# A Study of Occupational exposure of Noise on Hearing in Industrial workers

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***Abstract*: The aim of this paper is to analyse the result of individuals exposed to noise levels and their effects on hearing of 54 water plant industrial workers. Conventional Audiometric frequencies were measured and standard threshold shift was calculated for each ear along with Noise induced hearing loss proforma. Subjects were subdivided into 4 groups i.e (a) 25 to 35 yrs (b) 36 to 45 yrs (c) 46 to 55 yrs (d) 56 to 60 yrs.The range of noise level of the machines was in between 80dB and 100 dB. A dip in audiometric configuration was significantly observed at 4kHz and 8kHz, highest were 51% at high frequency bilateral. Occupational permissible noise exposure limit was for 8 hour time and distance from source of noise was 3 metres. The most affected were those workers aged 36 to 55 years and exposed to noise for over 15 to 20 years. There is a high incidence of Tinnitus in the industrial workers, unilateral tinnitus is 11% and bilateral tinnitus is 28%. Among 54 subjects, only 23 subjects used earplugs and 13 subjects used earmuffs. Workers who never used earplugs and earmuffs are 18 in number due to various reasons. It is concluded that increasing work experience and age are causing severe impact on hearing causing irreversible hearing loss.**
**Education, training and awareness for wearing hearing protective devices is crucial. Further to this, it aimed to implement Hearing Conservation Program as a control measure in prevention of NIHL.**

***Keywords*: Hearing protectors, NIHL, Occupational Hearing loss.**

## I. INTRODUCTION

Occupational noise exposure has been recognized as a big problem among workers in Indian industries. Excessive exposure to high intensity noise may be harmful to hearing and lead to noise induced hearing loss (NIHL).It is an irreversible but preventable disorder. Noise is an occupational hazard in this industrial sector but literature has few research study on the subject. Worldwide 16% of disabling hearing loss in adults is attributed to occupational noise exposure being greater in males than in females. WHO estimated that globally 16% of individuals have a moderate to greater degree of hearing loss due to occupational noise exposure.
A typical NIHL is of sensory neural type involving injury to the inner ear. It is bilateral and symmetrical, usually affecting the higher frequencies (3kHz, 4kHz, 6kHz); but onset of hearing loss is characterized by having visible dip in the audiogram at 4 kHz. As exposure to excessive noise level continues, neighbouring frequencies are progressively affected and dip broadens. 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.
Nabeel I, Irfan M, Normastura R. 2017 studied group of grass trimming workers with significant correlation of noise induced hearing loss with prevalence of 82.6% with range of machine noise between 91.3 and 100.7dB. Conventional audiometry reveals significant loss at high frequencies at 3, 4 and 6 KHz with the p value of 0.001,0.009 and 0.036 respectively.
Rupendra K Ranga, SPS Yadav, Ankush Yadav, Neha Yadav and Saroj Bala Ranga.2014 studied prevalence of occupational noise induced hearing loss in Industrial workers. They reported that the workers who worked in machinery area were affected more when compared to officials and helpers. The age group 36-40 years were affected more when compared to other age groups, 39% of industrial workers who were exposed to noise level >87.3dBA, for 8-12 hr/day .
Jesus C. and Juan R 2018 did a longitudinal study of noise exposure and its effects on hearing on 115 olive oil mill workers. In the study there was a notable rise in the noise level and the result of the Early loss Index measured hearing loss in each ear separately with 4KHz notch.

## II. MATERIALS AND METHODS

A cross sectional study was carried out on 54 Water Plant Industrial workers. Ear examination was done followed by Pure Tone Audiometry. Hearing threshold in conventional audiometric frequencies were measured and standard threshold shift was calculated for each ear. A well-structured, modified and validated Noise induced hearing loss proforma was used to collect information from 54 male subjects randomly selected from the industry.
The diagnostic criteria for NIHL were: - (a) Occupational noise exposure (b) work experience (c) hearing loss (d) no significant medical history affecting hearing. They were subdivided into four groups I.e (a) 25 to 35 yrs (b) 36 to 45 yrs (c) 46 to 55 yrs (d) 56 to 60 yrs.
The responses were scored and tabulated subjected to statistical analysis.

## III. RESULTS AND DISCUSSION

The total number of subjects on which study was done were 54 subjects. Among 54 subjects, normal hearing population were 25 subjects which was excluded from the study and rest 29 subjects were considered for the analysis.
The study showed following results of the hearing types of 29 subjects.

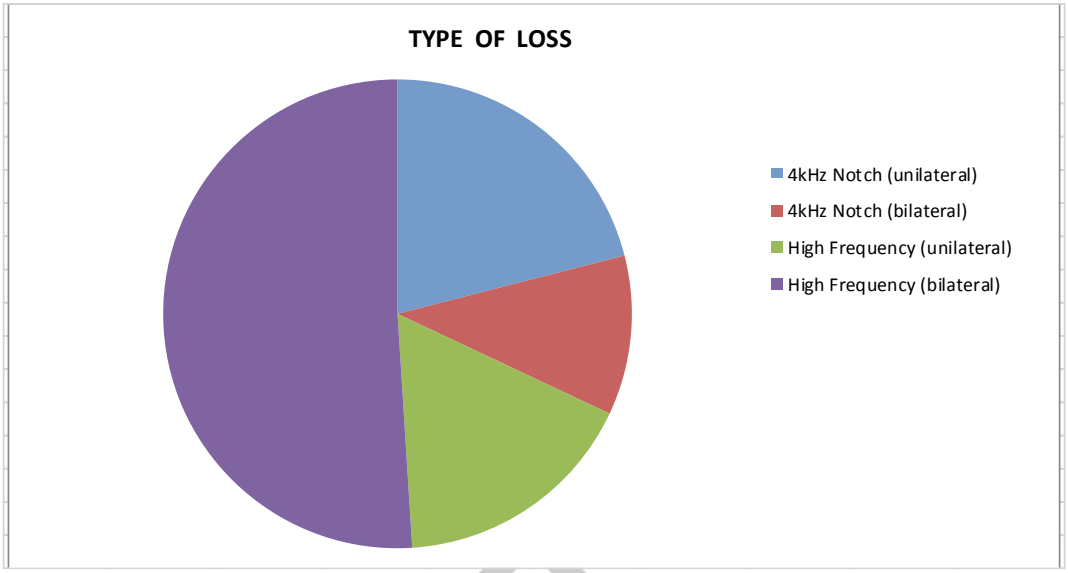


**Figure 1** Hearing Types with respect to Thresholds

**Table 1** Percentage of sum of number of subject with respect to Type of loss.

| TYPES OF LOSS | NUMBER OF SUBJECTS | PERCENTAGE |
|---|---|---|
| 4kHz Notch (unilateral) | 6 | 21 % |
| 4kHz Notch (bilateral) | 3 | 11 % |
| High Frequency (unilateral) | 5 | 17 % |
| High Frequency (bilateral) | 15 | 51 % |
| Total | 29 | 100% |

The percentage of above data were correlated and it was found that there is a strong and positive correlation between experience age and type of loss. Which is positive correlation of all 4 type of loss .Overall, 21% were with 4kHz Notch (unilateral), 11% with4kHz Notch (bilateral),17% with High Frequency (unilateral) and 51% with High Frequency (bilateral).
The range of noise level of the machines was in between 80dB and 100 dB. A dip in audiometric configuration was significantly observed at 4kHz and 8kHz in the subjects.The highest were 51% in high frequency bilateral. Occupational permissible noise exposure limit was for 8 hour time and distance from source of noise was 3 metres.

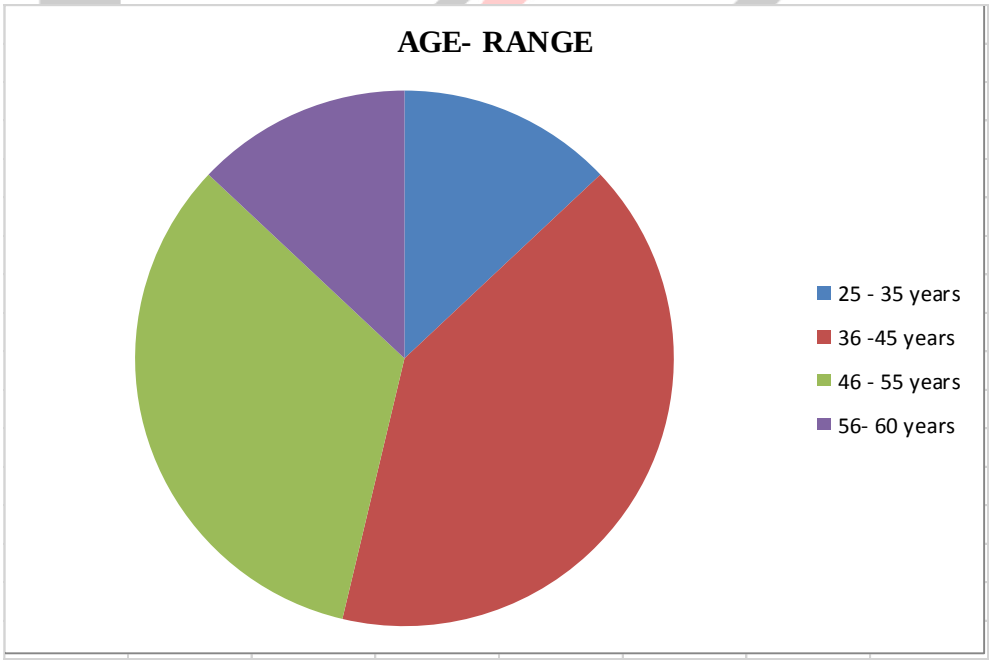


**Figure 3** Age Range

Overall, 13 % of the total analysed subjects were found to be in the age range of 25-35years, 41% were in the age range of 36-45 years, 33% were in the age range of 46-55 years and 13% were in the age range of 56-60 years. The most affected were those workers aged 36 to 55 years and exposed to noise for over a period of 15 to 20 years.

**Table 2** Percentage of sum of number of subject with respect to Tinnitus.

| TINNITUS | Number of Subjects | Percentage |
|---|---|---|
| UNILATERAL | 3 | 11 % |
| BILATERAL | 8 | 28 % |

There is a high incidence of Tinnitus in the industrial workers. It is summated in the following Table 2 that unilateral tinnitus is 11% and bilateral tinnitus is 28%.

**Table 3** Sum of number of subject with respect to Tinnitus.

| USE OF PERSONAL EAR PROTECTION DEVICE | Plugs | Muffs |
|---|---|---|
| YES | 23 | 13 |
| NO | 11 | 7 |

Earmuffs and Earplugs are the main types of hearing protective devices. Among 54 subjects, only 23 subjects used earplugs and 13 subjects used earmuffs. Workers who never used earplugs and earmuffs are 18 in number due to various reasons like old and spoiled, uncomfortable, old and hard, discomfort, not convenient to use. Some said protective devices were not provided, few said they wear only on when they are exposed to noise.

## IV. CONCLUSION

The study has documented a high incidence of noise induced hearing loss in water plant industrial workers and this would emphasis on the importance of using hearing protective devices. It is concluded that increasing working experience and age are causing severe impact on hearing causing irreversible hearing loss.

Awareness should be created among workers about the harmful effects of noise on hearing. Thus, it is necessary to make them aware and importance of the use of hearing protectors. Preventing strategies include health surveillance and follow up Pure tone audiometry. Further to this, it aimed to implement Hearing Conservation Program as a control measure in prevention of NIHL.

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