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# Hearing symptoms personal stereos

## Sintomas auditivos em usuários de estéreos pessoais

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## Summary

**Introduction:** Practical and portable the personal stereos if had become almost indispensable accessories in the day the day. Studies disclose that the portable players of music can cause auditory damages in the long run for who hear music in high volume for a drawn out time.
**Objective:** to verify the prevalence of auditory symptoms in users of amplified players and to know its habits of use
**Method:** Observational prospective study of transversal cut carried through in three institutions of education of the city of Salvador BA, being two of public net and one of the private net. 400 students had answered to the questionnaire, of both the sex, between 14 and 30 years that had related the habit to use personal stereos.
**Results:** The symptoms most prevalent had been hyperacusis (43.5%), auricular fullness (30.5%) and humming (27.5), being that the humming is the symptom most present in the population youngest. How much to the daily habits: 62.3% frequent use, 57% in raised intensities, 34% in drawn out periods. An inverse relation between exposition time was verified and the band of age (p=0,000) and direct with the prevalence of the humming.
**Conclusion:** Although to admit to have knowledge on the damages that the exposition the sound of high intensity can cause the hearing, the daily habits of the young evidence the inadequate use of the portable stereos characterized by long periods of exposition, raised intensities, frequent use and preference for the insertion phones. The high prevalence of symptoms after the use suggests a bigger risk for the hearing of these young.
**Keyword:** hearing, symptoms, habits.

## Resumo

**Introdução:** Práticos e portáteis os estéreos pessoais se tornaram acessórios quase indispensáveis no dia a dia. Estudos revelam que os tocadores de música portáteis podem causar danos auditivos a longo prazo para quem ouve música em alto volume por um tempo prolongado.
**Objetivo:** verificar a prevalência de sintomas auditivos em usuários de tocadores amplificados e conhecer os seus hábitos de uso
**Método:** Estudo prospectivo observacional de corte transversal realizado em três instituições de ensino da cidade de Salvador- BA, sendo duas de rede pública e uma da rede privada. Responderam ao questionário 400 estudantes, de ambos os sexos, entre 14 e 30 anos que referiram o hábito de utilizar estéreos pessoais.
**Resultados:** Os sintomas mais prevalentes foram hiperacusia (43,5%), plenitude auricular (30,5%) e zumbido (27,5), sendo que o zumbido é o sintoma mais presente na população mais jovem. Quanto aos hábitos diários: 62,3% usam frequentemente, 57% em intensidades elevadas, 34% em períodos prolongados. Verificou-se uma relação inversa entre tempo de exposição e a faixa de idade (p=0,000) e direta com a prevalência do zumbido.
**Conclusão:** Apesar de admitirem ter conhecimento sobre os danos que a exposição a som de alta intensidade pode causar a audição, os hábitos diários dos jovens evidenciam o uso inadequado dos estéreos portáteis caracterizados por longos períodos de exposição, intensidades elevadas, uso frequente e preferência pelos fones de inserção. A alta prevalência de sintomas após o uso sugere um risco maior para a audição desses jovens.
**Palavras-chave:** audição, sintomas, hábitos.

## INTRODUCTION

The individual devices with earphone had revolutionized the form to hear music. For being practical and portable they had become almost indispensable accessories in the day the day. This modern habit has mobilized the researchers to study the negative impact of the inadequate use of this equipment on the hearing. A recent study it discloses that the portable players of music can cause auditory damages in the long run for who hear music in high volume for a drawn out time (1).

The hearing is the one of the main ways for which human being interacts with way, being one them more important directions, moreover, it has a sufficiently complex and primordial function in the communication human being and preservation of the species. It is by means of it that we hear and we identify to all the sounds of the environment. Injuries in the sensorial structures of the hearing provoke damages in the detention, localization and discrimination of the sounds.

The growth of the urbanization and the advance of the technology had favored the rise of the levels of noise in the streets, the work and the leisure, causing damage to the welfare mental physicist and, as well as the hearing of the individuals (2). Authors ratify this affirmation, and add that the noise does not affect only the hearing, but also can produce symptoms as gastrointestinal increase of the arterial pressure, riots, sleeplessness and irritability (3). Currently, the ambient noise has been considered a problem of public health for being part of the majority of the daily activities of the human being (4).

The young, in its majority, adolescents, habitually is displayed music amplified of high intensity, especially in its activities of leisure (5). Music, in general, is a pleasant sound that provides pleasant sensation, however, can become a source of sonorous pollution depending on the way and it sound level that is used (4).

It is observed that adolescent in the age group of 12 the 18 years, had increased the equipment use very personal stereos (EP), many times, used in inadequate way, for many hours and in intensities very raised. It has two preoccupying reasons that they make with that these modern equipment is harmful for user: the first one is the great capacity of memory and high durability of the battery, what it favors its use in extensive days. And the second is the design of the phones, whose current trend it is the use of the insertion phones that are capable to concentrate all the sonorous energy produced inside of the external conduit auditory, being considered, for this characteristic, the most harmful (6).

Another preoccupying aspect is the intensity level with that these equipment is used, allowing that people to a meter of distance listen to the music that this being heard for the user through the phones. Studies had demonstrated that the sound pressure levels of these 120 equipment can reach dB, intensity enough to provoke auditory injury (7, 8, 9).

The great number of studies concerning this subject evidences the concern of that the use of these equipment in abusive and incorrect way can cause irreversible damages to the hearing (2,6).

In this way, considering the relevance of the subject, the objective of this work was to verify the prevalence of symptoms related for users of players of digital music amplified and to know its habits in relation to the use of these equipments.

## METHOD

### *Drawing of the study and population*

This is about an observational study like transversal cut, lead with primary data, carried through in the city of Salvador/BA in the period of September to November of 2010. It was developed in three institutions, one of average education and two of superior education, being two of public net and one of private net.

400 students had participated of the research, of both genders, with age group between 14 and 30 years that had related the habit to use personal stereos. The sample was composed for students of average education and superior in public and private colleges, independent of the course.

### *Data collection and Ethical Aspects*

The data had been gotten through a questionnaire structuralized (Appendix A) on the daily habits of use of the personal stereos, auditory symptoms after use of these equipment and the degree of awareness concerning the possible risks that these equipment can cause the hearing. Also a visual analogical scale was used, in order esteem the band of volume habitually used by the users, the same one consists of a straight line of 10 cm destitute of numbers, in which it has only indications in the extremity to the left of minimum volume, that corresponds 0 cm and to the right maximum volume that corresponds 10 cm.

For posterior analysis of the scale, the following considerations had been made:

**Appendix A.** Questionnaire.

Institution of education:
Schooling: () Basic () Average () Superior
Age:
1. Do you use personal stereos (Mp3, Mp4, Ipods)?
( ) Yes ( ) Not
2. With frequency are do you use to use its personal stereos?
( ) Always ( ) Sometimes ( ) Rarely
3. How many hours per day do you use its personal stereos?
( ) 30 min ( ) 1h ( ) More than 2h ( ) More than 4 h
4. In the scale below it marks in which position of the volume you considers to use habitually its personal stereo, being 0 minimum volume and 10 the maximum volume.
0_____10
5. Do you know which the maximum volume of its equipment (Mp3, Mp4, Ipod)?
( ) Yes ( ) Not
6. Which type of earphone do you use to use its personal stereo?
( ) Insertion (it places inside of the auditory canal) ( ) Aural Circum (it is on the ear)
7. In which environment do you use to use its personal stereo?
( ) Surrounding noisy ( ) Surrounding quiet ( ) In both
8. Do you use to sleep hearing music with its personal stereo?
( ) Yes ( ) Not
9. Which the musical sort do you use to hear in your stereo? (it can mark an alternative more than)
( ) Rock ( ) Pagode ( ) Country ( ) Jazz ( ) MPB ( ) Samba
10. Do you think you hear well?
( ) Yes ( ) Not
11. After the use of the stereo (Mp3, Mp4, Ipod), have already it perceived some of these symptoms:
( ) Buzzed ( ) Pain ( ) Giddiness ( ) Sensation of covered ear
( ) Reduction of the hearing ( ) Another_____
12. Do you have difficulty in perceiving or discriminating sounds, or in understanding it says it, in noisy environments?
( ) Yes ( ) Not
13. When you hear strong sounds or it is in very noisy environments do you feel discomfort in the ears?
( ) Yes ( ) Not
14. D you believe that the use of personal stereo in maximum volume can cause auditory loss?
( ) Yes ( ) Not
15. Have you already got some information on the harmful effect that the noise can bring for health?
( ) Yes ( ) Not
16. If answered yes to the previous question, in which main did you have access to this information?
( ) School ( ) TV, radio ( ) Billboard ( ) Written Media (newspaper, magazine)
( ) Internet ( ) Professional of health

**Chart 1.** Correspondence of the visual analogical scale.

| 0 _____ 10 | |
|---|---|
| Scale in centimeters (cm) | Band of volume |
| 0 - 4,5 | Adequate volume/Low Risk |
| 4,6 - 7,5 | Moderate volume/Moderate Risk |
| 7,6 - 10 | High volume/High Risk |

Previously to the application of the questionnaires the institutions that had participated of the research had signed an assent term authorizing the application of the questionnaires in its dependences, as well as, all the participants had also signed a term of free and clarified assent.

This study it was submitted to the Committee of Ethics in research of the College of Technology and Science (FTC), having been approved, without restrictions through seeming in the 2037 year.

### *Analysis of Data*

The data had been typed in the program EpiData Entry 3,1 (CDC, Atlanta, GA) and analyzed, quantitatively, in the SSPS version 15. The data had been tabulated and presented in form of Table and Graphs.

For categorical variable had been esteem frequencies simple and compared with the qui test - squared of

Pearson. While for continuous 0 variable they had been esteem average and medium. They had been considered as resulted statistical significant those that present p-VALUE < that 0,05.

## RESULTS

Table 1 shows the partner-demographic data of the population. 200 students of average education had participated of the research and 200 of the superior education of these 300 belonged to public institution and 100 of private. The age group varied between 14 and 30 years, however 91.6% had age up to 25 years, 64.8% were of the feminine sex.

Table 2 evidences the results how much to the daily habits of exposition to music electronically amplified in individual devices. How much to the use frequency 31.7% to the times are observed that 62.3% of the participants had related to use frequent, 6% rarely.

In what it says respect to the band of volume of habitual use, 57% of the individuals affirm to hear in high volume, 33% in moderate volume, and only 10% in low volume. Valley to stand out that 50.8% had told to have knowledge of the maximum volume of exit of its equipment.

It was still verified, that 34% of the young use to hear music for a period that varies of 2 hours until 6 hours per day. An inverse correlation was observed enters the time of exposition and the band of age (p=, 000). How much to the type of phone 75.5% they had affirmed to use insertion phone, 20.8% aural phone circum and 3.3% use both the phones.

The musical sorts more presented in the preference of the participants are the MPB with 63% followed of rock (48.3%) and pagode (41.5%).

**Table 1.** Characterization of the sample.

| Variables | | N(400) | % |
|---|---|---|---|
| Age (years) | 14 a 18 | 205 | 51,3% |
| | 19 a 25 | 161 | 40,3% |
| | 26 a 30 | 34 | 8,4% |
| Sex | Female | 259 | 64,8% |
| | Male | 141 | 35,2% |
| Institution | Public | 300 | 75,0% |
| | Private | 100 | 25,0% |
| Schooling | Level Medium | 200 | 50,0% |
| | Level Superior | 200 | 50,0% |

**Table 2.** Habits related to the use of personal stereos.

| Variable | | N(400) | % |
|---|---|---|---|
| Time of exposition/day | Until 1/2h min | 55 | 13,80% |
| | Between 1/2h e 2h | 117 | 29.3% |
| | Between 2h de 6h | 136 | 34,00% |
| Band of habitual volume | Low Volume | 40 | 10,00% |
| | Moderate Volume | 132 | 33,00% |
| | High Volume | 228 | 57,00% |
| Do You know which the maximum volume? | Yes | 203 | 50,80% |
| | Not | 195 | 48,80% |
| Kind of phone | Insertion | 302 | 75,50% |
| | Circum aural | 83 | 20,80% |
| | Both | 13 | 3,30% |
| Environment of use | Noisy | 55 | 13.70% |
| | Quiet | 60 | 15,00% |
| | Both | 285 | 71,30% |
| Do you Sleep hearing music? | Yes | 187 | 46,80% |
| | Not | 209 | 52,30% |
| Musical Gender | MPB | 252 | 63,00% |
| | Rock | 193 | 48,30% |
| | Pagode | 166 | 41,50% |
| | Samba | 154 | 38,50% |
| | Country | 91 | 22,80% |
| | Jazz | 85 | 21,30% |
| | Another | 18 | 4,50% |

The majority of interviewed (71.3%) use to use portable player in noisy environments how much quiet, however, 13.7% only use in noisy environment; 46.8% relate the habit to sleep hearing music in the personal stereos.

How much to the presence of symptoms exposition to music electronically amplified (Table 3), 67.2% of the interviewed ones already had after presented at least a symptom, being that 18.7% had related more than a symptom.

The symptoms most prevalent had been auricular fullness (30.5%) followed of humming (27.5%), otalgia (12.8%), hyperacusis (11.5%), giddiness (4.8%) and others (4.0%). 34% had not related to symptoms after the use. It was verified that how much bigger the lesser the presence of symptoms after use and how much lesser age the bigger age group is the prevalence of the humming in this population. Also a direct relation is observed enters the time of exposition and the increase of the prevalence of the humming. Valley to stand out, that the use in high intensities keeps a direct relation with the amount of cited symptoms.

As permanent complaint 43.5% of the participants the intense sounds had affirmed to present discomfort and difficulty in perceiving sounds and understanding speaks in noisy environments (36.5%). 15.8% related not to hear well.

It was evidenced that how much bigger the time of exposition that the prevalence of humming complaint.

In what it says respect to the degree of awareness in relation to the possible risks that the use of personal stereos can cause the hearing, 91.5% believe that these can cause auditory loss and 75.5% already had gotten some information on the harmful effect that the noise can bring for health. The ways of bigger access to these informations had been TV/radio (40.8%), Internet (29.8%), professionals of health (26%), written media (24.8%) and school (23.8%).

**Table 3.** Symptoms and complaints related to the hearing.

| Variables | | N(400) | % |
|---|---|---|---|
| Amounts of symptoms | 1 | 194 | 48.50% |
| | + of 1 | 75 | 18.70% |
| Symptoms after use of personal stereo | A. Protector | 122 | 30.50% |
| | Humming | 110 | 27.50% |
| | Otalgia | 51 | 12.80% |
| | Hyperacusis | 46 | 11.50% |
| | Giddiness | 19 | 4.8% |
| | Another | 16 | 4.0% |
| Difficulty in perceiving and to understand say it in noisy environments | Yes | 146 | 36.50% |
| | Not | 254 | 63.50% |
| Discomfort the sounds intense | Yes | 174 | 43.50% |
| | Not | 225 | 56.30% |
| Think that hears well | Yes | 334 | 83.50% |
| | Not | 63 | 15.80% |

## Discussion

For being practical, portable and to be in fashion the personal stereos equipments had become almost indispensable accessories in day-by-day, mainly between the young. This habit of modern consumption has generated great quarrels and research in the scientific way concerning the damages that can cause to the hearing of these individuals.

The fact calls the attention of that the use of these equipments, even so more common between adolescents, is present today in all the age bands. This habit is each incorporated time more to the routine of the people and the inadequate use becomes in a risk the auditory health.

Although the reduced dimension, these equipments are more powerful each time, with great capacity of memory and high durability of the battery favoring its use in extensive days (6). Moreover, studies show that the sound pressure levels of these equipments can reach 120 dB, intensity of potential risk to the human ear (7, 8, 9).

It was evidenced that 62.3% of the studied population have the habit to frequent use personal stereos for long periods of exposition and in raised intensities, these findings corroborate other studies with this population (2, 8, 9, 10, 11, 12).

The risks to the auditory health are evidences when we observe the habits of use and the correlation with the auditory symptoms. In this direction, it has a direct correlation enters the time of exposition and the presence of auditory symptoms (p= 0,004) being distinguished the humming as the symptom whose correction has greater tack statistics. Statistical significant relation also was found between the time of exposition and the age group (p=, 0000).

The use of these portable equipments occurs in diverse noisy environments as in the transit, school, college, street, academy of gymnastics etc. In general, in these places, the noise level is raised what it makes with that the users increase the volume to hide sounds external (11,12). It was observed in this study that 81.5% of the young use to use personal stereos in noisy environments.

Another aspect to be considered is design of the earphones whose model can potentiate the sonorous capacity

of these equipments. The phones of insertion, for being discrete, are more aesthetic and for possessing superior practicality to the voluminous external phones that recover the ear (circum-aural), are currently most popular (6). In this population it was observed that 75.5% have preference for the insertion phones, agreeing to other authors (4, 6, 9). The position of this type of phone, inserted in the external auditory conduit, favors potentiate of the intensity since all the sonorous pressure is lead for average ear. For GARSTECKI (2006), professor of clutters and sciences of communication of the Northwestem University (U.S.A.), the problem aggravates when these small phones do not incase perfectly in the ears and allow the entrance of external sounds, what it makes with that the user increases more the volume of player to stifle the external racket (13).

A significant number of young 67.2%, had affirmed to have after presented at least one of the symptoms exposition to music electronically amplified. The auditory symptoms more related by the users of personal stereos had been auricular fullness, followed of humming; these findings had been similar to the found ones in other studies (2, 5, 8, 9, 14, 15). Some authors believe that the humming, the sensation of covered ear and reduction of the hearing after extreme exposition to amplified music, can be the first signals of induced auditory loss for music (9,14).

The presence of temporary changes of the threshold is consensus in literature (TTS) after exposition the noises of high intensity (4, 9, 14, 15, 16, 17). However, derive from temporary changes of overexpusure to the noise can result in permanent changes of the threshold (3,18). The main factors for the development of auditory loss are the time of exposition, sonorous intensity and the individual susceptibility (3, 15, 18).

On the other hand, auditory loss for some authors is not the only resultant injury of the exposition the doses of superimposed noises. These individuals can present complaints as buzzed chronic, conscription and hypersensitivity to the sound (hyperacusis) (19). This study evidenced that great part of the participants (43.5%) related to discomfort the intense sounds, agreeing to other studies (3). Hyperacusis or hypersensitivity to the sounds is the constant bothers the sounds of weak, moderate or strong, independent intensity of the situation or environment (3,19).

It is worth highlighting that injuries of the agency of corti, hyperacusis, humming, among others alterations can hinder or make it difficult the full use of the auditory abilities, harming the quality of life of the individuals (19). A significant number of respondents 36.5% related to present difficulty in perceiving sounds and to understand speaks in noisy environments, corroborating similar research (2, 4, 8,10).

The negative impact of the inadequate use of these equipments on the hearing, no doubt belongs to the field of the public health (1). The individual portable equipment is arriving each time earlier at the hands and ears of the young; the necessity of the precocious implantation of educative actions becomes evident since basic education. In this study an inverse correlation was observed enters the exposition time and the band of age, that is, youngest has a propensity to use portable player in bigger intensities (p=, 000).

The majority of the interviewed citizens (91.5%) believes that the use of personal stereos in maximum volume can cause auditory loss and 75.5% already had gotten some information on the harmful effect that the noise can bring for health, these findings are in accordance with other similar studies (5, 8). Contrarily, a study carried through in São Paulo 85% of the young they believe that the use of these equipment in high intensity not cause auditory loss (6).

Although the ample percentage of young that already had had access the information on the harmful effect of the noise on the health, the described findings demonstrates that a great contingent remains with inadequate habits of use of these equipment. Some authors specifically argue the lack of action of protection and prevention of the auditory alterations caused for exposition to amplified music (2,4).

The school is the way of information less cited by the participants (23.8%) and the most cited the TV/Radio (40.8%). Other cited ways had been the Internet (29.8%), professionals of health (26.0%) and the written media (23.8%). These numbers suggest an insignificant participation of the school front to the role that it plays in the formation of the young.

## CONCLUSION

The more prevalent auditory symptoms in the individual portable equipment users had been discomfort the intense sounds, difficulty in perceiving sounds and to understand speaks in noisy environments, auricular fullness, humming, otalgia and hyperacusis. How much bigger the lesser age the presence of symptoms after the use and how much lesser the bigger age group is the prevalence of the humming in this population.

The daily habits of exposition evidence the inadequate use of these equipment characterized for long periods of exposition, raised intensities, frequent use and preference for the insertion phones.

Although the totality (91.5%) of the young almost to believe that the use of personal stereos in maximum volume can cause auditory loss and relate previous

information on the harmful effect of the noise on the health, a great contingent remains with inadequate habits of use of these equipments.

The school appears as the way of information that less contributed for the formation of the knowledge concerning the harmful effect of the noise. A more active participation of the school is suggested front to the role that it plays in the formation of the young, development of educational actions on the risks that the inadequate exposition to the noises can cause the health.

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