Forbrain® and Vocal Fatigue in Professional Voice Users

Preliminary Results and Ongoing Research Directions

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This study investigated the impact of the Forbrain® bone-conduction headset on vocal fatigue perception and selected acoustic parameters in singers and professional voice users, with the aim of exploring its preventive potential and informing further device development and protocol optimization. A controlled experimental protocol was implemented, combining validated subjective measures with objective acoustic analysis under standardized recording conditions to ensure repeatability and minimize external variability. Twenty-five participants (mean age 31 years), all intensive voice users, were enrolled after otolaryngological screening (laryngoscopy and videolaryngostroboscopy), which excluded structural or functional laryngeal pathology.

A two-period randomized crossover design with counterbalancing and a 3–7-day washout was adopted, allowing within-subject comparison between device OFF and device ON conditions. Vocal loading tasks included sustained /a/ phonation and a standardized singing task ("Happy Birthday to You"). Acoustic parameters were extracted using Praat (v6.3.9) and included fundamental frequency (F0), intensity, jitter, shimmer, harmonics-to-noise ratio (HNR), and long-term average spectrum (LTAS). Perceived vocal fatigue was monitored in real time using a Visual Analog Scale (VAS) administered every five minutes during loading, while broader subjective outcomes were assessed pre- and post-protocol using VFI, SVHI, and PAPV.

Compared with the OFF condition, device activation was associated with a reduction in vocal intensity and with changes in acoustic quality markers, including an improvement in HNR during sustained phonation and significant differences in LTAS during singing, suggesting a modification of spectral energy distribution and phonatory strategy. VAS data showed a progressive reduction in perceived vocal fatigue with the device ON, with mean ON–OFF differences increasing over time (−0.092 at 5 min; −0.232 at 10 min; −0.848 at 15 min; −0.884 at 20 min; −0.868 at 25 min). Consistent trends were observed in questionnaire outcomes, with decreases from baseline to post-test in VFI (−4.12), SVHI (−5.96), and PAPV (−7.61).

Overall, the findings indicate that Forbrain® use is associated with measurable changes in both subjective fatigue perception and objective acoustic output, compatible with a reduction in vocal effort and a more efficient phonatory pattern. Building on these preliminary results, ongoing research will focus on expanding the sample size and refining the experimental design. Specifically, future protocols will adopt a non-crossover structure in which all participants are assessed first with the device switched off and subsequently with the device switched on, to further limit carryover effects. In addition, a subgroup of participants will be exposed to longer-term device use, enabling evaluation of both short-term and longer-term effects on vocal fatigue and acoustic parameters, to support further device validation and optimization.