AUDIOLOGICAL FINDINGS IN YOUNG USERS OF HEADPHONES

Achados audiológicos em jovens usuários de fones de ouvido

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ABSTRACT

Purpose: to examine the relationship between the use of headphones and hearing impairments and hearing caused by portable music players. **Methods:** the purpose was to collect data through a questionnaire answered by the participants. Realization of audiometric tests: tonal and vocal audiometry, immittance, and acoustic reflexes, transient otoacoustic emissions and distortion product otoacoustic emissions, subsequently the data were compared between individuals of the same group and the groups were compared itself (the experimental group and control group). For statistical analysis we used the chi-square and Fisher exact test. **Results:** some of the variables investigated, such as the use of headphones 1 to 2 hours a day, the presence of non auditory and auditory complaints, exposure to high sound pressure levels of extra-occupational once a week to be nonsmoker do not use drugs prescription and not ringing often possessed statistically significant for the experimental group. Regarding hearing complaints there was a statistically significant difference between the experimental and control groups concerning the feeling of muffled ear and sensation of decreased hearing. **Conclusion:** the temporary symptoms indicate the potential harmful effects of listening to portable music players for an hour a day. Research is needed to assess long-term damage to the auditory system.

KEYWORDS: Hearing; Hearing Aid; Acoustic Impedance Tests; Hearing Loss; Noise; Music

INTRODUCTION

The auditory system is composed of anatomic elements such as ligaments, tendons, muscles, ossicles, sensory cells and neurons, and it can suffer interference from intrinsic or extrinsic factors such as noise[1-4]. Noise can be defined as an undesirable sound and its perception could be different depending on the listener. Noise intensity, exposure time and physical characteristics will determine how much it can damage hearing health[5,6]. The intensity, the kind of noise, its duration and quality are determining in the hearing alteration acquisition process[2,6-8].

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Hearing is extremely important to human beings. Audiologic screening is aimed at detecting possible alterations in the auditory system, peripheral or central. There are various auditory function evaluation procedures, among them: tonal audiometry, vocal audiometry, immittance testing, acoustic reflex research, auditory evoked potential and otoacoustic emissions, being that each test has its own specific evaluation objective and purpose[2-4,9-15].

There is a growing concern regarding the hearing health of the youth, as the indiscriminate exposure to places where there is great noise intensity and the use of portable equipment like earphones could, in a short or long term, bring irreversible damage to the auditory system. Exposure to high level intensity noises can trigger many different symptoms such as: intolerance to intense sounds, dizziness, otalgy (or earache), trouble understanding or hearing words, ringing in the ear and loss of hearing[16-22]. Besides hearing impairment, there is extra-hearing damage as: sleep disturbances, cardiovascular disorder, stress, fatigue, tension, irritability, inattention,

tiredness, nervousness, headaches and high blood pressure[23-25].

The use of earphones by young people, as well as the noisy environments attended by them is already considered public health hazard since they jeopardize auditory health[20,26]. In places visited often by youth like bars, night clubs, dance clubs, gyms, soccer stadiums among others, the intensity of sound is normally greater than 100dB(a) and individual portable equipment like earphones can be even greater[5,15,16,18-20,26].

Hearing problems are no longer a concern only among the elderly, they've become a part in the lives of many young people who had portable amplifying equipment for long periods of time in their ears, generally with the volume turned up to high intensity in an attempt to isolate themselves or compete with external noise. Another important factor that triggers hearing alterations is the type of earphones used, once the in-the-ear phones conduct the sound pressure into the middle ear and the inner ear without any protection. Let's not forget that the human auditory system has limits (up to eight hours of exposure a day to 85dB; the need for acoustic rest once the hair cells in the ear are sensitive) which need to be respected in order to avoid future problems[5,6,15,19-21,26].

Hearing loss caused by the constant use of earphones have similar characteristics to the one caused by occupational exposure to noise, in other words, the hearing loss is slow, progressive, irreversible, the sensorineural kind, bilateral, initially attacks the higher frequencies, and later the other frequencies[7,18,21,24,27]. According to the information mentioned regarding the youth's hearing behavior, this study's objective was to analyze the relationship between the use of earphones and the hearing and extra-hearing impairments caused by portable music players.

METHODS

The present project was analyzed by the PUC Minas Gerais Ethics and Research Committee (CEP), approved with register number 0109021300011 and considered risk free.

Thirty individuals of both genders between the ages of 16 and 29 who constantly use earphones were selected randomly to compose the experimental group. The control group was composed of thirty individuals of both genders within the same age range of the experimental group who do not use earphones constantly.

All individuals were previously informed the purpose of the study, when all and any questions were clarified and the free and informed consent term was signed. Upon the signing of the free and informed consent term, each one of the participants answered the data collecting questionnaire developed to be used in research previously carried out on the same theme and adapted by researchers to be used in the present study (Figure 1).

After that, the participants were submitted to an audiological evaluation. Previously, an inspection of the external acoustic meatus was executed using a Heine otoscope model Mini 2000. The participants also underwent tonal audiometry testing (air and bone conducted) and logoaudiometry (speech recognition rate and speech recognition threshold) in acoustic treated booths, using a Madsen audiometer, model Midimate 622, with supra-aural headphones TDH 39 and bone vibrator B71. Such tests allow hearing to be classified according to type, degree and configuration of the audiometric curve. The immittance testing was accomplished with use of an Interacoustics middle ear analyzer model AZ7, tympanometry and ipsilateral and collateral acoustic reflexes research done.

The participants also underwent the otoacoustic emissions evoked by transient and by distortion product, using Otodynamics ILO 292 equipment. The whole audiological evaluation was done in both ears of each participant, at the PUC Minas Centro Clínico de Fonoaudiologia (Speech Therapy Clinical Center), located at 2023 Brasil Ave., Belo Horizonte, MG, Brazil.

In order to classify the degree of hearing loss, the type of hearing loss and the audiometric configuration the authors used the criterion proposed by Lloyd and Kaplan (1978) Silman and Silverman (1997) and of Silman and Silverman, 1997 – adapted from Carhart, 1945 and Lloyd and Kaplan, 1978 respectively.

The classification of timpanometric curves followed the criterion proposed by Jerger, 1970. The criterion to analyze otoacoustic emissions was proposed by Azevedo, 1997[28]. Azevedo carried out a study and from the results was able to create some parameters so that the test would be conducted and considered within the standards of normality, being that such standards were used as criteria for the study. For TOAE (transient otoacoustic emissions test): presenting OAE (otoacoustic emissions) greater than the background noise, with amplitudes of at least 3 dBSPL at 1000 or 1500 Hz and at least 6 dBSPL at 2000, 3000, and 4000 Hz, reproductability greater than or equal to 50%. For DPOAE: when there is a signal/noise difference of 3dBSPL to 1000 Hz and other frequencies a signal/noise ratio of 6 dBSPL.

Dear informer,

This questionnaire is individual and confidential, being impossible to identify the informant. Please, it is critical that you respond to all the questions, because the absence of a response can invalidate it. Your responses should reflect their reality.

SOCIO-DEMOGRAPHIC DATA
Sex: ( ) Female ( ) Male
Education: ( ) High School ( ) Higher Education ( ) Other_____
Profession:
Works or has worked on site with the presence of intense noise? ( ) Yes ( ) No
DATA ON GENERAL HEALTH
How often do you consume alcoholic drinks?
( ) Never ( ) Sometimes ( ) On weekends ( ) Daily
Considering how smoker who has smoked at least 5 packs, in life, you qualify as:
( ) Currently Smoker ( ) Ex-smoker ( ) Non-smoker
Have you made or make constant use of drugs prescribed by a doctor? (If Yes, cite if you know what):
( ) Yes ( ) No ( ) Which?_____
Has difficulty hearing? ( ) Yes ( ) No
Has trouble understanding the sound of words? ( ) Yes ( ) No
Has ringing in your ears? ( ) Yes ( ) No
Has history of deafness in the family? ( ) Yes ( ) No
DATA ABOUT THE HEARING
Have you had or have any ear problem? ( ) Yes ( ) No ( ) Which?_____
As you consider your hearing? ( ) Good ( ) Average ( ) Bad
Have you ever been subjected to some type of ear surger? In which heard?
( ) Yes ( ) No ( ) Which?_____
You make use of headphones (MP3, Ipod, etc)? ( ) Yes ( ) No
How long have you makes use of sound equipment with headphones in ear? ( ) Never ( ) Less than 1 year ( ) 1 year ( ) 2 to 3 years ( ) 4 to 5 years ( ) More than 5 years
How often do you make use of headphones? ( ) Never ( ) Once a week ( ) Three times a week ( ) More than three times a week
How many hours a day you make use of headphones?
( ) Never ( ) An hour ( ) Two hours ( ) Three hours ( ) More than three hours
When you make use of MP you use headphones on both ears or in one? ( ) In the two ( ) Right Ear ( ) Left Ear
You increase the volume of your sound equipment when in noisy environment to cover up the noise (conversation, busy street, bus, etc)? ( ) Yes ( ) No
Which of the auditory symptoms mentioned below you have or have ever had after constant use of headphones to listen to music (MP3, Ipod, etc)? Select as many options as necessary. ( ) Dizziness ( ) Tinnitus ( ) Earache ( ) Stuffy ear feeling ( ) Sense of hearing low ( ) Increased hearing sensitivity ( ) Difficulty to understand in noisy environment ( ) Other:_____
In which ear you presented these symptoms? ( ) Right ( ) Left ( ) Right and left
Which of the extra-auditivos symptoms below you have ever had after constant use of headphones? Select as many options as necessary. ( ) Fatigue ( ) Anxiety ( ) Headache ( ) Irritability ( ) Stress ( ) Other:_____
You get exposed to noise often extra-ocupacional (disco, bars, etc.)?
( ) Never ( ) Once a week ( ) Three times a week ( ) More than three times a week
For you the constant use of headphones at high volume and for several hours a day can cause damage to your hearing and general health? ( ) Yes ( ) No
If so, what kind of damage the health?_____

Figure 1- Hearing health questionnaire

The inclusion criteria in the research were: Age range according to the one researched, in other words, individuals between 16 and 29 years of age; fit in one of the two groups researched: experimental – young people who use portable music players, or control – young people who do not use portable music players; present type A tympanometric curve, once other curves suggest middle ear alterations, which would result in the gathering of inadequate records in other tests carried out.

After collecting all the data, it received the appropriate statistical treatment in order to analyze results, the groups being compared to each other, as well as the results obtained in the audiological tests. The statistical analysis was carried out using software MINITAB 14. In order to verify association between variables the chi-squared test or Fisher exact test were used (the Fisher exact test is used instead of the chi-squared when there is a 2x2 association and fewer than five elements in one of the columns). For comparisons between the groups, experimental and control, the hypothesis test for proportion and the t-test were used. A 5% significance level was adopted for all tests.

RESULTS

The sample group used in the present study was composed by 60 individuals divided into two groups (30 in the experimental – EG and 30 in the control group – CG) characterized as follows:

- EG: 15 of each gender ranging between 16 and 29 years of age (an average of 21.37 years of age and standard deviation of 3.12).
- CG: 15 of each gender ranging between 18 and 29 years of age (an average of 23.4 years of age and standard deviation of 3.05).

The descriptive analysis of the experimental group (EG) and the significance values (p value) for each item considering its occurrence in more than 50% of the population (Table 1).

Table 1 mentions all the variables investigated with the number of precedents to each item researched, the percentage represented by each group and the p value proposed to the group. Table 1 shows that the use of earphones during 1 to 2 hours daily, the presence of auditory and extra-auditory complaints, exposure to high levels of extra-occupational sound pressure once a week, being a non-smoker, not using any medication and not hearing any ringing or humming had statistically significant frequency ($p \leq 0.005$).

Table 2 shows the association between variables: variable 1 – daily hours of earphone use; time of headphone usage (in years); exposure to elevated extra-occupational SPL (sound pressure level); age; trouble hearing complaint, and variable 2 – the presence of hearing complaints; number of hearing complaints; the presence of extra-auditory complaints; daily hours of earphone use, in order to verify the dependence between these in the EG. However, no statistically significant association between any of the correlated variables was verified.

The occurrence of auditory and extra-auditory symptoms in the experimental and control groups are shown in Figure 2. Besides the relative and absolute frequencies, the p values resulted from the comparison of proportions between the groups studied can be observed.

Table 1 – Distribution of the experimental group compared to the variables analyzed and respective significance

Variable		N	%	Value of p
Hours of daily use of headphones	1 to 2	24	80,00%	0,001*
	3 or more	6	20,00%	1,000
Presence of hearing complaints	Yes	24	80,00%	0,001*
	No	6	20,00%	1,000
Number of hearing complaints	0	6	20,00%	1,000
	1	15	50,00%	0,572
	2	5	16,67%	1,000
	3	4	13,33%	1,000
Presence of extra-auditivas complaints	Yes	23	76,67%	0,003*
	No	7	23,33%	0,999
Number of complaints extra-auditivas	0	7	23,33%	0,999
	1	17	56,67%	0,292
	2	6	20,00%	1,000
	3	0	0,00%	1,000
Headphone use time (in years)	Up to 1 year	5	16,67%	1,000
	2 to 5 years	15	50,00%	0,572
	More than 5 years	10	33,33%	0,979
Exposure to high extra NPS occu.	Never	7	23,33%	0,999
	1 x per week	20	66,67%	0,049*
	3 or more times	3	10,00%	1,000
Complaint of difficulty to listen	Yes	2	6,67%	1,000
	No	28	93,33%	0,000*
Smoke	Smoker	5	16,67%	1,000
	Ex-smoker	1	3,33%	1,000
	Non-smoker	24	80,00%	0,001*
Alcohol	Never	9	30,00%	0,992
	Sometimes	12	40,00%	0,900
	Weekend	9	30,00%	0,992
Medicines	Yes	6	20,00%	1,000
	No	24	80,00%	0,001*
Tinnitus	Yes	6	20,00%	1,000
	No	24	80,00%	0,001*

* Statistically significant values ($p \leq 0.05$) – Hypothesis testing for proportion
Legend: SPL: sound pressure level

Table 2 – Association between variables in the experimental group

Variable 1	Variable 2	Value of p
Hours of daily use of headphones	Presence of hearing complaints	1,000
Hours of daily use of headphones	Number of hearing complaints	1,000
Hours of daily use of headphones	The presence of extra hearing complaints	1,000
Hours of daily use of headphones	Number of extra hearing complaints	0,275
Time to use headphones (in years)	Presence of hearing complaints	0,392
Time to use headphones (in years)	The presence of extra hearing complaints	0,394
Exposure to high occupational extra NPS	Hours of use of the phone	0,290
Exposure to high occupational extra NPS	Presence of hearing complaints	0,603
Exposure to high occupational extra NPS	The presence of extra hearing complaints	1,000
Age	Hours of daily use of headphones	0,651
Age	Presence of hearing complaints	0,651
Age	The presence of extra hearing complaints	1,000
Complaint of difficulty to listen	Hours of daily use of headphones	1,000

* Statistically significant values (p ≤ 0.05) Chi-square-test and Fisher exact
Legend: SPL: sound pressure level

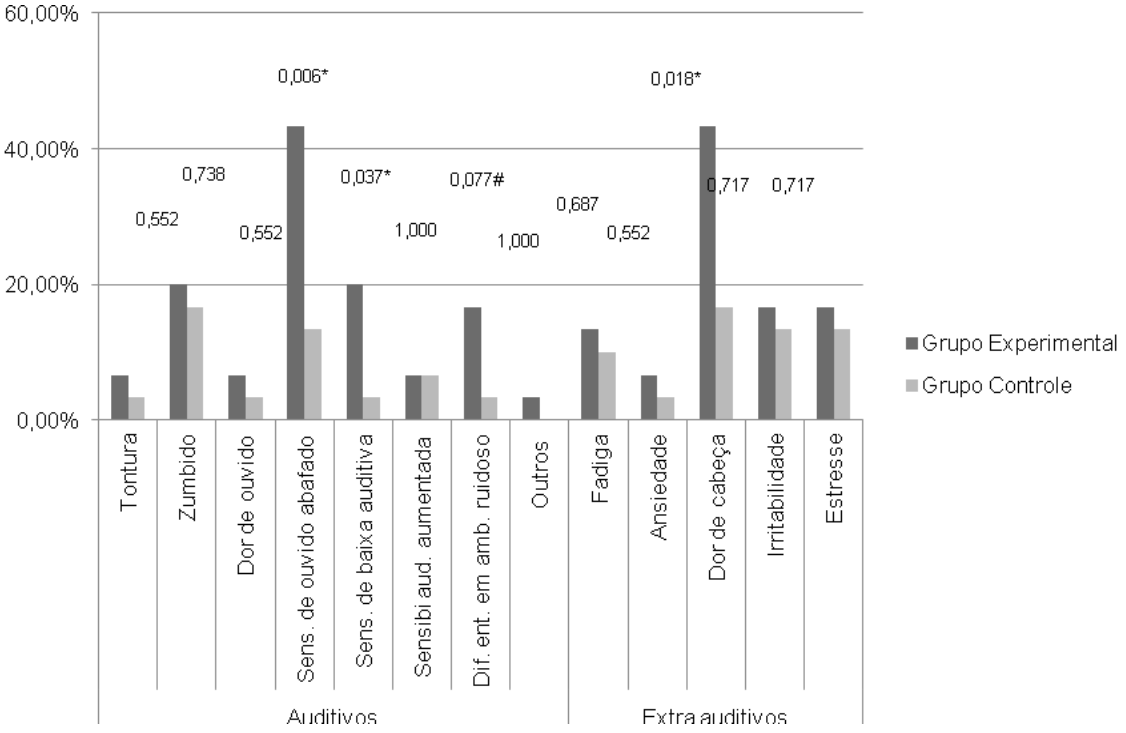

Figura 2 – Ocorrência de sintomas auditivos e extra-auditivos e respectivo valor de significância da comparação entre os grupos controle e experimental

Regarding hearing complaints there was a statistically significant difference between the experimental and control groups for muffled ear sensation (p=0.006) and (p=0.037). It is observed that these complaints were more frequent in the experimental group. The other auditory symptoms did not present any statistical difference between the groups, only the trouble understanding in noisy atmospheres presented a tendency toward statistical significance (p=0.077). Regarding extra-auditory complaints, there was statistically significant difference between the experimental and control groups only for headaches (p=0.018). We can observe that this symptom was the most frequent among the experimental group.

Through the Fisher exact test the association between hearing and extra-hearing complaints with exposure to high extra-occupational sound pressure levels was verified. There was no statistically significant association (p=0.858) between the correlating variables. Association between the presence of ringing or humming with the group studied (EG and CG) was verified; however there was no statistically significant association (p=0.245).

Considering the results of the DPOAE (present/absent) and TOAE (present/absent), analysis of the association between these results and the variables smoking, alcohol and on medication proceeded. The results of these associations are presented in Table 3. From the table, it is observable that some associations weren't possible to be carried out for the fact that all informants had presented a presence of emissions, which makes the association analysis impossible. Also observed is that the analysis of the DPOAE was carried out by frequency in isolation, while to the TOAE it was done per ear, independently of the frequency.

Table 3 – Association between otoacoustic emissions and smoke, alcohol and medicines

Variable	Group	Ear	DPOAE						EOAT
			1	1,4	2	3	4	6	
Smoke	EG	OD	1,000	0,433	0,538	0,538	0,166	0,433	1,000
		OE	1,000	1,000	0,433	0,310	0,310	0,254	1,000
	CG	OD	1,000	-	-	1,000	1,000	1,000	0,033*
		OE	1,000	-	-	1,000	-	-	1,000
Alcohol	EG	OD	0,287	1,000	0,093#	1,000	1,000	0,534	0,637
		OE	1,000	0,300	0,534	1,000	1,000	1,000	0,070#
	CG	OD	1,000	-	-	0,466	0,466	1,000	1,000
		OE	1,000	-	-	0,466	-	-	0,466
Medicines	EG	OD	0,556	0,501	0,556	1,000	1,000	1,000	0,302
		OE	1,000	0,200	1,000	1,000	1,000	1,000	0,290
	CG	OD	1,000	-	-	1,000	0,133	0,133	1,000
		OE	1,000	-	-	1,000	-	-	1,000

* Statistically significant Values (p ≤ 0.05) Chi-square-test and Fisher exact
# Tendency toward statistical significance (p ≤ 0.10) Chi-square-test and Fisher exact
Legend: DPOAE: distortion product otoacustic emission; EOAT: transient otoacustic emission; all present emissions (invalid analysis); EG: experimental group; CG: control group.

Regarding the TOAE it is observed that there was statistically significant association between smoking and the emissions in the right ear of the control group (p=0.033). This association is justified by the fact that all the non-smokers or ex-smokers presented TOAE present, while the only smoker presents TOAE absent. There was tendency towards statistical significance for the association between alcohol and TOAE in the left ear in the experimental group (p=0.070). This tendency is justified by the fact that all the informants that have TOAE absent drink alcohol, while among those who have TOAE present, some don't consume alcohol.

Considering the DPOAE, there was no statistically significant association between the variables smoking, alcohol and medication in any of the frequencies. It is worth pointing out that there was a tendency toward statistical significance in the association between alcohol and the result of the DPOAE in the right ear in the experimental group

(p=0.093). This association is justified by the fact that all informants who do not use alcohol presented emissions present and, among the ones who have emissions absent, all use alcohol. This finding proves a tendency towards the association between the consumption of alcohol with emissions absent.

Table 4 – Comparison of the magnitude of the emissions between the experimental and control groups

Emission	Ear	Frequency (KHz)	Average (DP)		Value of p
			EG	CG	
EOAT	OD	1	9,08 (6,10)	12,36 (6,14)	0,043*
		1,4	11,75 (6,61)	16,33 (5,61)	0,005*
		2	9,91 (5,80)	11,82 (3,49)	0,130
		3	7,64 (6,35)	11,29 (5,91)	0,025*
		4	5,91 (5,09)	9,88 (6,03)	0,008*
	OE	1	9,87 (5,49)	11,53 (7,69)	0,341
		1,4	12,09 (5,19)	15,08 (5,12)	0,028*
		2	9,26 (4,75)	11,88 (3,82)	0,022*
		3	7,05 (6,06)	12,12 (6,12)	0,002*
		4	3,73 (4,79)	10,87 (5,37)	0,000*
DPOAE	OD	1	9,67 (7,46)	10,02 (5,53)	0,839
		1,4	14,78 (8,47)	17,14 (5,17)	0,199
		2	13,55 (7,72)	17,02 (5,71)	0,053#
		3	12,15 (8,35)	15,72 (6,67)	0,073#
		4	18,77 (8,26)	20,29 (6,67)	0,437
		6	15,14 (7,93)	17,39 (9,28)	0,317
	OE	1	8,68 (5,45)	10,78 (5,93)	0,159
		1,4	16,37 (6,30)	16,13 (4,29)	0,864
		2	16,00 (6,37)	15,76 (5,17)	0,875
		3	12,97 (8,51)	16,54 (6,27)	0,070#
		4	17,14 (8,93)	20,17 (6,85)	0,146
		6	12,2 (10,2)	18,35 (7,15)	0,010*

* Statistically significant Values (p ≤ 0.05) – t Test
# Tendency toward statistical significance (p ≤ 0.10) – t Test
Legend: DPOAE: distortion product otoacoustic emission; TEOAE: transient otoacoustic emission; EG: experimental group, CG: control group.

Table 4 shows the average values and standard deviation of the TOAE and DPOAE in both groups and the respective significance value resulting from the comparison between them.

Statistically significant difference in the amplitude of the emissions between the groups for TOAE in the right ear at 1; 1.4; 3; and 4 kHz frequencies, and in the left ear for 1.4; 2; 3; and 4kHz frequencies was observed. In all cases the amplitude was greater in the control group. Regarding the DPOAE tests there was statistical difference between the groups only at a 6 kHz frequency in the left ear. There was a tendency toward statistical significance for the difference between the groups at 2 and 3 kHz frequencies in the left ear. As observed for the TOAE tests, for the DPOAE the response amplitude values were also greater in the control group.

Table 5 shows the occurrence of audiometric configuration in both groups and the significance values of the comparison between the groups. There was no statistically significant difference between the occurrences of the configurations between the groups.

It is noted that the irregular configuration was the most frequent in both ears in both groups.

Table 5 – Comparison of audiométrica between the groups configuration

Ear	Configuration	N (%)		Value of p
		EG	CG	
Rigth	Irregular	20 (66,66%)	18 (60,00%)	0,591
	Horizontal	8 (26,66%)	10 (33,33%)	0,572
	Notch	1 (3,33%)	0 (0,00%)	1,000
	DL	1 (3,33%)	1 (3,33%)	1,000
	DA	0 (0,00%)	1 (3,33%)	1,000
Left	Irregular	16 (53,33%)	18 (60,00%)	0,602
	Horizontal	9 (30,00%)	10 (33,33%)	0,781
	Notch	3 (10,00%)	0 (0,00%)	0,237
	DL	2 (6,66%)	1 (3,33%)	1,000
	DA	0 (0,00%)	1 (3,33%)	1,000

* Statistically significant values (p ≤ 0.05) – Hypothesis testing for difference between the proportions
Legend: EG: experimental group, CG: control group, DL: slight downward; DA: sharp downward.

DISCUSSION

In face of the research's proposal, it was observed that some subjects successfully accepted participation in the study, devoting little time to filling out the questionnaire and carrying out the audiometric tests. On the other hand, other subjects, even after a detailed explanation of the study, were not interested in contributing with it. During the active search for individuals who could take part in the groups studied, we could observe greater acceptance by individuals of female gender, being that individuals of male gender were more closed and less interested in cooperating. Another barrier faced was the difficulty in finding subjects who do not use earphones, such fact can be justified by how easy it is to acquire portable music player equipment, once they have existed since the 1980s, but have become more popular with the emergence of the *Ipod*[20,22,26].

Taking the study here presented under consideration, it was noted that most of the participants in the experimental group use earphones between one and two hours daily. Such fact corroborates with some studies that reveal that such frequency is enough to allow subsequent appearance of deterrents to the individuals' hearing health[5,6,20,26].

According to some studies, the constant use of earphones can cause the appearance of auditory and extra-auditory complaints, which can be confirmed in the present study, once 50% of the individuals studied in the experimental group have at least one auditory symptom. However, 76.67% of the subjects researched in the experimental group say they have extra-auditory complaints caused by the portable music players. Such finding corroborates with the literature which reports that exposure to high levels of sound pressure causes severe consequences in the quality of life[16-25].

Currently, the great majority of youth leisure activities involve noise, since they visit atmospheres with high levels of sound pressure. Such circumstances jeopardize youth auditory health because of the regular exposure to these places, the risks being greater when associated with the use of earphones. A fact which can be considered a public health problem. Corroborating with the findings in the literature, the study reveals that most young people go to noisy places at least once a week[5,15-22,26].

The presence of ringing or humming in individuals who constantly use portable music players is a common symptom, being that this symptom could indicate premature hearing problems. However, such finding did not corroborate the literature in the present study, once only 20% of the subjects researched presented ringing or humming[16-22].

According to the data analyzed in the research, only six individuals in the experimental group do not turn up the volume in their portable music players when they are in noisy ambiences. This habit, committed by many youngsters in the study, was also observed by other researchers[5,20,21,26].

Literature reports that the amplitude of otoacoustic emissions represents the quantity of external hair cells that are intact. Being so, the reduction of amplitude can predict possible auditory alterations. In the present study, it was observed that the individuals who use earphones present inferior otoacoustic emissions amplitude compared to those who don't use earphones, even though presenting normal hearing degree in the tonal audio metry[2,8,10,12,14,15,17,27].

It is important to highlight that even knowing that the constant use of portable music players can

damage hearing health (such as the ones mostly mentioned among the young people researched like hearing loss, irritability, ringing in the ear and stress), the use of this equipment is part of their routine, earphones being used as force of habit. Such attitude can lead to predicting how hard it will be for the youth to change their customes[17,20,22,26].

Another relevant aspect observed in this study regards the type of audiometric configuration presented by the young people. The audiograms showed irregular tracing configuration, tending toward the same configuration found in individuals who are exposed to occupational noise and eventually could develop Noise-induced hearing loss (NIHL). This way, some studies report the configuration to be quite similar and such hearing damage could be worsen still by individual characteristics: type of music listened to, type of earphones used, among others[1,2,6,7,18,26,27].

CONCLUSION

The chances of the hearing function deterioration based on the tonal and vocal audiometric tests, immittance testing and acoustic reflexes research, transient otoacoustic emissions and distortion product evoked otoacoustic emissions tests presented different results between the groups researched.

Therefore, the temporary symptoms indicate the potential negative effects of listening to portable music players an hour a day. However, research is still necessary in order to evaluate the long-term damage to hearing health and the potential extra-auditory effects caused by the constant use of earphones. As well as the combination to other types of exposure, leisure noise, alcohol consumption and the use of tobacco and their effects on the auditory system.

RESUMO

Objetivos: analisar a relação entre o uso de fones de ouvidos e os comprometimentos auditivos e extra-auditivos provocados pelos tocadores portáteis de música. **Métodos:** a proposta foi coletar dados, por meio de um questionário respondido pelos participantes. Realização dos exames audiométricos: audiometria tonal e vocal; imitânciometria e pesquisa dos reflexos acústicos; emissões otoacústicas transientes e emissões otoacústicas produto de distorção, posteriormente os dados foram comparados entre os indivíduos de um mesmo grupo e os grupos foram comparados entre si (grupo experimental e grupo controle). Para a análise estatística foi utilizado o teste Qui-Quadrado e exato de Fisher. **Resultados:** algumas das variáveis investigadas, tais como o uso de fones de ouvido de 1 a 2 horas diárias, a presença de queixas auditivas e extra-auditivas, exposição a níveis de pressão sonora elevados extra-ocupacional uma vez por semana, ser não fumante, não usar medicamentos controlados e não apresentar zumbido possuíram frequência estatisticamente significante para o grupo experimental. Em relação às queixas auditivas houve diferença estatisticamente significante entre os grupos experimental e controle para sensação de ouvido abafado e sensação de rebaixamento auditivo. **Conclusão:** os sintomas temporários indicam os potenciais efeitos nocivos de ouvir tocadores portáteis de música por uma hora ao dia. Pesquisas ainda são necessárias para avaliar os prejuízos de longo prazo ao sistema auditivo.

DESCRITORES: Audição; Auxiliares de Audição; Testes de Impedância Acústica; Perda Auditiva; Ruído; Música

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