

STUDY OF EFFECT OF NOISE POLLUTION ON AUDITORY FUNCTION OF FOOD INDUSTRY WORKERS

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Abstract: Backgrounds and objectives: Excessive noise pollution is a worldwide occupational health hazard which has considerable social, psychological and physiological impacts, including noise induced hearing loss (NIHL) at higher frequencies. Whilst occupational noise induced hearing loss is entirely preventable if measures are taken, once acquired it is irreversible. Our aim was to evaluate and compare the Auditory functions in subjects exposed to noise with unexposed once (control groups) and to find out the correlation between duration of exposure with observed audiometry parameters. **Method:** Study was done in 100 food industry workers of them 50 were exposed to noise and remaining 50 were not. Pure tone audiometry was done in all of them and the data obtained was analyzed by Epi info software. **Result:** It is found that those who were exposed to noise had higher hearing threshold than control with significance. **Conclusion:** Most food and drink industries have processes which emit high noise levels exceeding the 80dB (A) and 85dB (A) levels which affect their hearing sense adversely, so measures need to be taken to prevent it.

Key words: pure tone audiometry, food factory, noise, hearing loss.

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Introduction:

In occupational diseases of hearing exposure to noise is the commonest preventable cause (noise induced hearing loss-NIHL). Occupational hearing loss -also includes acoustic traumatic injury and NIHL¹. It can be defined as a partial or complete hearing loss in one or both ears as the result of one's employment. A very loud noise is a pervasive occupational hazard having many adverse reactions. Occupational noise may also cause elevated blood pressure, reduced performance, sleeping difficulties, physical stress, tinnitus, noise-induced hearing loss (NIHL) and temporary threshold shift². The psychological effects of noise are more common compared to the physiological effects and they are in the forms of annoyance, stress, anger and concentration disorders as well as difficulties in resting and perception^{3, 4, 5}. 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 85 db suffered from NIHL⁶. Most serious health effect is NIHL resulting from irreversible damage to the delicate hearing mechanisms in the inner ear. NIHL typically

involves the frequency range (pitch) of human voices, and thus interferes with spoken communications. The approximate estimated cost 1% of the GDP for noise pollution in developed countries. More than one-third of the hearing impairment is caused by noise pollution. The effects of the exposure to occupational noise are higher in the developing regions⁷. The epidemiological data on prevalence is lacking, also risk factors and costs of NIHL related data are not available in India. In this article, we have tried to review the occupational Noise Induced Hearing Loss problem in India.

Material and Methods:

The present study was conducted in McCain food Industry, at Mehsana district of Gujarat, with the help of Pure Tone Audiometer. We have taken ethics committee permission and care of all necessary pre-requisites and after taking informed consent of all subjects. In a total of 100 individuals, in one group 50 food industry workers were selected (Exposed to noise pollution) with age group of 20-40 years. Subjects with known medical disease or history of taking ototoxic drug were

excluded from study. In another group 50 control subjects (healthy and Unexposed to noise pollution) were included in this study. Out of the 50 workers (Exposed); 50 subjects in exposed group were divided again on the basis of duration of exposure (in years). In pure tone audiometry their hearing threshold is studied for different frequencies in all of them. The data collected was tabulated for frequencies and hearing threshold in study and control group with their standard deviation.

Results and Discussion:

The analysis of the results was done by student t test. The difference was found to be significant (p value < 0.05). Table 1 shows average hearing threshold in food industry workers was 28.92 ± 5.98 dBs in right ear and 29.04 ± 4.54 dBs in left ear, which was significantly higher ($p < 0.05$) as compared to unexposed subjects who had hearing threshold 21.40 ± 4.04 in right ear and 20.80 ± 2.74 in left ear at 4KHz frequency and also at 8 KHz frequency.

Frequencies (Hz)	Study		Control	
	Right Ear (Mean \pm SD)	Left Ear (Mean \pm SD)	Right Ear (Mean \pm SD)	Left Ear (Mean \pm SD)
250	22.96 \pm 4.14	24.04 \pm 3.73	19.56 \pm 1.86	19.52 \pm 1.83
500	24.60 \pm 2.94	23.16 \pm 4.25	19.36 \pm 2.06	19.84 \pm 1.13
1000	24.72 \pm 4.44	25.40 \pm 3.75	20.16 \pm 1.55	19.72 \pm 1.56
2000	25.68 \pm 5.35	26.60 \pm 4.20	20.12 \pm 1.73	20.02 \pm 1.57
4000	28.92 \pm 5.98	29.04 \pm 4.54	21.40 \pm 4.04	20.80 \pm 2.74
8000	28.80 \pm 7.92	28.52 \pm 6.43	20.80 \pm 3.82	20.40 \pm 1.97

TABLE 1

While Figure 1 shows effect of work duration i.e. exposure in years; on hearing loss. Out of 50 exposed subjects, 25 subjects were having hearing loss. Among these 25 subjects as duration of exposure increased degree of hearing loss showed an increasing trend with increase in threshold of hearing.

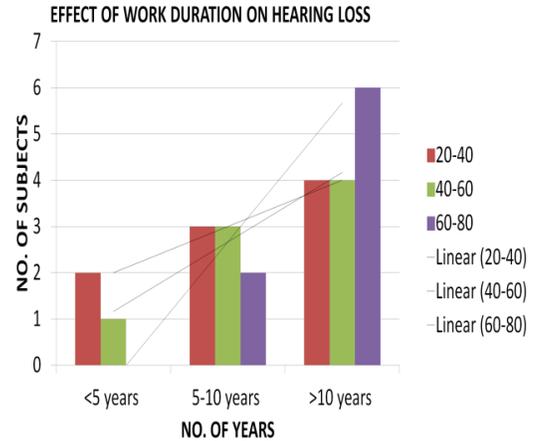


Figure 1

Similar results have been found in a study done at Turkey by E. Atmaca et. al on industrial noise and its effects. It had been measured that the noise levels in some industries were much higher the noise level of 80 dBs specified in Noise Control which could impair hearing⁸. Another survey done by Australian council of safety and compensation, showed increase in threshold for different frequencies with chronic exposure to noise⁹. In a study done by Nelson D et.al, 16% of the disabling hearing loss in adults worldwide (over 4 million DALYs) was due to noise pollution in different occupations, it ranges from 7% to 21% approximately in the many sub regions. Occupational noise is a significant cause of hearing loss in adults. The burden can be minimized by the use of engineering controls which reduces the generation of noise at its source which reduces noise induced hearing loss¹⁰. M K Talukdar studied noise pollution in textile industry where he found some hearing loss with the loudness of noise and had shown some measures to control noise pollution¹¹.

References:

1. Australian Safety and Compensation Council WORK-RELATED NOISE INDUCED HEARING LOSS IN AUSTRALIA APR 2006:6-9
2. Nelson, D et al - The Global Burden of Occupational Noise-induced Hearing Loss. American Journal of Industrial Medicine 2012; 48 (6):446-458
3. Cheung, C. K., Organizational influence on working people's occupational noise

- protection in hongkong. Journal of safety research 2004; 35: 465
4. OPhrstrom E. Sleep disturbance psycho-social and medical symptoms a pilot survey among person exposed to high levels of road traffic noise, Journal of sound and vibration 1989; 133: 117
 5. Finegold L. S. et. Al, community annoyance and sleep disturbance; updated criteria for assessing the impact of general transportation noise on people. Noise control Eng. J., Jan-feb.1994; 42:1
 6. Rabinowitz P, Rees T. Occupational hearing loss. In: Textbook of clinical occupational and environmental medicine. 2nd ed. Philadelphia, USA: Elsevier Saunders; 2005. :426-436.
 7. Report of informal consultation on prevention of noise induced hearing loss held on 28-30 October 1997. Geneva: WHO; Available from: <http://www.who.int/pbd/deafness/en/noise.pdf>
 8. Polish Journal of Environmental Studies 2005. ; 14(6):721-726
 9. Australian Safety and Compensation Council WORK-RELATED NOISE INDUCED HEARING LOSS IN AUSTRALIA, APR 2006; Appendix 1.
 10. Nelson, D et al - The Global Burden of Occupational Noise-induced Hearing Loss. American Journal of Industrial Medicine2012; 48(6):14
 11. Indian Journal of Fibre & Textile Research March-June 2001; 26: 44-49

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