

Lifestyles and hearing damage from noise: which interventions for prevention

Incoronata Panzone
Massimo Pellegrini
Brunella Quilici
Rita Vannini
Marusca Bugiani
Andrea Innocenti

UF PISLL, Azienda USL 3, Massa e Cozzile (PT), Italy

Corresponding Author:

Incoronata Panzone
UF PISLL, Azienda USL 3
Via XXIV Maggio 154
51010 Massa e Cozzile (PT), Italy
E-mail: t.panzone@usl3.toscana.it

Abstract

Background: hearing loss from noise is in Italy a relevant technopathy from the standpoint of human health and social and economic. The noise is prevalent in the workplace, both in agriculture, both in the industry, but also in the common living environments. Aim of the study is to assess possible hearing damage from noise in young people not exposed to occupational noise.

Methods: in the years 2005 to 2013 were carried out in 1659 tonal audiometry at rest audible in the cabin silent. Values of hearing threshold at frequencies 0.5, 1, 1.5, 2, 3, 4, 6 and 8 kHz by air in young people (1077 males and 582 females aged from 16 to 29 years old) were measured. The tracks audiometric were evaluated according to the method published by Merluzzi et al. based on the method developed by Klockoff et al. To the knowledge of lifestyles was administered a questionnaire specially structured.

Results: were within normal limits in 1213 audiometries, while 446, relative to 306 males and 140 females were altered.

Discussion: other factors, in addition to the noisy work, have a significant role in determining the damages hearing in the new generations, especially the prevalence among young readers portable audio files (MP3) and used to frequent nightclubs play a role important in determining the lowering of hearing threshold. In order to reduce hearing damage from noise is necessary to promote and develop at all levels, both at the workplace is in the liv-

ing environment, prevention programs, the training and information on risks to the reduction of noise in places of entertainment.

KEY WORDS: ear devices, hypoacusis, lifestyles, noise, young people.

Introduction

In Italy hearing loss from noise is one of the first occupational diseases of particular significance in terms of human, economic and social health. The noise is prevalent in the workplace where it continues to be considered a significant risk both in agriculture and industry. It's reported that in Europe about 35 million people are exposed to potentially dangerous levels (>85 dBA). Most workers are exposed to the risk loud noise and generally those belonging to the construction sector and the manufacturing sector, but do not underestimate the noise present in places such as schools, bars, concert halls and call center. The European Agency for Safety and Health at Work (EU-OSHA) has reported that about 20% of workers in Europe speak loudly during the middle of their work day and 7% is related to occupational hearing loss (Eurostat). Hearing loss caused by noise is the most common occupational disease in the EU. Predictors of hearing loss from noise are to be found in certain individual characteristics, luxuries habits like smoking and alcohol, particular lifestyles such as frequency of disco, habit of listening to music with headphones and playing noisy sports. Hearing damage from noise seems to grow hand in hand with the spread of multimedia technologies increasingly popular as MP3 players (1, 2). According to surveys by the European Commission, drawn up by the Scientific Committee on Health Risks Emerging and Newly Identified (SCENIHR), these media players (3) can reach sound pressure levels of 80 to 115 dB (A) in free field and with the use of special earphones that are introduced directly into the ear canal, the level can be further increased by 7-9 dB (A) (4, 5). From the literature it is clear then as a disco can be extremely dangerous and harmful to our hearing (6, 7). In fact, they (6), is present an average level equivalent exposure (LAeq) between 104.3 and 112.4 dB (A), well beyond the thresholds of noise in the industry that oblige the worker to the use of hearing protection.

The present study aims to describe the prevalence of hearing damage from noise outside of work for young first employees and not yet occupationally exposed to noise (8, 9). It also proposes to know the lifestyles of young people in order to relate any hearing damage

with the use of portable digital audio (including MP3 and iPod), attendance at dance clubs (10), the practice of noisy sports (motocross, clay pigeon shooting, go-kart and other sports and listening to loud music) and living in noisy areas.

Materials and methods

They were examined from the years 2005 to 2013 1659 young people of both sexes and aged between 16 and 29 years, including 1074 males and 585 females, all of Italian nationalities, resident in the territory of the Valdinievole and first occupation at work. Of young people surveyed in 1219 (73.5%) were aged up to 20 years, while 440 subjects (26.5%) were older than 20. Tonal audiometry was performed at rest sound in silent booth, using a clinical audiometer calibrated according to the International Standards ISO 389/75 standards, equipped with soundproof headphones. Measuring the values of hearing threshold at frequencies 0.5, 1, 1.5, 2, 3, 4, 6 and 8 KHz by air (11). The subjects met the criteria of normality DRAFT ISO/DIS 1999: "people who, at the time of the visit, are in normal health condition, without signs or symptoms of disease in the ear, no ear wax in the ear canals and no exposure working to noise" (12, 13). The same was administered a structured questionnaire aimed at knowing lifestyles, such as using portable digital audio (in particular MP3 and iPod), attendance at the disco, the practice of sport noisy (motocross, clay pigeon shooting, etc.) and living in noisy areas. The audiometric tracings were assessed according to the method published by Hake et al. based on the method developed by Klockoff et al. (11). Statistical significance was evaluated by the software OpenEpi vers. 3.02 / 2014.

Results

Of the 1659 young people surveyed were normal hearing individuals in 1213, while 446, of which 306 males and 140 females, were found to have a lower threshold hearing on the frequencies of 4000, 6000 and 8000 Hz. The threshold values were all greater than "0" audiometric. Furthermore, the mean threshold of the left ear

was found to be slightly less than the ear dx, for reasons not easily understandable. In other surveys, in literature, there was a mismatch between the hearing thresholds of the two ears, difficult to interpret (8).

Figure 1 shows the average values of hearing threshold found at various frequencies respectively for the right and left ear.

The altered audiometry were found to be 283 (23.2%) in the age group 16 to 20 years and 163 (37%) in the age group above 20 years. In 174 subjects (39.9%) of which 113 of the age group up to 20, the hearing loss was unilateral.

Remarkable is the percentage of people exposed to noise in the living environment for factors related to habits and lifestyles. Frequenting the disco was widely practiced in both males and females, and especially in the youngest age group where the proportion of subjects who attend the club was of 60.82% (14). Even listening to music with headphones turned out to be a habit quite common in both males and females, in an amount equal to 61% in those aged <20 years and 23.3% in those aged > 20 years (14). Both in the totality of the subjects in two age classes such habits and lifestyles it was statistically associated with hearing loss by χ^2 test ($p < 0.00001$).

Only a few subjects, respectively 6.7% in the age group <20 years and 4.2% in the age > 20 years, were noisy sports. All entities seem to live in areas that are particularly noisy.

Discussion

It emerges, especially among young people aged 16 to 20 years, a high popularity of the music with the use of portable music players to audio files and attending frequently nightclubs. These factors have a significant role in determining the hearing damage in the younger generation and can be held responsible for the difference in the hearing threshold from theoretical "0" audiometric found at various frequencies and especially to those of 4000, 6000 and 8000 Hz (14).

It is estimated that over the last 20 years in industrialized countries has decreased the number of those exposed to occupational noise, while the number of young people exposed to noise "social" has tripled. In parallel, there has been a dramatic increase and spread of hear-

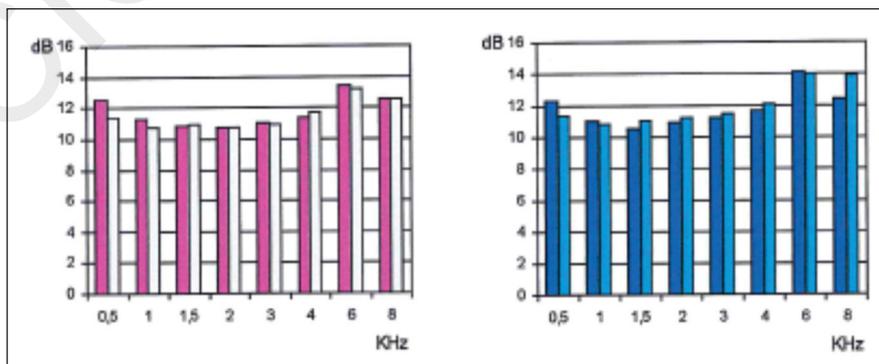


Figure 1 - Threshold hearing in young people aged 16 to 29 years for the right and left ear.

ing damage. In Italy, the hearing impaired is 12% of the population, with an average annual increase of 5% (3). For young people the risk of hearing loss comes from listening to the loud music, especially disco, rock concerts, and with the use of MP3 players (1, 7).

To underline that the workplace exposure to noise levels above 80 dB (A) for 8 hours per day for 5 days per week is considered a potential risk to hearing and this is the limit above which the employer provides for the adoption of measures of prevention and protection of risks from noise (15). MP3 music players (1, 2) can reproduce sounds at very high volumes, therefore an user of MP3 or iPod can be exposed to a noise level higher than that imposed as a limit for the workplace. Hence the need to promote and develop at all levels, both at the workplace both in the living environment, programs to prevent hearing damage from noise. First, the reduction of noise levels in dance clubs (7) can be an effective way to contribute to the prevention of harmful effects on hearing and beyond. In fact, exposure to high sound levels joined eventual intake of alcohol and use of psychoactive substances, as it happens inside the clubs, it can be an important contributing cause of road accidents that occur at the exit of the premises. As regards the earphones MP3 players, in Europe, it is applicable to the Standard CEI EN 50332 which provides for the emission of a maximum sound level of 100 dB (A). This limitation is not enough to protect users if it is made an incorrect use of the devices, such as listening to loud or for too long. The Commission of the European Communities, based on the study of the SCENIHR (5, 16) has issued recommendations; first of all the use of MP3 players must not exceed for more than an hour a day 60% of the maximum volume of the power level of the device. It should then moderate the volume of media players by young people, for example by choosing a sound level around 80 decibels, as well as reducing the hours of listening to music on headphones, often used by young people as well as sleep-inducing. In fact, it is proven by many studies (5, 16) that in determining the damage to the hearing apparatus is of fundamental importance, in addition to sound level, the exposure time.

The widespread use in the new generation of portable digital files and attending frequent nightclubs can be held liable for hearing damage detected in young people still not occupationally exposed to noise. Hence the need to promote among the youth programs of information and training on the risks and damage that the use of portable and attendance at nightclubs can lead to hearing. It is also necessary to educate young generation to the proper use of the equipment, avoiding listening to loud music and the use of earphones for many hours a day, also the decrease in noise levels in dance can help prevent hearing damage. The Prime Minister's Decree No. 215/99 "Regulation for determining the acoustic requirements of sound sources in places of entertainment and public entertainment and dancing in premises", as amended introduced limits sound pressure to which the customers can be exposed within the premises, equal to LAs max 102 dB (A) and LAeq 95 dB (A). From investigations (3) that

these limits are far exceeded. In fact, the sound levels encountered in discos were on average for LAs max equal to about 110, 4 dB (A), and for LAeq between 104.3 and 112.4 dB (A) (3).

As regards the dance clubs, the legislation is sufficiently tutelante against hearing damage for both goes both for workers, but it is not properly applied. None at all are, instead, the legal references on the damage to non-hearing noise, as the effects on balance and on the psycho-motor due to high noise, which is a possible cause, along with the consumption of alcohol and drugs, the phenomenon of "Saturday night". The obligations for the operators to hold exhibitions consist of adequate pre-assessments by the Competent Technicians, using limiters and timely distribution of the interior spaces to the local (17).

Expected all this, it is clear how the bodies responsible for monitoring and supervision should increase knowledge on the acoustic climate of the clubs, checking the technical documentation and the sound pressure level in dance clubs, in order to ascertain compliance with the limits imposed by DPCM nr. 215/99. In addition, the supervisors in charge must check the compliance to regulations by the operators. We need a more careful analysis under the authorization system, the need for areas of "compensation" to ensure periods of "rest sound" for users and for employees, which are useful in mitigating the effects of exposure to high sound levels.

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