



ORIGINAL ARTICLE

High-frequency profile in adolescents and its relationship with the use of personal stereo devices^{☆,☆☆}



Renata Almeida Araújo Silvestre^{a,*}, Ângela Ribas^a, Rogério Hammerschmidt^b,
Adriana Bender Moreira de Lacerda^a

^a Universidade Tuiuti do Paraná (UTP), Curitiba, PR, Brazil

^b Universidade Federal do Paraná (UFPR), Curitiba, PR, Brazil

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KEYWORDS

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Primary prevention

Abstract

Objective: To analyze and correlate the audiometric findings of high frequencies (9–16 kHz) in adolescents with their hearing habits and attitudes, in order to prevent noise-induced hearing loss.

Method: This was a descriptive cross-sectional study, which included 125 adolescents in a sample of normal-hearing students, at a state school. The subjects performed high-frequency audiometry testing and answered a self-administered questionnaire addressing information on sound habits concerning the use of personal stereo devices. The sample was divided according to the exposure characteristics (time, duration, intensity, etc.) and the results were compared with the observed thresholds, through the difference in proportions test, chi-squared, Student's *t*-test, and ANOVA, all at a significance level of 0.05.

Results: Average high-frequency thresholds were registered below 15 dB HL and no significant correlation was found between high frequency audiometric findings and the degree of exposure.

Conclusion: The prevalence of harmful sound habits due to the use of personal stereo devices is high in the adolescent population, but there was no correlation between exposure to high sound pressure levels through personal stereos and the high-frequency thresholds in this population.

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* Corresponding author.

E-mail: renatasaa@hotmail.com (R.A.A. Silvestre).

PALAVRAS-CHAVE

Audiometria;
Adolescente;
MP3 player;
Perda auditiva;
Prevenção primária

Perfil de alta frequência em adolescentes e sua relação com o uso de MP3 players**Resumo**

Objetivo: Analisar e correlacionar os achados audiométricos de altas frequências (9–16 kHz) em adolescentes com seus hábitos e atitudes de audição para prevenir perda auditiva induzida por ruído.

Método: Este é um estudo transversal descritivo que incluiu 125 adolescentes em uma amostra de alunos ouvintes em uma escola estadual. Os indivíduos foram submetidos a testes de audiometria de altas frequências e responderam a um questionário autoadministrado abordando informações sobre hábitos sonoros com relação ao uso de MP3 players. A amostra foi dividida de acordo com as características de exposição (tempo, duração, intensidade, etc.) e os resultados foram comparados aos limites observados, por meio do Teste de Diferença de Proporções, Qui-quadrado, teste T de Student e análise de variância (ANOVA), todos em um nível de significância de 0,05.

Resultados: Foi registrada média de limiares de altas frequências abaixo de 15 dB HL e não foi encontrada nenhuma correção significativa entre os achados audiométricos de altas frequências e o grau de exposição.

Conclusão: A prevalência de hábitos sonoros prejudiciais devido ao uso de MP3 players é alta na população adolescente, porém não houve correlação entre a exposição a altos níveis de pressão sonora por meio de MP3 players e os limiares de altas frequências nessa população.

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Introduction

Studies related to the recreational habits with exposure to high sound pressure levels (SPL), especially through stereos for personal use, have proved to be recurring in different adolescent populations, with prevalent data at over 90%.^{1,2}

Considering that technological development has provided increasing quality and power of earphones and headsets, with amplifiers that reach 130 dB SPL without sound intensity distortion,^{3,4} and coupled with personal stereo products that are inexpensive, highly portable, store large volumes of music, and have long-life batteries, there has arisen a situation in which the personal stereo (PS) has become particularly prevalent and harmful among the young urban population.^{4,5}

Some possible explanations for such exposure involve: the need for self-worth and social acceptance, leading to the adoption of fads in order to become a member of a group⁶; customization potential of a sound environment leading to personal isolation⁴; and even experimentation with pleasure and euphoria that may arise from the release of endorphins due to the physiological defense reaction that accompanies exposure to sound levels above 80 dB SPL.⁷

Although music has been considered less harmful to the human hearing system than an equivalent industrial noise, given the former's intermittent nature, allowing for a hearing recovery period, a lower dominant frequency, and more discreet alert reactions due to personal interpretation of whether it is a pleasant sound⁶; one must highlight the irreversible characteristic of high SPL induced hearing loss (HSPLIHL), greater susceptibility of cochlear damage in the youngest populations,⁸ and the increase in the predisposition to develop hearing loss in adulthood when there is early exposure to high noise levels.⁹

Traditionally, the diagnosis of HSPLIHL, as well as its monitoring and verification, are performed by subjective audiometric threshold testing observed through pure tone audiometry (PTA) and objective audiological evaluations, such as auditory brainstem response (ABR) and otoacoustic emissions (OAE) testing, especially distortion product (DPOAE).¹⁰

However, in view of the recognized early elevation of hearing thresholds for high frequencies, compared to normal thresholds, in light of potentially harmful conditions for the cochlear system such as exposure to occupational noise and/or ototoxic drugs, certain systemic and ontological diseases, as well as during the process of auditory aging. High-frequency audiometry (HFA) has been indicated as an instrument in the early diagnosis of hearing loss when compared to PTA and OAE.^{11–15}

This study aimed to analyze HFA findings in adolescents and correlate them with their use of PSs.

Method

This was a cross-sectional descriptive study approved by the Research Ethics Committee recorded under No. 2576.183/2011-08. All participants signed an informed consent authorizing the use of data collected after clarification regarding the research objectives and procedures.

The subjects invited to participate in the study were all adolescent students of both genders enrolled in a state school in the city of Curitiba, Brazil and present during evaluation days. Established inclusion criteria were: signing the informed consent, a normal otorhinolaryngological examination, evaluations for acoustic impedance, and pure tone audiometry ($n = 134$). Excluded from the final body of

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