

EXAMINING THE ASSOCIATION BETWEEN NOISE EXPOSURE AND BLOOD PRESSURE IN ALBARAKA PLASTIC COMPANY BETWEEN THE PERIOD OF MARCH AND MAY 2018Ekram Adam Idoom*¹, Sara Ismail Abdullah Faig² and Zahra Ibrahim Ahmmmed Mohammed³¹Faculty of Public Health University of Alzaeim Alazhari/ Sudan.²South Darfur Ministry of Health: Public Health Officer.³South Darfur Ministry of Health: Pharmacist Health Assurance.***Corresponding Author: Dr. Ekram Adam Idoom**

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Article Received on 30/09/2018

Article Revised on 21/10/2018

Article Accepted on 11/11/2018

ABSTRACT

The question of the association between occupational noise exposure and blood pressure has important public health implications. Noise can seriously damage the hearing system but it is only recently that research has been done on its possible contribution to hypertension and cardiovascular disease. Environmental noise is a known stress, which induces alterations of various physiological responses in individuals exposed to it. **The aim** of the present study was to assess the effects of industrial noise on hypertension of workers exposed to industrial noise in lock factory. **The study group** included 100 workers employed in different sections of lock factory exposed to industrial noise levels exceeding approximately 80dB. **The findings:** suggest that exposure to noise is a risk factor for blood hypertension in workers exposed to high noise levels (15- 25 years 123/84 mmHg), and that the drop-in blood pressure may be a sign of more sensitive effect of noise on blood pressure, according to other studies in literature. **Discussion:** Our result showed a significant increase in systolic blood pressure, diastolic blood pressure in lock factory. **Recommendation:** Efforts should be made to control the noise at the source, to control the transmission of noise and to protect the exposed persons.

KEYWORDS: Noise, Occupational, Hypertension, Cardiovascular, Acoustic waves, Systolic.**INTRODUCTION**

The term noise is commonly used to describe sounds that are disagreeable or unpleasant produced by acoustic waves of random intensities and frequencies. Noise pollution is becoming increasingly more severe in industrial countries and the cost of alleviating it in future years is expected to be insurmountable.^[1] Prevalence of noise is implicated in various illness of human and it is responsible for increased morbidity associated with modern life style. Immediate and serious attention must be given to control this mushrooming problem, since the overall loudness of environmental noise is doubling every ten years This has encouraged scientists to discuss and study the effects of noise pollution on human's health. The Federal Occupational safety and Health Act (OSHA) administrated by the U.S. Department of Labour, requires that specified noise exposures not be exceeded. Excessive noise pollution has been blamed not only for hearing damage and community annoyance but also for hypertension, fatigue, heart trouble, disturbed serum lipid, triglycerides, platelet count, plasma viscosity, glucose and reduced motor efficiency Many studies have shown that noise influences the cardiovascular, endocrine, metabolic, gastrointestinal and

neurological systems The cardiovascular system is considered to be the most involved and therefore has received the most attention, where as few specific studies have been performed concerning the relationship between noise and myocardial disease.^[2] There is evidence that noise presents a significant factor in the genesis of arterial hypertension coronary disease and disorders of peripheral arterial circulation.^{[1][2]}

Most of the studies have shown a rise in systolic and/or diastolic blood pressure while some of the researchers observed negative (decreased or non-significantly increased) association between blood pressure and noise.^[3] All studies are done in different environments, social, and economic status due to these differences we designed this study to evaluate the influence of noise exposure on blood pressure of people working in lock factory of Albarkh plastic company. There is evidence that by the use of appropriate preventive measures, the harmful effects of noise could be moderated and even eliminated.

Hypertension also known as high blood pressure (HBP), is a long-term medical condition in which the blood

pressure in the arteries is persistently elevated. High blood pressure usually does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral vascular disease, vision loss, chronic kidney disease, and dementia.^{[3][4]}

Modern understanding of the cardiovascular system began with the work of physician William Harvey who described the circulation of blood in his book "*De motu cordis*". In 1905, Nikolai Korotkoff improved the technique by describing the Korotkoff sounds that are heard when the artery is auscultated with a stethoscope while the sphygmomanometer cuff is deflated. This permitted systolic and diastolic pressure to be measured.^[5] Blood pressure affects between 16 and 37% of the population globally. In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally).^[3] This disease may vary substantially and is affected by emotions, pain, eating, voiding, caffeine, nicotine, drugs, body position, mental activity and physical activity. Determine if there is a family history of hypertension, cardiovascular disease, diabetes mellitus and dyslipidemia in first- or second-degree relatives, and document if there is.^[4] Noise can seriously damage the hearing system but it is only recently that research has been done on its possible contribution to hypertension and cardiovascular disease.^{[5][6]} It can be suggested that noise influences vascular tone, through direct and/or mediated mechanisms. The nonauditory effects of noise can manifest themselves through a series of nerve circuits represented, in addition to the reticular substance, by the limbic system, amygdala, hippocampus, hypothalamus and cortical nerve centers, also by autonomous nervous system.^[7]

Data on how noise affects different cardiovascular parameters are still conflicting, the different results may be linked to measurements taken at different stages of noise exposure. Sok as investigated a possible relationship between noise-induced hearing loss and high blood pressure (BP). Other investigations are still being made to see whether there are any links between hearing impairment, hypertension and cardiovascular disease.^{[6][7]}

MATERIALS AND METHODS

The cross-sectional study was conducted on 100 subjects of both sexes from lock factory (Albarkh) during (February, to May, 2018). The study was conducted in the Department of Epidemiology- Faculty of public Health, Alzeim Alazhari University.

Data collection procedure

The present study was used 100 questionnaires to select the cases which have following properties

- Subjects were working in lock factory.
- Subjects having no history of hypertension.
- Subjects having no history of myocardial infarction.
- Subjects having age less than 45 years. (people at 45

and above are already susceptible to hypertension).

Average time required for completing questionnaires
10 minutes

Measurement of Noise Intensity

Intensity sound level meter was not available and for this research, we assumed that noise is within the range of 35-130dB, with resolution of 0.1dB.

Recording of systemic arterial blood pressure

Blood pressure was measured in supine position by using mercury sphygmomanometer (Pagoda, Elite Surgical Industries, Egypt). Systolic blood pressure (SBP) and diastolic blood pressure (DBP) of all the subjects were recorded. Mean arterial pressure and pulse pressure were calculated from the above data.

- Mean arterial pressure = Diastolic BP + 1/3 Pulse pressure
- Pulse pressure = Systolic BP – Diastolic BP.

Area covered

Albaraka factory is one of the biggest factories located in Eastern side of Nyala town. It produces plastic materials.

Statistical Analysis

The results were analyzed by t-test using SPSS-16 package.

RESULTS

All the subjects selected in this study were in the age group of 15-45 years of range. (Table 1) shows the age composition of the subjects working in the factory. It shows that the maximum numbers of workers were in the age group of 25- 35 years and mean hypertension was 160/88 mmHg.

The distribution of workers according to working hours is shown in (Table 2) it shows the maximum number of workers in working hours between 6-12 hours with mean blood pressure 138/84 mmHg. Working life was showed in (table 3) it shows maximum number of workers in working life between 5-10 years with blood pressure 155/89 mmHg. The data were analyzed using the SPSS program. Analysis of significance by t test was used to compare the different parameters of the workers the values were significant for blood pressure.

Table 1: Age composition of cases vs mean blood pressure.

| Age in years | Number of persons | Mean blood pressure |
|--------------|-------------------|---------------------|
| 15- 25 years | 23 | 123/84 mmHg |
| 25- 35 years | 50 | 160/88 mmHg |
| 35- 45 years | 27 | 176/96 mmHg |

Table 2: Distribution of subjects per working hours.

| Working hours in hours | Number of workers | Mean of blood pressure |
|------------------------|-------------------|------------------------|
| Less than 6 hours | 11 | 120/80 mmHg |
| 6-12 hours | 67 | 138/84 mmHg |
| 13-18 hours | 22 | 157/88 mmHg |
| More than 18 hours | 0 | 0 mmHg |

Table 3: Distribution of Subjects according to working life.

| Working life in years | Number of workers | Mean of blood pressure |
|-----------------------|-------------------|------------------------|
| 1-5 years | 24 | 124/84 mmHg |
| 5-10 years | 53 | 155/89 mmHg |
| 10-15 years | 23 | 163/92 mmHg |

DISCUSSION

Noise pollution is increasingly being recognized as a physical factor in the environment that is injurious to many aspects of health. Our result showed a significant increase in systolic blood pressure, diastolic blood pressure in lock factory. Many researchers in the world have observed a significant rise in blood pressure in response to noise [IJEHR, 2005., Jovanovic, 1990 and WHO,2018]

Some of the scientists observed a rise only in systolic B.P. (Andren, 1983) (IJEHR, 2005). While many others found a significant increase in both systolic and diastolic B.P. in response to noise. According to (WHOa, 2018) could not see any association of noise and blood pressure, whereas observed insignificant increase in blood pressure (Jovanovic, 1990).

The actual mechanism for increase in blood pressure is not yet completely understood but it may be due to the following mechanisms:

The catecholamine released from adrenal medulla because of activation of adrenergic system, the effect of suprarenal glands steroids, angiotensin and the direct effect of noise on arterial wall tension influences the blood pressure and heart rate [WHO,2018].

1. Stimulation by noise, through sympathetic nervous system, causes an elevation of blood pressure by an increase in total peripheral resistance and myocardial contractility. The repeated stimulation with noise could then accelerate. (WHO, 2018) (WHO,1999).
2. The development of structural vascular changes in the peripheral resistance vessels and by this mechanism create a permanent blood pressure elevation to hypertensive levels [WHO, 1999].

It is seen that all the parameters are significant which has maximum noise level while only 3 parameters are significant in has minimum noise level. So, it is concluded that higher is the noise level, higher is the number of workers with hypertension previous study [WHO, 2018] showed similar results.

CONCLUSION AND RECOMMENDATIONS

These results show that industrial noise cause disturbance of cardiovascular system of the exposed workers so effective actions should be taken to prevent or minimize the effects of noise at workplaces. Efforts should be made to control the noise at the source, to control the transmission of noise and to protect the exposed persons. There should be permanent arrangements for regular measurements of noise levels at different locations in cities and factories and health education regarding noise control should be given due importance.

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