Knowledge, Attitude, and Practice of Printing Press Workers Towards Noise-Induced Hearing Loss

Ramziya Basheer¹, P.G. Bhargavi², Hari P. Prakash²

¹Department of Speech and Hearing, AWH Special College, Kallai, Calicut, Kerala, India, ²Department of Speech and Hearing, School of Allied Health Sciences, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Context: Noise-induced hearing loss (NIHL) is considered as a common occupational hazard among the industrial workers. The printing press is one of the common industrial set up where noise levels are often high. The awareness of people working in such a setup is generally less towards the hazards that is caused by noise exposure. Aim: The current study was designed to identify the knowledge, attitude, and practice (KAP) of printing press workers towards NIHL. Settings and Design: Cross-sectional study was carried using an adapted and validated KAP questionnaire. It was administered on 57 workers in Thiruvananthapuram, Kerala. Methods and Material: The study was carried out in two phases: phase I included the adaptation and validation of KAP questionnaire to printing press workers. Phase II comprised of the administration of the questionnaire among the study population. Statistical analysis used: Descriptive statistics was used to compile the results. To measure the internal consistency Cronbach’s alpha scale was used. Results: The responses obtained from workers showed inadequate knowledge, negative attitudes in certain subdomains and poor practice. Conclusions: The findings from the present study sheds light on the dearth of awareness in printing press workers on hearing conservation and need of training programs to educate the printing press workers towards the effects of NIHL.

Keywords: Attitude, knowledge, noise-induced hearing loss, practice questionnaire, printing press workers, Key Messages. Noise-induced hearing loss is a reversible condition and may become irreversible if not taken care.

Key Messages

Noise-induced hearing loss is a reversible condition and may become irreversible if not taken care.

Awareness and training program on hearing conservation needs to be given major importance when there is noise source at work place.

INTRODUCTION

Noise-induced hearing loss (NIHL) is gaining a significant attention in recent years and contribute 16% of hearing loss across the world in adults (based on 4 million DALYs). The exposure to noise can lead to auditory and non-auditory effects. The auditory effects are evident when exposed to sounds louder than 85dBA. NIOSH[1] suggests that exposure to 85dBA sound for a duration of 8 hours leads to Permanent Threshold Shift (PTS). If sound intensity is below the level of Damage Risk Criteria (DRC) it could still lead to hearing damage which is reversible, it is called Temporary Threshold Shift (TTS). However, the recovery period is dependent on the type of stimulus, the intensity, location and duration of the stimulus. Apart from hearing loss, the noise will also cause auditory effects like tinnitus and hyperacusis.

Industrial workers are mostly prone to hearing loss caused due to noise. In their work setting, most of the machines have a continuous or intermittent type of noise with varying centre frequencies. Moreover, the tonal components of noise can be impulsive or have unpleasant and disruptive temporal sound.
patterns. There is a lot of variation in the noise pattern generated in the industry; the mechanism of noise generation depends on the particular noise operation and equipment including electromechanical devices, pumps, compressors, cutters, presses etc. Noise from printing industry is considered as top occupational risk factors in many countries. Studies carried out at different countries have shown that noise levels in most of the printing presses are above the DRC. In India, a study was carried out on 170 workers from 10 printing presses were an average of 79.3 dBA and Leq value of 98.97 dB, respectively. In 1976, the Government of India included “Noise-Induced Hearing Loss” as a fortifiable disease and provided general provision for noise control as well as ways to protect it. Workers who are exposed to noise, which equals or exceeds 85 dBA, are required to wear hearing protectors. These should be provided by the employer at no cost to workers. The employer should also make provision for audiometric evaluation to all the workers who are exposed to noise level, which may or may not exceed 85 dBA in damage risk criteria. In order to increase the awareness related to NIHL the first step is to know the knowledge, attitude, and practice (KAP) towards it, so that effective training program can be mapped to prevent hearing loss due to noise.

There are very few studies focused on the NIHL among industrial workers specifically related to industrial sectors in India. There are no published studies regarding the KAP towards NIHL among the printing industry in India. Awareness towards noise exposure and its hazardous effect on workers will help in preventing hearing loss to individuals who are exposed to noise during their working hours. Therefore, the present research work aimed at finding out the KAP of the individuals in printing press due to noise exposure.

SUBJECTS AND METHODS

A cross-sectional study was carried out among the printing press workers in Thiruvananthapuram, Kerala. Individuals who were currently working in the respective study site and those who were able to read Malayalam were selected for the study. Approval from the Institutional ethical committee of Kasturba Medical College, Manipal, MAHE, was taken prior to commencement of data collection. The study was carried out in two phases.

Phase I

The assessment tool used in the study was adapted from a KAP questionnaire of NIHL in sawmill workers developed by Rus, Daud, Musa, and Naing. It had three sections namely KAP with a total of 42 questions which were divided into 12 knowledge items with 7 subdomains, 20 items of attitude with 6 subdomains and 10 items of practice section with a subdomain. In the initial stage, evaluation of the relevance of the existing questions to Indian context was carried out and based on it few modifications were done in all the three sections.

The adapted questionnaire was given to five experienced audiologists for the validation of the content. The modified English version of the questionnaire was given to two proficient Malayalam-English bilingual speakers for both forward (English to Malayalam) and backward (Malayalam to English) translation. To test the comprehensiveness of the questionnaire a pilot study was conducted on 10 printing press workers.

Phase II

Prior to the administration of the questionnaire signed informed consent was obtained from individuals who were willing to participate in the study. Demographic details, subject’s age, gender, language, and education, site/department/section of working, work experience, and working hours, were collected. The finalised questionnaire was distributed among 66 individuals from two printing presses in Kerala and a total of 57 printing press workers participated in the study.

Data analysis

The responses were scored for each section separately. Categorical responses were taken for knowledge section (YES or NO or DON’T KNOW). Each correct response was scored as “1”, “YES” (true/false) and incorrect responses was scored as “0” (true/ false). In attitude domain responses were rated based on the Likert scale, which ranged from 1 (strongly disagree) to 4 (strongly agree) depending on the questions. Scoring of practice domain was based on the Likert Scale from 0 to 3; 0 for never, 1 for seldom, 2 for often and 3 for always.

Overall mean percentage scores were calculated by dividing the obtained raw score with the total score of each domain and then multiplied by 100%. A cut-off point of 75% was taken for adequate knowledge, positive attitude and good practice.

Statistical analysis

The data obtained from 57 printing press workers was entered and analysed using Statistical Package for the Social Sciences (SPSS) version 16.0 IBM Corporation, Chicago. Socio-demographic details were expressed in terms of mean and standard deviation for numerical variable and percentage for the categorical variable. The statistical analysis was based on the percentage of the knowledge scores, attitude score, and practice scores.
Mean and standard deviation of these three sections were also calculated.

RESULTS

The KAP questionnaire was distributed among 57 individuals from two printing presses in Kerala, in which 54 were males and 3 were females; age ranged from 24 to 67 (43.35 ± 8.57). The participants had a working experience ranging from 3 months to 40 years (13.7 ± 8.04). The demographic details are represented in Table 1.

Phase I: Adaptation and validation of questionnaire into printing press workers and translating it into the regional language

The internal consistency of the questions for each of the sections was analysed separately using Cronbach’s alpha consistency scale. The scores for each of the items are given in Table 2, Table 3, and Table 4.

Phase II: Administration of the questionnaire to the printing press workers

The responses given by 57 printing press workers are expressed in terms of the mean in each domain which is depicted in Table 5.

Knowledge of printing press workers towards NIHL

Overall the mean percentage score of knowledge domain obtained in the current study was 55.6 (17.2). The participants had adequate knowledge regarding the general aspects of noise and causes of hearing loss. The details of each sub section under knowledge domain are represented in Table 6.

Attitude of printing press workers towards NIHL

In attitude section above 80% of the participants were aware of permanent hearing loss due to excessive exposure to noise and were worried that noise can deteriorate their hearing. The press workers thought that taking medication during early stages can prevent hearing loss. Around 77.2% of the workers knew that they had to inform the employer if they had hearing loss. A positive attitude was observed regarding the preventive measures to protect from hearing loss but 80.7% thought that closing ear with finger/hand was easier than wearing an earplug. It was observed that 89.5% knew that periodic audiometric evaluation can detect hearing loss. When asked whether they should inform the employer when the machines are noisier than before 93% of them agreed on the same (Table 7 describes the subsection of attitudes with responses).

Practice of printing press workers to prevent NIHL

All the 10 questions under the prevention subsection showed that more than 50% of the individuals had never taken any preventive measures in order to protect themselves from noise (Table 8 shows the details).

Table 1: Demographic details of printing press workers (n = 57)

| Demographic data                  | Mean (SD) | Number (%) |
|----------------------------------|-----------|------------|
| Age (in years)                   | 43.35 (8.57) |            |
| Gender                           |           |            |
| Male                             | 54 (94.7)  |            |
| Female                           | 3 (5.3)    |            |
| Education                        |           |            |
| High school                      | 20 (35)    |            |
| Secondary school                 | 9 (15.7)   |            |
| Diploma                          | 8 (14)     |            |
| Under graduation                 | 16 (28)    |            |
| Post-graduation                  | 4 (7)      |            |
| Site of working                  |           |            |
| Binding section                  | 30 (52.6)  |            |
| Printing section                 | 27 (47.3)  |            |
| Working experience (in years)    | 13.7 (8.04)|            |

Table 2: Item total statistics for knowledge domain

| Knowledge items | Scale mean if item deleted | Scale variance if item deleted | Corrected item-total correlation | Cronbach’s Alpha if item deleted |
|-----------------|-----------------------------|--------------------------------|----------------------------------|----------------------------------|
| B1              | 5.75                        | 3.61                           | 0.00                             | 0.60                             |
| B2              | 5.84                        | 3.35                           | 0.17                             | 0.59                             |
| B3              | 6.11                        | 2.70                           | 0.43                             | 0.53                             |
| B4              | 5.88                        | 3.11                           | 0.34                             | 0.56                             |
| B5              | 5.96                        | 2.99                           | 0.31                             | 0.56                             |
| B6              | 6.68                        | 3.39                           | 0.16                             | 0.59                             |
| B7              | 6.72                        | 3.42                           | 0.23                             | 0.58                             |
| B8              | 6.49                        | 3.14                           | 0.17                             | 0.60                             |
| B9              | 6.56                        | 3.50                           | -0.02                            | 0.63                             |
| B10             | 6.37                        | 2.77                           | 0.36                             | 0.55                             |
| B11             | 5.98                        | 2.83                           | 0.42                             | 0.53                             |
| B12             | 5.95                        | 2.94                           | 0.37                             | 0.55                             |

The Cronbach’s alpha obtained for the knowledge domain was 0.60, this value is considered as having “Questionable” internal consistency.
DISCUSSION

The questionnaire was initially checked for an internal consistency of three domains using Cronbach’s alpha. A value of 0.60 was obtained for knowledge domain and this is considered as to be “Questionable” internal consistency but literature supports the value stated as satisfactory. The attitude domain had an “Acceptable” level of internal consistency having a Cronbach’s alpha of 0.71 and value of 0.85 was obtained for practice domain which indicates a “Good” internal consistency.

Knowledge of printing press towards NIHL

Overall mean percent score of 55.6 (17.2) was obtained in the knowledge domain which indicated that the individuals of the printing press had an inadequate knowledge regarding certain aspects about NIHL. It was observed that all participants were aware regarding the fact that hearing loss due to noise is a common problem among printing press workers compared to that of office workers. Approximately 80% of the individuals...
The individuals who are exposed to noise had increased degree which influences the effect of noise exposure, aged as well as biological factors. Age also plays an important role in the literature which can affect hearing like environmental apart from noise exposure, there are few other reasons quoted having hearing loss.

Only 7% of them knew that both genders are at equal risk of having hearing loss than women if both are exposed to noise. Press workers were asked whether listening to loud music can also lead to hearing loss. The employees were aware of the fact that it is the responsibility of the employer to provide earplugs, which they have to wear during their working hours.

Printing press workers had poor knowledge about five specific areas under the knowledge domain. The least response was observed regarding the signs and symptoms of exposure to loud noise. The results showed that 55 (96.5%) of them thought that discharge from the ear is an early sign of hearing loss due to exposure to loud noise. Signs and symptoms of NIHL generally include difficult to understand speech in a noisy situation, tinnitus which is evident immediately after the noise exposure, slight muffling of sound. When the press workers were asked whether men are at more risk of having hearing loss than women, only 7% of them knew that both genders are at equal risk of having hearing loss.

Apart from noise exposure, there are few other reasons quoted in the literature which can affect hearing like environmental as well as biological factors. Age also plays an important role which influences the effect of noise exposure, aged individuals who are exposed to noise had increased degree of hearing loss compared to younger individuals. The hearing loss will also depend on the intensity of the stimulus, type and duration of exposure, as well as individual susceptibility to noise.

About 80% of the printing press workers believed that hearing loss cannot be reversed if they are no longer exposed to loud noise. This ascertains weak knowledge which included treatment aspects also. Only 26% of the individuals know that NIHL cannot be treated by medicine. 60% of the printing press workers were unaware of the laws that are existing in order to protect them from exposure to loud noises and those who were aware of the law had no knowledge that there are certain acts regulated by government related to noise in work place, domestic areas etc. Factory act and Environmental protection act are the acts which every worker has to be aware, if they are working in an industrial setting.

Attitude of printing press workers towards NIHL

Printing press workers showed positive attitudes towards most of the subsections like general areas related to NIHL, the cause of hearing loss, signs, and symptoms, prevention and risk-taking attitudes. The overall mean score for this domain was 65.4 (SD ± 8.75). Negative attitude was observed regarding the treatment aspects. About 80% of the individuals agreed that they will seek traditional medicine if they are noticing hearing loss in the early stage and this was correlating with their scanty knowledge regarding the treatment aspects as well.

Practice of printing press workers to prevent NIHL

Practice domain consisted of 10 questions under a single section of prevention and it showed an overall mean percent score of 21.3(SD ± 20.28). These include measures practiced by the printing press workers to prevent themselves from NIHL. The mean percent score indicates that the printing press workers were having poor practice as 75% was considered as having a good practice.

It was surprising that above 70% of the individuals had never used any ear protection devices during their work time, whereas most of them try to avoid noise as much as possible while they were working. The workers did not use any ear protection device because they were not provided by the employer. These workers had a belief that noise in the workplace was a common

| Table 6: Knowledge of the respondents towards NIHL |
|-----------------------------------|------------------|------------------|
| Knowledge                        | Items                   | Correct response (%) | Incorrect response (%) |
| General aspects about noise      | B1 Hearing loss due to noise is a common problem among printing press workers as compared to office workers. | 57 (100) | 0 |
|                                  | B2 Loud noise from printing press machines can lead to hearing loss. | 52 (91.2) | 5 (8.8) |
|                                  | B3 Hearing declines when printing press workers are exposed to higher level of noise. | 38 (66.7) | 19 (33.3) |
| Cause of hearing loss            | B4 Hearing loss can occur even if a worker is exposed to impulse noise for a long period. | 50 (87.7) | 7 (12.3) |
|                                  | B5 Listening to loud music on regular basis can cause hearing loss. | 45 (78.9) | 12 (21.1) |
| Risk factors                     | B6 Among those who are exposed to noise, men are at more risk of hearing loss than women. | 4 (7) | 53 (93) |
| Signs and symptoms of NIHL       | B7 Discharge from the ear is an early sign of hearing loss due to exposure to loud noise. | 2 (3.5) | 55 (96.5) |
| Treatment                        | B8 Hearing loss due to noise can be treated by taking medicine. | 15 (26.3) | 42 (73.7) |
| Prevention                       | B9 Hearing loss due to noise will recover to normal if a person is no longer exposed to excessive noise. | 11 (19.3) | 46 (80.7) |
| Law                              | B10 There is law that protects workers who are exposed to louder noises. | 22 (38.6) | 35 (61.4) |
|                                  | B11 It is the responsibility of the employer to provide earplugs. | 44 (77.2) | 13 (22.8) |
|                                  | B12 It is the responsibility of the employees to wear earplugs while working. | 46 (80.7) | 11 (19.3) |

All the values within bracket are in percentage and outside the bracket are the number of responses.
thing for which they were habituated. The data show that approximately 70% of the individuals had never undergone an audiometric evaluation to check their hearing status but the employer had arranged other medical evaluation. Around 72% of the printing press workers have never attended any seminar or course regarding hearing loss due to noise. These poor practices can further lead to increase in the prevalence of hearing loss among them. The results obtained in the current study was correlating with the study done in sawmill workers and on quarry workers.

CONCLUSION

The current study provides an idea on the KAP of printing press workers towards NIHL. The results of study showed evidence regarding lack of knowledge and poor practice when it comes to hearing loss caused due to noise. So there is need to create awareness in printing press workers. NIHL is totally preventable so educating and creating awareness regarding the hazards of noise in the workplace will create huge difference. The future research should be focused on training on effects of noise and studying the efficacy of training programs among workers of printing press.

Acknowledgments

The authors acknowledge Dr. Razman Mohd Rus and Dr. Amar Dhere for giving permission to adapt the questionnaire and help to conduct the study.

Table 7: Attitude of the respondents towards NIHL

| Attitudes | Items                                                                 | Response | 1 (strongly disagree) | 2 (disagree) | 3 (agree) | 4 (strongly agree) |
|-----------|-----------------------------------------------------------------------|----------|-----------------------|--------------|-----------|------------------|
| General areas related to NIHL | C1 Printing press workers will have hearing loss despite whatever precaution they use. |          | 19 (15.8%) | 15 (26.8%) | 21 (36.8%) | 12 (21.1%) |
|          | C2 I am not bothered about the noise in the workplace.                 |          | 14 (24.6%) | 25 (43.4%) | 10 (17.5%) | 8 (14.05) |
|          | C3 Exposure to noise while working in the printing press would not make me hearing impaired. |          | 19 (33.3%) | 21 (36.8%) | 13 (22.8%) | 4 (7.0%) |
|          | C4 I am not worried if I cannot hear properly after working in noisy places because it is only temporary. |          | 13 (22.8%) | 19 (33.3%) | 15 (26.3%) | 10 (17.5%) |
| Causes of hearing loss | C5 Excessive exposure to noise can cause permanent hearing loss. |          | 2 (3.5%) | 4 (7.0%) | 22 (38.6%) | 29 (50.9%) |
| Signs and symptoms | C6 I am not worried if my hearing starts to deteriorate. |          | 25 (43.9%) | 21 (36.8%) | 6 (10.5%) | 5 (8.8%) |
| Health-seeking attitudes | C7 I will seek traditional medicine if I have hearing loss in the early stage. |          | 4 (7.0%) | 7 (12.3%) | 31 (54.4%) | 15 (26.3%) |
|          | C8 I do not have to get early treatment if I suspect in the early stage because it is self-limiting. |          | 10 (17.5%) | 29 (50.9%) | 15 (26.3%) | 3 (5.3%) |
| Prevention | C9 I do not have to inform any employer if I have hearing loss. |          | 23 (40.4%) | 21 (36.8%) | 7 (12.3%) | 6 (10.5%) |
|          | C10 Preventive measures towards hearing loss due to noise in the printing press is important. |          | 5 (8.8%) | 3 (5.3%) | 20 (35.1%) | 29 (50.9%) |
|          | C11 We should use the ear plug to avoid becoming hearing impaired due to noise. |          | 3 (5.3%) | 3 (5.3%) | 24 (41.2%) | 27 (47.4%) |
|          | C12 I like to use ear plugs. |          | 4 (7.0%) | 8 (14.0%) | 30 (52.6%) | 15 (26.3%) |
| Risk taking attitude | C13 Workers must accept whatever type of earplugs given to them. |          | 4 (7.0%) | 15 (26.3%) | 24 (42.1%) | 14 (24.6%) |
|          | C14 Periodic audiometry assessment can detect hearing loss due to noise in the workplace. |          | 3 (5.3%) | 3 (5.3%) | 28 (49.1%) | 23 (40.4%) |
|          | C15 We should inform the employers if the machine is noisier than before. |          | 2 (3.5%) | 2 (3.5%) | 31 (54.1%) | 22 (38.6%) |
|          | C16 Training and health education for workers regarding methods on self-protection towards noise should be done from time to time. |          | 3 (5.3%) | 2 (3.5%) | 31 (54.1%) | 21 (38.6%) |
|          | C17 Discussion with the employer regarding noise in the workplace will not reduce the occurrence of hearing loss due to noise. |          | 11 (19.3%) | 18 (31.6%) | 18 (31.6%) | 10 (17.5%) |
|          | C18 Only employers need to know in detail about the occupational safety and health act. |          | 21 (36.8%) | 20 (35.1%) | 9 (15.85) | 7 (12.3%) |
|          | C19 Noise in the workplace is a usual thing for me. |          | 11 (19.3%) | 24 (42.1%) | 15 (26.3%) | 7 (12.3%) |
|          | C20 It is easier to close the ear using the finger/hand rather than wearing an ear plug. |          | 29 (50.9%) | 17 (29.8%) | 5 (8.6%) | 6 (10.5%) |
Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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