

Prevalence of occupational noise induced hearing loss in industrial workers

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Abstract - Introduction: Excessive noise is an important health hazard that can lead to auditory and extra-auditory effects which affect the welfare of individuals and groups exposed. **Objective:** This study was conducted to assess the prevalence of occupational noise induced hearing loss in industrial workers. **Methodology:** The study was conducted in 332 industrial workers and ENT and audiometric examinations were done to assess and correlate their age, years of service, noise level, duration of exposure, and degree of hearing loss. **Result:** 29.52% of industrial workers were affected, mostly of mild frequency sensorineural hearing loss due to occupational exposure to long durations of loud noises. **Conclusion:** Chronic exposure to noise is a common hazard in industrial workers and causes high frequency SNHL with 4 kHz notch. We observed that that out of the 332 industrial workers under study, 98 of them were affected with high frequency sensorineural hearing loss. The prevalence of occupational noise induced hearing loss was most observed in those between the age group of 36-40 years due to their long duration of exposure to loud noises over a maximum number of years. The observed total percentage of those affected with occupational noise induced hearing loss was found to be 29.52%.

Keywords: noise induced hearing loss, occupational noise, prevalence, audiometry

INTRODUCTION:

Hearing is important for a successful life. Occupational noise induced hearing loss (ONIHL) is a major cause of disability throughout the world and is the fifteenth most serious health problem which leads to social isolation and to serious economic burden [1]. Worldwide, 16% of the disabling hearing loss in adults is attributed to occupational noise, ranging from 7 to 21% in the various subregions. In India, NIHL has been a compensable disease since 1948. It is only in 1996 that the first case got compensation [2]. Exposure to sound above a level of approximately 85dB initially manifests as temporary hearing loss that is known as temporary threshold shift (TTS), which may have fast resolution within the first 10-15 days of exposure. However, a repeated or sustained exposure of noise to hair cells and associated nerve fibres leads on to degenerative changes and the TTS becomes permanent threshold shift (PTS). Excessive noise causes community annoyance, elevated blood pressure, stress, sleeping difficulties, reduced performance and tinnitus. It also leads to changes in serum lipid, triglycerides, platelet count, plasma viscosity and glucose. The effect of excessive noise could also be so devastating as to cause permanent memory loss or psychiatric disorders [3,4].

The noise levels in different industries are given in Table 1:

Table 1

Noise levels in different industries

Industries	Range (dBA)
Textile industries	102-114
Pharmaceutical firms	93-103
Fertilizer plants	90-102
Oil and natural gas complex in Bombay high	90-119
Road traffic in Ahmedabad city	60-102
Surface rail traffic	90-102
Metro rail	70-111
Air traffic	90-112

With the rapid development of industries and automobiles the noise hazard is increasing by many folds. The aim of the present study was to assess the prevalence of noise induced hearing loss in industrial workers so as to get evidence that will serve to inform policy makers to institute control and safety measures, in order to raise the level of awareness of the workers regarding the health risks of their work.

OBJECTIVES:

1. To identify the number of industrial workers suffering from occupational noise induced hearing loss
2. To assess and co-relate their age, noise level, years of service, duration of exposure, and degree of hearing loss

METHODOLOGY:

This study was conducted to evaluate the effect of noise pollution in two industries, that is, the automobile and food manufacturing factories in Chennai (Tamil Nadu), India. ENT and audiometric examinations were conducted in Saveetha Medical College and Hospitals in 332 workers from these industries who are between 21-60 years.

Inclusion criteria: Industrial workers aged between 21-60 years, noise level exposed to, years of service, duration of exposure, degree of hearing loss

Exclusion criteria: The patients suffering from chronic suppurative otitis media, wax, deviated nasal septum, sinusitis, diabetes, and hypertension and on drugs known to affect hearing were excluded from the study. Hearing threshold was 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 findings were charted and all data were analysed statistically.

FINDINGS:

Table (A):

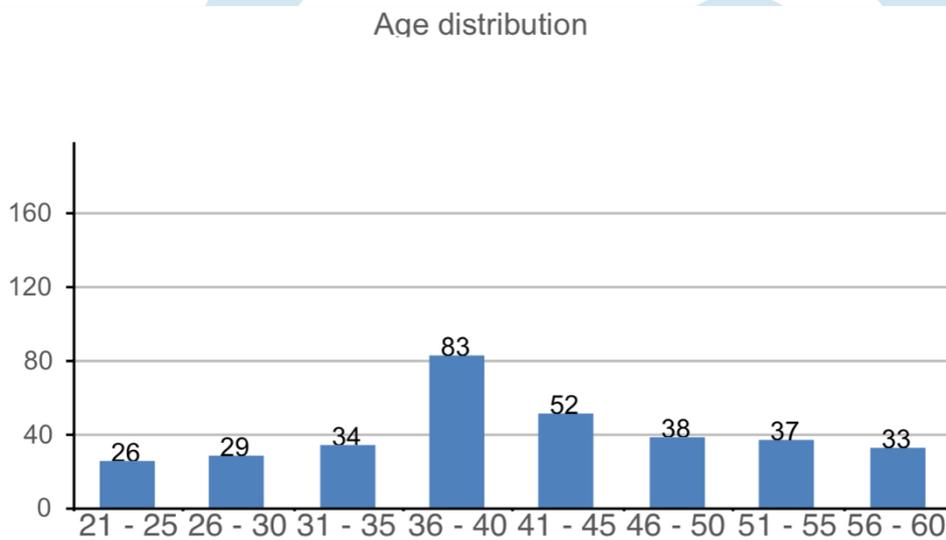


Table (B):

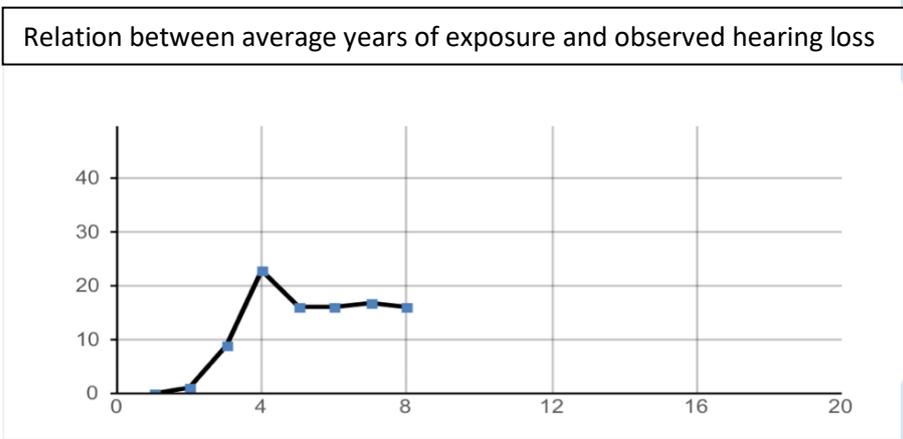
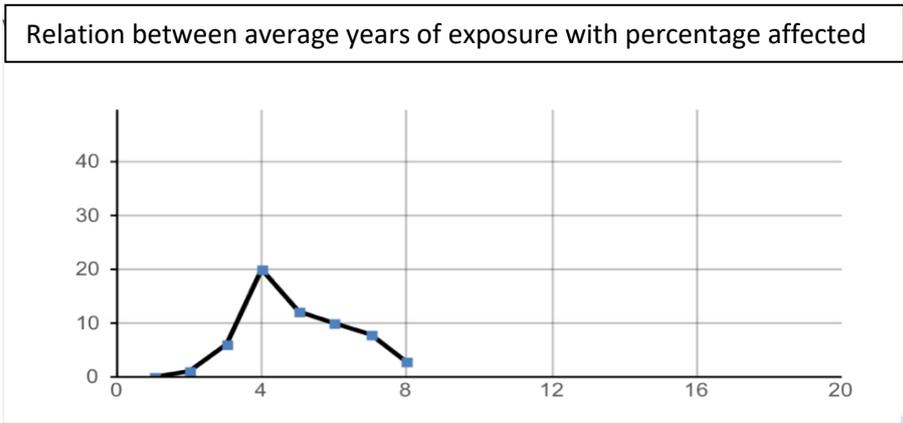
Sr. No.	Age group	Minimum years of exposure	Maximum Years of exposure	Average exposure	No. of patients	No. of NIHL	Percentage affected	Mild HF-SNHL	Moderate HF-SNHL	Moderately - Severe HF-SNHL	Severe HF-SNHL
1	21 - 25	1	4	3.57	26	0	0.00	0	0	0	0
2	26 - 30	2	5	4.23	29	1	3.45	1	0	0	0
3	31 - 35	6	10	8.79	34	9	26.47	6	3	0	0
4	36 - 40	9	15	14.08	83	23	27.71	20	3	0	0
5	41 - 45	13	20	17.51	52	16	30.77	12	4	0	0
6	46 - 50	17	20	18.64	38	16	42.11	10	6	0	0
7	51 - 55	21	22	21.58	37	17	45.95	8	6	3	0
8	56 - 60	24	25	24.42	33	16	48.48	3	3	10	0
					332	98	29.52	60	25	13	0

RESULTS AND DISCUSSION:

The study was conducted in 332 industrial workers against the inclusion criteria for possible relations independently. The prevalence of occupational noise induced hearing loss (ONIH) was most observed in those between the age group 36-45 years, corresponding to the ages of peak labour force participation [5]. The years of exposure to high frequencies of noise are

Sr. No.	Parameter (n=332)	Value	
1	Age range (years)	21 - 60	
2	Overall Mean age (m ± sd)	38.24 ± 15.16	
3	Corrected Mean age (m ± sd)	41.56 ± 14.48	
4	Overall M:F	3.1:1	
5	Corrected M:F	4.7:1	
6	Years of noise exposure - range (min - max)	1 to 25	
7	Mean minimum years of exposure (m ± sd)	11.62 ± 8.58	
8	Mean maximum years of exposure (m ± sd)	15.13 ± 7.97	
9	No. of candidates with NIHL (n, %)	98, 29.52	
10	Degree of Hearing loss categorisation (n, %) [HF-SNHL]	Mild	60, 61.22
		Moderate	25, 25.51
		Moderately-severe	13, 13.26
		Severe	-

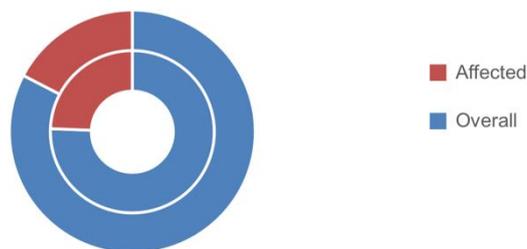
maximum in those aged between 41-45 years resulting in ONIHL at a younger age indicating the heavy impact of occupational noise on the burden of hearing loss at such young ages.



With regards to the predominance of ONIHL in males, this study has shown that males experience more effects after exposure to occupational noise than females. This may be due to males usually having greater exposure to noise at work than females due to differences in occupational categories, economic sectors of employment, and lifetime work history [6]. Another possible reason is the hormone-driven physiological differences between sexes. Several animal and human studies have demonstrated that women may be protected against hearing loss because of oestrogen and its signalling pathways [7,8].

It has been reported that ONIHL among workers has been significantly associated with an increased risk of work-related injuries. The suggested reasons for this finding are that higher noise levels obstruct the ability to hear warning signals, monitor equipment,

Gender distribution



react to environmental sounds, and coordinate with other workers [9]. In addition to auditory outcomes, ONIHL has also been associated with a number of non-auditory sequelae. Bad mood, poor cognition, sleep disorders, and cardiovascular diseases are the frequent complications of ONIHL. It has been suggested that noise exposure induces reaction of the autonomic nervous system and endocrine system, leading to increased secretion of the stress hormone, which in turn may lead to an increased risk of hypertension, coronary heart disease, and stroke.

Preventive measures:

At present, ONIHL is an irreversible disease with no effective treatment. Prevention remains the best option for limiting the deteriorations of hearing power [10]. A safe and healthy work environment is a basic requirement for all workers. The principal purpose of prevention measures for ONIHL includes monitoring occupational noise exposures (e.g., periodic noise exposure monitoring), reducing noise exposure in workplaces (e.g., engineering controls, administrative controls, and personal hearing protection), and early detection before permanent damage to the inner ear (e.g., routine audiometric examinations and health education). For industrial noise, elimination or reduction of noise through engineering or administrative control is the best way of ONIHL intervention. Hearing protection is a secondary level of protection measure. Both earmuffs and earplugs are commonly used as personal HPDs among workers.

CONCLUSION:

In summary, ONIHL is still the most prevalent occupational disease in the world. The findings from this review provide guidance to policymakers in terms of where resources might best be used and can provide insight into the effectiveness of other past interventions. Treatment strategies are still in the developmental stages; before they become universally available, the main strategy for reducing the prevalence of ONIHL is prevention.

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