



Speech Therapy Counseling: a unique and personalized format for subjects with chronic tinnitus

Aconselhamento Fonoaudiológico: um formato único e personalizado para sujeitos com zumbido crônico

Asesoramiento de terapia del habla: un formato único y personalizado para sujetos con tinnitus crónico

Rúbia Soares Bruno* 
Michele Vargas Garcia* 

Abstract

Introduction: Tinnitus is an auditory perception in the absence of an external acoustic stimulus. As it is growing in the audiological clinic, it is necessary to seek fast and effective treatment strategies. **Objective:** To verify the result of a unique format of Speech Therapy Counseling in the tinnitus perception reduction. **Methods:** Prospective and transversal study, registered under number 776111417.5.0000.5346, composed by convenience. The eligibility criteria included subjects from 18 to 59 years old, with normal hearing thresholds and chronic tinnitus, Visual Analogue Scale (EVA) at least grade five and with no history of neurological and / or psychiatric diseases. They were submitted to anamnesis, EVA and Tinnitus Handicap Inventory (THI) before and after treatment. For treatment, a division into two groups was performed randomly. One, called the Speech Therapy Counseling Group (target group), received Speech Therapy Counseling (personalized and written) based on the Tinnitus Activities Treatment and guidelines were also added regarding metabolic and muscular changes, eating habits, among others. Another, Music Group, was instructed to listen to music when noticing the symptom. After one month, EVA and THI were reapplied. **Results:** 11 subjects of both genders participated. The target group showed improvement and statistically significant differences before and after treatment. **Conclusion:** Speech therapy counseling

* Universidade Federal de Santa Maria – UFSM - Santa Maria – RS, Brazil.

Authors' contributions:

RSB: participated in the study design; methodology, data collection, article draft, and critical review.
MVG: contributed to the study design, critical review and guidance.

Correspondence email address: Rubia Soares Bruno - rubiabruno04@gmail.com

Received: 10/07/2020

Accepted: 27/01/2021

in a unique and personalized format proved to be effective in reducing the perception of the symptom and can thus be implemented in different hearing centers.

Keywords: Tinnitus; Hearing; Counselling.

Resumo

Introdução: O zumbido é uma percepção auditiva na ausência de um estímulo acústico externo. Por ser um crescente na clínica audiológica, é necessário buscar estratégias de tratamento rápidas e eficazes. **Objetivo:** Verificar o resultado de um formato único de Aconselhamento Fonoaudiológico na redução da percepção do zumbido. **Método:** Estudo de caráter prospectivo e transversal, registrado sob o número 776111417.5.0000.5346, composto por conveniência. Os critérios de elegibilidade contemplaram sujeitos de 18 a 59 anos, com limiares auditivos normais e zumbido crônico, Escala Visual Analógica (EVA) (mínimo nota cinco), sem histórico de doenças neurológicas e psiquiátricas. Foram submetidos à anamnese, EVA e *Tinnitus Handicap Inventory* (THI) antes e pós-tratamento. Para o tratamento foi realizada uma divisão em dois grupos de forma randomizada. Um, denominado Grupo Aconselhamento Fonoaudiológico (grupo alvo), recebeu Aconselhamento Fonoaudiológico (personalizado e por escrito) baseado na *Tinnitus Activities Treatment* e acrescentaram-se, ainda, orientações referentes a alterações metabólicas, musculares, hábitos alimentares, entre outras. Outro, o Grupo Música, foi orientado a ouvir música ao perceber o sintoma. Após o intervalo de um mês, foram reavaliados a EVA e o THI. **Resultados:** Participaram 11 sujeitos de ambos os gêneros. O Grupo alvo apresentou melhora e diferenças estatisticamente significantes antes e pós-tratamento. **Conclusão:** O Aconselhamento Fonoaudiológico em formato único e personalizado mostrou-se eficaz na redução da percepção do sintoma podendo, assim, ser implementado em diferentes centros auditivos.

Palavras-chave: Zumbido; Audição; Aconselhamento.

Resumen

Introducción: El tinnitus es una percepción auditiva en ausencia de un estímulo acústico externo. Como es un área en crecimiento en la clínica audiológica, es necesario buscar estrategias de tratamiento rápidas y efectivas. **Objetivo:** Verificar el resultado de un formato único de terapia del habla para reducir la percepción del tinnitus. **Metodos:** Estudio prospectivo y transversal, registrado con el número 776111417.5.0000.5346, consistente en conveniencia. Los criterios de elegibilidad incluyeron sujetos de 18 a 59 años, con umbrales auditivos normales y tinnitus crónico, Escala Visual Analógica (EVA) (nota mínima cinco), sin antecedentes de enfermedades neurológicas y psiquiátricas. Fueron sometidos a anamnesis, EVA e Inventariode Tinnitus Handicap (THI) antes y después del tratamiento. Para el tratamiento, se realizó una división en dos grupos al azar. Uno, llamado Grupo de Asesoría de Terapia del Habla (grupo objetivo), recibió la Asesoría de Terapia del Habla (personalizada y por escrito) basada en el Tratamiento de Actividades de Tinnitus y también se agregaron pautas sobre cambios metabólicos y musculares, hábitos alimenticios, entre otros. Otro, Grupo Música, recibió instrucciones de escuchar música al notar el síntoma. Después de un mes, EVA y THI se volvieron a aplicar. **Resultados:** 11 sujetos de ambos sexos participaron. El Grupo objetivo mostró una mejoría y diferencias estadísticamente significativas antes y después del tratamiento. **Conclusión:** El asesoramiento en terapia del habla en un formato único y personalizado demostró ser efectivo para reducir la percepción del síntoma y, por lo tanto, puede implementarse en diferentes centros auditivos.

Palabras clave: Tinnitus; Audición; Asesoramiento.

Introduction

Tinnitus is defined as an auditory perception when there is a lack of external acoustic stimulus¹.

When it persists for more than six months, it is considered chronic tinnitus².

Not being a disease, but a common and complex symptom with different causes and responsible

mechanisms³, it can come from the involvement of any portion of the auditory pathway⁴ or even from non-auditory factors. Among these, metabolic and/or circulatory alterations, stress, depression, anxiety, negative orientations³, among others. This symptom is present in subjects with hearing loss and also, with hearing threshold within the normal range⁵.

An important contribution to the comprehension of the pathophysiological mechanism of the tinnitus appeared in the 90's with the publication of the neurophysiological model of Jastreboff, which involves the participation of the auditory and non-auditory pathways in the perception of tinnitus. With the applicability of this clinical model, different models and programs^{6,7} were based, being the common point among the treatment techniques, the counseling.

Different studies⁸⁻¹⁰ aiming to discuss the impact of tinnitus in the quality of life, found that there is an impacting repercussion directly affecting sleep, social activities, and emotional issues. Counseling is extremely important in this sense, as it seeks to demystify tinnitus through auditory and non-auditory information⁶ and has proved to be effective as a treatment for the symptom¹¹. Such treatment, through guidance, hearing care, changes in habits and thoughts allows the subject to understand and relearn to give another meaning to the symptom. Thus, it acts to decrease the perception of tinnitus and improves the quality of life of these subjects¹¹.

Despite scientific advances, tinnitus is increasing in the audiological clinic, making it necessary to improve the diagnosis and think of fast and effective treatment strategies.

The literature shows that there are treatments associated to speech therapy counseling or isolated. However, it is believed that there is the necessity of fast and efficient treatments that can reach a greater number of aspects involved in tinnitus perception. Therefore, the justification of this study is the attempt of implementing the unique and personalized Speech Therapy Counseling, covering different aspects beyond the existing models in literature, in large hearing health centers.

Thus, the objective of this study is to verify the result of Speech Therapy Counseling in a unique and personalized format in the perception of tinnitus, this proposal being based on the *Tinnitus Activities Treatment* (TAT); however, guidelines

regarding physical activities, metabolic, muscular and eating issues, among others, have been added.

Method

This is a prospective and cross-sectional study approved at the Ethics Research Committee (ERC) under the number 776111417.5.0000.5346. The study was conducted in a Public Hospital. The sample was composed by convenience and the subjects who accepted to participate in the study were informed about the procedures, risks and benefits before signing the consent form, following the ethical precepts of the Resolution 466/12.

In order to compose the casuistry of the present study, adult subjects aged between 18 to 59 years of age, of both genders, were invited to participate. The eligibility criteria focused on subjects with hearing thresholds within the normality patterns of 250 Hz to 8000 Hz (until 25 dBHL), type A¹² tympanometry curve; complaints of chronic tinnitus (minimum perception of six months) unilateral or bilateral, VAS score of at least 5 and no history of self-referred neurologic and/or psychiatric diseases.

All subjects underwent visual inspection of the external acoustic meatus, semi-structured anamnesis searching for hearing and non-hearing information, and, finally, Visual Analog Scale (VAS) and Tinnitus Handicap Inventory (THI) before and after treatment (Speech Therapy Counseling or Music).

Each procedure was carried out as follows:

Semi-structured anamnesis: It was elaborated based on the Clinical Practice Guideline: Tinnitus¹³, and considered questions about hearing, tinnitus characteristics (timing, pitch, perception, localization, sensation, if it is related to something, how much it bothers and affects daily activities, what increases or decreases its perception, among others), associated complaints, health in general, daily life habits (eating, physical activities, sleep, emotions, among others).

From that, the treatment, that was randomly distributed (by order of arrival) was proposed. The sample consisted of 11 subjects, being six from the Speech Therapy Counseling Group and five from the Music Group with the average age of 44 years and the tinnitus time ranged from 8 months to 15 years (T1 = time 1 = <4 years; average of 2 years; n = 6 subjects and T2 = time 2 = ≥4 years; average of 7.8 years; n = 5 subjects). It is noteworthy that of

five subjects from T2, only one presented 15 years of symptom and one presented it for 10 years. The others are close to the average.

All subjects quantified the discomfort of chronic tinnitus by the score on the EVA scale and on the THI questionnaire before the treatment. After a month they returned for their reapplication.

The target group of this study (Speech Therapy Counseling Group) received their tasks in a unique and personalized way and they were marked in

the written protocol (Figure 1) to take home. The duration of the session was of 45 minutes and as the therapist explained the tasks and their possible influence on the symptom, he marked it on the paper, making sure that the subject had understood. As a differential, the protocol is simple and helps to understand and remember the tasks, as it can be placed in different places of the living environments.



UNIVERSIDADE FEDERAL DE SANTA MARIA

(BRUNO e GARCIA, 2018)

SPEECH THERAPY COUNSELING FOR CHRONIC TINNITUS

- Drink more water
- Avoid fasting for long periods of time (by eating small portions every 3 hours)
- Practice physical activity*
- Sleep from 6 to 8 hours per night
- Decrease chimarrão, coffee, black tea and other stimulant food ingestion.
- Avoid staying in silence (example: leaving television or radio on) in comfortable intensity.
- Search for leisure moments.
- Auditory rehabilitation.
- Relaxing massage.
- Control emotions
- Search for psychological care.
- Search for physiotherapy.
- Search for a nutritionist.
- Search for an endocrinologist.
- Follow the otolaryngologist's orientations.

VAS SCORE:

THI SCORE :

*Follow the cardiologist's recommendations

OBS.:

Figure 1. Exemplification of the Speech Therapy Counseling filling protocol.

Such activities were elaborated before every information told by the subjects, researched on their charts and based on exams. Thus, it was possible to outline Speech Therapy Counseling for the group with the proposed treatment.

In the activities marked in the protocol, specific instructions were given to each subject regarding possible “triggering factors” identified. The Counseling provided in this study is a proposal of the researcher, based on successful guidance pillars and established by Tyler⁶ in the Tinnitus Activities Treatment (TAT). As a differential, guidance was also added regarding the importance of the practice of physical activities, nutrition, leisure activities, metabolic, muscular (temporomandibular joint (TMJ), spine and cervical region issues. The aspects related to hearing, emotions and sleep were kept from TAT.

Besides, the subjects that already had monitoring with health professionals were advised to continue the care or were forwarded through the Municipal Department of Health to other health professionals, if needed.

For a better understanding, the explanations that guided the advising given to each described activity were as follows. It is emphasized that the explanations need to be adequate according to the level of education of each subject.

Drinking water: Water ingestion will act in the maintenance of every system, in other words, in the homeostatic balance. The recommended water ingestion average is 2 L per day, which is a quantity regulated according to some needs or diseases of the human organism¹⁴.

Water is the most important molecule for our organism, since most of the body’s functions happen with its aid. Liquid is fundamental for hormones, vitamins and minerals transportation, besides facilitating intestinal transit and the elimination of toxins. Lack of water decelerates the metabolism¹⁴ which may cause alterations in cellular metabolism that may lead to different diseases or symptoms, among them, tinnitus.

Avoid fasting for long periods of time (by eating small portions every 3 hours): The moment after a meal is considered the fed or absorptive state, in which the nutrient absorption, use and storage happen. After such stage, when the nutrients are not in the bloodstream any longer, but avail-

able for the tissue, the body enters in fasting/ post absorptive state. This condition uses the nutrients and, whenever they lack, the body commences to extract its stored nutrient supply¹⁴. However, if there is not such “stored nutrient supply”, other molecules may attempt to fulfill this demand, which causes cellular imbalance.

The lack of energetic material results in biochemical disharmony (catabolic and anabolic pathways), which leads to a slower metabolism in order to “save energy” or causes some compounds to change their functions to “repair” such lack, causing imbalance in the different kinds of systems in the human body¹⁴. This lack of energy alters the irrigation of different systems, including the auditory system, which may result in a greater tinnitus perception.

The “stored nutrient supply” is only made possible due to balanced eating habits, with few fasting periods, since the body occasionally needs to restore its nutrients for a better functioning. On the other hand, when there is excessive eating, the organism uses the needed nutrients and stores an excessive amount of substances that alter glucose and triglyceride levels and, consequently, cause alterations or diseases¹⁴.

The prolonged fasting generally comes together with an excessive eating habit that alters insulin functioning, which is the hormone that facilitates the entry and the metabolism of glucose in cells, favoring metabolic alterations, such as diabetes¹⁴.

Practice physical activity: Physical activity promotes the release of a hormone called endorphin that regulates the emotion and the perception of pain, helping to relax and resulting in well-being and pleasure. It is considered a natural analgesic, reducing the stress and anxiety, relieving tension and even being recommended in the treatment of mild depressions¹⁵.

When practicing regular physical activities, a continuous metabolic action is maintained, favoring an adequate functioning of biochemical processes. All benefits brought by physical activities may act upon the tinnitus generators or amplifiers.

Sleep from 6 to 8 hours per night: Sleeping has two different stages, the REM (Rapid Eye Movement) and the non-REM (slow), and both have fundamental functions in the human organism. When there is difficulty in sleeping, some of these

stages are broken and there may be imbalances in the repairing functions.

In the REM phase, the sleep is deeper, the body is repaired and also repairs energy levels. Furthermore, this stage is responsible for maintaining a healthier body, recovering non-muscular tissue, helping muscles and bones and strengthening the immune system. Such repairing/restoration acts directly in the neuronal tissue and, consequently, in memory, focus, learning and in stress and anxiety levels¹⁶.

Any modification, especially during the REM phase, leads to biochemical imbalances that may cause tinnitus perception.

Decrease caffeine ingestion: Caffeine has a stimulant effect and the Central Nervous System (CNS) is the most affected region. The stimulant effects do not result from caffeine's direct action on the CNS. On the contrary, this substance causes indirect stimulation on the CNS by blocking another chemical neuromodulator, the adenosine, that usually has a tranquilizing effect on the neurons¹⁷.

Hence, caffeine affects our sympathetic nervous system by blocking the adenosine receptors that act, also, in decreasing cellular activity. When adenosine has a limited activity, there is an acceleration in the activity on a neural level, influencing the hearing pathways excitability and, consequently, modifying and influencing tinnitus aspects¹⁷.

Different sources of food have caffeine in their compounds, such as chimarrão, black tea, guaraná, Coca-cola, among others. Therefore, greater explanations are necessary for the population, regarding the importance of watching caffeine use closely because of its influence in triggering or increasing tinnitus perception.

Avoid staying in silence: Silence provides to the subject a sharper perception of tinnitus. Therefore, indicating the use of sound generators, such as water sources, hearing aids with sound generators, radios and TV, among others, to "mask" the tinnitus is extremely valuable¹². Hence, the brain is being "deceived" by the sound generators and deviates the focus of the symptom; yet, it is necessary that the specific sound is considered pleasant to the subject.

It is known that tinnitus has a great negative impact on the life of the subjects and directly affects the quality of sleep, which is fundamental for qual-

ity of life^{8,9,10}. Also, at night is usually when there is more silence, which allows the subject a more acute perception of tinnitus. Thus, such "masking" strategies can be performed during the day and especially at night.

Search for leisure moments: Considering everyday worries, such as in the contexts of work, home, studies, among others, the fast pace of the daily life limits the opportunities for leisure activities. However, they are important to our health and wellbeing and can be present at any time of the day. It can be a trip, a rest, a conversation, Reiki practice, gardening, plants, a good reading or any activity that differs from the routine and promotes the feeling of wellbeing.

Auditory Rehabilitation: Auditory rehabilitation aims at stimulating the detection, discrimination, recognition, and understanding of non-acquired or lost hearing stimuli through a Personal Hearing Amplification Device (PHAD) and / or auditory training. In the case of peripheral hearing loss, there is a need for the use of sound amplifiers, although there are also features with sound generators to treat tinnitus.

Thus, in case or not of hearing loss, hearing aids can be used. Also, there is auditory training that aims at stimulating, through activities, the auditory abilities that influence attention, memory, discrimination and may be related to the perception of tinnitus.

Relaxing massage: To relieve muscle tension, the body often releases substances that modify blood flow and stimulate auditory cells. In this way, they can send signals to the brain without a sound source and, thus, result in tinnitus¹⁴.

Another explanation is that muscle tension can compress vascular structures and, consequently, interfere with blood supply¹⁴ and may lead to phantom auditory perceptions.

In this sense, we recommend relaxing massages, warm water compresses mainly in the regions of the neck, the use of adequate pillows and suitable sleeping positions, since any of these strategies can ease muscular issues. However, in more specific cases that require more guidance, the subject is directed for treatment with a physiotherapist.

Controlling emotions: Through the neurophysiological model³, it has been shown that there is a strong relationship between tinnitus and emotional issues (stress, anxiety, depression). This is due to brain associative connections mainly between the limbic system (involved with the emotions) and the autonomous system. Hence, in moments of greater stress and anxiety, one can have a greater perception of tinnitus.

Thus, there is the need for a search to alleviate these emotional symptoms that may be through herbal medicines (which do not present contraindications), breathing exercises and leisure activities. However, if necessary, the subjects are directed for treatment with a Psychologist and / or Psychiatrist.

Seek care with a Psychologist: Depressive disorders need special attention, since nowadays, their prevalence is increasing, which worries the professionals of the area. According to the World Health Organization¹⁸ in Brazil, in 10 years, this disorder grew by 18.4% and the global prevalence is 4.4%.

The Psychologist is the professional who offers therapeutic support to treat depressive disorders. Such disorders interfere in different levels and systems of the human body, and through associative brain connections¹⁴ can influence auditory symptoms such as tinnitus.

Moreover, depression and tinnitus can be related in three different ways: depression as something that affects tinnitus, tinnitus as a predisposition to depression, and finally tinnitus being a comorbidity in subjects with depression¹⁹. In this sense, it is up to the Psychologist to understand the relationship of tinnitus with emotional issues and, thus, treat them.

Seek care with Physical Therapist: Muscular and / or vascular changes may be treated by Physical Therapists. If this demand is met, the subjects are sent to such services. Because tinnitus is a multifactorial symptom, its treatment also becomes multiprofessional and there are several physiotherapeutic conducts that act on the symptom, such as: cranial osteopathy, needlework, acupuncture, relaxation massages, among others.

Seek care with a nutritionist: The metabolism of the ear depends directly on the supply of glucose and oxygen from the bloodstream^{20,21}. Any metabolic alterations, such as hyperlipidemia,

glycemic, lipidic, insulinemic alterations can result in auditory alterations, among them, tinnitus^{20,21}.

These alterations in metabolism can be controlled or remedied with nutritional intervention, thus, the conditions of the inner ear can be improved in a general and in a particular way, in tinnitus²².

Seek care with Endocrinologist: Metabolic changes can trigger a series of modifications in the different systems of the human body. The ear is already a very sensitive organ and, in the face of these modifications, can have its functioning changed, resulting in dizziness, tinnitus and even hearing loss^{20,21}.

When, for example, there are increased cholesterol levels, this “fat” may impair cochlear microcirculation by decreasing the release of a vasodilator (nitric oxide) or acting directly on the outer hair cell membrane, decreasing its motility by increasing stiffness of the walls of these cells, which impairs the proper functioning of the inner ear²³.

In the existence of uncontrolled levels of glucose in the body, there is a change in the endocochlear potential, since the stria vascularis has an intense metabolic activity being sensitive to the levels of oxygen, glucose and availability of adenosine triphosphate (ATP)²⁴.

Follow the otolaryngologist’s instructions: Otolaryngology is usually the first specialty that has “contact” with the subject with tinnitus. Thus, it is suggested to continue treatment in such specialty. However, if the care was given initially with other professionals, it is important to follow the proposed treatments and, if necessary, seek other forms of treatment.

The group used as a comparison, Music Group, was instructed only to listen to music when they perceived their tinnitus. It is noteworthy that music is considered a form of treatment for tinnitus, however, in this study, the objective of this was only a way of comparing the proposed treatment format (unique and personalized Speech Therapy Counseling) in order to verify its effectiveness.

To measure the results of Counseling in the symptom perception, chronic tinnitus, we applied the Visual Analogue Scale (VAS) and the Tinnitus Handicap Inventory (THI) questionnaire.

Visual Analogue Scale (VAS): One-dimensional instrument for the evaluation of the intensity of chronic pain. It is a line with numbers from 0 to 10. At one end of the line, the label “no tinnitus” is written, while, at the other, there is the label “the worst tinnitus possible”. The patient is then asked to evaluate and mark the discomfort he or she feels at the moment²⁵.

Application of Tinnitus Handicap Auditory (THI): It is composed of 25 questions divided into scales: Functional (F), which measures the annoyance of tinnitus in mental, occupational, social and physical functions; the emotional scale (E), which

measures responses such as anxiety, depression, anger; and catastrophic (C), which quantifies the despair and referred disability caused by the symptom. There are three options for answering each of the alternatives: “yes” (4 points), “sometimes” (2 points) and “no” (0 points). The sum of points is categorized into 5 groups or degrees of severity: Grade 1: negligible (0 to 16%), Grade 2: mild (18 to 36%), Grade 3: moderate (38 to 56%), severe (58 to 76%), and Grade 5: catastrophic (78 to 100%)²⁶.

After one month, the subjects returned to respond again to VAS and THI.

Both treatments cited above were applied in a population with the characteristics below (Chart 1).

Chart 1. Sample Characteristics

	Groups (Speech Therapy Counseling and Music)		
		N	%
Type of tinnitus	Whistle	7	63.63%
	Waterfall	4	36.36%
Tinnitus Sensation	Continuous	10	90.90%
	Pulsatile	1	9.09%
Manifestation	Constant	11	100.00%
Perception	Gradual	4	36.36%
	Sudden	7	63.63%
Localization	BE, worse RE	2	18.18%
	BE, worse LE	5	45.45%
	In the head	1	9.09%
	RE	2	18.18%
	LE	1	9.09%
Intensity	Always strong	3	27.27%
	Varies	8	72.72%
Frequency	High	9	81.81%
	Low	2	18.18%
Tinnitus decrease - Music	No	6	54.54%
	Yes	5	45.46%
Tinnitus decrease - Good night of sleep	No	8	72.73%
	Yes	3	27.27%
Tinnitus increase - loud noise	No	5	45.46%
	Yes	6	54.54%
Tinnitus increase - stress	No	1	9.09%
	Yes	10	90.90%
Tinnitus increase - alcohol	No	10	90.90%
	Yes	1	9.09%
Tinnitus increase - in silence	No	2	18.18%
	Yes	9	81.81%
Lightheadedness	No	6	54.54%
	Yes	5	45.46%
Headache	No	8	72.73%
	Yes	3	27.27%

	Groups (Speech Therapy Counseling and Music)		
		N	%
TMJ	No	10	90.90%
	Yes	1	9.09%
Cervical pain	No	8	72.73%
	Yes	3	27.27%
Chest pain	No	8	72.73%
	Yes	3	27.27%
Lumbar pain	No	10	90.90%
	Yes	1	9.09%
Coffee	No	9	81.81%
	Yes	2	18.18%
Sweets	No	6	54.54%
	Yes	5	45.45%
Chimarrão	No	4	36.36%
	Yes	7	63.63%
Coca-cola or other fizzy drinks	No	9	81.81%
	Yes	2	18.18%
Water	No	5	45.46%
	Yes	6	54.54%
Bad sleep	No	3	27.28%
	Yes	8	72.72%
Inadequate eating habit	No	1	9.09%
	Yes	10	90.90%
Sedentarism	No	5	45.46%
	Yes	6	54.54%
Smoking	No	9	81.81%
	Yes	2	18.18%
Depression*	No	7	63.64%
	Yes	4	36.36%
Anxiety*	No	2	18.18%
	Yes	9	81.81%
Fear/trauma	No	10	81.81%
	Yes	1	18.18%
Hormonal alterations	No	10	90.90%
	Yes	1	9.09%
Metabolic alterations - High cholesterol level**	No	8	72.73%
	Yes	3	27.27%
Metabolic alterations - High glucose level**	No	7	63.64%
	Yes	4	36.36%

Subtitles: RE: right ear; LE: left ear; BE: both ears; TMJ: temporomandibular joint; *: self-referred complaints and symptoms; **: information withdrawn from the subjects' charts.

Results

When comparing THI before and after treatment between the Music and Speech Therapy Counseling Groups, the target group showed a more significant improvement than the other group (Table 1).

When comparing VAS before and after treatment between the Music and Speech Therapy Counseling Groups, the target group showed a statistically significant difference (decrease in the degree of discomfort) (Table 2).

Table 1. Comparison of THI before and after treatment between the Music Group (MG) and the Speech Therapy Group (STG).

THI		A _v	M _d	SD	Min.	Max.	N	CI	P-value*
STG	Before	3,17**	3,50	1,47	1	5	6	0,21	0,021*
	After	2,33**	2,00	1,51	1	5	6		
MG	Before	3,00	3,00	0,71	2	4	5	0,07	0,035*
	After	2,40	2,00	0,55	2	3	5		

Caption: Av: Average; Md: Median; *: Significant P-value at 5% ($\alpha = 5\%$), T-Student test; SD: standard deviation; N: Number of participants; CI: Confidence interval; ** Average THI based on grade (1, 2, 3, 4 or 5).

Table 2. Comparison of VAS before and after treatment between the Music Group (MG) and the Speech Therapy Group (STG).

VAS		A _v (Grade)	M _d	SD	Min.	Max.	N	CI	P-value*
STG	Before	8,50	8,50	1,38	7	10	6	0,33	0,032*
	After	6,33	6,50	2,73	3	10	6		
MG	Before	8,20	8,00	0,45	8	9	5	0,34	0,094
	After	7,20	7,00	1,48	5	9	5		

Caption: Av: Average; Md: Median; *: Significant P-value at 5% ($\alpha = 5\%$), T-Student test; SD: standard deviation; N: Number of participants; CI: Confidence interval.

Discussion

It was possible to outline a unique and personalized counseling after an investigation of auditory and non-auditory factors as previously presented. Thus, the particularities of each subject were emphasized, as the heterogeneity of the symptom is known. Counseling in a single session proved to be effective in reducing the symptom (Tables 1 and 2).

A study²⁷ verified the applicability of speech-language counseling in two sessions associated to the use of Personal Hearing Amplification Device (PHAD) in reducing tinnitus sensation. In that study THI was used as a method to measure the change in discomfort and found a reduction in the sensation of tinnitus. In the present study, the Speech Therapy Group in a unique and personalized format reported a significant improvement when compared to the

Music Group, and this fact can be evidenced by the EVA and THI scores.

Our findings corroborate to a research²⁸ that analyzed patients' feedback from a UK health service on the efficacy of different forms of treatment for tinnitus. These forms included: TRT-based education, Cognitive Behavioral Therapy (CBT), hearing aids, sound therapy and subject-focused Counseling. As a result, Counseling was the most effective treatment to help them manage their tinnitus and hyperacusis, followed by education and CBT. In our study, speech therapy counseling was also effective in reducing the perception of the symptom, evidencing that all subjects in group Counseling benefited from the treatment (Tables 1 and 2). This treatment was based on the TAT principles and also sought to add guidelines covering other aspects as described in the methodology section.



Researchers²⁹ evaluated subjects with tinnitus before and after treatment in a structured group based on Tinnitus Retraining Therapy (TRT) and Cognitive Behavioral Therapy (CBT). The treatment included six sessions lasting 1 hour and a half once a week and the authors found that the treatment described was effective in improving tinnitus. The present study was based on another therapy, TAT⁶ with the addition of information related to aspects involved in tinnitus, different from the study mentioned above. However, there was also effectiveness in improving the symptom and, in one session, which can be a fact that contributes to the subject's engagement.

Another study³⁰ also applied speech therapy counseling based on TAT, but associated with Personal Hearing Amplification Device (PHAD) (simple or combined) and in subjects with hearing loss. They aimed at verifying if the combined use of amplification and sound generator would be more effective than just amplification in reducing the annoyance of tinnitus. It was concluded that combined adaptation and simple adaptation were equally effective in reducing tinnitus nuisance. Despite being proposed and different populations from the current study, both had in common the speech therapy in a single session and verified an improvement in the symptom.

As previously mentioned¹⁰ speech therapy counseling is a treatment that has benefits in reducing the perception of tinnitus. In the study above-mentioned, different forms of counseling were applied (instructions related mainly to auditory aspects, sleep, emotions, associations to pleasant sounds and positive thoughts) and certified through questionnaires, in order to prove the benefits of a combined single counseling session. The present study also brings the benefits of counseling in a single session and, as a differential, information related to aspects of nutrition, muscle, metabolic, cervical changes and physical activities. Such guidelines sought to explain in a simple way the possible associations with tinnitus and how they could help each subject in their particularities.

In the Music Group there was also an improvement in the symptom (Table 1), despite not being statistically significant. These findings suggest that

music helps in improving the symptom, however, associated with specific guidelines, mainly related to habits, marked in the speech therapy counseling protocol as this study was able to obtain more effective results.

The present research sought a judicious methodology, with randomization and comparison of treatments, bringing the average age closer so that it can contribute to the treatment for tinnitus. It was possible to verify that the Counseling Group in a unique and personalized format, presented better results in the symptom in the pre and post analysis observed in the EVA and THI scores (Tables 1 and 2). Regarding the Music Group, this improvement was verified only by THI (Table 2).

Thus, this therapy proposal contributes to the treatment of tinnitus and also, to a greater engagement of the subject and reduction of travel costs. It is also noteworthy that speech therapy counseling covers several aspects, one of which is the use of music, however the behavioral changes and the subject's reaction facing the symptom are emphasized.

The scientific evidence that this study brings is to suggest for speech therapists in the Clinic or in the scope of the research, when encountering subjects with normal auditory thresholds and chronic tinnitus, to make a complete investigation of the auditory and non-auditory pathway factors. Therefore, it is highlighted the importance of speech therapy Counseling and that the subject with tinnitus needs a thorough evaluation and good Counseling, which this protocol is efficient for. In addition, the written format allows the subject to have a greater control of the treatment, since on facing so much information it can be forgotten and, it's also an aid to the family and the therapist.

Conclusion

The single session and written Speech Therapy Counseling showed itself efficient in reducing the perception of tinnitus symptom, which may lead, hence, to its implementation in different diagnosis and hearing rehabilitation centers, both public and private.

References

1. Moore BCJ. The psychophysics of tinnitus. In: Eggermont, J. J. et al. Editors, *Tinnitus*. New York, Springer, 2012, p. 187-253.
2. Farhadi M, Mahmoudian S, Saddadi F, Karimian AR, Mirzaee M, Ahmadzadeh M, et al. "Functional brain abnormalities localized in 55 chronic tinnitus patients: Fusion of SPECT coincidence imaging and MRI". *J. cereb. blood flow metab.* 2010; 30 (4): 864-0.
3. Jastreboff PJ. Phantom auditory perception (tinnitus): mechanisms of generation and perception. *Neurosci Res.* 1990; 8(4): 221-54.
4. Figueiredo RR, Azevedo AA de. Introdução, epidemiologia e classificações. In: Figueiredo RR, Azevedo AA, editors. *Zumbido*. Rio de Janeiro: Revinter; 2013. p.1-4.
5. Langguth B, Kreuzer PM, Kleinjung T, De Ridder D. Tinnitus: causes and clinical management. *Lancet Neurol.* 2013;12(9):920-30.
6. Tyler RS. Neurophysiological Models, Psychological Models and Treatments for Tinnitus. In: Tyler RS, editor. *Tinnitus Treatment – Clinical Protocols*. Nova Iorque: Editora Thieme; 2006. p.1-22.
7. Davis PB, Wilde RA, Steed L. Relative effects of acoustic stimulation and counseling in the tinnitus rehabilitation process. *Aust N Z J Audiol.* 2001; 23: 84-5.
8. Cardoso NA, Hoshino ACH, Perez MA, Bastos WR, Carvalho DPD, Câmara VDM. Zumbido em uma população ribeirinha exposta ao metilmercúrio. *Audiol Commun Res.* 2014; 19(1): 40-4.
9. Mazurek B, Szczepek AJ, Hebert S. Stress and Tinnitus. *HNO.* 2015; 63(4): 258-65.
10. Searchfield GD, Boone M, Bensam J, Durai M, Hodgson SA, Linford T, Vogel D. A proof-of-concept study of the benefits of a single-session of tinnitus instruction and counselling with homework on tinnitus. *Int. j. audiol.* 2020; 59(5): 374-82.
11. Liu YQ, JiChen Z, Li G, Lai D, Liu P, Zheng Y. Effects of Educational Counseling as Solitary Therapy for Chronic Primary Tinnitus and Related Problems. *BioMed res. int.* 2018; (4): 1-9.
12. Jerger J. Clinical experience with impedance audiometry. *Arch. otolaryngol.* 1970; 92(4): 311-24.
13. Tunkel DE, Bauer CA, Sun GH, Rosenfeld RM, Chandrasekhar SS, Cunningham ER et al. Clinical Practice Guideline: Tinnitus Executive Summary. *Otolaryngol.* 2014; 151(4): 533-41.
14. Silverthorn DU. *Fisiologia humana: Uma abordagem integrada*. 7ª ed. Artmed editora; 2017.
15. Gonçalves LS. *Depressão e atividade física: uma revisão*. Uberlândia. 2018. 22f. [Monografia]. Uberlândia: Universidade Federal de Uberlândia – UFU, 2018.
16. Sheldon SH, Ferber R, Kryger MH, Gozal D. *Principles & Practice of Pediatric Sleep Medicine*. 2ª ed. Elsevier Saunders; 2014.
17. McArdle WD, Katch FI, Katch VL. *Nutrição para o desporto e o exercício*. Rio de Janeiro: Guanabara Koogan; 2001. p. 306-11.
18. Organização Mundial da Saúde. *Depressão e outras doenças comuns Transtornos Mentais: Estimativas Globais de Saúde*. Geneva: Organização Mundial da Saúde; 2017. Licença: CC BY-NC-SA 3,0 IGO.
19. Geocze L, Mucci S, Abranches DC, Marco MA, Penido NO. Systematic review on the evidences of an association between tinnitus and depression. *Braz. j. otorhinolaryngol.* 2013; 79(1): 106-11.
20. Sanchez TG, Medeiros IRT, Fassolas G, Coelho FF, Constantino GTL, Bento RF. Frequência de alterações da glicose, lipídeos e hormônios tireoidianos em pacientes com zumbido. *Int. arch. otorhinolaryngol.* 2001; 5(1): 16-20.
21. McFerran DJ, Phillips JS. Tinnitus. *The Journal of Laryngology & Otology.* 2007 ;121(3): 201-8.
22. Almeida TAS, Samelli AG, Mecca FDN, Martino ED, Paulino AM. Sensação subjetiva do zumbido pré e pós intervenção nutricional em alterações metabólicas. *Pró-Fono.* 2009; 21(4): 291-6.
23. Olzowy B, Canis M, Hempel JM, Mazurek B, Suckfüll M. Effect of Atorvastatin on Progression of Sensorineural Hearing Loss and Tinnitus in the Elderly: Results of a Prospective, Randomized, Double-Blind Clinical Trial. *Otol. neurotol.* 2007; 28(4): 455-8.
24. Belfort MAFG, Zanoni A, Onishi ET. Prevalência de alterações glicêmicas em pacientes com zumbido. *Acta ORL.* 2006; 24(3): 108-12.
25. Azevedo AA, Mello PO, Siqueira AG, Figueiredo RR. Análise Crítica dos Métodos de Mensuração do zumbido. *Rev bras otorrinolaringol.* 2007; 73(3): 418-23.
26. Ferreira PEA, Cunha F, Onishi ET, Branco-Barreiro FCA, Ganança FF. Tinnitus Handicap Inventory: Adaptação Cultural para o Português Brasileiro. *Pró-Fono.* 2005; 17(3): 303-10.
27. Matos IL, Rocha AV, Mondelli MFCG. Aplicabilidade da orientação fonoaudiológica associada ao uso de aparelho de amplificação sonora individual na redução do zumbido. *Audiol., commun. res.* 2017; 22: e1880.
28. Aazh H, Moore BC, Lammaing K, Cropley M. Tinnitus and hyperacusis therapy in a UK National Health Service audiology department: Patients' evaluations of the effectiveness of treatments. *Int. j. audiol.* 2016; 55(9): 514-22.
29. Holdefer L, CP de Oliveira CA, Venosa AR. Sucesso no tratamento do zumbido com terapia em grupo. *Braz. j. otorhinolaryngol.* 2010; 76(1): 102-6.
30. Santos GM, Bento RF, de Medeiros IRT, Oiticica J, da Silva EC, Penteado S. The influence of sound generator associated with conventional amplification for tinnitus control: randomized blind clinical trial. *Trends in hearing.* 2014; 18:1-9.