

Original Research Article

The Health Effects of Noise on Workers' Mental Health

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Abstract: Background: Exposure to noise could be caused many unhealthy conditions. If noise was in suitable limit, it was not been harm. Objective of this study was to determine the health effects of noise on workers' health. **Methods:** It was a study. The articles with people who were employed in different industries were participated in this study. Articles groups were followed for sleep disorders, psychological, neurological and cardiovascular symptoms and signs. These groups were exposed to different levels of noise; according to work site, 4 groups were participated: work site 1, work site 2, work site 3 and work site 4. Symptoms and signs were determined. Data were analyzed with SPSS 16. ANOVA, Chi-2, Exact test and relative risks with considering $P < 0.05$ as significant level. **Results:** In articles Work site 4, had the most noise levels; 79.05 ± 0.10 dB A. Sleep disorders, psychological, neurological and cardiovascular symptoms and signs. Were determined. All of the symptoms and signs were the most in group 4. Relative risks for confusion was $1.88(1.20-2.95)$, for loss of concentration was $1.72(1.17-2.53)$, for fatigue was $1.71(1.02-3.57)$. Risks for headache and sleep disorders in group 4 were $1.70(1.01-3.56)$ and $1.61(1.03-3.77)$. **Conclusions:** Noise had health effects in low to moderate levels and might be caused confusion, loss of concentration, fatigue, headache and sleep disorders.

Keywords: Noise, Confusion, Loss of Concentration.

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INTRODUCTION

Exposure to noise could be caused many unhealthy conditions. If noise was in suitable limit, it was not been harm.

Exposure to noise was been in the all environment. If noise was in high level it had been caused hearing disorders. But researches were followed non hearing effects of noise [1].

One of the most effective physical factors in the workplaces was noise [2]. The employees generated some noise for doing the works [3]. But the level of noise and continuous of it were important too [5, 6].

The main etiology for many of some symptoms and signs in the workplaces was physical hazards [7]. Noise, temperature, air velocity and etc. had special standards [8]. Noise need to controlled as the same as other physical risk factors in the work place and environment [9, 10]. If it was lower than or more than standards, for example less than 20 dB A and more than

85 dB A, could be harmful [11, 12]. But in recent years researchers showed injury with lower and higher levels [8, 9].

Battista GE and coworkers assessed about the effects of high-noise on environment and people [1]. Gilles A and coworkers worked on tinnitus from hearing problems [2].

Flores LS and coworkers studied about the characteristics of tinnitus from noise induced hearing loss [3]. Hollingworth SA and co-workers showed the effects of environmental noise on human [4].

Abdullahi A and coworkers demonstrated the occupational hazards among the abattoir workers associated with noise exposure [5]. Sand S and coworkers studied about the health risks assessment [6]. Belojević G and coworker worked on non-auditory effects of community noise [7].

Adeninskaya EE and coworkers showed the methods of prevention of hearing loss due to noise [8].

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Hall SJ and coworkers demonstrated the acute physiological stress response to an emergency alarm and mobilization during the day and at night [9].

Dzhambov AM and coworker showed the effects of exposures to road traffic, noise, and air pollution as risk factors for type 2 diabetes [10].

Wright BA and coworkers studied about the moderators of noise-induced cognitive change in healthy adults [11]. DuBose JR and coworker showed the effect the noise on sleep [12].

Shepherd D and coworkers worked on the covariance between air pollution annoyance and noise annoyance, and its relationship with health-related quality of life [13].

Workers need to exam in periodic examinations for noise effects [14]. Assadi SN and coworkers worked on examination of workers those exposed to physical risk factors. Control of physicals was necessary specially noise exposures.

Physicals could be affected on heart and cardiovascular systems [15-17], as the same as mental and neurological. Noise could be discussed in human factors engineering [18-20].

In ergonomics, there were many typical subjects [21, 22], those need to worked in the work places and environments [23-25]. The researchers studied about the noise and standardizations in ergonomics [26].

Health programs for workers were necessary and measuring the risk factors were important subject in this situation. There were some unknown factors about noise effects and researcher wanted to find the facts.

Objective of this study was to determine the health effects of noise on workers' health.

METHODS

Study Setting; articles were done in different industries.

Study design and Study population; it was a study. Articles about the people who were employed in different industries were participated in this study. Groups were followed for sleep disorders, psychological, neurological and cardiovascular symptoms and signs. These groups were exposed to different levels of noise; according to work site, 4 groups were participated: work site 1, work site 2, work site 3 and work site 4. Symptoms and signs were determined.

These groups were exposed to low to moderate level of noise; according to working sector the population was divided to four groups. Symptoms and signs were determined by using questionnaire and physical examinations and clinical tests.

Symptoms and sign were confusion, loss of concentration, fatigue, headache, arrhythmia, hypertension, tinnitus and sleep disorders.

The Inclusion criteria in articles were people who worked in different industries with at least 6 years work experience in the same work. The exclusion criteria in articles were having the related diseases in ears, psychological, cardiovascular and neurological systems before beginning this job and having the positive family history of ears, psychological, cardiovascular and neurological disorders.

Exposure assessment; all exposures assessed and calculated the risks. Other work exposures were kept in the standard levels. Noise density measured and calculated according to standards of occupational safety and health administration by using a sound level meter by standard number 1910-95.

The validity and reliability of questionnaire were checked with specialists' opinions and also with performing a pilot study with correlation coefficient 92%. The participants were examined by author using a questionnaire, physical exams.

For statistical analysis, data were analyzed with SPSS 16. Chi-2, Exact test, ANOVA, P value less than 0.05 was considered for significant levels and relative risks were calculated with confidence interval 95%.

Ethical consideration; the study was implemented with the consent that was obtained from all the participants.

RESULTS

In articles the study participants were divided into 4 groups based on psychological stresses.

Work site 4, had the most noise levels; 79.05 ± 0.10 dB A. Sleep disorders, psychological, neurological and cardiovascular symptoms and signs were determined. All of the symptoms and signs were the most in group 4. Relative risks for confusion was 1.88(1.20-2.95), for loss of concentration was 1.72(1.17-2.53), for fatigue was 1.71(1.02-3.57). Risks for headache and sleep disorders in group 4 were 1.70(1.01-3.56) and 1.61(1.03-3.77).

Ears, psychological, heart and neurological symptoms and sign were determined. Confusion and loss of concentration were more in group 4 and the relative risks were 1.88(1.20-2.95) and 1.72(1.17-2.53). Risks of confusion and loss of concentration in group 3 were 1.14(1.12-2.93) and 1.25(1.10-2.80).

Articles showed the minimum, maximum and means of noise levels in four groups. Group 4 had the highest level and group 1 had the lowest level of noise

levels. There were significant differences between four groups. ($P < 0.05$)

The highest number of symptoms and signs were in group 4: Symptoms and sign were eyes, psychological, cardiovascular and neurologic; sleep disorders, hypertension, arrhythmia, tinnitus, headache, fatigue, confusion and loss of concentration.

The lowest number of symptoms and signs was from group 1. There were significant differences. These items were demonstrated in articles.

The relative risks for symptoms and signs were determined, group 4 had the highest risks. Relative risk in group 4 for sleep disorder was 1.61(1.03-3.77) and for fatigue was 1.71(1.02-3.57). Relative risk in group 3 and 2 for sleep disorder were 1.12(0.17-2.85), 1.02(1.19-1.93) and for fatigue were 1.43(1.10-2.50), 1.11(1.01-2.12). Articles show the relative risks in different groups. By using the logistic regression, these were had significant differences.

DISCUSSION

According to articles findings, Work site 4, had the most noise levels; 79.05 ± 0.10 dB A. Sleep disorders, psychological, neurological and cardiovascular symptoms and signs were determined. All of the symptoms and signs were the most in group 4. Relative risks for confusion was 1.88(1.20-2.95), for loss of concentration was 1.72(1.17-2.53), for fatigue was 1.71(1.02-3.57). Risks for headache and sleep disorders in group 4 were 1.70(1.01-3.56) and 1.61(1.03-3.77).

Ears, psychological, heart and neurological symptoms and sign were determined. Arrhythmia and hypertension were more in group 4.

According to the finding; group 4 had the highest number of symptoms and signs for auditory, cardiovascular, psychological and neurological systems: sleep disorder, hypertension, confusion, arrhythmia, tinnitus, headache, fatigue and loss of concentration. The lowest number of symptoms and signs was from group 1. Groups 2,3 had the average levels of noise. There were significant differences. By using the logistic regression, these were had significant differences. It mean symptoms and signs were not related to age, other occupational exposure and environmental exposures and body mass index.

Other studies showed the same as these results and demonstrated the special effects of noise on auditory, neurological, psychological and cardiovascular systems [6, 7]. Noise in low or high levels had effects on different part of the body, from ears to heart [20].

It seems that noise was affected on several organ systems, because of generation of stress [10,11]. In this study author showed that group 4 had the most

frequency of arrhythmia and sleep disorders and group 1 had the lowest frequency of them. Other studies had demonstrated the harmful effects of noise on well being and health [10, 11].

After deleting the effects of age, other exposures and body mass index the risk of diseases had significant difference. The risk of neurological and psychological symptoms and related diseases was demonstrated in other studies too [7]. Neurological symptoms and mental disorders could be caused by exposure to lower noise level [6, 7]. This study showed the effects of low to moderate noise level on neurological symptoms and signs and mental or psychological symptoms disorders.

The occupational physician must not ignore this important item in occupational health system. Modifying the workplace for noise was necessary.

According to the results of this study, researcher thought that specific job analysis must be done for all workers and must be measured all of risk hazards in the work place. In other studies were worked on determination of risk factors by emphasized on noise in related industries [25, 26].

Frequency of symptoms and signs were important and were gathered by reliable and valid questionnaires.

Author found that the noise was an important risk factor for auditory, psychological, cardiovascular and neurological disorders in high or low levels. Low or high level might be followed by neurological, mental such as sleep disorder, confusion, loss of concentration, cardiovascular disorders such as arrhythmia and hypertension.

Examinations in occupational medicine had an important subject. Auditory, Psychological, cardiovascular and neurological disorders should be prevented by periodic examinations and tests. The author of this article recommended to assessment and measurement the risk factors in the workplaces specially physicals such as noise and tried to modify the workplaces, they should be examined personnel in as soon as possible.

Noise exposure could be resulted from environmental exposures, occupational health team might be paid attention.

CONCLUSIONS

Noise had health effects in low to moderate levels and might be caused confusion, loss of concentration, fatigue, headache and sleep disorders.

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