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Management of Tinnitus, Effectiveness of Sound Therapy in Costa Rica

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Definition and Prevalence of Tinnitus

Tinnitus is defined as the perception of a sound in one, both ears or the entire head, without there being a known sound source, which in some people can be disturbing and affect the quality of life. Studies worldwide estimate up to 30% of the population perceive sounds, the journal JAMA Neurology published a study where it is estimated that by 2023, there are 740 million people in the world who suffer from tinnitus [1]. Ten percent of individuals carrying tinnitus have a very intense perception, called disturbing by the effect of tinnitus [2-6]. In Costa Rica, there are no data on the prevalence of tinnitus, according to data provided by the National Insurance Institute (INS), from 2017 to 2022, an average of 150 patients consults monthly due to hearing loss or tinnitus in that institution. Recent onset or acute tinnitus is one that has less than six months of onset and has a better prognosis of recovery than chronic tinnitus, which is therefore one that has more than six months of establishment.

Causes or Triggers of Tinnitus

Tinnitus is a symptom, which can be present in more than 600 health conditions. Being a perception of an individual, it is always subjective. It is estimated that 5% of reported cases of noise in the ears are due to endogenous reasons, that is, noises generated in structures adjacent to the ear, which are perceived by the peripheral auditory organ, these body sounds are called somatosounds, due to their vascular, muscular or mechanical origin, they cannot be classified as tinnitus, since its existence is objectifiable and its handling is completely different from that of tinnitus and should not be confused with these. Tinnitus is a health problem that can be very disabling, to the point that it is the first cause of consultation in audiology. The emotional component plays a preponderant role in the appearance and evolution of the associated consequences, being that tinnitus is usually accompanied by other psychological conditions such as depression, anxiety and stress [7-10].

Tinnitus Assessment Protocol in the Audiology Consultation

The basic audiological intervention in case of tinnitus should begin with a detailed medical history, specially designed for patients with this symptom. Subsequently, a tool is applied to evaluate the degree of disability or impairment of the patient's quality of life, questionnaires such as the Tinnitus Handicap Inventory, which has a translated and validated version into Spanish. Once this is done, we proceed with videotoscopy, impedancemetry, tonal and vocal audiometry, taking annoyance thresholds and aquaphenometry, with its basic elements, tone equalization, intensity equalization, maskability and residual inhibition. In some rare cases, special tests will have to be performed that are useful, although not essential routinely, such as otoacoustic emissions and auditory evoked potentials. For the audiometric threshold taking, the Hugson Westlake Modified procedure was used [11].

Once the battery of tests is done, the audiologist will arrive at a diagnostic impression of the patient's condition and determine the remedial plan, which may include sound therapy, behavioral therapy, audioprosthetic adaptation and possible referral to other professionals such as otolaryngologists, psychologists, psychiatrists, neurologists, dentists, physiotherapists, neurosurgeons, etc. Special attention should be paid in cases of unilateral tinnitus of recent onset, accompanied or not by unilateral sensorineural hearing loss, as well as other medical conditions that should be referred as soon as possible for specialized medical evaluation [12-15].

Materials and Equipment Used for Patient Assessment

An Amplivox two-channel audiometer, model 270, with daily calibration, was used. Noise levels were controlled in real time and the audiometric booth was certified not to exceed 40 dBA of background noise, with ANSI type 2 sound level meter, properly calibrated. Videotoscope brand Welch Allyn model Macroview, Impedance meter Amplivox, model 102-4.

Tinnitus Treatment, Therapy, and Management

Once it has been determined that there is no treatable medical cause or when the patient has already received treatment for the medical condition that could be the possible trigger for tinnitus, the audiologist has tools for the management of tinnitus, such as the adaptation of hearing aids, in cases where the patient presents a hearing loss that must be corrected with hearing aids, sound therapy, the placement of masking devices or even using a combination of these strategies. The audiologist may also require the intervention of other professionals, the most common case is the synergistic involvement of the psychologist for the implementation of cognitive behavioral therapy.

During the year 2020, a large amount of tinnitus was detonated, due to the stress caused in the population by the arrival of the covid 19 pandemic, where there were psychological aspects that probably increased the perception of pre-existing tinnitus or the appearance of new cases, such as fear of contagion, confinements and fear of vaccines. Given this scenario, the author saw the need to implement a therapeutic protocol specially designed for the wave of acute cases of tinnitus, based on the combined prior knowledge of Jastreboff's auditory retraining therapy, sequential sound therapy and behavioral therapy, this procedure was called: Tinnitus Band Therapy (TBT Olmo). The tinnitus management protocol was activated in our hearing center and the case count began, as well as the documentation of the results of sound therapy, giving rise after three years, to the presentation of this writing [16-18].

Demographics of 170 Tinnitus Patients in Costa Rica

Below are the results of the analysis of numerical data and the follow-up of TBT Olmo sound therapy implemented between 2020 and 2023 in 170 patients in Costa Rica. The analysis of the data shows that tinnitus in Costa Rica affects men and women equally, since the numbers are equal in terms of the percentage of people who consulted for noise in one ear, in both or in the whole head: 50% male and 50% female (Figure 1 and 2).

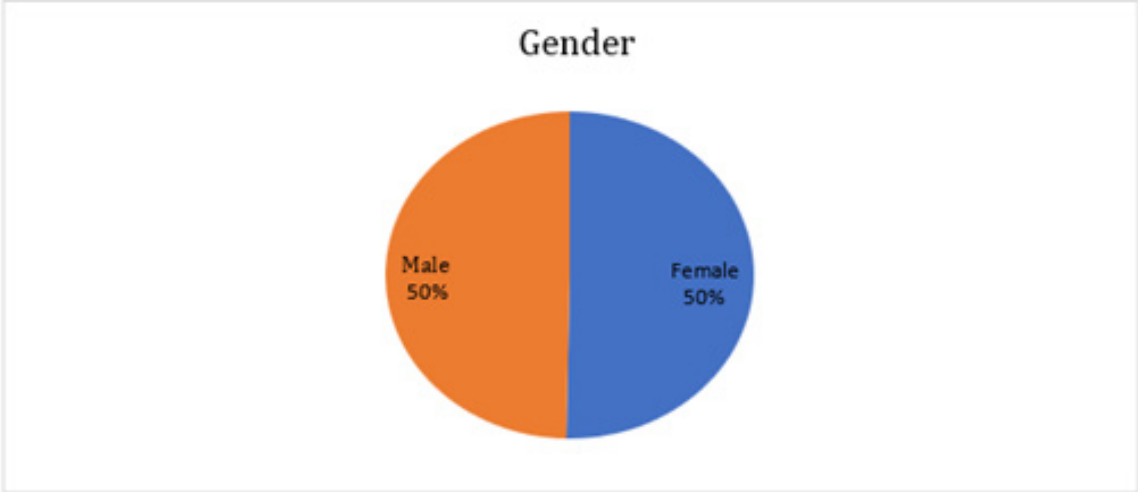

Figure 1: In both or in the whole head: 50% male and 50% female.

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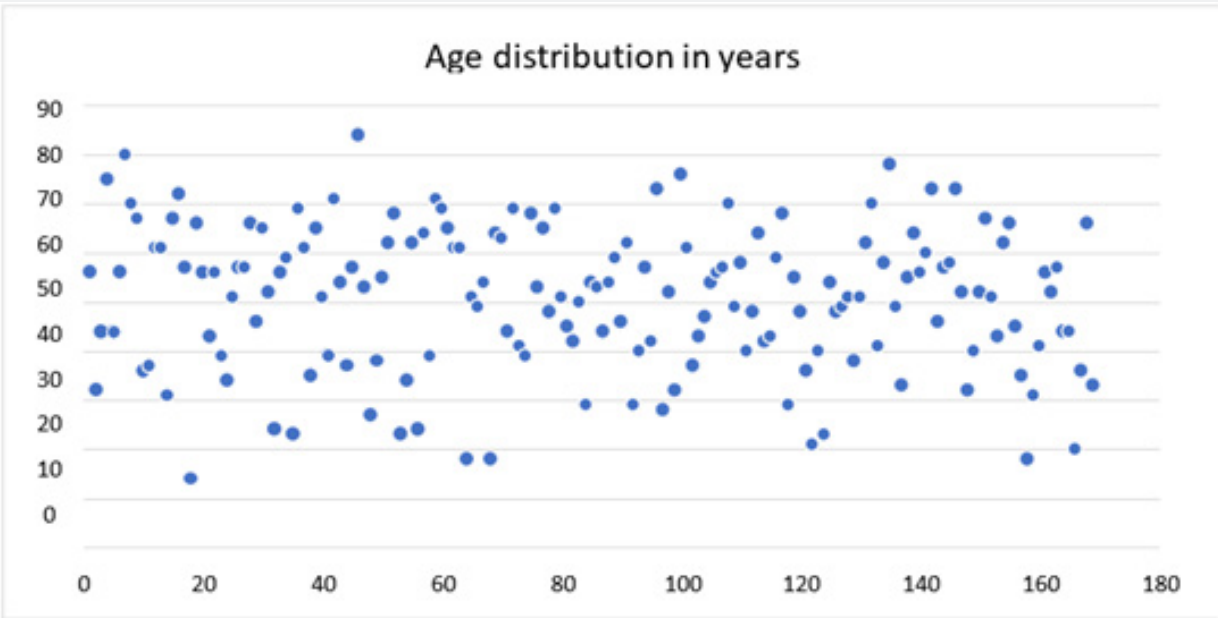

Figure 2: As for age, tinnitus affects people between the ages of thirty and seventy.

With respect to the type of tinnitus, for classification purposes, in this study they were divided into two types, Auris tinnitus which are those that the individual locates in one or both ears and the cerebri which are the tinnitus that the subject identifies throughout the head. In this case, most of the tinnitus in the sample studied are of the Auris type (76%), while those of the Cerebri type are a minority (24%) (Figure 3). In the hearing section, it is determined that the majority of people who perceive tinnitus are carriers of some degree of hearing loss (76%), while there is a percentage of people with noise in the ear who present hearing within normal ranges (24%) in conventional audiometry (250 to 8000 cycles per second) evaluated with the Hugson Westlake threshold method. Modified, Amplivox brand two-channel audiometer, model 270 with daily calibration, certified soundproof booth with internal noise less than 40 dBA, measured with ANSI type 2 sound level meter (Figure 4).

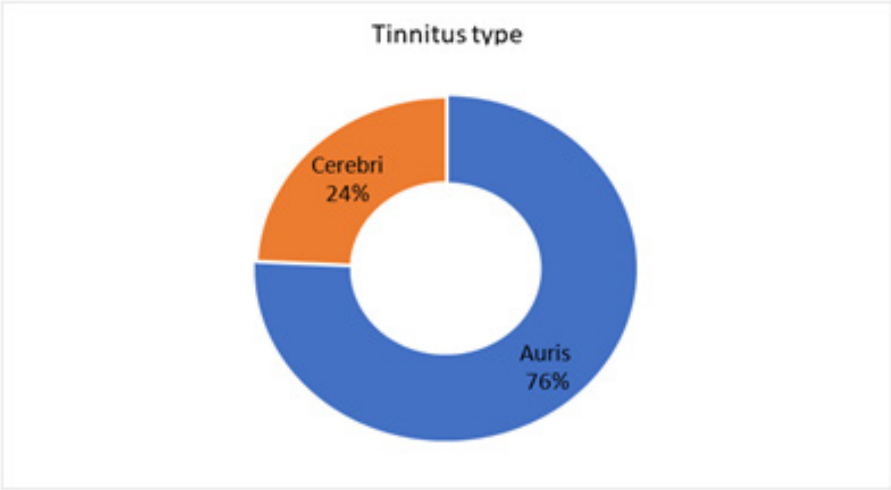

Figure 3: In this case, most of the tinnitus in the sample studied are of the Auris type (76%), while those of the Cerebri type are a minority (24%).

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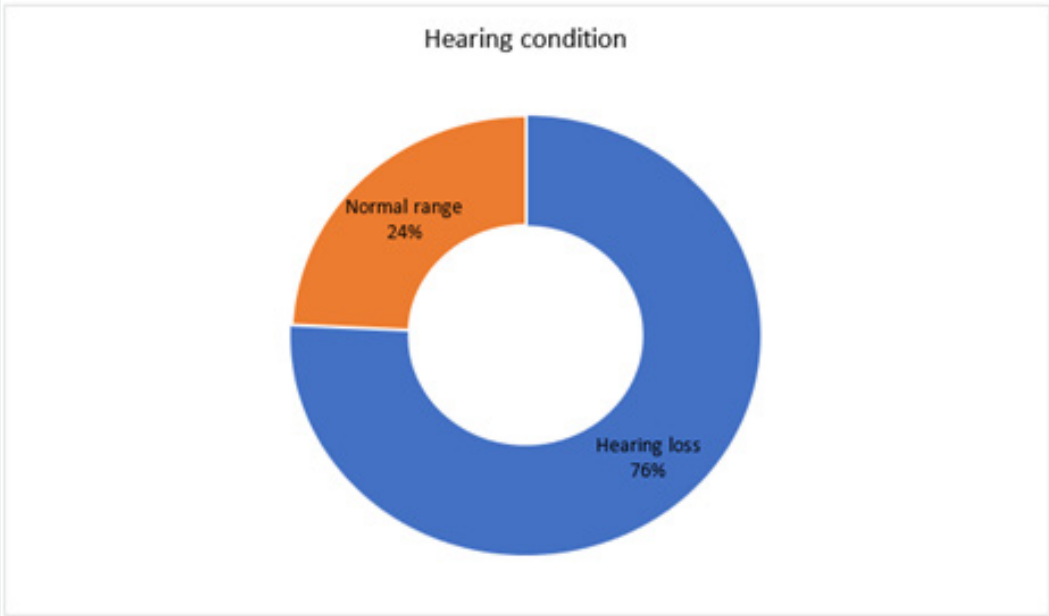

Figure 4: In the hearing section, it is determined that the majority; of people who perceive tinnitus are carriers of some degree of hearing loss (76%), while there is a percentage of people with noise in the ear who present hearing within normal ranges (24%).

Characterization of Tinnitus Described by 170 Patients in Costa Rica

(Figure 5) The most prevalent frequencies indicated by patients carrying tinnitus are between 4000 and 8000 cycles per second, the latter being the most important frequency recognized by people with tinnitus. As for the intensity, most tinnitus was recognized between 5 and 15 dB SL. This data were obtained from the results of the subjective acuphenometry test performed on all patients evaluated (Figure 6).

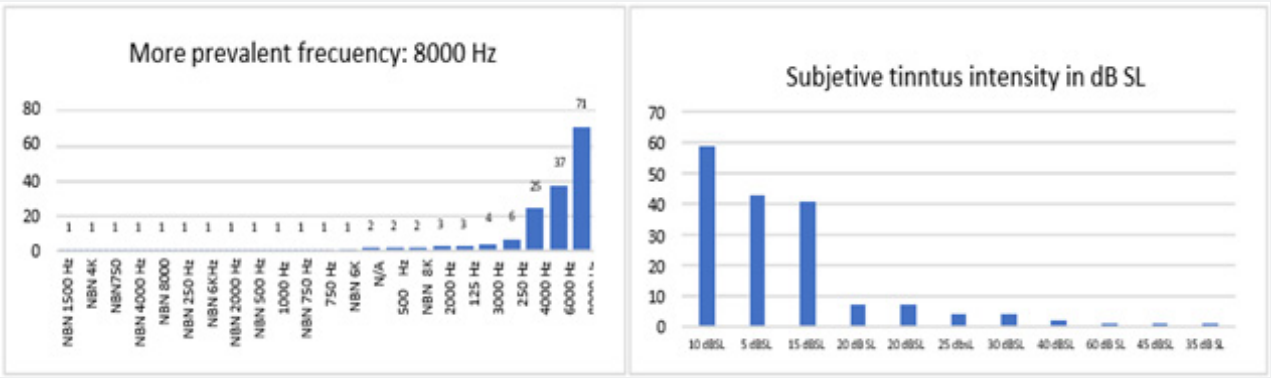

Figure 5: The most prevalent frequencies indicated by patients carrying tinnitus, are between 4000 and 8000 cycles per second, the latter being the most important frequency recognized by people with tinnitus.

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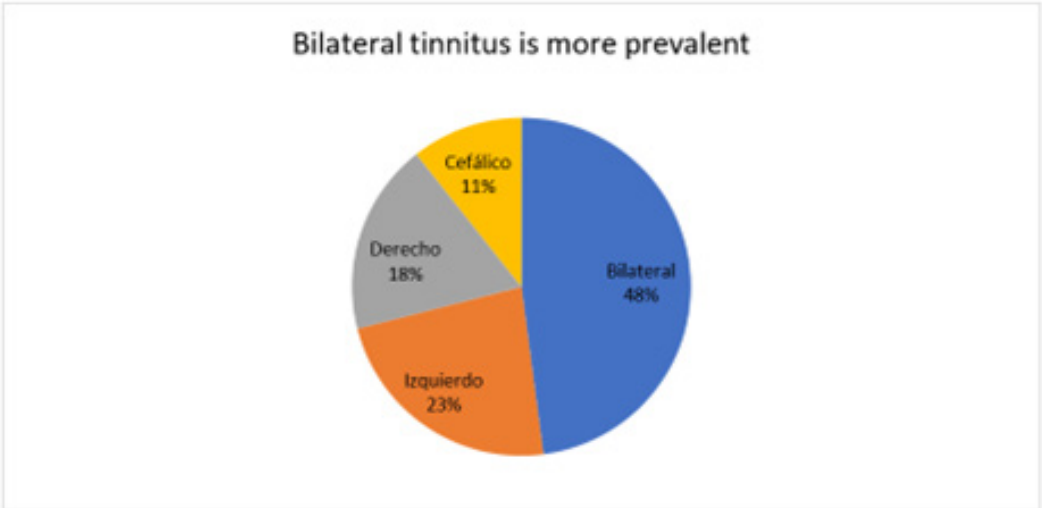

Figure 6: With regard to the ear affected by the perception of tinnitus, the analysis of the data reveals that most patients identify tinnitus bilaterally (48%) of the subjects evaluated, 23% report hearing the sound in the left ear, 18% identify it in the right ear and 11% state that the sound is in the whole head and not in the ears.

Comorbidities

Many studies in the world suggest that there are triggering conditions, causes and comorbidities of tinnitus. In the analysis of the data carried out in Costa Rica, it is concluded that there is an important relationship with stress, noise exposure and presbycusis among the coexisting conditions in patients with tinnitus. Dyslipidemias are present in up to 20% of patients with tinnitus (Figure 7). One of the most relevant findings is the presence of a history of exposure to intense noise in a recreational or occupational way, where 26% of tinnitus carriers claim to be or have been exposed to noise at work or socially (Figure 8). Noise exposure is the second most important triggering or causal factor found in the audiological medical record, identified by investigating the time of symptom onset or the cause that patients report.

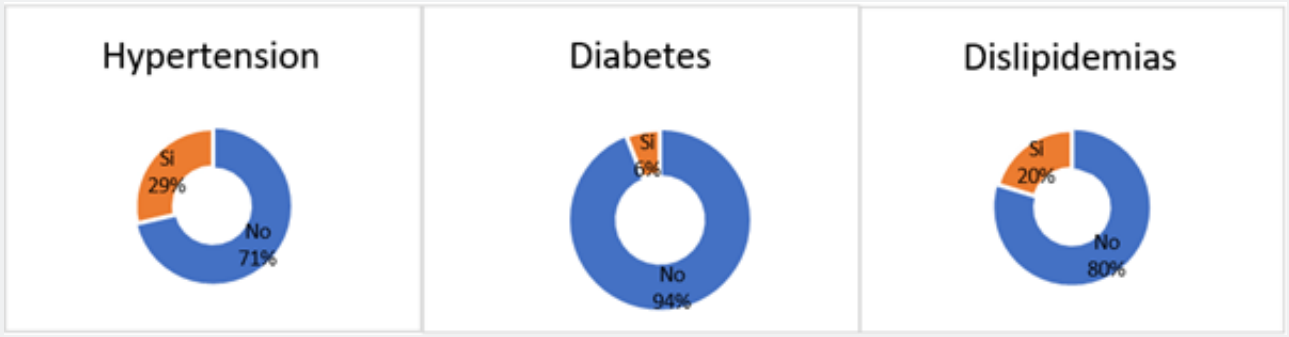

Figure 7: Dyslipidemias are present in up to 20% of patients with tinnitus.

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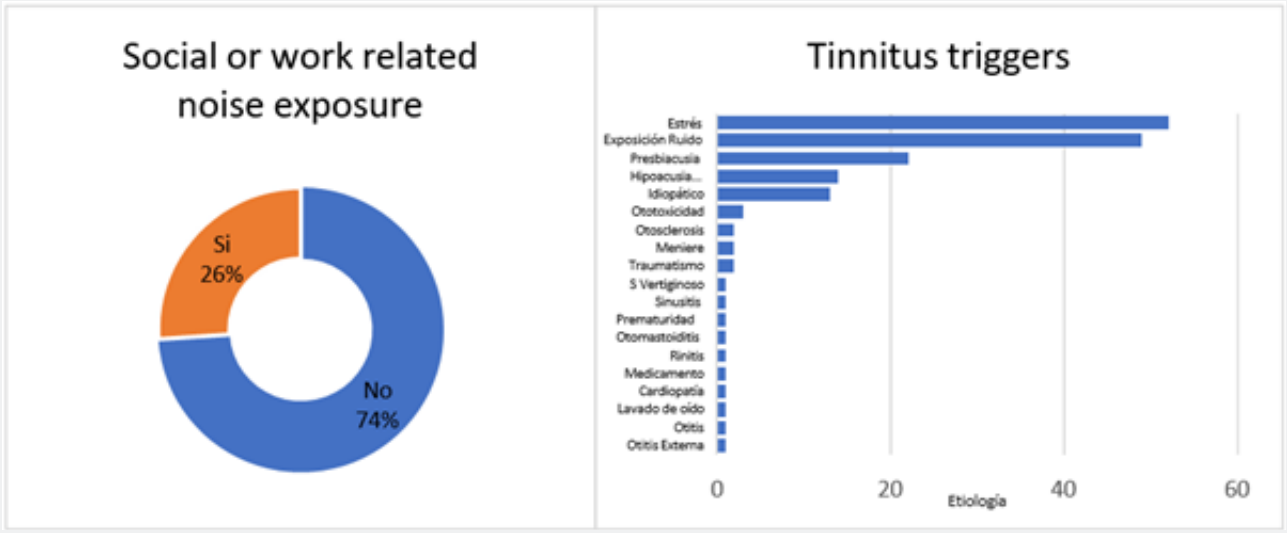

Figure 8: Where 26% of tinnitus carriers claim to be or have been exposed to noise at work or socially.

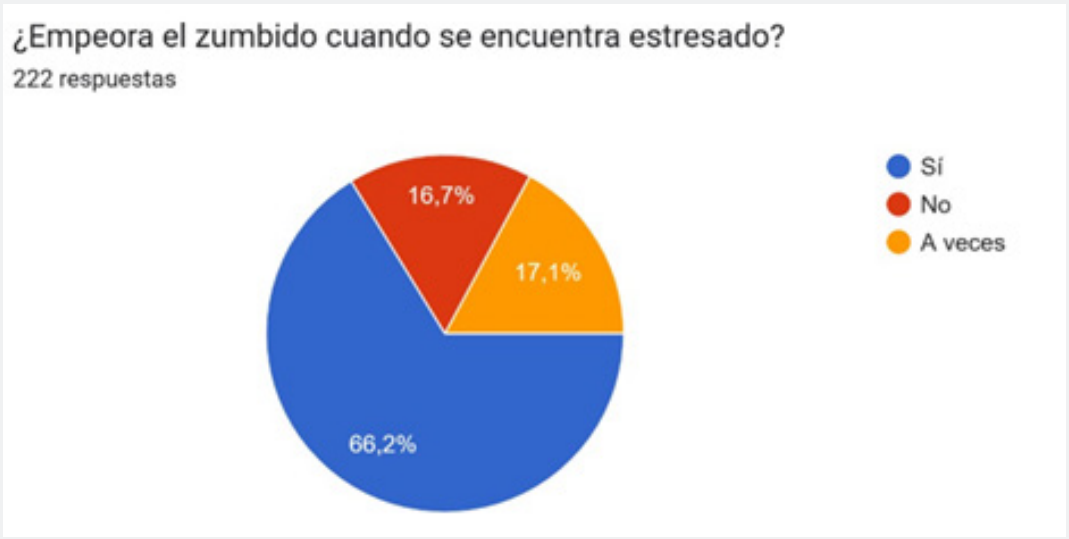

Figure 9: It should be noted that exposure to noise is a 100% preventable factor, which could prevent up to 30% of tinnitus casuistry.

A common factor is exposure to high intensities of noise or loud music, many exposures occur for work reasons, but also recreationally in musical concerts, while doing sports or with video games with helmets for many hours. It should be noted that exposure to noise is a 100% preventable factor, which could prevent up to 30% of tinnitus casuistry (Figure 9). Stress, anxiety and depression appear as the most important factor for the appearance of tinnitus in the analysis of the data. This information emerges not only in the clinical interrogation but is also self-reported by patients with tinnitus in the tinnitus disability questionnaire (THI). Up to 83% of tinnitus carriers report that noise increases when they are stressed.

Results of Sound Therapy for Tinnitus Management in 170 Patients in Costa Rica (2020-2023)

Sound therapy has been identified worldwide as the second most important alternative for the management of tinnitus, along with cognitive behavioral therapy. The use of both strategies has been shown to have an enhanced effect. The multidisciplinary intervention, from the audiological, medical and psychological perspective, stands as the best approach to alleviate the discomfort generated by tinnitus according to the consensus of most researchers and that the data obtained with TBT Olmo therapy have confirmed in the same line of action

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(Figure 10). 83% of patients use sound therapy, either as a tool to control the perception of tinnitus, as well as to relieve or mitigate discomfort. 71% of cases say that sound therapy has improved their quality of life and 74% would recommend sound therapy to a family member or friend. All these data confirm that sound therapy is an effective tool for the management of chronic disturbing tinnitus of different etiology and that the result is far superior to other therapies or treatments or the placebo effect itself published in other studies.

Figure 10: 83% of patients use sound therapy, either as a tool to control the perception of tinnitus, as well as to relieve or mitigate discomfort. 71% of cases say that sound therapy has improved their quality of life and 74% would recommend sound therapy to a family member or friend.

Hearing Aids or Hearing Aids for Tinnitus Management

It is well known among the scientific community that the use of hearing aids or hearing aids is very effective in combating tinnitus. Research states that 80% of patients with hearing loss perceive tinnitus and that 80% of patients with tinnitus have some degree of hearing loss. In the event that the patient is a carrier of hearing loss and this must be corrected with hearing aids [19], that is, that his audiometric tonal average in the frequencies of 500, 1000 and 2000 cycles per second is equal to or greater than 30 decibels HL, it is necessary to make the audioprosthetic correction in order to provide a solution to the communication deficiency and in turn, Have the possibility of delivering sound therapy even through prostheses (Figure 11). In the analysis of the data of the group of patients with tinnitus in this report, it was found that 9% of tinnitus cases had a level of hearing loss that should be corrected with hearing aids. In these cases, hearing aids were adapted and through this sound therapy was also granted to accelerate the habituation process [20-23].

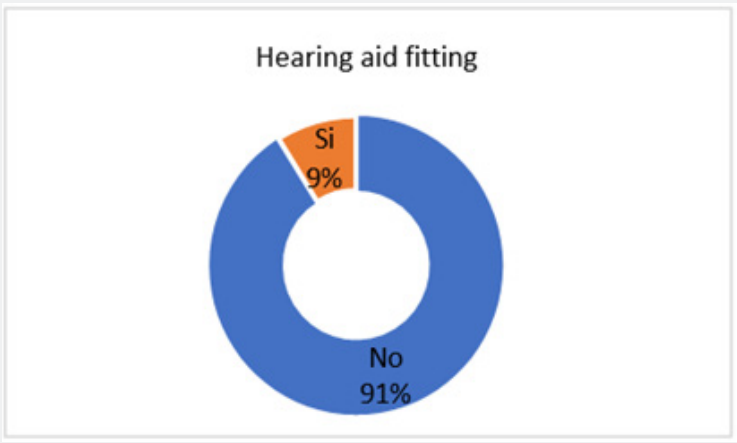

Figure 11: In the analysis of the data of the group of patients with tinnitus in this report, it was found that 9% of tinnitus cases had a level of hearing loss that should be corrected with hearing aids.

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Conclusion

Sound therapy is effective for the management of tinnitus and for improving the quality of life of patients. Although in many cases sound therapy is used by individuals more as a palliative than as a cure or solution in itself, it is a useful tool for the patient that helps him control tinnitus, hide it, so that the patient can evolve in the habituation process and avoid that it is tinnitus who controls or conditions the quality of life of the subject who suffers it. Multidisciplinary intervention is essential for the effective management of tinnitus. The audiologist can provide guidance to start the habituation process, select the tools to be used in each case, either prosthetic adaptation if the patient requires it, sound therapy and tinnitus masking devices. In addition, the audiologist can detect medical and psychological conditions that require the intervention of other professionals and refer the individual to obtain those complementary services.

The basic battery of audiology tests is sufficient as a starting point for tinnitus characterization. With the classic battery of clinical history, otoscopy, impedancemetry, tonal and vocal audiometry, nuisance thresholds and acufenometry, it was possible to characterize tinnitus in all cases evaluated, make topographic and differential diagnosis, detect carriers of medical conditions and select the characteristics of sound stimulation or auditory rehabilitation in a personalized way. Hearing aids or hearing aids are effective in reducing the discomfort generated by tinnitus, in addition through them sound therapy can be performed and even most of them today have programmable memories to place tinnitus masker in case you require it.

Counseling, follow-up and accompaniment is essential to achieve improvement, patients appreciate the interest of the professional in the habituation process. Although sound therapy itself provides a sense of relief from the symptom of tinnitus, audiological, medical and psychological accompaniment with a focus on cognitive behavioral therapy is necessary to enhance the results of the intervention. The best approach that can be offered to the patient with tinnitus today should be interdisciplinary, counseling, follow-up and accompaniment, this should include medical care, psychological intervention with behavioral therapy and audiological management with sound therapy at least.

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