THE RELATIONSHIP BETWEEN OCCUPATIONAL NOISE EXPOSURE AND ARTERIAL BLOOD PRESSURE AT TEXTILE INDUSTRY

Masoud Ghanbari Kakavandi¹, Meisam Mordi¹, Seyedeh Shadi Charganeh², Hamed Yarmohammadi³*

¹Department of Occupational Health, School of Public Health, Kermanshah University of Medical Sciences, Kermanshah, Iran.
²Department of Environmental Health Engineering, School of Public Health, Zabol University of Medical Sciences, Zabol, Iran.
³Department of Occupational Health, School of Public Health, Kermanshah University of Medical Sciences, Kermanshah, Iran.

Email: yarmohammadi68@yahoo.com

Received on 07-08-2016 Accepted on 08-09-2016

Abstract

Occupational Noise Exposure is one of the most common pollutants in industrial and high traffic environments. In addition, high blood pressure is one of the health-threatening risk factors. The present study was carried out to investigate the relationship between Occupational Noise Exposure and blood pressure at a textile industry. This case study was carried out on 50 people exposed to noise above 85 dB and 50 people exposed to noise less than 55 dB. The blood pressure of the samples at rest was measured and recorded, as well as, the value of noise using cell-231 sound meter measured in different units. In the end, information obtained was analyzed. The results showed that, arterial blood pressure in people exposed to noise above 85 dB was more than the people exposed to noise less than 55 dB. Also, the workers of group had higher age and higher blood pressure than the control group. The results of this study showed that there is a relationship between noise and blood pressure. It is therefore recommended that, with continuous monitoring of blood pressure in people exposed, its complications such as heart disease can be prevented.

Keyword: Noise, arterial blood pressure, industry, textile, pollutants

Introduction

Occupational Noise Exposure is one of the most common pollutants in industrial and high traffic environments (1, 2). According to the World Health Organization, noise is considered as the third dangerous pollutant in major cities (3), and the organization has estimated the daily noise-induced damage at about 4 million dollars (4-5). In the world, more than
600 million people exposed to hazardous occupational noise, of this number, 50 to 60 million are in Europe and North America. In Iran, according to national statistics in 2006, 738953 Workshops in four parts of industry, mining, agricultural services with 2,747,738 people employed in the country have been identified, of which, in 17% of Workshops, the workers exposed to harmful noise factors (6). Acute exposure to noise has stimulated the nervous and hormonal systems, and in turn, has led to transient changes such as increased blood pressure, increased heart rate and heart – vascular disorders, which continuing the long-term contact can be associated with the permanent effects (7). High blood pressure is a major public health challenge around the world, which in 2000 was about 26.4% which it reaches to 29.2% in 2025 (8).

High blood pressure is considered as a major risk factor for many serious diseases such as cardiovascular and renal diseases (9). Many factors affect blood pressure, such as occupational and environmental factors such as noise, stress, temperature, exposure to some chemical materials and shift (10). In numerous studies on workers who working in noisy environments, it is observed that long-term exposure to noise above 80 decibels increases the risk of high blood pressure (11). Neghab et al, after studying the effects of chronic noise exposure on Petrochemical Complex workers found that, noise in workers exposed leads to increased blood pressure and hearing loss (6). Also, according to a study of Motsmed Zadehet al, exposure to noise above 85 dB has led to increased blood pressure and also has an impact on work efficiency and interference in conversation (12). Smith et al have been examined the physiological responses of the body when exposed to loud noise, and found that repetitive and continuous noise exposure has led to chronic human physiological and psychological disturbances, and changes in heart rate and blood pressure. (13) Ising et al compared the effects of noise under laboratory and field conditions and found that, exposure to noise of 97 dB has made physiological and psychological changes in half of the subjects (14). In study of Zhao et al, it is also identified that after family history, and salt intake, noise explore plays an important role in high blood pressure (15). In multiple studies conducted, discrepancies can be observed, for example in some studies, this effect in the age range of 50 years is described, although most researchers who have conducted studies on the effect of chronic noise on blood pressure, and have shown that, noise with the development of atherosclerosis can increase blood pressure. It is noteworthy that, each researcher due to the limitations in the study, has analyzed and described the results of his research, and these limitations are involved in obtaining similar or different results, (12). This harmful factor has a negative impact on human health, one of these effects, is changes in blood pressure due to the impact on a person's physiological systems. Given the importance of
hypertension as a risk factor of cardiovascular disease, more studies seem essential to maintain health of people (6). The purpose of this study was the relationship between noise and blood pressure at textile factory workers in Boroujerd (Iran).

**Material and Methods**

This study was carried out on 50 workers exposed to noise above 85 dB, as test group (who were working in textile factory) and 50 workers exposed to noise less than 55 dB, as control group. Sampling was done using random sampling method from among 83 subjects who were exposed to high sound in different units. The study population was composed of men. Demographic data was collected using self-report questionnaire, the data included age, weight, height, experience, and factors such as diseases related to drug intervention by interfering in blood pressure, smoking and consumption of salt and symptoms such as dizziness, tinnitus ears, sleep disorders. Blood pressure in two groups was measured by trained personnel using Alkapa mercury manometer at rest (2). Noise was carried out using a sound meter cell-231, by a specialist with experience in all industrial units. In the end, the authentication information entered the statistical software SPSS-16 and was analyzed.

**Results**

The results showed that the average noise in the case group was 97.5 and in the control group was about 55 dB. Demographic data in two case and control samples showed in table 1, distribution of people with hypertension and normal blood pressure in two case and control groups in table 2 and distribution of people with hypertension and normal blood pressure in two case and control groups was showed in Table 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>The average in the in case group (n: 50)</th>
<th>The average in the control group (n: 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>42.6</td>
<td>42.9</td>
</tr>
<tr>
<td>Weight</td>
<td>77.2</td>
<td>72.9</td>
</tr>
<tr>
<td>height</td>
<td>171.1</td>
<td>171.2</td>
</tr>
<tr>
<td>work experience</td>
<td>13.5</td>
<td>13.9</td>
</tr>
</tbody>
</table>

Table-2: The distribution of people with hypertension and normal blood pressure in two case and control groups.

<table>
<thead>
<tr>
<th></th>
<th>Case group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>High blood pressure</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Normal blood pressure</td>
<td>42</td>
<td>47</td>
</tr>
</tbody>
</table>

Number Percent       Number Percent
8 16%               3 6%
42 84%              47 94%
Table-3: The distribution of people with hypertension and normal blood pressure in two case and control groups according to age group.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Top blood pressure</td>
<td></td>
</tr>
<tr>
<td>Under 45 years</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Over 45 years</td>
<td>3 (6%)</td>
</tr>
<tr>
<td>Pressure Blood</td>
<td></td>
</tr>
<tr>
<td>normal</td>
<td>28 (56%)</td>
</tr>
<tr>
<td>Total</td>
<td>33 (66%)</td>
</tr>
</tbody>
</table>

Discussion

Due to the presence of confounding factors, such as hypertension-related diseases, different types of human nutrition, different environmental conditions in different industries, type of equipment used, type and how to use of personal protective equipment, type of study, a method of measuring blood pressure and the lack of uniformity definitions of words (such as blood pressure and allowable noise level), making a detailed comparison between this study and other similar studies is not possible.

Therefore, a comprehensive interpretation is associated with the restrictions (2). The results showed that blood pressure in those who were exposed to noise above 85 dB, roughly was 2.5 times the people who were exposed to noise below 55 dB (Table 2). In a study, 24-hour blood pressure of workers of an automotive industry who were exposed to noise above 85 db for 16 hours continuously showed that the mean systolic blood pressure in workers exposed to noise levels above 59 dB was more than others (16).

Zare et al showed that mean systolic blood pressure in airport staff (noise exposure group) was more than the others(2). In our study, those who were older than 45 years, and exposed noise above 85 dB (case group -table 3), had more blood pressure than the control group. In study of Abbate, it was found that systolic and diastolic blood pressure in the long run tend to increase with increasing age and work experience (7).

Several studies showed that exposure to noise can cause short-term physiological responses through the autonomic nervous system, and activates physiological responses, including increased heart rate, increased blood pressure, peripheral vasoconstriction, resulting in increased blood pressure and peripheral arterial blood pressure. In addition, exposure to
industrial noise with high intensity is associated with increasing levels of adrenaline and noradrenaline, and in some studies, an increase in levels of cortisol has been reported due to noise exposure. It seems that high levels of the sound pressure through increased stress leads to secrete a hormone called adrenaline, peripheral vasoconstriction, resulting in short time physiological responses through the autonomic nervous system, and activates the physiological reactions such as increased heart rate, increased blood pressure (6).

**Conclusion**

In the end, we can say that, the noise is one of the factors influencing blood pressure in people who are employed in industry, and due to the fact that high blood pressure is linked to heart disease, so monitoring blood pressure in workers noise exposure appears necessary, and may reduce the incidence of cardiac complications.

**References**


Corresponding Author:
Hamed Yarmohammadi*

Email: yarmohammadi68@yahoo.com