26. TRANSCUTANEOUS AURICULAR VAGUS NERVE STIMULATION EFFICACY IN DRUG RESISTANT EPILEPSY TREATMENT

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Introduction. Transcutaneous auricular vagus stimulation (taVNS) modulates the locus coeruleus-norepinephrine (LC-NE) network through impulses delivered to the external ear via Aβ fibers using frequencies mostly between 10-30 Hz which could desynchronize ictal rythms and prevent seizure onset. taVNS might be a viable therapeutic adjunctive option in drug resistant epilepsy, with no response to 2 different medications (25% of all cases).

Aim of study. Assessment of taVNS's impact on neural oscillations via modulation of seizure-free period duration, seizure frequency, P3 event-related potential amplitude, tonic pupil size, salivary cortisol levels, and evaluate potential side effects.

Methods and materials. Clinical trials, prospective studies, and meta-analyses published between 2018 and 2024, using PubMed and ILAE databases with 267 references in total.

Results. Across 3 studies the results at 8, 16 and 24 weeks, displayed average seizure frequency reduction of 36.2%, 49.1%, and 55.6%, compared to the baseline. On average 24% of the participants were reported to be seizure free compared to the control group. In a different study, interictal EEG at 44 weeks displayed a reduction of abnormal findings during wakefulness. LC-NE modulation research reveals heterogeneous outcomes, as taVNS does not induce changes in P3 amplitude and pupil size diameter ($p = 0.3$-0.4), yet a mitigated decrease in salivary cortisol was observed ($p=0.4$). Across 10 studies adverse effects amounted to 10%, most prevalent being headache, skin irritation and ear pain (8.9%, 7.1%, 4.6%).

Conclusion. Research reveals an improved quality of life and seizure control in patients undergoing taVNS. The physiological markers did not seem to be modulated by taVNS, however hormonal responses that would indicate LC-NE network activation were attested. Gaining further insights into optimal adjustment of taVNS parameters which would impede ictal rhythm synchronization without adverse effects is crucial for enhancing effectiveness on a case-by-case basis. This is particularly significant for individuals with drug-resistant epilepsy, as it expands the range of available adjunctive therapeutic options.

Keywords. Drug resistant epilepsy, transcutaneous auricular vagus nerve stimulation, network.