



Tinnitus, quality of life and emotional issues of hearing aids users

Zumbido, qualidade de vida e questões emocionais de sujeitos usuários de próteses auditivas

Zumbido, calidad de vida y aspectos emocionales de pacientes usuarios de prótesis auditivas

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Abstract

Introduction: Tinnitus symptom can provoke different reactions in the subjects, being harmful to the quality of life and being able to generate emotional changes. **Objective:** To evaluate a relation between the presence of symptoms of anxiety and depression, quality of life and severity of tinnitus in the elderly, users of hearing aids. To evaluate a relation between the presence of anxiety and depression symptoms, life quality and severity of tinnitus in the elderly, users of hearing aids. **Methods:** For the quantitative study, the elderly of both genders; with tinnitus complaint; sensorineural hearing loss until moderate

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grade and users of hearing aids participated. Anamnesis, basic audiological evaluation, acuphenometry, application of Tinnitus Handicap Inventory, Hospital Depression and Anxiety Scale and SF-36 Quality of Life Questionnaire were performed, the last two being performed by a psychologist. **Results:** Eight subjects were evaluated, the tinnitus was strong and high pitch, the severity of tinnitus was negligible to severe, psychological questionnaires evidenced moderate anxiety and depression and higher scores in the components: Social Aspects and Mental Health. **Conclusion:** There was no correlation between life quality, emotional issues and grade of annoyance with tinnitus, in the sample.

Keywords: Tinnitus; Hearing; Quality of life.

Resumo

Introdução: O zumbido pode provocar diferentes reações nos sujeitos, sendo prejudicial à qualidade de vida e podendo gerar alterações emocionais. **Objetivo:** Avaliar a relação entre a presença de sintomas de ansiedade e depressão, qualidade de vida e gravidade do zumbido em idosos usuários de próteses auditivas. **Métodos:** Para o estudo quantitativo, participaram idosos, de ambos os gêneros; com queixa de zumbido; perda auditiva neurosensorial de grau até moderado e usuários de próteses auditivas. Foi realizado anamnese, avaliação audiológica básica, acufenometria, aplicação dos questionários *Tinnitus Handicap Inventory*, *Hospital Depression and Anxiety Scale* e Questionário de Qualidade de Vida SF-36, sendo os dois últimos realizados por uma psicóloga. **Resultados:** Oito sujeitos foram avaliados, o zumbido foi médio forte e de *pitch* alto, a gravidade do zumbido foi de desprezível a severo, os questionários psicológicos evidenciaram Ansiedade e Depressão moderada e maior pontuação nos componentes: Aspectos Sociais e Saúde Mental. **Conclusão:** Não houve correlação entre qualidade de vida, questões emocionais e grau de incômodo com o zumbido, na amostra estudada.

Palavras-chave: Zumbido; Audição; Qualidade de vida.

Resumen

Introducción: El zumbido puede causar diferentes reacciones en los sujetos, perjudica la calidad de vida y puede generar alteraciones emocionales. **Objetivo:** Evaluar la relación entre presencia de síntomas de ansiedad y depresión, calidad de vida y gravedad del zumbido en adultos mayores usuarios de prótesis auditivas. **Métodos:** Para el estudio cuantitativo, participaron adultos mayores de ambos géneros, con queja de zumbido, pérdida auditiva neurosensorial de grado moderado y usuarios de prótesis auditivas. Fueron realizados: anamnesis, evaluación audiológica básica, acufenometría y aplicaron de los cuestionarios *Tinnitus Handicap Inventory*, *Hospital Depression and Anxiety Scale* e Questionário de Qualidade de Vida SF-36, siendo que los dos últimos aplicados por una psicóloga. **Resultados:** Ocho pacientes fueron evaluados, el zumbido fue medio / fuerte y de *pitch* alto, la gravedad del zumbido fue de insignificante hasta severo, los cuestionarios psicológicos mostraron ansiedad y depresión moderada y mayor puntuación en los componentes: Aspectos sociales y Salud mental. **Conclusión:** No hubo correlación entre calidad de vida, aspectos emocionales y grado de incomodidad provocado por el zumbido en la muestra estudiada.

Palabras claves: Zumbido; Audición; Calidad de vida.

Introduction

Tinnitus is an auditory sensation realized by the subject, in the absence of a sound stimulus coming from the external environment¹. It is not a disease, but rather a symptom arising from the impairment of some portion of the auditory pathway, either by outer, middle, inner ear, auditory nerve, brain stem and/or cerebral cortex^{2,3}.

Authors refer that this symptom is considered one of the worst for the human being, being overcome only by intense pain and intractable dizziness⁴.

It is known that tinnitus can provoke different reactions in the subjects, including in some cases interfere directly with their activities of daily living. Alterations in sleep, concentration, emotional balance, communication, as well as alterations in reasoning may be occasioned in the presence of this

symptom^{2,5}. Therefore, tinnitus may be harmful to the quality of life of these individuals⁶⁻⁸. Since it is a disorder that produces discomfort, in more severe cases, it can lead to the withdrawal of social life and even to suicide⁴.

Tinnitus may be the result of abnormal activation of some centers of Central Nervous System, including auditory and extra-auditory pathways. The result of the interaction among these centers, especially the Limbic System and the Autonomic Nervous System, would be responsible for the appearance of negative emotional associations and annoyance reactions, reported by subjects with tinnitus⁹. By activating the Limbic System, accountable for the emotions, the subject begins to realize it with greater intensity and discomfort^{6,9}.

In these cases, the emotional issues emerge, because the sensation and annoyance that it brings in the life of each subject depends on the association with this symptom, and many subjects associate the presence of tinnitus with some serious illness. This fact can lead to anxiety disorders, for example^{4,10,11}.

It should be emphasized that anxiety is a normal condition triggered as an adaptive response of the organism, which drives performance, involving psychological and physiological components. However, it becomes pathological when the intensity or frequency of the response does not correspond to the situation that triggers it, or when there is no specific object to which it is directed. This differentiation will depend on the situation itself, of the characteristics of the individual and of the interpretation he makes of the situation^{4,11}.

In this context, tinnitus may be one of the possible causes for the development of depression and anxiety, whether or not it is associated with hearing loss^{4,5,7,10-12}. It should be considered that there are also cases in which people go through complicated stages of life, with different degrees of distress, and acquire tinnitus as a result of these emotional disorders. Thus, there is a connection between tinnitus and emotional problems, but it is not always easy to identify who is the precursor^{4-7,9,11}.

Because of this relationship, it is necessary to investigate possible psychological issues in subjects with tinnitus^{13,14}. In this scenery there are studies that recommend the use of self-evaluation questionnaires of tinnitus, such as *Tinnitus Handicap Inventions (THI)*, as a predictor of subjects with some degree of anxiety and depression, that is, such a questionnaire can serve as a screening

for those who need a more complete psychological assessment^{4,5,15-21}.

In this context, the identification of emotional disorders in subjects with tinnitus is relevant^{4,5,10,11,13} and the performance of Psychology and Speech Therapy, integrated with medical care, are strategies to minimize the negative effects of tinnitus perception on quality of life of the subjects with this symptom.

From the above, the objective of the present study was to evaluate the relationship between the presence of anxiety and depression symptoms, quality of life and tinnitus severity in elderly users of hearing aids.

Method

This cross-sectional and quantitative study was approved by the Committee of Ethics in Research on 05/31/2016, under registration number 55688416.6.0000.5346. Regarding ethical and legal issues, the subjects attended during this study signed the written informed consent form and the researchers signed the Confidentiality Agreement, fully following Resolution 466/2012 of the National Health Council.

It was performed in a public service of a university hospital that offers speech and language therapy. For the sample composition, the following inclusion criteria were listed: elderly, of both genders, complaining of tinnitus for at least six months (bilateral); To moderate sensorineural hearing loss and users of behind-the-ear hearing aids (BTE) - category B of regulation 793/GM and 835/GM of the Unified Health System (SUS) (BRASIL, 2012) - for at least six months; residing in the same city of the research. Exclusion criteria were defined as: elderly with middle ear alteration, people with limited examination, such as evident cognitive deficit or inability to provide consistent answers.

The captation of such subjects happened through a database of a Hearing Health Program of the Unified Health System (SUS). The study was performed in June 2016.

All the selected elderly, through the analysis of the referred database, and from the eligibility criteria, were contacted via telephone to confirm the permanence of the tinnitus complaint and to schedule the evaluations intended for the present study.

The participants of the research performed a complementary anamnesis, containing questions that included: identification of tinnitus characteristics (type, frequency of perception, location, time of onset), use of hearing aids, leisure activities and clinical history.

To update the audiological status, a basic audiological evaluation was performed by means of airway auditory thresholds search in the frequencies of 0.25 to 8 kHz and by bone in the frequencies of 0.5 to 4 kHz. An *Interacoustics* audiometer, AD229 model, was used in an acoustic booth (following the ANSI S3.1-1991 standard of environmental noise level). The classification of hearing thresholds was based on the recommendation of the World Health Organization (1997). Speech recognition was performed in order to determine the Speech Reception Threshold (SRT) and the Speech Recognition Percentage Index (SRPI). Acuphometry, an evaluation used to “measure tinnitus” subjectively; frequencies of 125 Hz at 20 kHz and intensities (dBNS) were used above the patient’s hearing threshold at each frequency (from 1dB to 1dB); The subject had to identify the acoustic stimulus closest to the pitch sensation; the patient was then asked to identify the sensation of loudness in each ear.

The *Tinnitus Handicap Inventory (THI)* questionnaire adapted to the Portuguese¹⁵ was also performed. From a score, the degree of interference and annoyance of tinnitus in the subject’s quality of life is identified. It consists of 25 questions divided into scales: functional (measures the annoyance caused by tinnitus), emotional (measures the affective responses to tinnitus) and catastrophic (quantifies the despair and incapacity caused by the symptom). There are three options: “yes” (four points), “sometimes” (two points) and “no” (zero points). The sum of points is categorized into five groups or degrees of severity: light or no handicap (0-16%), mild (18-36%), moderate (38-56%), severe (58-76%) and catastrophic 100%), according to authors¹⁵.

These procedures were performed by a speech therapist in a single appointment of approximately one hour of duration.

At another time previously scheduled, the elderly answered to the Brazilian version of SF-36 Quality of Life Questionnaire²² consisting of 11 questions and 36 items, approaching eight aspects: (domains or dimensions), represented by functional

capacity (ten items), Physical aspects (four items), pain (two items), general health (five items), vitality (four items), social aspects (two items), emotional aspects (three aspects), mental health (five items) and a comparative question about the current perception of health, and a year ago. The individual receives a score in each domain, ranging from 0 to 100, with 0 being the worst score and 100 being the best²².

The participants also answered the *Hospital Depression and Anxiety Scale (HADS)* questionnaire validated in Brazil²³. This scale consists of a self-filling instrument containing 14 multiple choice questions, consisting of two sub- -interspersed scales: one for anxiety-state (seven questions) and one for depression-state (seven questions). HADS scores ranged from zero to 21 points, subjects with scores <seven are considered without clinically significant symptoms for anxiety and/or depression, scores \geq eight and \leq 10 with mild symptoms, scores \geq 11 and \leq 14 with Moderate symptoms and scores \geq 15 and \leq 21 with severe symptoms of anxiety and/or depression²³. Both questionnaires were performed by a psychologist.

Thus, for the sample there were found 170 medical records that would fill out all the eligibility criteria, 60 patients were not possible to contact by telephone (telephone off and / or disabled) and 94 did not fit the profile of the sample (no present tinnitus anymore and/or do not fill out the eligibility criteria of this study). Therefore, 16 elderly were scheduled, however, only eight attended the appointment to perform the procedures listed in this study. This group was of a mean age of 75 years (minimum age 61 and maximum age 84), two women and six men.

A descriptive analysis was performed of all the variables involved in the study in order to summarize the information contained in the Microsoft *Excel* database (*Office*®) and to characterize the casuistry.

To evaluate the correlation, *Spearman* Correlation was used through *Statistical* software 9.0. The *Spearman* Correlation is based on the ordering of two variables without any restriction regarding the distribution of values, that is, more used for non-parametric data. This technique serves to measure how much the variables are interconnected, that is, how closely one is related to the other. The results are expressed as a percentage which can have positive and negative values.

When the correlation is positive it means that as one variable increases its value, the other correlates with it and also increases proportionally. However, if the correlation is negative implies that the variables are inversely proportional, that is, as one grows the other decreases, or vice versa. To measure how strong a correlation was, the following rating scale was used: 0-20% bad, 20-40% weak, 40-60% regular, 60-80% good and above 80% optimal, being that set level of significance of 0.05. All confidence intervals constructed throughout the work were constructed with 95% statistical confidence.

Results

Table 1 presents the characterization of the sample, considering the result of Acufenometry, degree of hearing loss, time of use of hearing aids and time of sensory deprivation, before joining the Hearing Health Program.

Regarding the clinical history, S1 has been treated for prostate cancer and has a history of otitis; S2 presents cardiopathy, altered cholesterol and dizziness complaint; S3 presents arterial hypertension and obesity; S4 presents altered cholesterol and diabetes; S5 is cardiopathic, hypertensive, and presents postural alterations; S6 and S7 are healthy and do not use medications; S8 presents postural problems and altered cholesterol. It should be noted that subjects S1, S2, S3, S4, S5 and S8 use medication to control the referrals, with medical advice.

The application of the THI - Tinnitus Handicap Inventory in the studied sample showed that the severity of the impact of tinnitus on the subjects' lives ranged from slight to severe, and it should be noted that only S2 and S4 presented more than moderate tinnitus, as can be observed in Figure 1

The application of the Hospital Anxiety and Depression Scale (HADS) in all subjects resulted in Table 2, in which scale was observed if clinically significant symptoms were reported from "discrete" to "intense".

The SF-36 Quality of Life questionnaire applied to the subjects of the sample is presented below in the graph, showing a higher score in the components: Social Aspects and Mental Health, in the sample studied. It can still observe the score of each subject (Figure 2).

Table 1. Descriptive analysis of the sample composition, considering the following variables: Acufenometry result (per ear); Degree of hearing loss (per ear), the length of use of hearing aids and time of sensory deprivation (n = 8)

	S1	S2	S3	S4	S5	S6	S7	S8
Acufenometry	RE: 6kHz 45dBNS	RE: 3kHz 30dBNS	RE: 2kHz 25dB	RE: 6kHz 45dBNS	RE: 3kHz 30dBNS	RE: 3kHz 30dBNS	RE: 1,5kHz 25dBNS	RE: 0,25kHz 15dBNS
	LE: 6kHz 40dBNS	LE: 3kHz 35dBNS	LE: 0,75kHz 25dBNS	LE: 6kHz 30dBNS	LE: 2kHz 20dBNS	LE: 2kHz 20dBNS	LE: 2kHz 20dBNS	LE: 0,25kHz 25dBNS
Degree of hearing loss	RE: Moderate	RE: Mild	RE: Mild	RE: Moderate	RE: Mild	RE: Moderate	RE: Mild	RE: Mild
	LE: Moderate	LE: Mild	LE: Mild	LE: Profound	LE: Moderate	LE: Moderate	LE: Moderate	LE: Mild
The length of use of hearing aids	2 years	4 years	2 years	4 years	8 years	4 years	6 years	3 years
Time of sensory deprivation	5 years	3 years	2 years	10 years	4 years	4 years	5 years	2 years

Label: RE: Right Ear; LE: Left Ear; Khz Kiloherztz; dB: Decibús e S: Subject.

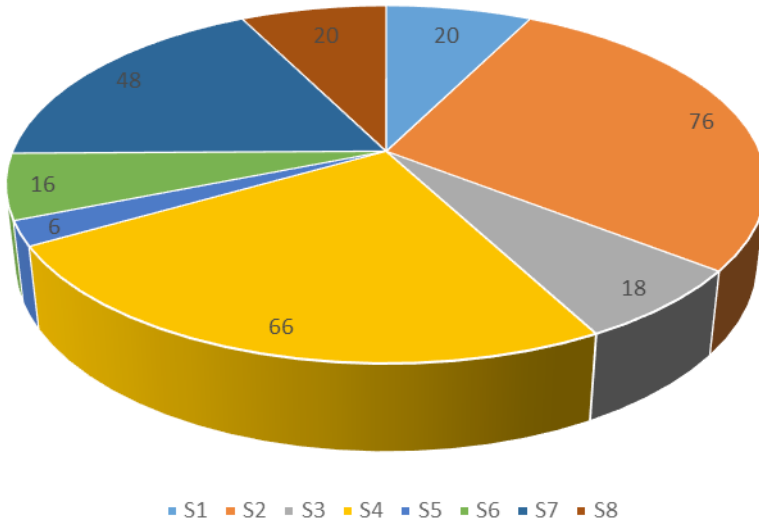
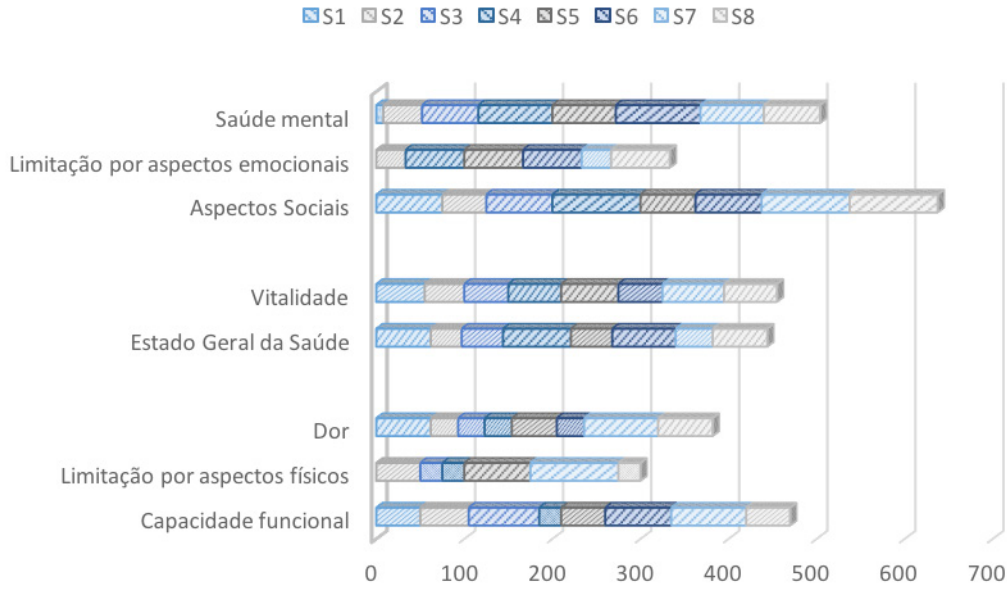


Figure 1. Tinnitus severity measured by the application of the Tinnitus Severity Questionnaire in the sample studied (n = 8)

Table 2. Descriptive result of the application of Hospital Anxiety and Depression Scale, per subject (n=8)

HADS	S1	S2	S3	S4	S5	S6	S7	S8
Anxiety	6	10	6	11	8	11	7	8
Depression	3	8	7	3	7	1	8	5
Score	9	18	13	14	15	12	15	13
Result	Discrete (8-10)	Intense (16-21)	Moderate (11-15)	Moderate (11-15)	Moderate (11-15)	Moderate (11-15)	Moderate (11-15)	Moderate (11-15)

Label: HADS: Hospital Depression and Anxiety Scale; S: subject..



Label: S1: Subject 1; S2: Subject 2; S3: Subject 3; S4: Subject 4; S5 Subject 5; S6: Subjevct6; S7: Subject 7; S8: Subject 8

Figure 2. Result of the SF-36 Quality of Life questionnaire, presented by items in the eight subjects studied

It was performed also a correlation between the duration of use of hearing aids and the severity of tinnitus, assessed by means of the THI questionnaire. There was no significant correlation ($R = -0.055$, $p = 0.896$).

Table 3 shows the correlation of all variables (SF-36 Quality of Life Questionnaire and Hospital Anxiety and Depression Scale) with the THI questionnaire, using the *Spearman* Correlation test. There was no correlation between the questionnaires applied by the psychologist and the THI.

Table 3. Correlation analysis of the findings in the SF-36 Quality of Life Questionnaire and the Hospital Anxiety and Depression Scale with Tinnitus Handicap Inventory scores (n = 8)

	N	Valor de p
SF36 - Functional Capacity X THI	8	0.817099
SF36 - Limitation by physical aspects X THI	8	0.607224
SF36 - Pain X THI	8	0.838719
SF36 - General health X THI	8	0.624427
SF36 - Vitality X THI	8	0.763924
SF36 - Social aspects X THI	8	0.610757
SF36 - Limitation by emotional aspects X THI	8	0.645208
SF36 - Mental health X THI	8	0.404992
HDAS & THI	8	0.4227
HADS Anxiety X THI	8	0.562942
HADS Depression X THI	8	0.384494

Spearman Correlation Test

Label: THI: Tinnitus Handicap Inventory; HADS: Hospital Anxiety and Depression Scale; N: Number; R: coefficient correlation.

Discussion

To characterize the subjects complaining of tinnitus and hearing loss of a hearing rehabilitation program, in relation to acuphenometry, it was found that half of the subjects (S1, S2, S4 and S6) had pitch tinnitus equal to or greater than 3 kHz and another half report hearing low frequency tinnitus (S3, S5, S7 and S8) (Table 1). These findings agree with the subjects' own subjective analysis in relation to their respective tinnitus, referred during the complementary anamnesis. Self-analysis of tinnitus occurred in the form of comparison with environmental noises such as whistle, cigarette, sizzle, boiling kettle and so on. Authors²⁴ also found variability in tinnitus frequency, which was at least 1 kHz up to 8 kHz, when performing acuphenometry in subjects with bilateral tinnitus and of variable etiology. They also assessed the intensity of tinnitus and found intensity of 20 dBNS at 86 dBNS with a mean of 38.66 dBNS; another study still found a mean of 23.34 dBNS (+17.84 dBNS standard deviation)²⁵. The present study found mean *loudness* of 29.37 dBNS (minimum of 15 dBNS at the maximum of 45 dBNS). It is pointed out that such a finding shows a strong *loudness* of the tinnitus sample, since some authors consider that the mean is lower, values between 7.27 dBNS and 19 dBNS^{21, 26}.

Authors point out that the frequencies in acufenometry most frequently found are the highest^{7, 25}, but it should be emphasized that acuphenometry is a subjective characterization of tinnitus, so it is possible this variety of responses found²⁷. Such data is peculiar to each sample.

All subjects in the sample have at least mild sensorineural hearing loss and use hearing aids bilaterally. The reported literature indicates that there is a relationship between tinnitus perception and sensory deprivation hearing loss^{2, 3}. It is known that tinnitus perception is an abnormal activity of the auditory system and hearing aids are aimed at minimizing such sensory deprivation. However, sometimes the use of auditory amplification does not minimize the complaint of tinnitus, especially in those cases in which this symptom may be a consequence of extra-auditory issues⁹. This fact was also observed in the subjects of the sample, who even using Hearing Aids for at least two years still had tinnitus. However, such subjects have health comorbidities, as well as compromises related to

their own aging, which could contribute to the permanence of the tinnitus complaint.

Hearing loss is one of the possible causes of the onset of tinnitus in the subjects of the sample, however, it is known of the diversity of causes of tinnitus and this may be related to the clinical history of the subjects. In addition, aging itself may potentiate the perception of tinnitus^{1, 4, 11, 17-21}, as already mentioned previously. A clinical history with many comorbidities may be associated with tinnitus, such as heart disease, hypertension, altered cholesterol, obesity, diabetes, postural changes¹².

As a way of assessing the severity of tinnitus, the THI questionnaire is widely used in Brazil and abroad. Tinnitus can be classified as slight or no handicap to catastrophic, using this questionnaire¹⁵, and in the present study subjects were found with degrees of slight or no handicap to severe in relation to tinnitus perception. It is pointed out that more than 60% of the present sample presents the perception of tinnitus to a negligible or slight degree. It is inferred that in these subjects, despite the permanence of this symptom even after the use of sound amplification, such an issue may not bring losses in their lives. As there is heterogeneity of patients with tinnitus, a pattern of tinnitus degree is not found in studies, precisely because of the great diversity of issues involved with this symptom^{4, 11, 17-21}. Furthermore, it is noted that the perception of tinnitus is personal and also depends on the emotional state of subject⁴, as will be discussed below.

During the interview with the psychologist, the subjects reported questions related to the onset of tinnitus perception, beyond pointing out the experiences with several medical and diagnostic treatments obtained over the last years. Although the focus was the relation of the subject with the tinnitus, the report of the clinical experience came out other issues, related to the family, occupation, moments of leisure and also the interference of other health problems in the quality of life of all of them.

The Hospital Anxiety and Depression Scale questionnaire can be applied as screening for emotional disorders¹ and its use has been increasing. Some authors have already used it in subjects with tinnitus, with the objective of assessing emotional issues, as in this present study, asserting that it is an effective tool^{2, 4, 7, 29}. The application of the Hospital Anxiety and Depression Scale (HADS) in all the subjects resulted in table 2, in which a "discrete"

to “intense” scale of this emotional disorder was observed, and it should be noted that the majority had a moderate result; only one subject presented an intense degree. The data of the present study also corroborate with other studies in which there is prevalence of anxiety in the elderly with tinnitus^{29, 30}.

A study of 2011² also used the SF-36 questionnaire in order to verify the quality of life of 61 patients with tinnitus and found a correlation with tinnitus severity and quality of life. Therefore, the authors considered that the SF-36 questionnaire is a good tool to evaluate the quality of life of the subjects with tinnitus symptom and consequently susceptible to emotional disorders. In the present study, in Figure 1, it can be observed that the subjects of the sample present a greater impact on “social aspects”, “mental health” and “functional capacity”, in that order, and the aspect “limitation by physical aspects” was the one of less value, less approached by the subjects. It is possible to infer that the “social aspects” item was the most punctuated, since the subjects of the sample present hearing loss and this sensorial deprivation makes these subjects probably have communicative difficulties that interfere directly in the quality of their social relations¹⁰.

One data that was evidenced in the present study was the non-correlation between the time of use of hearing aids and the severity of tinnitus, evaluated by means of the THI questionnaire ($R=-0,055$; $p=0.896$). It was hypothesized that such a correlation would exist, but as discussed earlier this data may be associated with the fact that the tinnitus of the subjects in the sample have extra auditory causes and also present a possible relation with aging. As already referenced considering the several etiologies of tinnitus such finding can be justified^{4, 11, 17-21}.

Table 3 sought to analyze the correlation of the findings in the SF-36 Quality of Life Questionnaire and in the Hospital Anxiety and Depression Scale with Tinnitus Handicap Inventory scores. The present study did not verify correlation between these data, probably as a consequence of the sample arrangement and mainly due to the degree of annoyance with the tinnitus of the sample was discrete. It should be noted that objective to measure of patients’ emotional issues is complex and difficult⁷. In the literature it was not possible to find studies that demonstrate a correlation between

quality of life and THI. Regarding the findings with HADS and the perception of tinnitus, a recent study⁷ also found no correlation between the anxiety and tinnitus symptom, claiming that anxiety and depression did not change with the modification of tinnitus perception in the subjects. Authors^{16, 17} also found low correlations between depression and severity of tinnitus. However, studies have found a positive correlation between anxiety and depression with tinnitus⁵.

The present study also understood that the non-correlation among such findings may be due to the sample size and the little expressive degree of annoyance of tinnitus of the evaluated subjects. In this sense, these results pointed out the importance of new studies with a greater number of subjects and especially researches with samples composed by subjects with disabling tinnitus.

The union of evaluation tools, from different areas, Speech-Language Pathology and Psychology, has been assembled in the identification of the auditory and emotional issues of subjects with tinnitus. Therefore, this symptom deserves a multidisciplinary view and the joint action of these specialties with the medical clinic providing the subjects with a better rehabilitation. Thus, knowing the complaint of the subject more completely can shape a therapeutic alternative more adequate for it.

Conclusion

Eight subjects complaining of tinnitus and hearing loss were evaluated, evidencing the acufenometry strong medium loudness and high pitch tinnitus. The duration of use of hearing aids was two to eight years, but the subjects of this sample experienced sensorial deprivation from two to ten years before the beginning of the use of sound amplification. However, there was no correlation between the time of use of hearing aids and the degree of annoyance with tinnitus. There was also no correlation between quality of life, emotional issues and degree of annoyance with tinnitus in the studied sample.

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