

SEPTINTOJI TARPTAUTINĖ KONFERENCIJA

THE 7th INTERNATIONAL CONFERENCE

2026 m. liepos mėn. 7-10 d., Vilniaus universitetas, LIETUVA

7th-10th of July, 2026, Vilnius University, LITHUANIA

**EVOLIUCINĖ MEDICINA:
ŽMOGAUS RAIDOS PERSPEKTYVOS IR SVEIKATA
BESIKEIČIANČIOJE APLINKOJE**

**EVOLUTIONARY MEDICINE:
PERSPECTIVES ON HUMAN DEVELOPMENT AND HEALTH
CONSEQUENCES IN A CHANGING ENVIRONMENT**

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Vilniaus universiteto Medicinos ir sveikatos mokslų
Doktorantūros mokykla, VU Medicinos fakultetas

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THE EFFECT OF BILATERAL NON-INVASIVE VAGUS NERVE STIMULATION ON STRESS-RELATED SYMPTOMS IN HEALTHY ADULTS

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Background and Aim: Stimulation of the vagus nerve influences symptoms associated with both the hypothalamic–pituitary–adrenal (HPA) axis and the autonomic nervous system. The goal of the study was to evaluate the effect of transcutaneous vagus nerve stimulation on stress related symptoms and compare the effect of unilateral and bilateral stimulation.

Materials and Methods: Approval was obtained from the Vilnius Regional Biomedical Research Ethics Committee. 40 healthy subjects were randomly selected from primary care center. A total of 37 participants (8 men and 29 women) remained throughout the entire study, aged 21–64 y. Three questionnaires (Generalised Anxiety Disorder 7-item scale (GAD-7), Patient Health Questionnaire-9 (PHQ-9), Pittsburgh Sleep Quality Index (PSQI)) were used to evaluate anxiety and depressive symptoms as well as sleep quality during the study. The questionnaires were taken before the study and after four weeks of stimulation.

Results: Significant improvements were observed across all self-reported measures following four weeks of VNS. Depression symptoms (PHQ-9) decreased significantly in both unilateral ($n = 17$, $V = 136$, $p < 0.05$) and bilateral stimulation groups ($n = 20$, $V = 174$, $p = 0.002$). Anxiety symptoms (GAD-7) also showed significant reductions in both subgroups ($n = 17$, $V = 114.5$, $p = 0.002$ unilateral; $n = 20$, $V = 161$, $p = 0.008$ bilateral). Sleep quality, assessed via the PSQI, improved significantly unilateral ($V = 120$, $p < 0.05$) and bilateral stimulation conditions ($V = 186.5$, $p < 0.05$).

Conclusions: This study demonstrates that transcutaneous vagus nerve stimulation (tVNS), particularly bilateral stimulation, may effectively improve self-reported symptoms of depression, anxiety, and sleep disturbance. These findings support the potential of tVNS as a non-invasive intervention targeting physiological and psychological aspects of stress-related disorders.

Keywords: anxiety, depression, sleep quality, transcutaneous vagus nerve stimulation (tVNS)