

Hearing Function in Periaural Player Music Customers

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ABSTRACT

Hearing acuity indices were compared in periaural player music customers and non-customers. At conventional speech frequencies, up to 8 kHz, auditory thresholds in customers did not differ from those in non-customers. At 8- and 12-kHz frequencies, however, the player fans possessed greater thresholds. The trend did not display any dependence upon music listening lengths. Gender bearing was revealed furthermore: high-frequency threshold elevation rates were greater in female than in male customers. Audiometrical inspections of player music customers seem advisable for an in-time revealing and rehabilitation of hearing disorders happened. The audiochecking has to include high frequencies, 12 kHz at least.

Periaural music players are rather popular in the world around. The maximal sound intensity in players reaches 100-120 dB (Biassoni et al., 2005). The customers mostly use the devices in the noisy environments: when walking through the streets, when transporting over, etc. In such situations the outer noise level approximates conventionally to 90 dB (Bradley et al., 1987). To follow the applied melody, the music intensity in players should thus exceed 90 dB that appearing harmful for delicate inner-ear structures (Mostafapour et al., 1998; Williams, 2005).

The influence of the player music on the hearing function has been estimated in the present study. 277 students of the higher education establishments participated in the project. The age of inspected individuals fell within the range of 18-25 years. 174 from the tested subjects were females and 103 were males. 150 participants, 141 females and 49 males, were music player fans while 127 individuals, 73 females and 54 males, were apart from the regular periaural music listening and constituted thus the control sample.

Potential participants of the research underwent initially otoscopy. If finding cerumen or any outer- and middle-ear pathology, the subject was not included in the study. Individuals filled then the particular questionnaire. The subjects were excluded from the sample if indicating the history of auditory trauma, and/or of the use of ototoxic drugs, and/or of a family history of a hearing loss at early ages. Special attention was given to the duration of the music player usage: how many years, how many days, and how many hours per day are involved the participants in music habits.

Hearing thresholds were determined in a soundproof chamber. The pure-tone audiometry was conducted by GCI-16 Audiometer. Hearing acuity indices were determined monaurally at 1-, 2-, 3-, 4-, 6-, 8-, and 12-kHz frequencies.

The program IBM SPSS Statistics 20 was applied for the quantitative processing of obtained results. The primary data analyses, e.g. revealing of ratios and estimation of mean values, were descriptive. The comparison of the test vs. the control intergroup categorical variables was performed utilizing the Person Chi-Square Test.

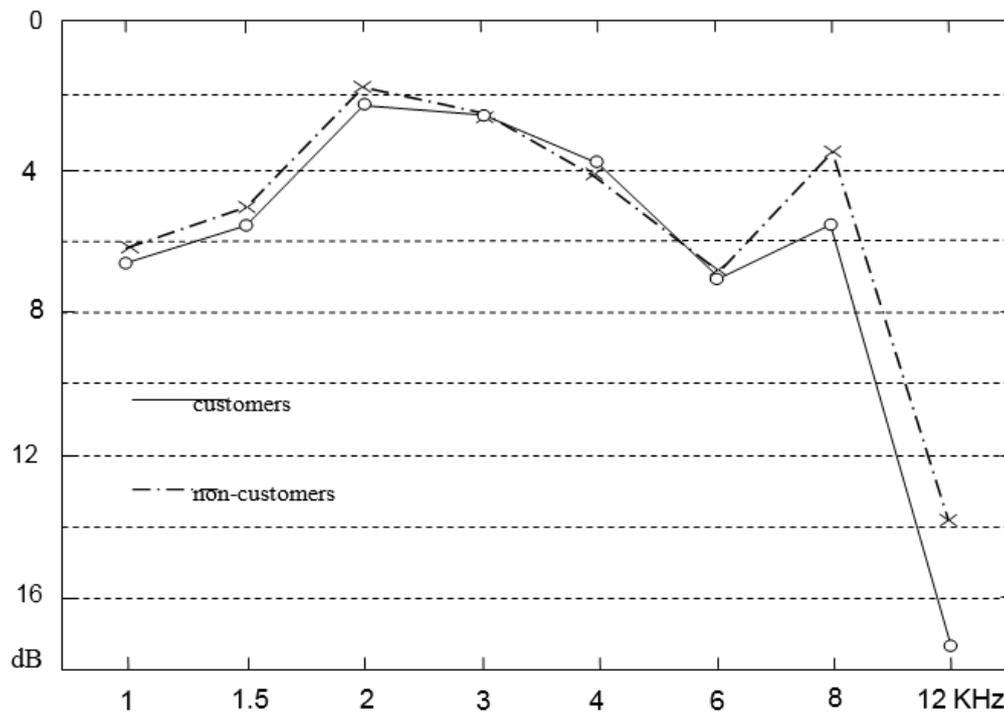


Fig. 1. Auditory thresholds in periaural player music customers and non-customers at 1-12-kHz frequencies.

Auditory threshold values of music player customers and non-customers were estimated at 1-12-kHz frequency band (Fig. 1). No difference was found at 1-6-kHz frequencies. At higher frequencies, 8 and 12 kHz, the thresholds in periaural player music customers regularly exceeded those in non-customers (Figs. 1 and 2). At 8 kHz the mean difference approximated to 2 dB while at 12 kHz to 4 dB. The latter disparity was statistically significant ($p < 0.001$). The systematic usage of player music can lead thus to high-frequency hearing impairments. From the overall number of 277 inspected individuals, the impaired hearing at 12-kHz frequency was the case in 101. From those, 80 subjects belonged to the test subgroup of the periaural music player fans while 21 only to the control one, 79.2% and 20.8%, respectively ($p < 0.001$).

Within the inspected generation, the increase in auditory thresholds at high sound frequencies did not display any dependence upon the age of music periaural player music customers: the incidences of high-frequency hearing worsening in age groups of 18-20 and 21-25 years appeared rather similar.

From the overall number of the 80 periaural player music customers, demonstrating an increase in auditory thresholds at 12-kHz frequency, in 54 individuals it occurred unilaterally while in 26 bilaterally. The threshold augmentation appeared thus twice as much unilaterally than bilaterally: 67.3% and 32.7% of cases, respectively. The hearing threshold augmentation

at high auditory frequencies failed to correlate with duration of periaural player music listening. The threshold augmentation at 12-kHz frequency was detected somewhat more frequently in customers involved in periaural player music more than 6 hours per day, 54.2% (Fig. 3). On the other hand, the impairment incidence was greater in individuals rarely, 1-2 hours, than more intensively, 3-6 hours, being engaged in everyday music: 48.6% and 40.7%, respectively.

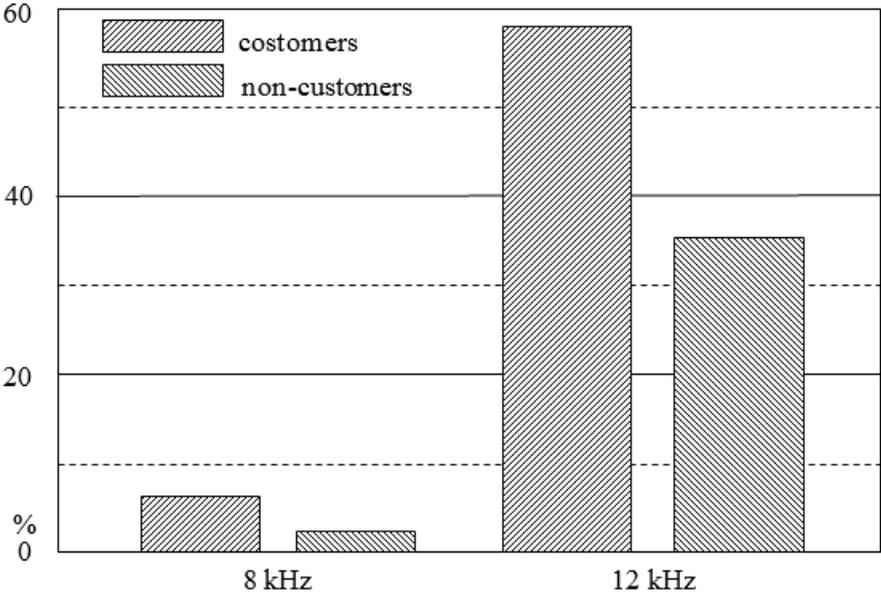


Fig. 2. Incidences auditory threshold augmentation at 8- and 12 kHz frequencies of music periaural customers and non-customers.

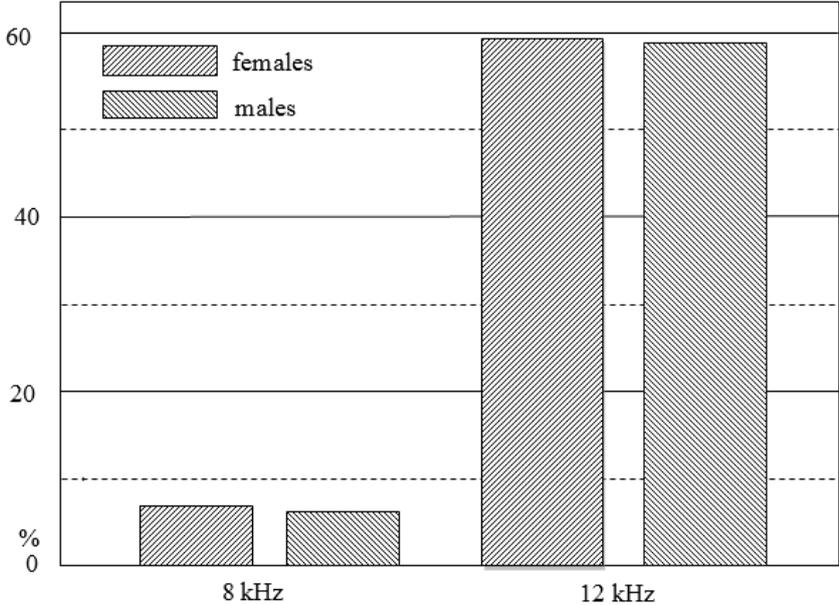


Fig. 3. Incidences (in %) of auditory threshold augmentation at 8- and 12- kHz frequencies in periaural music player customers of female and male genders.

The incidences of auditory threshold augmentation at high auditory frequencies in the control subgroup were lower in females than in males: 12% and 22%, respectively (Fig. 4). In the test

subgroup, on the opposite, the rate of high-frequency impairment in females exceeded that in males: 55% and 49%, respectively. The ears of females appeared thus more sensitive to the periaural player music effects than those of males.

The following conclusions were reached considering the results of the study:

- At conventional speech frequencies the hearing thresholds in periaural music player customers are within the normal limits and statistically are not differed thus from those in non-customers.
- The hearing thresholds in periaural music player customers are increased at high sound frequencies, at 8 and 12 kHz, in particular.
- Augmentation of hearing thresholds in periaural music player customers at high auditory frequencies are not correlated with everyday lengths of the player usage and bear thus more individual-personal rather than systemic-group character.
- The effects of periaural music listening on a hearing function possess gender specific character: high-frequency hearing loss due to systematic periaural music listening has more regular character in female than in male music player customers.

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