

Awareness on Occupational Noise Hazard Among Welders

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ABSTRACT

The aim of the study is to assess the welders awareness on occupational noise hazard and its management in Chennai. A total of 42 welders, participated. A questionnaire was developed, validated, and distributed. The sections of the questionnaire are scored using a close ended option. (1=yes, 0= no). Data was collected, and it was statistically analyzed. The results revealed low awareness scores on both awareness on noise hazard(42.5%) and its management(44.4%) with positive attitude(92.5%) to take measures on controlling noise. The current study concluded by suggesting the welders to be provided with periodic audiological evaluation and ear protective devices in workplace to prevent hearing impairment and other health impacts caused by prolonged noise exposure.

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I. INTRODUCTION

Noise can be defined as any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoyance (Environmental Protection Agency,1972)

Among pollutant types, noise has received high rankings. Numerous health impacts, both auditory and non-auditory, are associated with noise pollution (Nicchi, 2014). Noise affects cognitive function, causes behavioral issues. Even at low decibel levels, persistent noise can discomfort, disturb sleep, and stress people out, which increases their risk of developing cardiovascular disease, cerebrovascular illness, metabolic changes, psychological problems (American public health association, 2021)

Acoustic trauma, tinnitus, noise-induced temporary threshold shift, and noise-induced permanent threshold shift are the main impacts of workplace noise exposure. According to OSHA, a standard threshold shift (STS) is a change in hearing thresholds of at least 10 dB on average at 2,000, 3,000, and 4,000 Hz. Longer shifts make the effects of excessive noise exposure worse (longer than 8 hours). (OSHA technical manual, 2022).

Noise exposure to welders can be dangerous. Arc welding and cutting generate different amounts of noise depending on the process. 75-115 db A is the range of noise exposure (Health and safety executive). The amount of noise an individual is exposed to each day depends on the decibel level (dB(A) value) and the period of exposure during the workday. Up to 80% of the shift is spent with a welder exposed to arcing. When possible, welders should interrupt the noisy process and use practical techniques to lower noise levels for the particular procedure, and minimizing the remaining risk by using earplugs, ear muffs, or other hearing protection.

Ear protective devices are used to lower worker noise exposure. The use of ear protection device helps against hearing loss caused on by prolonged exposure to loud surroundings as well as the entry of debris and water into the ear canal. Ear protection devices work primarily by protecting the ear canal with soft, muffled material. The substance reduces the intensity of sound waves that are transmitted to the ear. (OSHA technical manual, 2022). Hearing protective devices come in different forms like ear muffs, ear plugs, electronic hearing protection device, semi insert device canal cap, etc.

1. Earplugs- Earplugs are reusable or disposable, come in a variety of sizes, forms, and materials, and are designed to occlude the ear canal while worn. In warm and/or humid locations like foundries, smelters, glass factories, and outdoor construction in the summer, earplugs are more appropriate.
2. Earmuffs - Earmuffs are one-size devices made to fit almost all adult users and come in a variety of sizes, shapes, and materials. It is made to cover the external ear and decrease sound's ability to reach the inner ear. For intermittent exposure, earmuffs are a good choice.
3. Hearing bands- Hearing bands resemble earplugs but differ in that they have a tight band like headphones. Though there are alternatives, the band usually goes around the wearer's neck at the back. Hearing bands have been well for their convenience and availability in a range of styles, sizes, and materials. Decibels are used to measure the Noise Reduction Rating (NRR). It is intended to assist the user in comparing the quantity of noise that the hearing protection equipment is reducing . The more noise that is blocked from entering the ear, the greater the NRR. In order to reduce workplace noise, it is crucial to wear appropriate hearing protection device. The majority of industrial workers are unaware of the purposes and advantages of

wearing hearing protection as a useful instrument to prevent the damaging effects of noise on the auditory system. (Ifeoluwa andOwolawi(2021).

Taniewski ,Zaborski,Szczepański &Nitka (1978)investigated efficiency of 9 types of hearing protectors and results found that the maximum efficiency (4kHz -(20-41) dB. The minimum efficiency (125 Hz - (8--21) dB). Attenuation efficiency of broad-band noise (18-40 dB). The aim of the current study is to evaluate welders awareness on occupational noise hazard and importance of ear protective device use in Tamil Nadu

II. REVIEW OF LITERATURE

Chang & Chen (2009) investigated noise exposure on welding workers and The result revealed the equivalent sound levels at welding sites in the construction industry were much higher (Leq = 82.2 2.0 dB (A)) with peak levels reaching 100 dB (A) than those in offices (Leq = 59.5 1.6 dB (A)) The risk of hearing loss was 5 times higher in the exposure group than in the administration group .

Rahimi-Moghadam & Khanjani (2013) evaluated Hearing Loss and Changes in Blood Pressure of Welders in a 4 Year Period and the result shows The equivalent noise exposure for workers over the duration of one business day was 97.8 dB, ranging from 90 to 110 dB. Following 4 years, there was a statistically significant increase in hearing loss (6.04 dB) in the employees' right ear at 8k Hz and in their left ear at 1k (1.77 dB), 4k (2.29 dB), and 8k Hz (4.89 dB) . The blood pressure did rise throughout this time, although it wasn't much higher.

Bushathoki, Singh, Sagtani, Niraula & Pokharel (2014) evaluated Awareness of occupational hazards and use of safety measures among welders in eastern Nepal and The findings indicate that (90.7%) welders were aware of at least one welding hazard and at least one PPE. However, just 47.7% of people reported using any PPE. .

Korczynski (2000) investigated Occupational Health Concerns in the Welding Industry, Welders reported flash, sore/red/teary eyes, headaches, nosebleeds, and a black mucous discharge from their nasal membrane as health issues along with excessive smoke levels and poor ventilation in the workplace.

Mutangala, Ndiaye, Kaseba, Mukeng, Cilundika& Mukomena(2021) investigated Occupational Hearing Hazards among Informal Sector Welders in Lubumbashi , result revealed 37.96% (n = 41) of the individuals had occupational hearing loss with mild hearing loss (80.49%)and moderate and severe hearing loss (2.44%) . 1% of welders acknowledged aware about the risk of noise exposure in the workplace, but 96%did not wear personal protective equipment (PPE).

Isah&Okojie (2006) investigated Occupational Health Problems of Welders in Benin City, Nigeria and result indicates When compared to the levels of awareness of workplace dangers (91.6 %) and work-related health complaints(96.4%), the average degree of protective device use was generally low (35.9 %)

Tagurum,Gwomson, Yakubu ,Igbita ,Chingle & Chirdan (2018) evaluated Awareness of occupational hazards and utilization of PPE among welders in Jos metropolis, Nigeria and result shows 99.3% were aware of the risks associated with welding work and , goggles were the most often used PPE (98%) followed by gloves (65.4%), boots (58%) overalls (36.3%) face mask (30.6%), and earplugs (12.9%).

Wanjari&Wankhede (2020) investigated Occupational Hazards Associated with Welding Work That Influence Health Status of Welders and conclude that the lack of personal protection equipment in welding creates a number of occupational health risks. The use of personal protective equipment significantly reduces a number of occupational health risks.

Chauhan, Anand,& Kishore (2014) investigated Occupational hazard exposure and general health profile of welders in rural Delhi And result revealed 53% said their employment was physically demanding, involved a huge amount of weight lifting (57%), and was dangerous (56%). They said that noise and dust/smoke were the two main work.

Kwak & Han (2021) reviewed The Effectiveness of Hearing Protection Devices from 2000 to 2021 and from 20 articles result revealed Users of the HPD function reported that it performed significantly well (p 0.05).A significant difference in sound attenuation (p 0.05) between groups when HPDs were worn and when they were not, but no difference in sound localization (p = 0.628) or speech perception (p=0.103)

III. Method

Aim : The purpose of the study is to determine the level of awareness of the occupational noise hazard among Welders in Chennai in order to prevent auditory and non auditory effects of noise.

Objectives:

- To determine the degree of awareness on noise hazard
- To determine the degree of awareness on management of noise hazard

The present study was done in two phases

PHASE 1: The questionnaire was developed with the help of a range of supporting reference. Speech-language pathologists with experience validated the questionnaire. The development of the questionnaire includes the modifications and suggestions. The first of the questionnaire's three parts includes information on the demographics and work history of the welder. There are 19 questions in the second section, discussing topics including noise hazards, auditory effects, and non-auditory impacts. 9 questions in the third section are focused on management of the noise hazard. Close ended questions are used to grade both sections (Yes 1, No 0)

PHASE 2: Participants with inclusive and exclusive criteria

➤ A Total of 42 Welders in and around Chennai with more than 5 years of work experience included. Welders working in industry set up were not part of the study.

Procedure :

The validated questionnaire was distributed. A consent was taken from all the participant. The participants were given enough time to finish the surveys, and participation was entirely optional. The questionnaire had to be filled out by each respondent privately and anonymously. The participant required to fill up the questionnaire form by selecting the options from yes- 1 and no- 0

Analysis:

The questionnaires data collected was further statistically analyzed and the results are discussed below.

IV. RESULT

Table 1 Shows percentage score of awareness on noise hazard

Question	YES		NO	
	N	%	N	%
Are you aware of hazards of noise exposure	11	26.2%	31	73.8%
Uncomfortable or pain in the ear while exposed to loud noise	33	78.6%	9	21.4%
Loud sound cause a blocking sensation in your ear	34	81%	8	19%
Noise can affect digestive system	0	0%	42	100%
Noise exposure can lead to psychological problem	6	14.3%	36	85.7%
You will feel irritated after several hours of work in noisy area	30	71.4%	12	28.6%
Noise causes a disturbance in equilibrium and difficulty in maintain balance	12	28.6%	30	71.4%
You will feel tired after your work in the noisy area	25	59.5%	17	40.5%
Loud sound can damage your ear	17	40.5%	25	59.5%
More noise exposure leads to hearing impairment	16	38.1%	26	61.9%
Hearing impairment major cause of defective communication	19	45.2%	23	54.8%
you will feel any difference in breathing pattern while working under high level of noise	2	4.8%	40	95.2%
Noise exposure cause vision problem	0	0%	42	100%
Prolonged noise exposure can lead to memory problem	3	7.2%	39	92.8%
Noise exposure cause sleep disturbance	30	71.4%	12	28.6%
High level noise can cause giddiness	27	64.3%	15	35.7%
Prolonged noise exposure makes you stressful	34	81%	8	19%
Prolonged noise causes a change in personality	6	14.3%	6	85.7%
Loudness of noise you are exposed to is too loud	34	81%	8	19%

From table 1 it can be seen that 81% acknowledge that they are exposed to loud noises, but only 26.2% are aware of the risks associated with noise exposure. A high % of welders are aware prolonged noise exposures leads to pain(78.2 %), blocked sensation(81 %), and stress(81 %), sleep disturbance(71.4%), giddiness (64.3%), irritation (71.4%) and tiredness (59.5%). low % of welders are aware that prolonged noise exposure can cause vision problem (0%), digestion problem (0%), damage to the ear (40.5%), hearing impairment (38.1%), poor communication (45.2%), changes in their breathing patterns(4.8%), memory problem(7.2%), personality changes(14.3%), psychological issues (14.3%) and equilibrium difficulty and imbalance (28.6%).

Table 2
Shows percentage score of management on noise hazard

Question	YES		NO	
	N	%	N	%
Do you think periodic audiological evaluation is necessary	32	76.2%	10	23.8%
Have you ever checked your hearing level?	5	11.9%	37	88.1%
Do you know about rehabilitation part of noise induced hearing loss?	6	14.3%	36	85.7%
Are you aware of audiologists?	5	11.9%	37	88.1%
Do you use ear protective device?	5	11.9%	37	88.1%
Are you aware of importance of ear protective device?	5	11.9%	37	88.1%
Do you think ear protective device are useful?	33	78.6%	9	21.4%
Early identification of hearing loss due to noise exposure major step in rehabilitation?	38	90.5%	4	9.5%
Are you willing to take any measures to control noise?	39	92.8%	3	7.2%

From table 2 it can be seen that high % welders agree with periodic audiological evaluation(76.2%), early identification(90.5%),EPD usefulness(78.6%) only 11.9% undergone audiological evaluation and 11.9% use EPD. Low awareness score seen with awareness about noise rehabilitation(14.3%), audiologist(11.9%), EPD importance(11.9%). 92.8% shows positive attitude on taking measures to control noise.

Table 3*Shows overall percentage score of awareness on noise hazard.*

OVERALL AWARENESS ON NOISE HAZARD	%
YES	42.5
NO	57.5

From table 3 it can be seen that 42.5% aware about noise hazard and 57.5% not aware.

Table 4

Shows overall percentage score of management on noise hazard

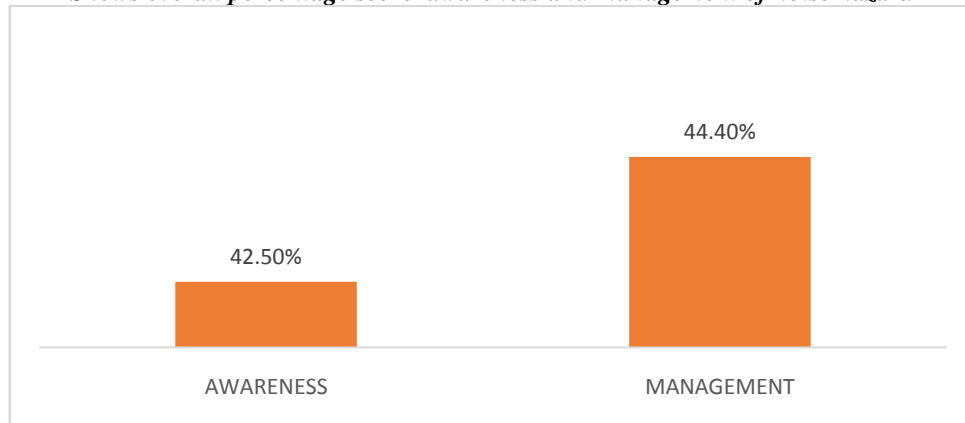
TABLE 4

MANAGEMENT	%
YES	44.4
NO	55.6

From table 4 it can be seen that 44.4% aware about management of noise hazard and 55.6% not aware.

Fig 1

Shows overall percentage score awareness and management of noise hazard



V. DISCUSSION:

From the above table and statistics, 81% of people agree that they are exposed to loud noises, yet only 26.2% are aware of the dangers of this exposure.

Basner, Babisch, Davis, Brink, Clark, Janssen, & Stansfeld (2014) investigated Auditory and non-auditory effects of noise on health and conclude Noise-induced hearing loss is still very prevalent in occupations which damage the nerves and hair cells. There is increasing proof of the non-auditory impacts like hypertension and cardiovascular disease, decreases cognitive function, sleep disturbance, annoyance. From the above table and statistics, both the non-auditory consequences, such as stress, fatigue, irritability, sleep disturbance, and giddiness, as well as the auditory effects, such as pain and blocked sensations, are associated with high awareness scores.

Harazin, Grzesik & Pawlas (1990) investigated the effects of noise on vision efficiency and result revealed vision efficiency changes following a 1-hour exposure to noise levels of 90 dB-A, 93 dB-A, 96 dB-A, or 99 dB-A suggest that there is a complex interaction between noise intensity and exposure time. Jafari, Kolb, and Mohajerani (2020) investigated the adverse impacts of different noise exposure paradigms on the neuroendocrine system, hippocampal and neocortical structures, cognitive performances, and the development of Alzheimer's disease (AD) and findings indicate that hypothalamic-pituitary-adrenal (HPA) axis and other sympathetic divisions of the autonomic nervous system, as well as stress hormones that influence the brain and behaviour, are believed to be hyper activated as a result of chronic noise exposure. The current study findings indicate low awareness scores on the effects of noise with vision, digestion, the ear, hearing, communication, breathing patterns, memory, personality, psychological disorders, and balance and imbalance problems.

92.8% shows positive attitude on taking measures to control noise. High % welders agree with usefulness of periodic audiological evaluation, early identification, EPD but only 11.9% use EPD and aware about the EPD importance. Low awareness score seen with knowledge on management, only 11.9% of welders aware about audiologist profession and undergone audiological screening throughout the period of working.

VI. CONCLUSION:

The current study investigated on the awareness among welders in Chennai about the noise hazard in the workplace and result indicated low awareness score on cause, effect and also management. Low percentage of welders are aware about the ear protective device and importance of ear protective device to prevent the occupational hearing loss. Overall positive response seen with the welders on periodical evaluation, early identification to prevent hearing loss and to take measure to control occupational noise pollution in the workplace.

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