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ASSOCIATION OF HEARING COMPLAINTS AND HEADPHONE USE- A REVIEW STUDY

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Abstract: Introduction: Technological evolution has contributed to new lifestyles, and with these changes, the use of sound equipment with individualized headphones by children, young people and adults is increasingly common. **Objective:** To verify the association between hearing complaints and the use of headphones. **Methods:** Literature review based on articles published until August 2021. Article searches were performed in the databases of the Virtual Health Library (BVS), Online System for Search and Analysis of Medical Literature (MEDLINE) using the following controlled descriptors: Hearing, headset, hearing loss, youth, noise effects. **Results:** Tinnitus, hypersensitivity to intense sounds, loss of ability to hear certain sounds and difficulties in understanding speech in noisy environments were the main complaints found. **Conclusion**: It was possible to identify the close relationship of hearing complaints associated with the use of headphones.
Keywords: Hearing; Hearing loss caused by noise; Health risk behavior; Noise effects.

INTRODUCTION

Hearing is extremely important for human beings, because it is through it that communication and perception of sounds are developed. It is a sense that manifests itself even before birth, making us capable of social interactions. The auditory system is composed of a set of organs that are capable of capturing and transmitting sounds until they reach the brain, where the information will be processed [1].

Technological evolution has contributed to new lifestyles and, with these changes, the use of sound equipment with individualized headphones by children, youth and adults is increasingly common. Young people, mostly teenagers, are exposed to high-intensity amplified music, especially in their leisure activities [1].

The high intensity of sounds in headphones used by young people can produce a slow and progressive hearing loss, causing hearing loss with sensorineural characteristics, which are very similar to losses caused by exposure to occupational noise [2]. For this daily exposure, the duration and power of the sound devices, which can reach high levels of sound intensity [3], must be considered.

It is estimated today that the maximum volume to which we can be exposed for 8 hours a day is up to 85 decibels (dB). As the volume increases, the exposure must be reduced by half the time [4]. However, this control of exposure time and intensity does not always happen in the daily lives of young people. Some smartphones and headphones are capable of playback at volumes up to 130 dB. According to the recommended rates, listening to music at this intensity for more than 5 minutes would be enough to cause some type of damage to the hearing, causing this continuous exposure to sounds more intense than indicated, which can trigger symptoms such as tinnitus, of pain and pressure in the ears, sound distortion, permanent hearing loss, intolerance to loud sounds, dizziness and difficulties in understanding what is being said.

In the last two years, within the context of a pandemic, the population has made daily and constant use of headphones, whether for occupational activities, studies and / or leisure activities. Considering this reality and the auditory risks that this behavior provides, it is relevant to research and publicize the auditory complaints associated with the indiscriminate use of headphones, in order to awaken in the population the ability to detect the auditory risk of the continuous use of this device. Seeking alternatives for promotion, health education and changes

in habits, this study aimed to verify the association between hearing complaints and the use of headphones.

METHODOLOGY

The method of this study was a literature review with information search carried out in the databases of the Virtual Health Library (VHL) and the Online System of Search and Analysis of Medical Literature (MEDLINE).

For the construction of this research, the following steps were followed: establishment of the guiding question, selection and acquisition of articles (inclusion and exclusion criteria), evaluation of pre-selected studies, discussion of results and presentation of the review. In the first stage of the research, the following guiding question was elaborated: What are the hearing complaints associated with the use of headphones?

Then, the selection of articles was carried out, according to the topic addressed in the research, using the following descriptors: "Adolescent AND Hearing AND Hearing Aids"; "Hearing and noise effects and young people"; HearingAnd Headphones"; "Hearing loss and headset and youth".

The inclusion criteria established for the selection of articles were: being an original article, published in Portuguese, English and Spanish, with a publication period from January 2011 to August 2021, with an abstract available for reading and answering the guiding question. Duplicate articles, articles in the literature review format, case reports, articles containing hearing loss and paid articles were excluded.

RESULTS

In the first stage of the research, 1,949 studies were found, of which those that were outside the inclusion criteria were excluded, then the titles and abstracts were read (figure 1) which resulted in the selection of 6 works for in-depth reading and selected to compose the research (table 1).

DISCUSSION

Among the 1,949 articles found, only 06 were analyzed, since the others did not answer the guiding question present in this study.

Knowing that this is a topic that has been widely discussed in the scientific literature for decades, the number of articles analyzed is justified due to the following aspects: articles dealing with the use of headphones associated with hearing loss, leisure music from sound equipment, articles that analyzed the sound pressure level of headphones, articles that contained only audiological data, and those that compared the types of intra- and supra-aural headphones.

After selecting the articles that answered the guiding question, we have: article 1 by Herrera et al. [5,] with the objective of analyzing the habits and behaviors of adolescents exposed to music amplified with headphones and its implications for hearing health. This is a survey carried out with 131 young people aged between 15 and 18 years old, which found tinnitus, increasing the volume of the TV and asking people to repeat what was said as the main hearing complaints. The prevalence of headphone use among young males was another result found in this study.

The second article, by the authors Gonçalves et al. [2,] was a study that made a comparison between a control group and an experimental group, in order to assess the occurrence of auditory symptoms associated with the use of headphones. The authors found a prevalence of temporary symptoms such as: tinnitus, dizziness, earache, muffled ear sensation, low hearing, increased hearing sensitivity and difficulty understanding in a noisy environment, which indicated the potential harmful effects of listening to portable music players. music for one to two hours a day, with

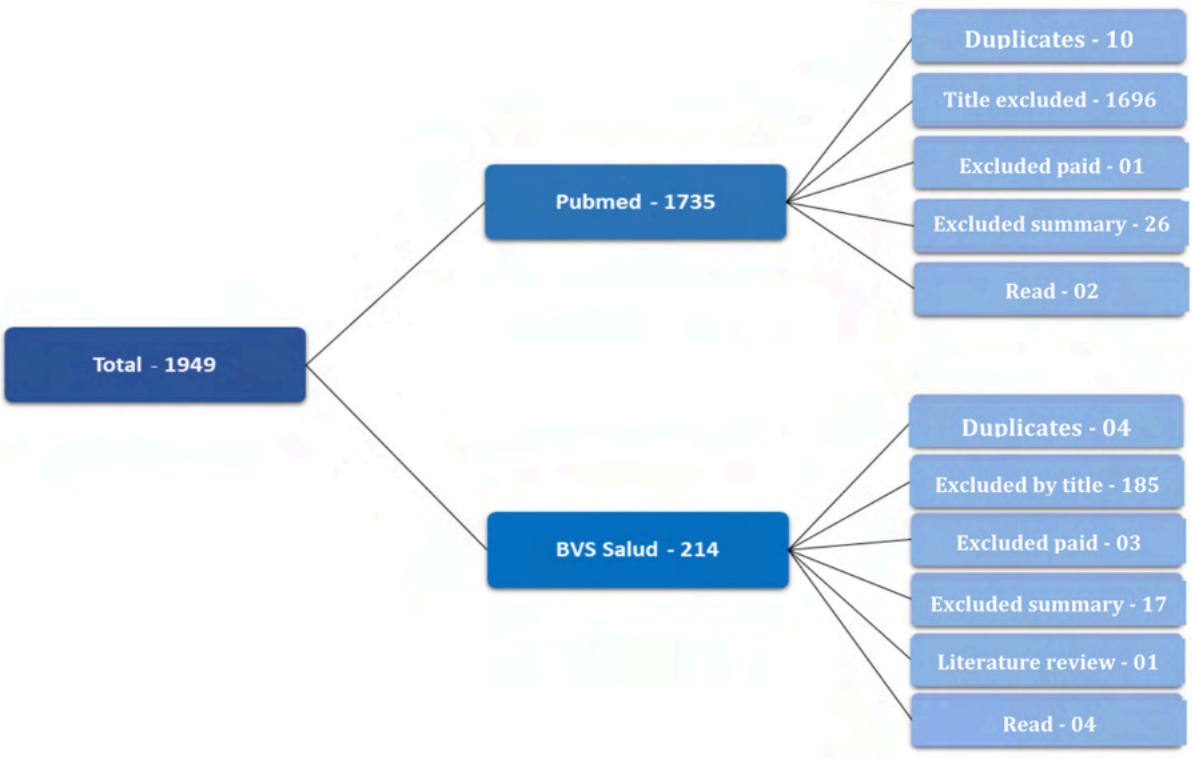

Figure 1. Diagram of included and excluded studies according to established inclusion and exclusion criteria.

No.	authors	Title	Year
1	Herrera et al [5]	Amplified music with headphones and its implications on hearing health in teens	2016
2	Gonçalves CL, Dias FAM [2]	Audiological findings in young headphone users	2014
3	Santana BA, et al [7]	Prevention of hearing loss in the school context against leisure noise	2016
4	Silva et al [8]	Use of digital audio players by high schoolstudents: measurement of use intensityandusagehabits	2018
5	Widen SE, Båsjö S, Möller C, Kähäri K. [9]	Headphone listening habits and auditory thresholds in Swedish adolescents. habits and hearing thresholds in swedish teenagers.	2017
6	David R Moore, Oliver Zobay, Robert C Mackinnon, et. al.[10]	life time leisure music exposure associated with in creased frequency of tinnitus./ Lifetime leisure music exposure associated with increased frequency of tinnitus.	2013

Table 1. Survey of the research in relation to the database, authors, title and year.

a higher occurrence of auditory symptoms in the experimental group. This statement can be justified by the fact that post - stimulatory hearing fatigue is capable of causing temporary changes in hearing thresholds after exposure to noise [6].

Study 3, by Santana et al. [7], refers to a research with 58 students of both genders aged between 10 and 17 years old, elementary and high school students, in which an educational lecture was held in the form of a dialogic expository class, lasting one hour, using audiovisual resources, addressing aspects of hearing and possible damage caused by exposure to amplified music, emphasizing the use of headphones. As a result, it was found that the majority had at least one hearing complaint, with tinnitus being the most frequent, corroborating the literature that considers it as one of the main symptoms of hearing loss due to noise exposure, emphasizing that this is just a symptom and not the cause of the loss [4].

In the research by Silva et al. [8], referring to article 4, which aimed to investigate the relationship between the sound pressure levels of personal stereos and hearing complaints, evaluating two groups of users: one with more than five years of use and the other with less than five years. The results showed that users with more than five years of use had the following auditory complaints: Difficulty understanding sound in noise, tinnitus, sensation of occlusion, sensation of hearing loss, dizziness, otalgia, ear itching. Despite pointing out that more than half of the young people evaluated said they were concerned about their hearing health, there is no change in attitude in the face of these situations, pointing to the need to reformulate educational campaigns in hearing health.

In article 5, the authors Widen et al. sought to investigate self-reported listening habits and listening to portable music. The study was carried out with the participation of 280 Swedish students who described their general listening habits and hearing problems. As a result, the following data were obtained: 14% reported poor subjective hearing and 7% to 8% reported experiencing hearing problems such as tinnitus, noise sensitivity and noise fatigue, corroborating Seligman [10], who describes the same associated auditory symptoms exposure to high-intensity sounds.

Article 6, Moore et al. [11] presented a study carried out using an online questionnaire on lifetime exposure to noise and tinnitus. A total of 4,950 people between 17 and 75 years of age participated in this research, in which 76% of people reported constant tinnitus, with a prevalence in male participants, in which there is controversy among the authors, as some report a slight increase in the prevalence in females. for having more time available to seek medical help and others suggest the prevalence in males, justifying the fact that men are more exposed to occupational noise [12].

The surveys selected for this review indicated that more and more young people are harming their hearing with the use of headphones. These complaints serve as a warning, as they signify the onset of noise-induced hearing loss (NIHL), which is considered slow and progressive, and can be avoided with reduced exposure and greater access to information. All the symptoms reported in this study are common to NIHL, which is characterized by a decrease in hearing acuity, especially at higher frequencies (3K to 6k Hz) [13], justifying, for example, the difficulty in understanding speech, hypersensitivity to intense sounds, temporary hearing loss and tinnitus.

The mechanism by which this degeneration of the cochlea occurs after exposure to noise is still unknown, however, it is believed that the stereocilia are capable

of rebuilding themselves from top to bottom, in a period of 48 hours. If the injury is more intense, to the point of overcoming this self- repair mechanism, it can lead to a mechanical rupture that results in a toxic combination of endolymph and perilymph in the cochlear duct structure, causing side effects, including the loss of hair cells and the corresponding fibers. nervous [14.] In the literature, it is possible to verify the great effort of the scientific community to report the damage that noise causes on hearing, however, it is also observed that little is reflected when investigating changes in habits and prevention.

With regard to the prevention of NIHL in young people, more investments in preventive programs are suggested, as there are those focused on occupational health, and that the same efforts must be made to protect the hearing of young people exposed to high-intensity sounds., in order to prevent such losses. It is necessary to include prevention programs in schools, with basic themes related to hearing health, including information about which sounds are harmful to hearing health, aiming to raise the awareness of young people from school age on the appreciation of hearing and care to be taken, promoting reeducation in their behaviors that favor better listening habits.

CONCLUSION

Based on the objectives of this review, it was possible to identify the close relationship between hearing complaints associated with the use of headphones. Tinnitus, hypersensitivity to loud sounds, loss of ability to hear certain sounds and difficulties in understanding speech in noisy environments were the main complaints found in the articles selected for this review. These complaints are potential risks for the acquisition of noise-induced hearing loss.

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