIHL will add substantially to the global burden of disability. Hearing loss is the third most common disease in the adult

population, ranked after cardiovascular diseases and hypertension. Occupational noise induced hearing loss refers to a hearing loss caused by loud sounds experienced in work place. Hearing loss is caused by exposure to loud sounds at 85 dB or above over a long period of time <sup>(3)</sup> It has been estimated that worldwide, as much as 500 million individuals might be at the risk of developing noise-induced hearing loss (NIHL). <sup>(4)</sup> An estimate from National Institute of Health suggests that one third of hearing loss is caused due to noise exposure. Approximately 0.5 million population of Indian metropolitan cities are exposed to hazardous to their hearing. <sup>(5)</sup>

The estimated cost of noise to developed countries ranges from 0.2 to 2% of GDP where it is the cause of more than 1/3<sup>rd</sup> of the hearing impairment. <sup>(6)</sup> Worldwide, 16% of the disabling

hearing loss in adults (over 4 million DALYs) is attributed to occupational noise, ranging from 7% to 21% in the various sub regions. The effects of the exposure to the occupational noise are larger for males than females in all sub regions and higher in the developing regions.<sup>[7]</sup>

Hearing loss not only affects quality of life but also increases risk of injury for instance inability to hear approaching vehicle and warning signal which can lead to accidents. Loss of hearing affects life, employment, education and wellbeing, and is therefore a challenge for an individual routine life. At the workplace hearing loss decreases not only efficiency but also puts a question mark on the individual's safety as well. The objective of this study was to ascertain the burden and determinants of occupational noise induced hearing loss.

**METHODOLOGY:**

This cross-sectional study was conducted among employees of an automobile industry in Maharashtra from August to September 2022 to evaluate the effect of noise pollution at work place. We used universal sampling method to select respondents for the study. The principles outlined in the declaration of Helsinki were followed while conducting the study. The patients suffering from chronic suppurative otitis media, wax, deviated nasal septum, cerumen or perforation of tympanic membrane were excluded from the study. Out of a total of 100 employees, 71 participants were included in the study after obtaining exclusion criteria & written informed consent. Data regarding age, type of work, & years of experience was collected. All underwent ENT examination and audiometry. Audiometric testing was conducted in a sound free room in the office and calibrated digital audiometer was used. Air & bone conductions were tested at frequency of 0.25, 0.5, 1, 2, 4, 6 and 8 kHz. Hearing threshold were obtained for each ear at 250-8 kHz and a threshold above the 25 dB was considered to be hearing loss in any of the above frequencies. The data was entered in MS Excel 2010 and analyzed using IBM SPSS software 16 trial version. Frequency, percentage, and proportion were calculated. Data was represented in tabular and graphical format. The Chi-square test was used as a test of significance.

**RESULTS:**

This cross-sectional study was conducted among 71 employees of an automobile industry in Maharashtra. Out of 71 participants, 11.3% were aged below 30, 76.1% aged between 31-45 years & 12.7% were above 45 years of age. All the study subjects were male. Majority of the subjects (39.4%) were engineers & (36.6%) were office workers. Most of the participants (88.73%) had work experience of more than 5 years. Socio- demographic profile of study subjects is displayed in table 1.

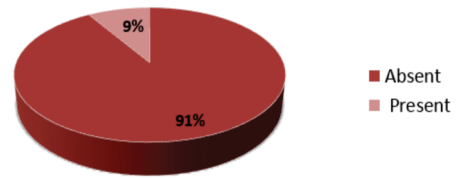
Out of 71 participants, 6(9%) had noise induced hearing loss & 65(91%) had normal hearing (fig. 1). All the participants who had noise induced hearing loss have exposure of more than 10 yrs of industrial work & majority of them belongs to more than 45 yrs of age group. In comparison to Forklift operators and Maintenance staff, noise induced hearing loss was reported among office workers (50.01%) & engineers (33.33%). Age was found to be significantly associated with noise induced hearing loss (p value < 0.05). (Table 2)

**Table 1: Socio- demographic profile of study subjects**

Socio- demographic variables	Frequency	%	
Age	<30	8	11.3
	31-45	54	76.1
	>45	9	12.7
Type of work	Engineers	28	39.4
	Forklift operators	5	7
	Maintenance staff	12	16.9
	Office workers	26	36.6

Years of experience	< 5 years	8	11.26
	> 5 years	63	88.73

**Fig 1. Distribution of study participants according to hearing loss assessment**



**Table 2. Association of socio demographic factors of study participants with Hearing loss**

Socio- demographic variables	Hearing loss		Chi square	p value	
	Absent [n(%)]	Present [n(%)]			
Yrs of experience	<5yrs	8 (12.30)	0(0)	2.552	.279
	5-10yrs	14(21.53)	0(0)		
	>10yrs	43 (66.15)	6 (100)		
Age	<30	7(10.76)	1(16.66)	8.94	0.01
	30-45	52(80)	2(33.33)		
	>45	6(9.23)	3(50.01)		
Type of work	Engineers	26(40)	2(33.33)	0.844	0.83
	Forklift operators	5(7.69)	0(0)		
	Maintenance staff	11(16.92)	1(16.66)		
	Office workers	23(35.38)	3(50.01)		
Total	65	6			

**DISCUSSION:**

A cross-sectional study was conducted among employees of an automobile industry in Maharashtra from August to September 2022 to evaluate the effect of noise pollution at work place.. The age range of most study participants falls between 31 years to 45 years & most of them were engineers having experience of more than 5 years.

In our study, 6(9%) of the total participants had noise induced hearing loss diagnosed upon audiometry. Similar finding seen in study done by Khan MA et. al 2016<sup>[8]</sup>, where 47 (10.49%) workers had hearing loss diagnosed upon audiometry & in study by Amarnath ES 2017<sup>[9]</sup> found the prevalence of hearing loss among the automobile industrial workers was nearly 6.6%. Another study done by Ranga RK et. al 2014<sup>[10]</sup> found the prevalence of hearing loss among industrial workers was 38%. This might be attributed to lack of proper use of personal protective equipment's like Ear plugs & Ear muffs & noise control at source.

In our study, all the participants who had noise induced hearing loss have exposure of more than 10 years of industrial work & majority of them belongs to more than 45 years of age group where age was found to be significantly associated with noise induced hearing loss (p value < 0.05). Study done by Amarnath ES 2017<sup>[9]</sup> revealed that age group category (< 38 years versus >38 years), and Work experience (2 years) was found to be statistically significant with noise induced hearing loss. In another study done by Ighoroje DA et. al 2004<sup>[11]</sup> & Nirmalya M & Gandhari B 2011<sup>[12]</sup> stated that age was positively related to noise induced hearing loss. From these findings we can conclude that as age advances there is upward trend of noise induced hearing loss & the burden of hearing loss caused by excessive noise at work has many

consequences for individual & society. Hearing protection programs, noise control at source, audiometric monitoring & workers education on proper use of PPE should be improved to protect workers from hearing loss.

#### CONCLUSION:

The prevalence of noise induced hearing loss (9%) is in accordance with national NIHL prevalence range (7-21%). Occupational noise is significant cause of early onset of noise induced hearing loss in adults. Multiple factors contribute to occupational noise induced hearing loss but major contributor can be lack of prevention. Use of personal protective equipment such as ear muff, ear plugs is essential for prevention.

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