

NOISE AND ITS EFFECTS

NICULINA ȘCHIOPU¹, D. I. BARDAC²

^{1,2} „Lucian Blaga” University of Sibiu

Keywords: noise
organizational, the
effects of noise faction
body

Cuvinte cheie:
zgomotul, măsuri
organizatorice,
efectele zgomotului
asupra organismului
uman

Abstract: The effects of noise on the body are auditory fatigue, sound trauma, hearing loss, occupational deafness, stress and cardiovascular disorders. Prolonged and permanent noise increases blood pressure, impairs circulation, diminishes attention etc.

Rezumat: Efectele cele mai importante ale zgomotului asupra organismului uman sunt oboseala auditivă, trauma sonoră, hipoacuzia profesională, surditatea profesională, stresul și tulburările cardiovasculare. Zgomotul prelungit și permanent duce la creșterea TA, afectarea funcțiilor circulatorii, diminuarea atenției etc.

INTRODUCTION

As humans, we live and work in a world of sounds and noise. Noise is an uncoordinated powerful sound, and sound is defined as the mechanical vibrations of the environment transmitted to the auditory system.(1) According to Larousse - noise is a combination of sounds without harmony.(2) Physicists define noise as a random superposition of different frequencies and intensities, and physiologists define noise as any sound producing annoying unpleasant sensation. Man perceive sounds with a frequency between 16 and 20 000 vibrations per second and with an intensity between 0 and 120 dB.(3) The noise produced by a conversation ranges between 30 and 60 dB. The level of 20-30 dB is harmless to the human body. Sound limit is 80 dB. A sound of 130 dB causes a pain sensation and the 150 dB sounds are unbearable.

PURPOSE OF THE STUDY

This article aims at presenting issues related to the overload of the body that occurs when the person is exposed to intense noise. Sounds are indispensable to human and animal existence. Most human activities generate noise. Noise can also be generated by natural sources (volcanic eruptions, landslides, earthquakes, the sound of waterfall etc. and by artificial sources (horns, bells, road traffic noise etc.). Industrial noise is very common.

Each person interprets noise differently and this may depend on age, temperament, health, or external factors.(5)

The physical characteristics of noise are:

- sound intensity or strength is the most important character trait. It depends on the source, distance and possibility of transmission or copying. It is measured in decibels or phons. Decibel is a logarithmic unit calculated starting from the absolute threshold of audibility of p 0 dB for a 1000 Hz sound. Phon is the physiological unit of perception by the human ear of the weakest sound excitation.

- time – the period of time that the excitation sound (noise) acts on the auditory analyzer.
- frequency – the number of acoustic vibrations in a second and is measured in the number of times per second or Hz.

Because the environmental noise is omnipresent and cannot be avoided, a significant proportion of the population is exposed to it. About 20% of the population of the EU suffer from noise levels that health experts consider to be unacceptable. WHO estimates that approximately 40% of the population is exposed to road traffic noise exceeding 55 dB. WHO is currently developing a study that addresses a number of effects of noise on health.(7)

Quantifying the causes of morbidity associated with environmental noise is an emerging challenge for policy makers. Exposure to noise does not only impair hearing but can also cause other health problems such as cardiovascular diseases. The causes of morbidity associated with ambient noise have not yet been quantified. Noise also has an impact on political life. The magnitude of the consequences on long-term is unexpected (example –migration routes change etc.). Noise impacts are enhanced when they interact with other stressors in the environment – pollution, chemicals. Prolonged exposure to loud noise can cause hearing impairments. To protect workers, the 2003 EU Directive on noise, which came into force in all Member States in 2006, established a daily exposure limit value (8 hours) to a noise of 87 dB.

The main effects of noise on the body are:

- auditory fatigue
- sound trauma
- hearing loss professional
- professional deafness
- stress
- cardio-vascular disorders

Prolonged and permanent noise leads to high blood pressure, impaired circulation, diminished attention etc.(4)

Noise does not affect short-term health, but it may affect long-

¹Corresponding Author: Schiopu Niculina, int. Polux, nr.6, bl.G 13, sc.B, ap.28, Ploiești, jud. Prahova România; e-mail: schiopu_nina@yahoo.com, tel. +40-0723576193

Article received on 15.11.2011 and accepted for publication on 31.01.2012
ACTA MEDICA TRANSILVANICA March 2011;2(1):256-257

term health. Auditory organs are connected with the central nervous system. Actions adversely affect not only noise but can cause ear and neurological changes – dizziness, headache, fatigue.(9)

Lazarovici (executive director of Enviro Consult, a company specialized in providing services for the measurement noise), states that „Legal regulations make a distinction between noise from construction sites and industrial and office noise, depending on the mental load each of employee.” In addition to the noise coming from various devices, it is possible that the manner and intensity of communication between employees to disrupt the working activity.(12)

Noise protection is stipulated as an essential requirement of the European Council Directive 89/106/EEC.

„Protection from noise ” is the quality requirement. In 2006, the development of strategic noise maps for agglomerations with more than 250 000 inhabitants began, as well as for crowded roads and railways and major civil airports. After the accomplishment of the strategic noise maps, action plans will be made containing concrete measures to reduce noise levels. The high level of noise at work leads to the decrease of the potential profit and of the individual performance of the exposed employees. Organizational measures to prevent accidents and occupational diseases are achieved by:

- identification of noise sources (fixed or mobile),
- identification of the noise-exposed workstation,
- assessment of noise sources,
- noise level measurement.

Duties and responsibilities for identifying and assessing the risks should be reflected in the health of employees.(11)

The most important and certain way to achieve a noise reduction is to approach this problem even from its design stage. It is necessary to measure the ambient noise, the functioning noise and to establish the influences of different operating parameters. One way to reduce industrial noise is the use of quieter machines, the use of silences and acoustic carcasses. Noise reduction at source is the most effective and economic measure.(12)

Direct protection of the employee consists in using systems especially, called antiphones, which can be:

- internal (making an attenuation of 30 dB): plugs or pads that are inserted into the ear canal,
- external (producing an attenuation of 45 dB) are helmets or hats that cover the entire pavilion of the ear.

The human body adapts to the noise limits rigorously determined, therefore, allowable levels of noise cannot increase.(8)

The means of individual protection against noise protect only the auditory organs. It is now much discussed the verbal tone action starting from the premises that the human body has, in addition to ear, other areas able to receive sound waves. Thus, excessive noise can disturb the exposed body's overall condition, even if the ears are protected. The action of noise on the human body is currently being studied.

The most common effect of noise is impaired neurovegetative balance, which may occur at intensities of about 60 dB. Research has shown that high levels of noise have negative effects, and pathological reactions produce heavy deafening. The sounds of a certain intensity are harmful. The human body can begin to react adversely to noise at about 80 dB. The effects can be physical, mental or emotional. Noise effects are not immediately obvious. Hearing can be damaged slowly and almost imperceptibly.(6)

When choosing hearing protection, the noise level the employees are exposed to should be taken into account, as well as the working environment to provide optimum protection. Irrespective of the chosen protective equipment, it should be worn all the time, by the worker exposed to noise working environment. The new Directive 2003/10/EC on noise was necessary because hearing loss due to noise has been recognized by WHO as the most prevalent irreversible occupational disease (but which can prevented). This directive intends to protect workers' health and decrease the likelihood of their exposure to noise.(10)

REFERENCES

1. Bardac I, Stoia M. Elemente de medicina muncii și boli profesionale, Editura Mira Design Sibiu; 2004.
2. Toma I. Medicina Muncii, Editura Sitech Craiova; 2004.
3. Cocarță A. Medicină Ocupațională, Editura Medicală Universitară Iuliu Hațieganu, Cluj Napoca, vol.1, 2009.
4. Niculescu T. Manual de boli profesionale, Editura Medmun Bucuresti, vol 1, 2010.
5. Niculescu T, Todea A, Toma I. Medicina Muncii. București, Editura Medmun; 2003.
6. Bardac I, Guzau E, Stoia M. Igiena industrială, Editura Universității Lucian Blaga Sibiu; 2007.
7. Bogahty Z. Manual de Psihologia muncii și organizațională, Editura Polirom Bucuresti; 2000.
8. Păuncu E. Medicina Muncii, Editura Orizonturi Universitare Timisoara; 2004.
9. Darahont A, Cavin A. Poluarea sonoră și civilizația contemporană, Editura Tehnică Bucuresti; 1982.
10. Ursoiu C, Dumitrescu C. Poluarea sonoră și consecințele ei. Editura Facla Bucuresti; 1976.
11. Iorga I. Măsurarea zgomotelor și vibrațiilor în tehnică. Editura Tehnică Bucuresti; 1983.
12. STAS 11617-90. Metode pentru determinarea nivelului de zgomot și limitele admisibile, Institutul Român de Standardizare București; 1990.