

**Material and methods:** Eleven patients (9 females, 2 males; mean age  $62.36 \pm 5.89$  years) with both hearing loss and tinnitus were enrolled. Study eligibility criteria specified SNHL, based on a pure tone average of hearing thresholds at 0.5, 1, 2 and 4 kHz  $> 20$  dB, as well as not having previously received any counselling or cognitive therapy for tinnitus. Tinnitus was examined using tinnitogram test and 25 items of the Tinnitus Handicap Inventory (THI). Data management and analyses were performed using IBM SPSS Statistics 27. Correlations between the THI and the use of hearing aids, as well as between THI scores and perceived tinnitus intensity, were evaluated using Spearman's correlation coefficient. Statistical results were considered significant at the alpha level  $< 0.05$ .

**Results:** Tinnitus was bilateral in 54.5% of the patients and unilateral in 45.5%. Hearing aids were worn by 6 patients (63.64%) for a mean time of 9.69 years. For patients who wore hearing aids, significantly lower scores were found on the THI compared to unfitted participants (mean THI scores of 19.10 vs 49.50;  $R_p = 0.66$ ;  $p = 0.03$ ). Likewise, a moderate correlation was found between tinnitus intensity and THI, with higher tinnitus intensity associated with higher scores of THI ( $R_p = 0.70$ ,  $p = 0.02$ ).

**Conclusions:** Marked effects on tinnitus were observed in participants with hearing aids, showing significant improvements with auditory amplification. Acoustic therapy using hearing aids seems to be effective for tinnitus-associated hearing loss.

#### Impact of the use of mask on speech perception

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**Background:** The COVID-19 pandemic, caused by the SARS-CoV-2 virus, triggered the need to use several preventive measures, which brought new challenges to communication, such as complying with social distancing and the use of face protection systems. Although there is a relief in the mandatory measures, the use of masks is still frequent, especially in health units. This study evaluated the impact of mask use on speech perception, by performing vocal audiometry in live voice, without using a mask and using three different types of masks (Surgical, KN95, FFP2).

**Material and methods:** The study was observational, analytical, and cross-sectional. It had a sample of 25 individuals with normal hearing, between 35 and 55 years old, to whom vocal audiometry was performed without a mask and with 3 types of face protection masks.

**Results:** 80% of the individuals considered that they heard well and 68% of the individuals considered that they hear worse with a mask than without a mask. The mask preferred by most participants is the KN95 (56%), while 44% prefer to

use the surgical mask. There were statistically significant differences in the vocal audiogram when using the FFP2 mask, with a percentage of correct answers of 82.08%.

**Conclusions:** It was concluded with this study that, of all the masks used, it was with the FFP2 that there were statistically significant differences in speech perception. It was concluded that all masks affect speech perception, with greater impact on FFP2, which is most used in a hospital environment, requiring greater care and adopting alternative strategies to ensure that the message is understood by the other person.

#### Importance of auditory training in the development and stimulation of skills in hearing aid users – a systematic review of the literature

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**Background:** Auditory rehabilitation performed by psychoacoustic amplification allows for an increase in audibility, however, there may be difficulties in sound perception. Auditory training can be used to improve auditory performance, consequently improving auditory skills affected by hearing loss. This study aims to understand which skills are developed and/or stimulated by auditory training in hearing aid users and the importance of this type of training in these individuals.

**Material and methods:** Systematic review of the qualitative literature. The search was applied in the electronic databases PubMed, Web of Science and B-on using the expression “auditory training” for “hearing loss” AND (abilities or skills) AND hearing aids”.

**Results:** After applying the eligibility criteria, 23 articles were analysed, published between 2013 and 2021.

**Discussion:** The main skills affected by hearing loss and stimulated by training are mainly related to speech perception, especially in noisy environments. There was greater evidence of the effectiveness of formal auditory training, compared to informal auditory training.

**Conclusions:** Auditory training has an influence on the auditory skills affected by hearing loss; however, there were some differences in the results, thus it is important to invest in further studies in this area.

#### Influence of chronic obstructive pulmonary disease and ventilotherapy on hearing

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**Background:** Chronic Obstructive Pulmonary Disease is a disease that affects the airways, characterized by its chronic and progressive inflammation, resulting in obstruction of the respiratory flow. It's pathogenesis leads to states of hypoxia

and hypercapnia (states of low oxygen content and high carbon dioxide content, respectively, in the bloodstream), which several authors advocate as causes for the development of hearing loss. At the same time, ventilation therapy is commonly used in the treatment of this pathology, as it prevents this same respiratory obstruction. In doing so, this therapy is thought to have the potential to counteract the effects of the disease on hearing ability. This study aims to investigate whether chronic obstructive pulmonary disease has any influence on the auditory system, and therefore whether it can be considered a risk for the development of hearing loss, and also to assess the possibility of ventilation therapy, indirectly, effect on its attenuation or reversal.

**Material and methods:** The investigation is classified as a case series study, in which the sample, of three participants, is divided into two groups according to the parameter to be evaluated. For each participant, pure tone tonal audiograms were compared prior to diagnosis or to the initiation of ventilation therapy, with audiograms after diagnosis or the initiation of ventilation therapy, according to the parameter under analysis.

**Results:** Regarding the analysis of the influence of chronic obstructive pulmonary disease on hearing thresholds, the respective participants had minor, and sometimes inconstant, changes in hearing thresholds. As for the question concerning the analysis of the influence of ventilation therapy on hearing thresholds, the participants involved showed improvements, quite notorious in one case of the hearing ability.

**Conclusions:** The results of this study do not allow us to give a concrete answer to the first part of the question, inasmuch as it is not possible to attribute, without a doubt, the responsibility to chronic obstructive pulmonary disease for the alterations observed. On the other hand, the results referring to ventilation therapy support the hypothesis that this therapeutic action can positively influence hearing in these clinical conditions.

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### Intervention in people with tinnitus: Widex Zen Therapy Program

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**Background:** Tinnitus is the perception of a sound in the absence of an external sound source. It is estimated that 12 to 30% of the adult population suffers from tinnitus with different levels of severity, in the most severe cases it can lead to anxiety, depression and changes in sleep patterns. Widex Zen Therapy (WZT) emerges as an alternative therapeutic approach in cases where causal treatment has not been possible or successful. It has four therapeutic components – counselling, amplification (in the case of hearing loss), Zen fractal tones and relaxation, with the aim that the tinnitus has the least possible negative impact on the patient's quality of life. This study aims to evaluate the effect of the WZT approach in people in whom the main complaint is Tinnitus

**Material and methods:** Thirty-six individuals with significant tinnitus impact (Tinnitus Handicap Inventory (THI)

> 18) and with at least three months of WZT protocol. Of which 14 female (39%) and 22 male (61%), with a mean age of 52.7 years. The sample was divided into two groups: 14 participants (39%) have normal hearing and 22 have hearing loss (61%). All subjects were referred by an ENT doctor. THI was used pre-intervention and after three months of WZT intervention.

**Results:** All subjects received counselling, 92% used the Zen fractal sounds and 75% completed the relaxation exercises, all members of the hearing loss group received amplification (61%), according to hearing loss. The average total THI score of both groups' pre-intervention was 57 points ( $N = 36$ ), with a significant reduction of 21 points on THI after the three months WZT program. 78% decreased at least one level on the five-level THI scale and 19% decreased more than one level. In the group segmented analysis: people with normal hearing had an average THI score of 54 points pre-intervention and reduced 21 points after 3 months of WZT. Participants with hearing loss had an initial mean THI score of 58 points, which reduced 22 THI points after 3 months of WZT.

**Conclusions:** The WZT Program significantly reduces the negative impact of tinnitus regardless of having or not hearing loss. However, its long-term benefits need to be evaluated.

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### Preschool Hearing Screening Program: first evidence study

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**Background:** According to the World Health Organization in 2020, 34 million children around the world have deafness or hearing loss, in which 60% of cases can be prevented. This study intends to identify hearing changes in preschoolers who attend the cluster of schools in the Centro Hospitalar Entre Douro e Vouga, CHEDV's region and to emphasize the value of preschool hearing evaluation in order to prevent long-term effects on the child's overall development. Currently, this type of screening is not carried out in our country.

**Material and methods:** 46 children (92 ears), aged between 4 and 6 years old, were evaluated by Santa Maria da Feira school educators using anamnesis, otoscopy, tympanogram, pure-tone air-conduction at 0.5–4 kHz and vocal audiometry. Children who displayed changes in these assessments were alerted to the assistant doctor and directed to an ENT consultation.

**Results:** We found that 28% of the ears tested had mild hearing loss and 3% had moderated hearing loss, according to BIAP 02/1. In 57% of the instances (40% type C and 17% type B), the tympanogram appeared altered, meaning that the middle ear was altered in more than half of the examined ears. Additionally, 20 of 46 children (43.47% of the cases) were found to have hearing disorders.