P015

AUDITORY OBJECTIVE MEASURES

Distortion product otoacoustic emissions in patients with tinnitus and normal pure-tone thresholds

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Objective

Tinnitus is the perception of sound in the absence of an external source. Cochlear injury is a major cause of tinnitus in patients with hearing loss. The study aims to record otoacoustic distortion product emissions (DPOAEs) in patients with tinnitus and normal hearing and compare them with the DPOAEs of a control group with normal hearing without tinnitus.

Materials and Methods

The study group (SG) included 20 subjects (29 ears) with tinnitus and normal hearing (0.25-8KHz threshold ≤25dBHL) whereas the control group (CG) included 10 healthy volunteers (20 ears) without tinnitus and normal hearing (0.25-8KHz threshold ≤25dBHL). Each ear was tested separately. Consistent with ethical requirements, written consent was obtained from each participant after providing a clear and thorough explanation of the study.

Medical history was recorded for all participants, focusing on otological diseases and medication intake. All participants underwent a complete otolaryngological examination, pure tone audiogram, high-frequency pure tone audiogram, and DPOAEs-gram (L1=55dB, L2=65dB for F2:619-10000HZ). Criteria of acceptance for DPOAE recordings were SNR>7dB, DPOAE>-10dbSPL, noise<-10dBSPL, and normative values according to gender. In addition, participants in the SG completed a detailed tinnitus history as well as the Tinnitus Handicap Inventory (THI) and underwent tinnitus analysis with the MedRx Tinnometer.

Results

The mean age in the SG was 37,8 (SD:7,6), and that of the CG was 36,9 (SD:8,3) (p=0,68) (Fig 1). The mean THI score was 42,7 for the male and 42,6 for the female subjects. The recorded average values of DPOAEs during the DP-gram of the CG were of considerably larger amplitude in most of the tested frequencies than that of the SG (t-test, p<0.05) (Fig.2). Tinnitus assessment showed tinnitus pitch matching at the frequency area in the DP-gram where the acceptance criteria were not met. In participants from SG with tinnitus described as "tone" or "whistling" DPOAEs did not meet the recording criteria for frequencies ≥ 6KHz (Fig.3), while in those whose tinnitus was described as "cicadas" DPOAEs did not meet the recording criteria for frequencies around 4KHz. Patients who did not have DPOAEs at lower frequencies, had a tinnitus sensation higher in intensity and for longer duration, even in noisy environments (Fig 4). It was also observed that in patients with ~ 4KHz tinnitus, these appeared suddenly and with high intensity, while in patients with high-frequency tinnitus ≥ 6KHz, they had a gradual onset and a gradual increase in intensity.

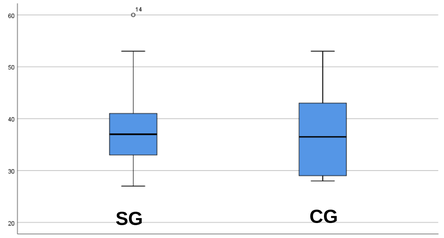

Fig.1. Mean age of SG and CG (p<o.68)

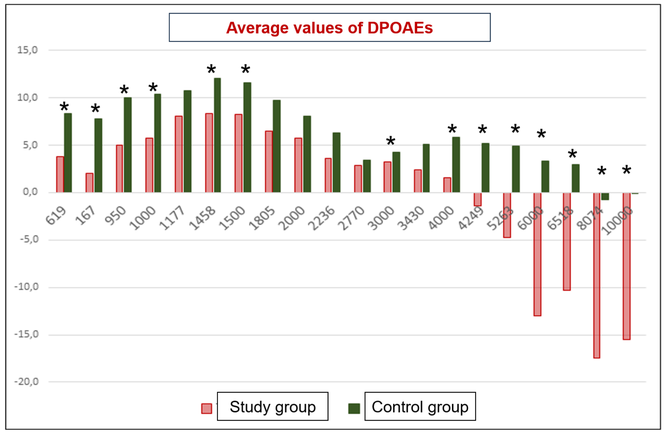

Fig.2. Average values of recorded DPOAEs in SG and CG (p<o.o5)*

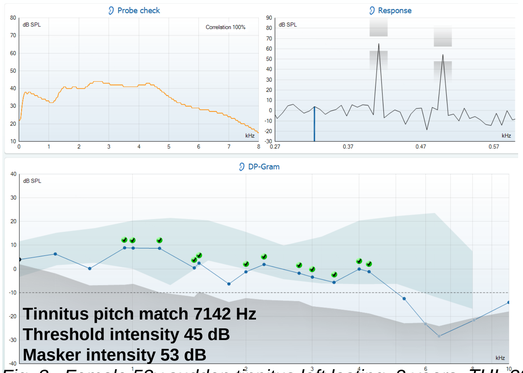

Fig. 3. Female 53y sudden tinnitus left lasting 2 years, THI=32, perceptible 40% of the day

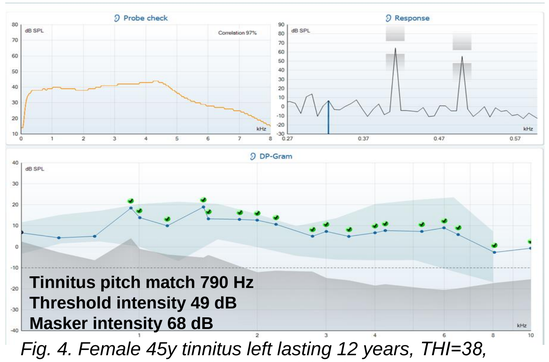

Fig. 4. Female 45y tinnitus left lasting 12 years, THI=38, perceptible 80% of the day

Conclusion

DPOAEs recording is a quick, early diagnostic tool for individuals with tinnitus and normal hearing. Tinnitus may be caused by an incipient cochlear lesion that has not yet affected the pure tone audiogram threshold. Thus, counseling and tinnitus retraining therapy can be offered.

References

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