In past decades, there has been increasing concern with recreational noise, which children and young people are the most exposed to, with a growing trend to hearing disorders. Among the intervention programs related to noise effects and validated for Portuguese language, there is Dangerous Decibels® (DD). In Brazil, the School Health Program (SHP) is an intersectorial Health and Education policy, which aims to contribute to the students’ whole education by means of health promotion, prevention and care. The main objective of this study was to evaluate DD program, included in the SHP interventions. Exploratory, quantitative research was carried out on a case study among 6th graders of 32 Municipal Schools from Itajaí, Brazil. For the data collection, validated, structured questionnaires were used (before, after and three months after the educational interventions). During 2018, DD Program was carried out by the same tutor to all classes. In the result analyses, descriptive and comparative statistics was used, significance level of 5%, by means of the Statistica 13.3 software. The sample comprised 1,835 students, 838 females and 997 males. Mean age was 11.53 years, standard deviation of 0.8. The greatest part of the group (96.9%) had never taken part in any educational campaigns at school, had risky hearing habits (pointing out the use of earphones for 91.1%), reported tinnitus (72.2%), did not know any information on the subject (62.6%), and did not know how to protect themselves from noise (58.9%). The assessed questions, after DD activities, evidenced improvement. The study calls attention for the scarcity of interventions on the theme at schools or how to cope with the problem and shows the effectiveness of the DD to enhance knowledge and
preventive actions related to noise, suggesting that such actions should be expanded and integrate interventions of hearing health promotion within the SHP.

Keywords: health education, school, noise, sound, hearing loss, public health policy.

1. Introduction and objective

In the past decades, increasing concern about noise has been observed, which has the second place in the world ranking of environmental pollution [1]. To have an idea of the magnitude of the problem, the World Health Organization (WHO) estimates that 10% of the world population is exposed to hazardous noise levels, and 76% of the population, who lives in large urban centers, is affected by acoustic impact much greater than the recommended [2,3]. Keeping in mind that the noise effects are not limited only to the hearing system (tinnitus and hearing loss), often leading to mental and emotional disorders, communication disorders, sleep disorders, in addition to cardiovascular, hormonal, neurological, musculoskeletal dysfunctions, among others [4-6].

Apart from the environmental noise, the use of cellphones, tablets and other gadgets, powerful sound equipment and earphones has increased progressively and astoundingly, as well as the attendance to environments, where the exposure to high sound pressure levels is increasingly more common. The options of leisure with noise exposure have become acquired habits, influenced by fads and social representations, thus, a socially acceptable health aggression [7]. Children and teenagers are the most exposed, and a trend to increasing hearing disorders has been observed, pointing to the risk of a future generation with early hearing dysfunctions [8-18].

In 2015, the WHO estimated that 1.1 billion young people were at risk of developing noise-induced hearing loss (NIHL), mainly for the use of earphones at very loud volume and attendance to shows [19]. More recent estimates by the National Health And Nutrition Examination Survey found that 12.5% of children and young people between 6 and 19 years of age, in the United States, have already featured some noise-related hearing disorders [20].

In spite of not being the only factor [21], lack of information has still contributed a lot for the increasing NIHL and, as this type of hearing loss can be totally prevented, its approach should start by arising the population awareness, by means of health promotion and education programs [21].

Among the currently available intervention programs for hearing health promotion, based on scientific evidences, the Dangerous Decibels® Program stands out. The Dangerous Decibels® (DD) is a public health program, existing since 1999, which aims to reduce the incidence and prevalence of tinnitus and NIHL among children and young people. The program works on changes of knowledge, attitude and behaviors, associated with the prevention of hearing loss, including several methodologies and itinerant courses to qualify educators in the area. In Brazil, in 2015, the Brazilian Academy of Audiology¹ started to integrate DD partnership network, with the main goal of facilitating the implementation of the program in the country, in order to promote children and young people’s hearing health.

The Dangerous Decibels® Brasil (DDB), based on the American DD version, is a hearing health program to children and teenagers, mainly aiming at the prevention of noise-induced hearing loss and tinnitus. The program makes use of funny educational strategies to inform children and young people about the effects of high sound pressure levels on hearing.

The DDB program, used in this study, was already validated for the Brazilian Portuguese language [22], and has qualified professionals to be carried out in Brazil.

¹ The Brazilian Academy of Audiology is a non-profitable academy, founded in 2001, whose attributions are to promote the cooperation with associations and similar institutions, in addition to generating ways to expand scientific studies in the Audiology field. Site: http://www.audiologiabrasil.org.br.
Concerning the School Health Program (SHP), it is an intersectorial policy of Health and Education, set up in Brazil in 2007 by Decree number 6,286 of December 5th, which aims to contribute to the students’ integral education, by means of actions of promotion, prevention and care, in order to cope with vulnerabilities that hinder the full development of children and teenagers from the public education network [23]. In 2017, Interministerial Ordinance number 1,055, from April 25th, passed and, in its Chapter III, establishes the expansion of interventions to be held by the SHP, including, in its Article 10, the hearing health promotion [24].

Thus, as our main objective, we aimed to assess the effectiveness of the DDB program as one of the strategies for the Hearing Health Promotion among children and teenagers at Municipal Schools in the city of Itajaí, Santa Catarina State, Southern Brazil, included in the actions of the SHP.

2. Methodology

2.1 Study design

Exploratory, quantitative research was carried out in a case study of action/intervention and assessment.

2.2 Participants

The target public was all 6th graders from 32 Municipal Schools of Itajaí, Santa Catarina State/Southern Brazil, included in the SHP.

2.3 Instruments

The instruments comprised three structured questionnaires: questionnaire A, applied before the educational intervention, questionnaire B, applied soon after the DDB activities had been held, and questionnaire C, applied three months after the educational intervention, all validated, translated and adapted by the DDB team, including demographic data (age, gender), questions on knowledge about sound, noise, hearing and ear protection, in addition to hearing habits, attitudes, symptoms and behaviors.

2.4 Procedures

The DDB was carried out by the same national Tutor of the Program during 2018, full-time basis, with students being divided in 1 group in the morning and 1 group in the afternoon, and activities averaging 45 minutes for each session, held at the Auditorium of the Municipal Secretary of Education in the city of Itajaí/Santa Catarina State, Southern Brazil.

The DDB actions followed the nine steps of the DD Program, according to previous qualification in order to carry out such activities, and the evaluations were performed by means of questionnaire application before, soon after, and three months after the activities (held by the school teachers).

The steps of the DDB Program entailed: 1. Introduction (general presentation, definition of ‘decibel’, and presentation of three ways to protect hearing: walk away, turn down the volume and protect your ears); 2. What is sound? (general notions of sound waves, activities using sound pitches); 3. How do we hear? (ear anatomy and its function); 4. How can we damage our hearing? (activity with models simulating the sound waves and the hairy cells); 5. What sound is this? (online game of sound recognition); 6. How loud is the sound? (decibel scale with examples of sounds and their levels); 7. Measuring decibels (use of the sound level meter for measurement of decibels in different situations); 8. How to wear ear protectors; 9. Shake up your world: time for action (exemplifying situations of exposure to recreational noise, discussing habits, attitudes and behaviors).

The study was approved by the Ethics Board on Research from Universidade Tuiuti do Paraná (Tuiuti University of Paraná State), protocol number 2.551.067, and all participants signed the Free Informed Consent Form.

2.5 Data analysis

Descriptive statistical methods (tables of absolute and relative frequencies in %) were used in the analyses of individual results of the questionnaires A, B and C. For the comparative analyses of the questionnaires A and C, A and B, B and C, McNemar Test (paired data) was used, significance level of
0.05 (5%), considering only the positive answers (yes, always, true, agree) and the negative answers (no, never, false, disagree) for the test application. Statistica 13.3 software was used in the analyses.

3. Results

1,835 students, from 32 Municipal School from Itajaí, participated in the study, 838 (45.75%) females and 997 (54.3%) males, ages between 10 and 16 years, mean of 11.53 years, mode and median of 11 years, standard deviation = 0.80.

Most of them (96.9%) had never participated in any campaigns or specific intervention from the hearing field at school.

The descriptive analyses evidenced that the largest part of the group has hazardous hearing habits, pointing out the use of earphones (91.1%), with 47.6% of the teenagers reporting earache or tinnitus, at some moments, when exposed to high sound pressure levels, and 72.2% of them reporting steady or intermittent tinnitus.

Regarding the sound knowledge: 62.6% claimed that they did not know about noise-related hearing loss, and 58.9% reported that they did not know how to protect their hearing whenever it was necessary.

Concerning their intention to wear or the use of ear protectors, it was verified that 89.75% never wore ear protectors; 47.1% would not wear ear protectors to go to a show with loud music, 34.7% were not sure about wearing them; and only 18.1% stated that they would wear ear protectors (before carrying out the activities of the DDB program).

Statistical differences were observed after the activities to all the addressed issues (soon after the interventions, as well as three months later), evidencing improvement.

Such results call the attention to the scarcity of noise-oriented interventions, showing the importance and need to try and address such issues, unfortunately not duly valued at schools. Results also showed that the use of several participating and dynamic educational strategies are effective, helping the awareness and improvement of knowledge in the area, fostering children and teenagers’ interest and perception on the subject. Concomitantly, it fosters reflection and problem-solving, by pointing ways to reduce and/or avoid noise and its harmful effects to health and environment.

4. Conclusion

The study shows the effectiveness of the DD program to improve knowledge and preventive noise-related attitudes, suggesting the expansion of such actions and their integration to the interventions of the hearing health promotion within the national SHP.

References

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