

## IMPORTANCE OF IMPEDANCEMETRY IN ESTIMATION OF AUDITIVE EFFECTS OF INDUSTRIAL NOISE

### Abstract

Impedancemetry - tympanometry and stapedius reflex present objective method in researches of hearing sense. They present precise information about hidden structures of middle and inner ear. These methods enable objective estimation of condition of transmission apparatuses, reflex curve of muscles stapedius, determination of objective threshold of hearing, registration of hearing fatigue.

The main goal of this paper is detailed analysis of impedancemetric research - tympanometry and parameters of acoustic reflexes in industrial workers exposed to high intensity of noise with known physical characteristics and different duration of exposure.

Research covered 173 workers (346 ears) employed in working unit "Blacksmith unit" in company Zastava. During the working process in that working unit, noise is above permitted limits, and it has negative frequent structure. Workers were selected in four groups. In the first group were workers, who spend all working time in area with noise above permitted limits. In the second group were workers who spend part of their working time in the area with noise above permitted limits, in total duration of 3 hours. The third group was consisted of workers who work with blacksmith hammer machine, where the noise level was the highest. The fourth group was control group consisted of workers without damage of hearing but who spend whole time in are with high noise. Workers in the first, second and third group had different levels of hearing damage caused exclusively by influence of chronical acoustic trauma.

We took anamnesis, ORL status from all the workers, we also performed audiometric and impedancemetric research - tympanometry and stapedius (acoustic) reflex.

By tympanometric method we found higher values of compliance when compared to control group, at workers in the first and the third group, specially at workers of the first group it was above  $0.9 \text{ cm}^3$ , while in the fourth group it was from  $1.0$  to  $1.4 \text{ cm}^3$ .

By examining acoustic reflex we found that the middle value of the sound strength needed to cause stapedic reflex - reflex threshold, is higher in the first and third group of workers comparing to the second and control group. At higher frequencies 2000 Hz and 4000 Hz, the increase of the reflex threshold was found in the first and third group (96 dB) compared to control group (87 dB). Amplitude is increased on frequencies 500 Hz and 1000 Hz (3,38) in the first and third group, compared to control group (2,36), while at higher frequencies this increase is more noticeable.

Rising angle of the reflex curve in the first, second and the third group was from  $41^\circ$ - $50^\circ$ , in control group  $31^\circ$ - $50^\circ$ . Output angle in most examined ears in the first, second and third group was from  $26^\circ$ - $35^\circ$ , while in control group it was from  $16^\circ$ - $35^\circ$ . Impedancemetric is, as objective, non-invasive, short term method, very easy to use, it does not require the assistance and

cooperation of workers which helps to avoid wrong judgment, impre reactions of workers.

**Key words:** impedancemetric, hearing damage, noise