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ORIGINAL ARTICLE

## Sound generator associated with the counseling in the treatment of tinnitus: evaluation of the effectiveness<sup>☆</sup>

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### KEYWORDS

Tinnitus;  
Hearing loss;  
Hearing aid

### Abstract

**Introduction:** The relations between the tinnitus and the hearing loss are due to the sensory deprivation caused by hearing loss, since this is followed by the functional and structural alteration of the auditory system as a whole. The cochlear lesions are accompanied by a reduction in the activity of the cochlear nerve, and the neural activity keeps increased in mainly all the central auditory nervous system to compensate this deficit.

**Objective:** This study aimed to verify the effectiveness of the sound generator (SG) associated with the counseling in the treatment of the tinnitus in individuals with and without hearing loss regarding the improvement of the nuisance through Tinnitus Handicap Inventory (THI) and Visual Analogue Scale (VAS).

**Methods:** The sample consisted of 30 individuals of both genders divided into two groups: Group 1 (G1) was comprised of 15 individuals with tinnitus and normal hearing, adapted to SG; Group 2 (G2) was comprised of 15 individuals with complaints of hearing acuity and tinnitus, adapted with SG and an individual hearing aid device (HA). Both groups underwent the following procedures: anamnesis and history of complaint, high frequency audiometry (HFA), imitancymetry, acuphenometry with the survey of psychoacoustic pitch and loudness thresholds and application of the tools THI and VAS. All of them were adapted with HA and Siemens SG and participated in a session of counseling. The individuals were assessed in three situations: initial assessment (before the adaptation of the HA and SG), monitoring and final assessment (6 months after adaptation).

**Results:** The comparison of the tinnitus nuisance and handicap in the three stages of assessment showed a significant improvement for both groups.

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**PALAVRAS-CHAVE**

Zumbido;  
Perda auditiva;  
Aparelho auditivo

**Conclusion:** The use of the SG was similarly effective in the treatment of the tinnitus in individuals with and without hearing loss, causing an improvement of the nuisance and handicap. © 2016 Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial. Published by Elsevier Editora Ltda. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

### Gerador de som associado a aconselhamento no tratamento de zumbido: avaliação da eficácia

**Resumo**

**Introdução:** As relações entre o zumbido e a perda de audição advêm da privação sensorial causada pela perda auditiva, uma vez que esta é seguida pela alteração estrutural e funcional do sistema auditivo no seu conjunto. As lesões cocleares são acompanhadas por uma redução da atividade do nervo coclear e a atividade neuronal mantém-se aumentada em principalmente todo o Sistema Nervoso Auditivo Central para compensar este déficit.

**Objetivo:** Este estudo teve como objetivo verificar a eficácia do Gerador de Som (GS) associado ao aconselhamento no tratamento do zumbido em indivíduos com e sem perda auditiva em relação à melhora do incômodo por meio do Tinnitus Handicap Inventory (THI) e Escala Analógica Visual (VAS).

**Método:** A amostra consistiu em 30 indivíduos de ambos os sexos, divididos em dois grupos: Grupo 1 (G1) foi composto por 15 indivíduos com zumbido e audição normal, adaptados ao GS; o Grupo 2 (G2) consistiu em 15 indivíduos com queixas de acuidade auditiva e zumbido, adaptado com GS e um aparelho auditivo individual (AA). Ambos os grupos foram submetidos aos seguintes procedimentos: anamnese e história da queixa, Audiometria de Alta Frequência (AAF), imitanciometria, acufenometria com o levantamento de limiares psicoacústicos de Frequência e Altura e aplicação das ferramentas THI e VAS. Todos eles receberam adaptação de AA e GS Siemens e participaram de uma sessão de aconselhamento. Os indivíduos foram avaliados em três situações: Avaliação Inicial (antes da adaptação do AA e GS), Monitoramento e Avaliação Final (6 meses após a adaptação).

**Resultados:** A comparação do incômodo do zumbido e deficiência nas três fases de avaliação mostrou uma melhora significativa nos dois grupos.

**Conclusão:** A utilização de GS foi igualmente eficaz no tratamento do zumbido nos indivíduos com e sem a perda de audição, causando uma melhora da perturbação e da deficiência.

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**Introduction**

The relations between the tinnitus and the hearing loss are due to the sensory deprivation caused by hearing loss, since this is followed by the functional and structural alteration of the auditory system as a whole. The cochlear lesions are accompanied by a reduction in the activity of the cochlear nerve, and the neural activity keeps increased in mainly all the Central Auditory Nervous System (CANS) to compensate this deficit. The increase in the activity of the CANS characterizes a hyperactivity of the nervous structures that result in a "neural noise". This noise can be codified by the own nervous system generating the perception of the tinnitus.<sup>1</sup>

The theories suggest the tinnitus is caused by a sequence of central changes that are triggered by the decrease in the afferent of the sound stimulus. A prediction resulting from this theory is that the compensation of such afferent may be a way of preventing or reversing the changes in the CANS

badly adapted, which underlies the tinnitus. The acoustic stimulation, for example, could compensate this decreased afference.<sup>2</sup>

The acoustic therapy is performed with the insertion of sound enrichment in the individual's daily life, and it aims to provide relief from tinnitus. In less specific interventions, the individual may be advised to use strategies, such as: insert background music during daily activities, use sounds of relaxation, listen to music with earphones, use pillows with speakers, use water cascades, use sound generators in the tinnitus level and conventional Hearing Aids (HA).<sup>3</sup> The HA consists of the amplification of environmental sounds – both mask the tinnitus and help in habituation by sound enrichment, the SG produces the wideband noise, songs or any other spectrally modified type of sound.<sup>4</sup>

There is a need of presenting scientific evidence in the tinnitus treatments to help the professionals in decision-making, therapeutic handling of patients and development of clinical guidelines that would direct the assessments and

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