

Unhealthy occupational exposure to noise in nightclubs and lack of employee awareness

ABSTRACT

Music is widely used in leisure activities, but environments with high sound intensity such as nightclubs may expose workers to the unhealthy level of sound pressure. Excessive noise has been associated with hearing impairment, difficulty in verbal communication, increased psychological tension and lower level of attention of workers. The objective of this study was to evaluate the sound pressure level of electronically amplified music through 25 measurements in triplicate in the different nightclub environments installed in the city of Cascavel (Brazil) during the presentation of disk jockey and with live sound. By anamnesis, he verified the perception of the employees in the exposure unhealthy. The results showed that all employees exposed to unmitigated excessive noise, 18.8% said that the music and noise in the place affect their function and everyone perceives the buzzing after the end of the journey. No employee interviewed uses Individual protection equipment, with 27.1% complaining about the occupational discomfort caused by the protector, while 50% of the reasons characterized by the lack of awareness of the interviewees. It's concluded that the noise agent in nightclubs is serious and imminent, culminating in occupational illness if isn't mitigated by the use of protection equipment and the implementation of risk management programs and employee awareness.

Keywords: Hearing loss. Risk analysis. Working conditions. Worker's health.

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INTRODUCTION

Many social and labor changes have come with an industrial revolution, causing occupational health to focus on risk management in the workplace. Changes in work environments require new forms of health check and different planning of health and safety professionals (HARRISON; DAWSON, 2016).

The Brazilian legislation establishes the necessary conditions for the acceptability of noise in communities and specifies a method of noise measurement (ABNT, 2000). The laws further define noise levels compatible with acoustic comfort in different work environments but do not have limited music values in nightclubs.

In Sweden, for example, there are two recommendations of work-related occupational safety limits and activities for both musicians and listeners (LOUREIRO, 2002).

One problem is the underestimation of the occurrence of accidents (OPPONG, 2015), but this perception is individual and rarely evaluated by the Specialized Service in Safety Engineering and Occupational Medicine (SESMT) (LEITER; ARGENTERO, 2009). Thus, workers will be better protected when they are fully informed of environmental risks, they can anticipate preventive measures (LEITER; ARGENTERO, 2009, INOUE, 2014).

The nightclubs are framed as entertainment houses, for providing leisure to the users. but they impute sound with high volume in order to inhibit the noises of conversation between people. But this can make the environment unhealthy for employees, who do daily work and are exposed continuously to high sound pressure levels.

The problem presented is the existence of a safety control system, the purpose of this study was to analyze the of Sound Pressure Level (SPL) in the nightclubs, observing the workers' perception of unhealthy exposure, as well as assessing the degree of awareness about the use of individual safety equipment.

The objective of this study was to evaluate the sound pressure level of electronically amplified music in the different nightclub environments installed in the city of Cascavel (Brazil). Measurements were taken during the presentation of disk jockey and with live sound.

By anamnesis, the perception of the employees in the unhealthy exposure was verified, to verify their awareness of the harmful effects of continuous exposure to noise.

METHODOLOGY

NIGHTCLUBS LAYOUT

The first stage consisted in the construction of the layout of the discotheques and in the survey of the measurement points in each workstation. It was also carried out the survey of the number of employees and their respective functions to characterize working hours.

The nightclubs are located in Cascavel city, Brazil, have a capacity of more than 1500 people, and average daily operation time is 7.18 hours, starting at 22:00 hours.

MEASUREMENTS OF THE NOISE LEVEL

The second stage of the methodology was the measures of the noise level of the work environments. For this, an Icel decibelimeter model DL4090 was used, duly calibrated and configured in the "A" weighting curve, slow (slow) response, according to technical standard Brazilian Norm (NBR) nº. 10.151 (ABNT, 2000).

The measurement performed at the workstations with the equipment located at a distance of approximately 0.15 m from the employees' ears. The measurements took place during the presentation of Disk Jockey (DJ) and during the presentation of the band with live music.

The results presented in graphic form, separated by sector and compared with the tolerance limit of norm Regulatory Norm nº. 15 (NR-15) (BRASIL, 2014) to verify occupational exposures in each workplace.

The analysis of ear protectors followed the standard NR-06 (BRASIL, 2015) and the administrative guidelines occurred according to the hierarchy established in NR-09 (BRASIL, 2016).

ANAMNESIS

The third stage consisted in the elaboration and application of the anamnesis, in the form of a questionnaire based and adapted from Santoni (2008), as follows:

Anamnese Questionnaire

1. Name: _____ 2. Age: _____ 3. Function: _____
4. Date of Birth ____ / ____ / ____ 5. Sex: () () Fem.
6. How many years have you been working in the current nightclub? _____
7. Do you have any other work? () Yes No
If so, which one? _____
8. How many days a week do you work in the nightclub? _____
9. What days? () Mon. () Tue. () Wed. () Thu. () Fri. () Sat. () Sun.
10. Approximately how many hours per night? _____
11. Do you wear any type of ear protection when you work? () Yes No
If so, for how long? _____
If yes, how many hours do you use for the journey? _____
If not, why? _____
What type? _____
Complaints: _____
12. After you started working at the nightclub, did you have any of these symptoms?
() intolerance to loud sounds () buzz () stomachache

- irritability / nervousness insomnia none of the alternatives
 Headache lack of attention Others _____
 decreased hearing memory problems
 dizziness depression

13. At the end of the working day, he presents:

- decreased hearing sensation none of the alternatives
 capped ear sensation others: _____
 buzz
 intolerance to loud sounds

14. Do you feel uncomfortable with the intensity of the music you are exposed at work?

- Yes No

15. Does music and noise in the workplace affect your job? Yes No

As? hinders communication irritates stresses Other: _____

16. Do you think the sound you are exposed to affects your health? Yes No

If yes, how? _____

17. Do you think there is any way to protect your hearing? Yes No

If yes, how? _____

18. As for the "use" of ear protectors, what do you have to say?

- Do you feel uncomfortable while using it?
 After a while using, causes ECO?
 Do not you listen right?
 It does not get in the way of anything, I usually do my tasks.
 I know it's important and I want to use it throughout my work day.
 Others _____

19. Regarding the "no use" of ear protectors, does it relate to any of the alternatives below?

- Bother. Accustomed to the sound Difficulty hearing
 Difficult communication Loss Headache
 I am not exposed to risk Irritation Earache
 Itching I like ambient music Thick voice
 I do not like Hearing muffled Others _____
 I'm not interested When I ask you do not have
 Habit Voice muffled

20. Do you think you hear well? Yes No

21. Do you have constant tinnitus? Yes No

22. Do you feel dizzy? Yes No

23. Do you have strong sound intolerance? Yes No

24. Do you feel your ears covered? Yes No

25. Do you have difficulty communicating? Yes No

The questionnaire was composed of personal data; information on exposure to amplified music, auditory and extra-auditory complaints, and perceptions of the auditory sensation after the workday ended and after each worker began his profession in nightclubs.

STATISTIC DESIGN

The noise measurements tested by Analysis of Variance (ANOVA) and the means compared to each other, at the 5% level of Tukey, under the null hypothesis that nightclubs present excessive noise.

Between the presentation of the DJ with electronic sound and the presentation of the band with live music a comparison was made of the variability of the means in order to verify if the sound pressure levels differ statistically, at the level of 5% of Tukey.

The results presented by sector, in graphic form, with the averages of sound pressure levels measured in nightclubs. Auditory and extra-auditory complaints of employees and opinion / justification about non-use of Individual protection equipment (IPE) also presented.

RESULTS AND DISCUSSIONS

The average noise level during DJ performance was 103.1 ± 5.9 dB(A). Already during the live band presentation, the average of sound pressure levels were 105.1 ± 9.9 dB(A).

Table 1 shows the analysis of the variance of noise measurements showing that nightclubs show a significant difference, 5% of Tukey, between the sound pressure levels in nightclubs with DJs, compared to nightclubs with live sound.

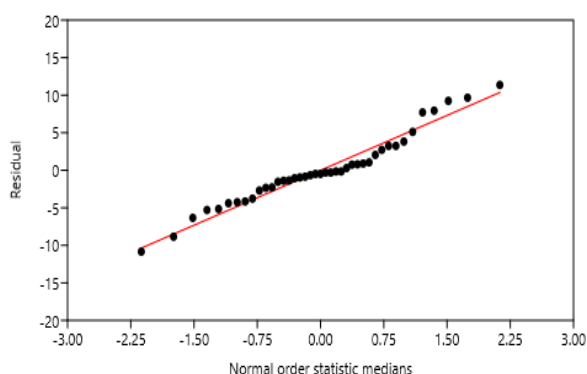
Table 1 – Analysis of variance of noise in nightclubs and with different sonorizations

	Sum of sqrs	df	Mean square	F	p (same)
Between groups:	86,7175	6	14,4529	0,5494	0,7669
Within groups:	894,495	34	26,3087		
Total:	981,212	40	0,7655		

Source: Authorship (2018).

At p(value) of 0.7669, the sound pressure level presented low variation and normal distribution of residues, as shown in Figure 1.

Figure 1 – Waste distribution



Source: Authorship (2018).

It verified that all the environments evaluated inside the nightclubs are unhealthy, indistinctly.

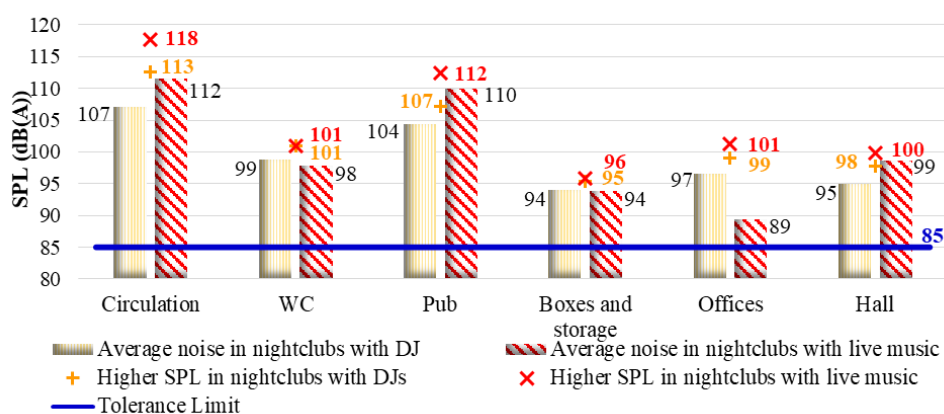
Occupational noise and its hazards can become a serious social problem, noise is present in many work environments, is analyzed mainly in industries but also present for other professional categories, such as musicians and nightclub employees (SOUSA, 2009).

Several studies have pointed to the high prevalence of Noise-Induced Hearing Loss (NIHL) in Brazilian industries. However, not only industry workers are exposed to high sound pressure levels (NPS). There are other professional categories, such as musicians and nightclub employees, who are also exposed to high levels, mostly from electronically amplified music. (SOUSA, 2009, p.3)

Most cases of "unprofessional" exposure to amplified music are limited to a few hours per week. On the other hand, professionals such as musicians, sound technicians and DJ are exposed continuously and frequently (SAMELLI; SCHOCHAT, 2000). Being the noise of leisure detrimental to these professionals (MOUSTAPAFOUR; LAHARGOUE; GATES, 1998).

The average noise values during the DJ presentation and during the band presentation (live music) showing in Figure 2, also the maximum sound pressure levels found at each workstation.

Figure 2 – Waste distribution



Source: Authorship (2018).

In nightclubs with DJs, sound pressure levels measured at workstations were higher than the normalized tolerance limit (85 dB(A)) and the highest SPL measured during DJ performance was 112.6 dB(A) while the highest SPL measured during performance with Live music was 117.7 dB(A), both in the circulation area (dance floor). It should be noted that the standard considers activities with noise levels above 115 dB(A), without adequate protection, pose a serious and imminent risk to workers (BRASIL, 2016).

In nightclubs with live music, where it is estimated that the highest NPS, of 112.5 dB(A), occurred on the dance floor.

Amorim et al. (2008) studied noise in nightclubs during the year 2008, they found intensities between 78 and 111 dB(A) and affirmed that the noise intensity present in nightclubs can cause the development of hearing loss. Gunderson, Moline; Catalano (1997) investigated possible hearing loss in nightclubs with the evaluation of 31 workers and found that the sound pressure level ranged from 94.9 to 106.7 dB(A).

In addition, for other consequences, such as increased accidents due to loss of intelligibility in verbal communication among workers (FERREIRA, 1998). In the sense, Loureiro (2002) reported that nightclub employees have their occupational activities in environments with noise that is more than allowed by Brazilian legislation and often without the use of IPE.

Regarding the average noise found in the nightclub, the NR-15 states that the maximum exposure time to this NPS, without adequate protection, should be 35 minutes, which indicates the unhealthy functions of the nightclubs.

Reducing the volume of the sound would be the more sensible option, since it would suit the noise levels to the normalized ones. However, the low volume of the sound would compete with the conversations and other noises that could displease the regulars.

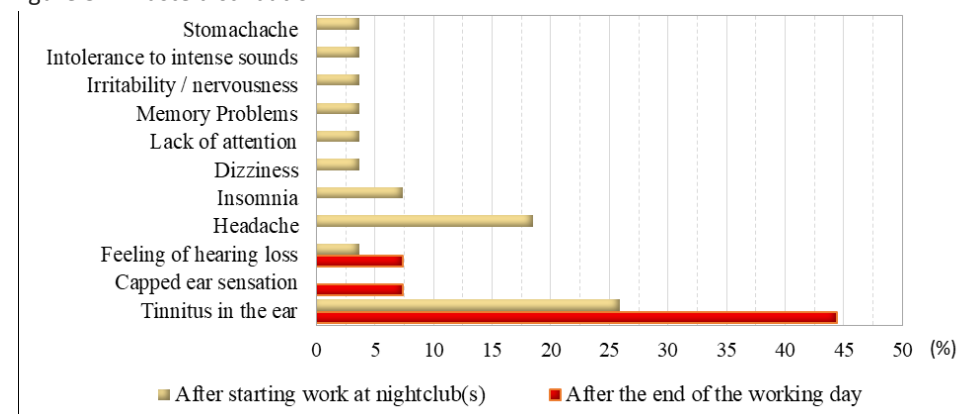
Reducing sound volume would be the more sensible option as it would be suitable for noise levels for standardized ones. However, the low volume of the sound would compete with the conversations and other noises that could displease the regulars.

Reducing the exposure time to noise is unreasonable, since promoting employee rotation every 35 minutes is not feasible or economically feasible. In this way, the ear protector becomes the effective solution for the working environment, provided it has attenuation, Noise Reduction Rate (NRRsf), not less than 19 dB(A), and can be used of two types (if a single protector does not have the required attenuation).

Regarding the anamnesis analysis, of the 27 employees, 14 (52.0%) were male and 13 (48%) were female, with ages ranging from 18 to 39 years, with a mean of 27.3 years. It observed that 51.2% of the employees circulate during a large part of their journey through the environments with the highest noise level. It highlighted that in this study there was no significant correlation between age and sex with complaints of symptoms of noise exposure.

Figure 3 shows the auditory and extra-auditory complaints presented by the employees immediately after they finish their workday and also arose latently - after working in nightclubs.

Figure 3 – Waste distribution



Source: Authorship (2018).

In from the complaints presented, observed that tinnitus, the sensation of capped ear and the sensation of hearing loss are immediate effects of occupational exposure to unhealthy noise. These results corroborate with studies by Santoni (2008), Pfeiffer et al (2007), Russo et al (1995) and Mendes et al (2007) who also identified tinnitus as the biggest complaint in exposed to high noise level. But, some different reasons of Mendes et al (2007) are:

In music, the dominant frequencies are the lower ones, less damaging, since the stapes attenuates the lower frequencies more effectively; already in industry, are the high frequencies;

In the industry the noise is continuous for most of the day, whereas in music the temporal pattern is fluctuating, the music is played for shorter periods, with certain periods of peak and pauses between them, in which the ear can recover;

It is suggested that pleasurable sounds, such as music, are less harmful than unwanted ones. (MENDES et al., 2007, p.790)

The latent symptoms reported were tinnitus, decreased hearing sensation, headache, insomnia, dizziness, lack of attention, memory problems, irritability / nervousness, intolerance to loud sounds and stomach pain. Consistent with Loureiro (2002), Sousa (2009), Fiorini (1994), Fernandes; Morata (2002) e Martines; Bernardi (2001); who singly highlighted one or more of these complaints in their research, through an anamnesis questionnaire, found tinnitus as the most frequent symptom (GUNDERSON ET AL, 1997).

The presence of these symptoms suggests a temporary alteration of the threshold due to exposure to amplified music at high levels, even for short periods (SANTONI, 2008).

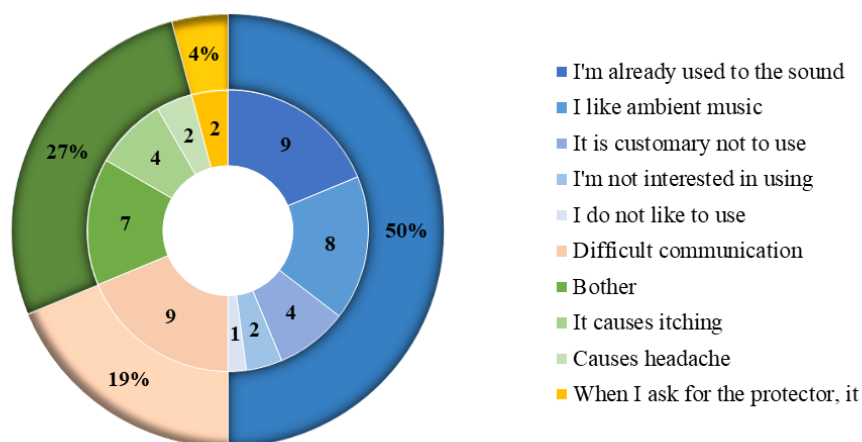
It is noteworthy that only six employees (22.2%) answered that the sound to which they are exposed may affect their health, and four of them quoted to know that hearing loss is an effect of exposure to music played in high intensity.

No employee uses a hearing protector during the workday at the nightclub analyzed in this study, and 50% of the reasons characterized by the lack of awareness of the interviewees, as shown in blue in Figure 4. Among the opinions expressed, we emphasize being accustomed (18.8%), enjoy the sound environment (16.7%) and not the EPI of usual use (8.3%), or interest (4.2%).

The difficulty in communication was the justification for the non-use of IPE by 19% of the employees. Occupational discomfort was the reason for 27.1% of the interviewees, as can be seen in green in Figure 4, with opinions being that the protector bothers (14.6%), causes itchiness (8.3%) and causes headache (4.2%). It is noteworthy that only 4.2% of the workers pointed out the lack of supply as a cause of not using ear protectors, which also indicates the low awareness of the employees in requesting such IPE.

Desired and pleasurable sounds (such as music) may be less dangerous and unwanted like industrial noise (SAMELLI; SCHOCHAT, 2000), but the tendency not to classify high-intensity music as noise does not exclude it as a potential threat to the human ear.

Figure 4 – Waste distribution



Source: Authorship (2018).

Exposure to high NPS was associated with the onset of other factors such as tinnitus, dizziness, atrial fullness, mood swings, stress, and irritability (FIORINI, 1994). Also to headache, nervousness and stomach problems (FERNANDES; MORATA, 2002).

Sleep disturbance was one of the most common symptoms in studies in people who frequented noisy places, who reported difficulties in falling asleep and then awakening frequently during sleep (MARTINES; BERNARDI, 2001). The authors described other symptoms such as lack of attention, difficulty concentrating, memory problems, discouragement, irritability and depression (FERNANDES; MORATA, 2002).

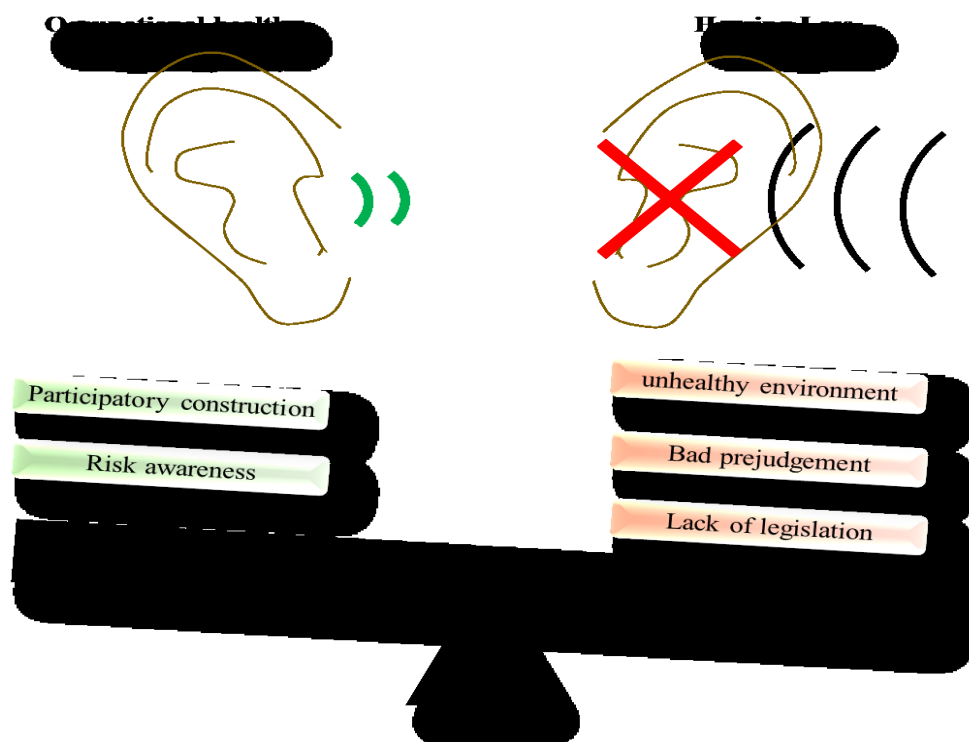
It's found that employees' attitudes related the lack of legislation, the impairment in the use of PPE and unhealthy environment are responsible for them to Hearing Loss. While the participatory construction of prevention, the analysis of environmental risks and training for risk awareness aiming to show the causal nexus between exposure and noise are essentials, as shown in Figure 5.

Some of the extra-auditory effects found were dilated pupils, increased production of thyroid hormones, increased heart rate, contraction of the stomach and abdomen, contraction of blood vessels (GERGES, 2000).

With regard to the low rate of use of IPE, (GUNDERSON et al, 1997) found that 16% of the workers surveyed had regular use of a hearing protector. In this study, no worker uses IPE, which indicates no awareness of its use. In this sense, the NR-6 (BRASIL, 2015) is for the employer to provide the IPE and to train the employees on the correct use, hygiene and conservation, as well as to monitor the proper use and to record such facts.

Sousa (2009) reported that one of the reasons for non-use is in the choice of hearing protector type, which still done indiscriminately by establishments, not obeying the technical aspects for each professional category. Thus, the operation of an ear protector depends on the physiological and anatomical characteristics of each user.

Figure 5 – Waste distribution



Source: Authorship (2018).

It is noteworthy that when asked about the annoyance caused by the intensity of the music to which they are exposed at work, all 27 employees replied that they did not bother, however, nine employees (33.3%) said that the music and the noise in the place affect their function, causing irritability or stress and making communication difficult with the client.

On evaluating the perception of workers regarding occupational risk, the literature presents a study of auditory risks in the wood sawing processing for industry in Thailand. The conclusion pointed out the perception of risk plays a predictive role for the use of Hearing Protective Devices (HPD), and suggests opportunities to increase the effectiveness of HPD training, along with other strategies of the control hierarchy, point to policy recommendations aimed at improving risk recognition and risk perception (THEPAKSORN et al, 2017).

Corroborating with more training and awareness raising, a study by Biabani et al (2017) to determine actual attenuation of ear protectors showed that the main factors that different levels of experience and user awareness affect the expected attenuation.

CONCLUSIONS

In this work, the sound pressure levels of nightclubs were measured and it is possible to identify that noise is above the limits specified by current legislation, thus, all workers are exposed to the physical agent in an unhealthy manner.

He found that 100% of employees complain about the ringing sensation in the ear immediately after the end of the day, and that 25.9% remain tinnitus in the latent form, however, no employee uses IPE.

Given the low level of awareness and high volume of sound in the workplace, the employer should provide adequate hearing protection along with training for its correct use, encourage its use throughout the work day, distribute the damages that noise can cause audiometry and conducts audits periodically examines employees.

Exposição profissional insalubre ao ruído nas casas noturnas e falta de consciência dos funcionários

RESUMO

A música é amplamente utilizada em atividades de lazer, mas ambientes com alta intensidade de som, como casas noturnas, podem expor os trabalhadores ao nível insalubre de pressão sonora. O ruído excessivo tem sido associado a deficiência auditiva, dificuldade em comunicação verbal, aumento da tensão psicológica e menor nível de atenção dos trabalhadores. O objetivo deste estudo foi avaliar o nível de pressão sonora da música ampliada eletronicamente através de 25 medidas em triplicata nos diferentes ambientes de casas noturnas instaladas na cidade de Cascavel, PR (Brasil) durante a apresentação do *disk jockey* e com som ao vivo. Por anamnese, verificou-se a percepção dos funcionários quanto à exposição insalubre. Os resultados mostraram que todos os funcionários estão expostos ao ruído excessivo e percebem o zumbido após o término da jornada, apesar de 18,8% deles afirmarem que a música e o ruído no local afetam sua função. Nenhum empregado entrevistado usa equipamentos de proteção individual sendo que 27,1% deles justifica desconforto ocupacional enquanto 50% das razões apresentadas caracteriza falta de conscientização dos entrevistados. Concluiu-se que o agente de ruído nas casas noturnas é sério e iminente, culminando em doenças ocupacionais se não for mitigado pelo uso de equipamentos de proteção e pela implementação de programas de gerenciamento de riscos e conscientização dos funcionários.

PALAVRAS-CHAVE: Análise de risco. Condições de trabalho. Perda auditiva. Saúde do trabalhador.

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