HEARING LOSS IN OCCUPATIONAL HEALTH: INTEGRATIVE REVIEW

ABSTRACT
Objective: to analyze the national scientific literature about hearing loss in occupational health. Method: integrative review, from 2009 to 2013, in order to answer the question << What generates and characterize the hearing loss in workers?>>. The consulted databases were: LILACS, BDENF and SciELO library, and using the following key words in Portuguese perda auditiva (hearing loss) and saúde do trabalhador (occupational health). The results are presented by descriptive statistics, and, then, analyzed and discussed with the literature. Results: 17 articles were identified, describing that the personal protective equipment, the age, the exposure time, the profession, the noise with a dB level and other factors influence on losing the hearing and provoke some annoyance in occupational health. The tinnitus is one of the symptoms related to hearing loss. Conclusion: it is important to evaluate the risks the professional are exposed to, by the employer, as well as to provide the proper protection. Descriptors: Hearing Loss; Occupational Health; Nursing.

RESUMO
Objetivo: investigar a produção científica nacional sobre a perda auditiva na saúde do trabalhador. Método: revisão integrativa, de 2009 a 2013, a fim de responder a questão << O que gera e caracteriza a perda auditiva nos trabalhadores?>>. As bases de dados consultadas foram LILACS, BDENF e biblioteca SciELO, utilizando os descritores em português perda auditiva e saúde do trabalhador. Os resultados são apresentados a partir da estatística descritiva, analisados e discutidos com a literatura. Resultados: foram identificados 17 artigos, encontrando que o equipamento de proteção individual, a idade, o tempo de exposição, a profissão, o ruído com o nível de dB e outros agentes, influenciam no surgimento da perda auditiva e provoca certos incômodos na saúde do trabalhador. O zumbido está entre os sintomas que caracterizam a perda auditiva. Conclusão: é importante existir uma avaliação dos riscos a que os profissionais estão expostos, além do ruído, por parte do empregador, assim como o fornecimento de proteção adequada. Descriptors: Perda Auditiva; Saúde do Trabalhador; Enfermagem.

RESUMEN
Objetivo: Investigar la producción científica nacional acerca de la pérdida auditiva en la salud de los trabajadores. Método: una revisión integradora, 2009-2013, con el fin de responder a la pregunta << Lo que genera y qué es la pérdida auditiva en los trabajadores?>>. Las bases de datos consultadas fueron LILACS, BDENF y la biblioteca SciELO, usando las palabras clave, en portugués, pérdida auditiva y salud de los trabajadores. Los resultados se presentan como la estadística descriptiva, analizados y discutidos en la literatura. Resultados: se identificaron 17 artículos, encontrando que el equipo de protección personal, la edad, el tiempo de exposición, la profesión, el ruido con el nivel de dB y otros agentes influyen en la aparición de la pérdida de la audición y provoca ciertas molestias en la salud trabajador. El tinnitus es uno de los síntomas que caracterizan la pérdida auditiva. Conclusión: es importante contar con una evaluación de los riesgos a los que los profesionales están expuestos, además del ruido, por el empleador, así como proporcionar una protección adecuada. Descriptors: Pérdida Auditiva; Salud Laboral; Enfermería.
INTRODUCTION

Health, covered by Article n. 196 of the Federal Constitution, and regulated by the second article of the Health’s Organic Statute, is defined as a common right and duty of the State, acquired by the Brazilian citizen. In this right, the occupational health is included.¹

The Occupational Health compounds an area of the Public Health which includes the relationship between work and health as an element of study and intervention. Acting for promoting and protecting the worker’s health, by developing actions for observing the risks present in the work environment and working conditions, health problems of workers and the organization and provision of assistance to them, involve procedures of diagnosis, treatment and rehabilitation in an integrated manner, in the Unified Health System.²

The exposure to poor working conditions intensifies the possibilities of getting ill. Once health is associated with the real possibility of self-care and enjoying life, it is not difficult to understand that poor working conditions and problems in interpersonal relationships contribute to worsen the health of professionals.³

The exposure to noise, for the frequency and its many effects on the human body, is responsible for one of the main problems of occupational and environmental health nowadays. The Noise-Induced Hearing Loss (NIHL) is one of the most common problems of the occupational health worldwide. It is defined as the loss generated by long-term exposure to noise; it is a sensorineural hearing loss type, usually bilateral, irreversible and progressive with the noise exposure time.¹²

According to the average of the hearing thresholds measured for frequencies of 100, 2.000 and 3.000 Hz in workers from the United States, 17% of the individuals working in the industrial sector of the country have, at least, some mild hearing damage. In Italy, for about 10 years, NIHL has been the most registered occupational disease, representing 53.7% of diseases related to work. On the other hand, studies show that the extra-auditory effects of noise exposure need special attention from health professionals, due to the broad spectrum of the observed repercussions.²

When analyzing hearing loss related to work, it is necessary to assess the existence of other factors that may not specifically cause hearing loss, but may also enhance the effects of noise on hearing, such as exposure to certain chemicals, vibrations and the use of some medications. Therefore, it is important to consider not only the noise - the most common agent - but also others, along with all the effects they possibly originate in terms of diagnosis, preventive measures, safety limits, legislation, and etc.¹

Thus, nowadays, people are exposed to noises wherever they are, all over the world, causing them to lose their hearing, in addition to other factors. In this context, this study analyzed the scientific literature about hearing loss in occupational health, with the objective of discussing the factors that cause it.

OBJECTIVE

• To analyze the national scientific literature about hearing loss in occupational health.

METHOD

This paper was presented as a requirement for the Course Conclusion Work << The hearing loss in occupational health: an integrative review >> for the Post-Graduate Course in Occupational Health Nursing, Metropolitan College of Science and Technology. Parnamirim-RN, Brazil, 2014.

It is a review study, with an integrative review as a means of research, which is a method that enables the synthesis of knowledge and integration of applicability of significant results, being the widest method to approach revisions, providing inclusion of experimental and non-experimental studies in order to completely describe the analyzed phenomenon.⁴

This type of review has six stages for its development: the elaboration of the guiding question, stating the participants, the interventions and the actual results; the search or sampling in the literature, which is the research in databases based on inclusion and exclusion criteria; data collecting, which intends to extract information from the selected articles from a pre-set instrument; critical analysis of the included studies, which assesses the quality and characteristics of each study included in the work; the discussion of the results, in which a comparison of the collected is performed; and the presentation of the integrative review, which is the final stage that discloses the relevant and detailed information, based on contextualized methodologies.⁴

Considering this issue, following question emerged: what generates and characterizes the hearing loss in workers? Therefore, for conducting this study, the following inclusion criteria were determined: complete, original and available articles; published in
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Portuguese; within the established time (2009-2013); and those about hearing loss in occupational health. Theses, dissertations, brochures, letters, editorials, essays, literature reviews, articles found in different databases and that were not fully available were excluded. The research was conducted in the Virtual Health Library (BVS), between September and October 2013, using the following data bases: Latin American databases and Caribbean Health Sciences (LILACS), Nursing Database (BDENF) and Scientific Electronic Library Online (SciELO). They were used due to the connection with the objective of this review, once the national literature about the theme was its objective. The key words hearing loss and occupational health were used.

For collecting the data of the articles, an adapted instrument was used, covering the items of the study identification and characterization. The results are presented as descriptive statistics, analyzed and discussed in the literature.

RESULTS

This paper intended to evaluate the scientific literature about the influence of hearing loss in occupational health, regarding its causes and the factors influencing its appearance or worsening.

Therefore, when performing an integrated research in the BVS, they 274 jobs were found using the descriptors hearing loss and occupational health. After using the exclusion and inclusion criteria 17 articles were found - ten are available in LILACS and SciELO, whereas seven are in LILACS and none, in BDENF.

It is possible to observe that roughly 93.8% of the articles were excluded because they do not meet the pre-established criteria and weren’t about the theme of this study. The selected articles are from ten different journals of health - 12 (70.58%) are specifically about otorhinolaryngology (six) and audiology (six); three, about public health; and one, about medicine. None belongs exclusively to the nursing area.

Regarding the authors, most of them are audiologists, covering 13 articles (76.47%); one is a nurse; one, a psychologist; and two, physicians of Environmental Health and Occupational Health. This audiology prevalence is explained by the fact that the mentioned theme is related to the field of expertise of these professionals, which is speech and hearing.

The selected articles were published from 2009 to 2013: four were published in 2009; four, in 2010; three, in 2011; three, in 2012; and three, in 2013.

According to the type of study, 14 (82.35%) articles were transversal studies, and three were a retrospective analysis. This can be explained by the fact that the transversal study is a type in which each individual is analyzed in order to look for possible relationship of causes between the possible factors of exposure to risks or diseases at certain time.

Concerning the individuals who participated in the studies, the total was 3,086: 1,636 men, 254 women and 1,196 did not specify. The highest number of men is explained by the fact that the type of the employment is less indicated for women. Regarding the age, 16 articles (94.11%) described this issue; only one did not mention it. The ages ranged from 18 to 68 years old (Figure 1).
When considering the place of the research, it was observed that seven (41.17%) were performed in industries.6,10,14-6 The other ten sites are very distinct, including: construction company11, hospital12,17, airport18, companies from different segments13, clinic of occupational medicine19, referral center for occupational health20, military band21, meat warehouse22 and community.23

The evaluated professional categories were: textile workers23, construction company employee11, carpentry, boiler, cooling, maintenance25, firefighters, military26, fixer, assistant, cutter, sander, polisher, carpenter, joiner20, chainsaw operator, tractor driver, machine operator, mechanic, welder, driver, mechanic, pump operator, general services, forestry machine operator, brazier, packaging assistant, electrician22, bus driver27, fag, ovenbird, auxiliary oven-bird, box carpenter, wheel operator, dispatch operator, brazier, loader operator27, forklift operators28, employees of machining29; musicians30, agricultural pilots12, workers at a meat warehouse22, metal industry workers, transport industry, construction, textile industry, mining20, farmers31, employees of a glass processing industry30 and food company employee.16

Concerning the research and diagnostic tools used in the studies, 16 reported collecting data with a specific questionnaire and all 17 articles conducted or analyzed their assessments with audiological tests. Of these tests, 13 were audiometric tonal7,9,12-6,18-9,21-3, one was tonal and brain-stem audiometry17; three were not specified.10-1,20

Regarding the noise level of the environment, ten studies (58.82%) recorded the amount of decibels (dB) with sound pressure level instrument operating in the compensation circuit “A”, and the other seven did not provide this information, presenting the minimum number of 60 dB(A) in the sector of boilers, and the maximum of 106.8 dB(A) in the office of the dispatch operator (Figure 2).
According to the time the workers were exposed to the noise, 15 articles (88.23%) provided this information, with a minimum of three months, among the employees of a factory of funerary urns\(^6\), machining\(^8\) and warehousing meat\(^9\), and the maximum of 45 years at a refrigeration sector of a hospital.\(^{17}\)

Some of the studies discussed the exposure to other agents, namely: cotton dust\(^7\); sawdust, glue, solvents, fuel oil\(^{17}\), vibration, chemical agents\(^8\); carbon monoxide; pesticides.\(^{12,14,5,23}\) Among these, some were considered environmental contaminants with potential ototoxicity, namely: solvents, vibration, chemicals, carbon monoxide and pesticides, that is, they could influence on the hearing loss.

**DISCUSSION**

It was observed that, in this study, the scientific studies have been focusing on the issue of hearing loss in workers, due to the large number of publications about the theme, considering the possibilities of affecting the workers’ lives.

Therefore, some factors may influence on the hearing loss and cause certain annoyances in workers’ health; they are: personal protective equipment (PPE), age, exposure time, profession, the noise with high dB level and other agents. Tinnitus is also among some symptoms that indicate the existence of hearing loss.

The use of PPE may involve choosing an item adequate for the exposed risk and performed function, considering the efficiency required for controlling the exposure to the risk and the provided comfort. The employer is responsible for providing a training program for the proper use and guidance about the limitations of PPE, for its supply, use, custody, hygiene, preservation, maintenance and replacement.\(^{24}\) Some articles discussed about the influence of the use of PPE in hearing loss, either by its improper use or by not using it.\(^{8,11,2,14,5,17,22,3}\)

Age is a factor that influences on the hearing loss and some publications found that the higher the age, the higher the chances of hearing loss, also associated with the

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<td>Cotton dust</td>
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<td>Tinnitus</td>
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<td>Tinnitus, headache, difficulty understanding words and dizziness.</td>
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<td>Tinnitus, lack of concentration and stress.</td>
<td>Pesticides</td>
<td>81,2-95,5 dB (A)</td>
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<td>13</td>
<td>Tinnitus and dizziness</td>
<td>Sawdust, glue, solvents and fuel oil.</td>
<td>60-97 dB (A)</td>
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Figure 2. Analysis of some factors present in the research: references, symptoms, dB of the environment, harmful agents and exposure time. Subtitle: dB = decibel with sound pressure level A, NI = Non-informed, R = the reference number, m = months, y = years, min = min.
exposure to a harmful agent. The main characteristics of the noise induced hearing loss (NIHL) are the irreversibility and gradual progression with the time of exposure to the risk. The prevalence of hearing loss increases with the elevation of the time of exposure to noises. This factor was detected in some studies of this review. Another study also evidenced it, in which the oldest employees have higher levels of predisposition to contract the hearing loss.

The type of the performed function is related to the onset or increased hearing loss. Another study confirmed this statement and found that, based on the type of economic activity, the results show that 53.8% of metallurgical industry workers have audiometric notch in both ears, followed by timber companies, with 48.1%, and marble shops, with 40.4%.

Noise is the most common harmful physical agent in the workplace and exposes many workers. Continuous exposures are worse than intermittent, however, brief exposure to loud noise can also cause hearing loss. When the noise is intense and the exposure to it is continued, on an average of 85dB(A) for eight hours a day, structural changes begin to happen in the inner ear, leading to the NIHL. This is the most common injury to the worker’s health and is present in various types of activity, especially steel, metallurgy, printing, textiles, paper and cardboard, glass making, among others.

In this context, most of the articles stated about the decibel levels of the working environment and all of these were higher than or had the maximum level beyond the recommended one. Other study also discussed about the high levels that are harmful to the worker’s health. However, there are several risks in the workplace beyond noise that may affect the workers’ hearing: certain chemicals, vibrations and the use of some medicines. Some studies stated that the presence of ototoxic chemicals or vibration products are likely to produce or enhance the effects of occupational hearing loss. Another publication showed that the organic solvents can act as ototoxic and neurotoxic agents, causing serious damage to the hearing, and may also harm the cochlea, the auditory nerve and auditory pathways.

There were some symptoms reported by participants, namely: tinnitus, stress, irritability, trouble concentrating, dizziness, difficulty in understanding the words, headaches, sleep disturbances, intolerance to loud sounds, dizziness, insomnia, gastric disorders, hypertension and others (Table 2). Among these symptoms, tinnitus was the most common and ten articles of this review mentioned it as the indicator of hearing loss. Tinnitus is one of the symptoms most commonly reported by people with NIHL and is the first warning of exposure to abusive noises, an evidence also found in other article.

CONCLUSION

The results of this study show that there are many studies about hearing loss in workers’ health, demonstrating the concern about the mentioned issue, as it affects the worker’s life regarding a psychosocial change, that is, it influences on the social life of the worker. The study also showed that several factors influence on the decrease in the hearing capacity, including personal aspects, such as age, exposure time in the employment, profession, use of PPE, as well as the environmental aspect, corresponding to the exposure to harmful agents and the workplace.

It was possible to observe that a job of promotion and prevention of hearing loss must be implemented by employers, providing PPE suitable to effectively diminish the exposed risks. At the same time, it is necessary to provide information and education about the proper use of PPE by workers, considering the individual variability during its use.

In this context, it would be important to evaluate the risks the professionals are exposed to, in addition to noise, by the employer, as well as to provide protection against all of them. Therefore, there would be a decrease in the cases of hearing loss caused by noise and other aggressors, and the absence or reduction of the cases of tinnitus, stress, irritability, trouble in concentrating, dizziness, difficulty in understanding the words, headaches, changes in sleep, intolerance to loud sounds, insomnia, gastric disorders, SAH and others.

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