VERSITA

ARS Medica Tomitana - 2012; 2(69): 98-100
DOI 10.2478/v10307-012-0020-z

R. Chirică[1], G.I. Comșa[2]

Daily noise exposure effects on serum transaminases

[1] Faculty of Medicine Constanta/Discipline Physiology
[2] Faculty of Medicine Constanta/Discipline ORL

ABSTRACT:
Noise pollution is one of the biggest problems that europeans is facing in our days. Half of europeans live in a permanent noise and one third suffer from insomnia due to noise pollution. Also, besides affecting social life, exposure to noise can cause changes in the organs, and it can be a triggering cause disease.
Key words: Noise pollution, diseases, noise, insomnia

Răzvan Chirică, MD

Str. Tulcea, nr. 10, Bl TM3 ap.23, Constanta
+40722361341
razvan.chirica@yahoo.com

Introduction

Stress associated with sound pollution, in enclosed spaces, is a serious problem for many people in Europe, according to a specialized study conducted earlier this year. Noise is more or less annoying, depending on its intensity (the main element); the frequency of which, the higher, the more traumatic is to the ear; duration of exposure, as is it longer, the more troublesome is for the ear, especially when is associated with vibrations.

Noise acts directly on the ear, exerting auditory effects, and extra auditory effects.

Current research has shown that high levels of noise acts really negative but also very oppressive silence is causing anxiety. Therefore, a certain intensity sounds are needed. Each person has a certain level of tolerance for noise, and now is delving into play factors such as age, health or temperament. [1]

Stress is a normal reaction for many people, to various noise sources. Most striking neuro-endocrine immune interactions are occurring in the state of

stress.

Stressors, physical or mental, triggers a complex adaptive response, called stress or alarm response, designed to counteract the effects of the stressor.

Intensity adaptive response is dependent on age, gender, hormonal status and genetic factors. [2]

Materials and method:

Experimental animals used in our model were albino rats of Wistar line, males aged 14 weeks and weighing 200-220 g. that were cared for, in compliance with the rules of hygiene, food and accommodation required by Community legislation. [4]

The experimental model consists of five groups, whose characteristics are:

- Control group (M) - animals in this group were not exposed to noise, serving as a reference for the experimental groups.
- Experimental group (E1) - animals in this group were exposed only once to noise (38 ± 2 dB) for one hour, three minutes exposure, 3 minute break
- Experimental group (E2) - animals in this group were exposed only once to noise (38 ± 2 dB) for 2 hours, 3 minutes exposure, 3 minute break
- Experimental group (E1-7) - animals in this group were exposed to a cycle of exposure to noise (38 ± 2 db) which lasted seven days, for an hour, 3 minutes exposure, 3 minute break.
- Experimental group (E2-7) - animals in this group were exposed to a cycle of exposure to noise (38 ± 2 db) which lasted 7 days, 2 hours, 3 minutes exposure, 3 minute break.

After noise exposure, blood samples were taken.

It was monitored the activity of the following parameters: Glutamic Pyruvic Transaminase (GPT), Glutamic Oxalacetic Transaminase (GOT), using a spectrophotometer CECIL CE 2012, 2000 Series, which is 1 cm tank.

Data were statistically analyzed using the usual methods, and calculate test "t" of Student [3] was to determine the significance of difference between the averages that was compared.

Results and Discussion:

Acute and chronic stimulation of the hypothalamic-pituitary axis port, produce changes throughout the body.

The impairment of hypothalamic-pituitary axis port produces changes in liver enzymes. These changes are represented in table no. 1 (for GPT) and no. 2 (for GOT).

Table 1. Mean GPT values, for the control group and experimental group, after a single exposure for one hour or two hours, and after repeated exposure for 7 days

GPT	*X*	*P*≤
M	29.9	
E_{1-7}	34.85	0.05
E_{2-7}	41.07	0.01
E_1	83.57	0.001
E_2	63.50	0.01

Changes of liver tissue enzymes, are produced both, by short-acting stimulus (a single exposure for an hour or two hours) but also by long-acting stimulus (for 7 days).

Liver parenchyma is beginning in the acute phase to show signs of damage, signs evidenced by increases in serum transaminases, statistically significant increase ($p \leq 0.05$), as shown in the table. 1 and no. 2.

*Table 2. Mean GOT values, for the control group and experimental group, after a single exposure for one hour or two hours, and after repeated exposure for 7 days (*statistically insignificant)*

GOT	*X*	*P*≤
M	72.60	
E_{1-7}	72.28	SI *
E_{2-7}	79.42	0.05
E_1	195.90	0.001
E_2	128.85	0.001

In conditions of chronic stimulation in the study, over a period of 7 days, changes maintain the secretion of serum transaminases.

It is assumed that these changes in serum transaminases are indirect consequences, the result of both the autonomic nervous system activation, which releases catecholamines, and the hypothalamic-pituitary-adrenal axis, which is responsible for the release of corticosteroids.

There is a close relationship between physio-pathological changes between liver enzymes and serum cortisone, relationship that, under acoustic stress, lead to changes at both levels, enzyme and cellular level, changes which, if are not detected and combated, can lead to the occurrence of irreversible damage and the development of specific diseases.

Conclusion:

1. Acoustic stress is an important factor of developing diseases at different cellular and anatomical levels

2. Acute exposure to a sound stimulus may produce changes in the liver

3. Support over a long period of auditory stimulus, convert sensation perceived in sound stress, which can induce changes in liver enzyme

4. Noise can be a powerful stressor, and may cause disturbance on biochemical parameters of body

References:

1. Catana F. M., Toma L. (2007 November). *Zgomotul, otrava care ne ucide lent*. from http://www.9am.ro/stiri-revista-presei/Social/77368/Zgomotul-otrava-care-ne-ucide-lent.html
2. Bardac I, Stoia M. (2004) *Elemente de medicina muncii şi boli profesionale*, Sibiu, Romania, Editura Mira Design.
3. Senedecor G.W, Cochran WG. (1980) *Statistical methods* (7th ed.) (pp. 334-364) Ames, Iowa, Iowa State University Press.,
4. Ciudin E., Marinescu D. (1996) *Animale de laborator, (vol. I)* (pp 99-136), Bucureşti, România, Ed. All