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Proprioceptive Disorders After Stroke

Troubles de la proprioception post-AVC

1. Systematic Reviews and Meta-Analysis

1.1. Generic Acupuncture

1.1.1. Ren 2025

Ren S, Chen Y, Liu Y, Lv Q, Peng J, Song L, Zou Y, Zhang H, Chen X. Acupuncture for somatosensory deficits after stroke: a systematic review and meta-analysis. Front Med (Lausanne). 2025 Feb 7;12:1504215. https://doi.org/10.3389/fmed.2025.1504215

Objective	This meta-analysis aimed to evaluate the randomized controlled trials (RCTs) of acupuncture for somatosensory deficits after stroke to provide the current best evidence for clinical practice.
Methods	A systematic search was performed for eligible articles on the acupuncture for somatosensory deficits after stroke based on 14 databases. Two reviewers independently screened the RCTs, extracted data, and evaluated the methodological quality. A meta-analysis of RCTs was conducted using STATA 11.0 software.
Results	A total of **57 RCTs were included**. Meta-analysis results showed that compared with the control group, the acupuncture group had a higher effective rate [risk ratio (RR) = 1.21, 95% CI (1.17, 1.24), I 2 = 10.6%, P < 0.001] and a better sensory disturbance score [mean difference (MD) = 5.37, 95%CI (3.81, 6.92), I 2 = 93.9%, P < 0.001]. The Visual Analog Scale in the acupuncture group was lower [MD = -1.44, 95%CI (-1.81, -1.07), I 2 = 94.5%, P < 0.001]. The acupuncture also showed an improvement in the ability of daily living [MD = 12.19, 95% CI (8.50, 15.87), I 2 = 97.2%, P < 0.001] and the symptoms of neurological deficit [Standardized Mean Difference (SMD) = -1.53, 95%CI (-2.04, -1.03), I 2 = 89.7%, P < 0.001].
Conclusions	The current best evidence shows that acupuncture has advantages in raising the effective rate, alleviating sensory disturbance, relieving pain, enhancing the ability of daily living, and improving the symptoms of neurological deficits for somatosensory deficits after stroke compared with the control group. And the adverse reactions in acupuncture group were acceptable. However, further well-designed high-quality and multicenter international studies are needed to verify the effectiveness and safety of acupuncture for somatosensory deficits after stroke.

1.1.2. Zhang 2025

Zhang Z, Yuming H, Huixian Y, Zhang Y. Application of Neuromodulation Techniques in the Treatment of Proprioceptive Disorders After Stroke: A Meta-Analysis of Randomized Controlled Trials. Neural Plast. 2025 Sep 16;2025:1705888. https://doi.org/10.1155/np/1705888

Background	After a stroke, proprioceptive disorders can impair patients' ability to perceive the speed and direction of movement accurately and the spatial position of their limbs, leading to motor dysfunction, including balance and postural control deficits, which severely affect activities of daily living and quality of life. Neural plasticity is a key factor in poststroke recovery. In recent years, neuromodulation techniques targeting neural plasticity have become a major research focus. This study aims to conduct a meta-analysis of the efficacy of neuromodulation techniques in treating proprioceptive disorders in stroke patients.
Methods	A systematic search was conducted in PubMed, Embase, the Cochrane Library, and Web of Science for studies investigating neuromodulation techniques for proprioceptive impairment in stroke patients, from database inception to December 2024. The primary outcome was the change in proprioception.
Results	Nine randomized controlled trials were included, with one study contributing two datasets, for a total of 10 datasets involving 360 patients. In the treatment group, 182 patients received neuromodulation combined with conventional rehabilitation; 178 controls received rehabilitation alone. Overall, meta-analysis found no significant difference between groups (SMD = 0.221, 95% CI = -0.194 to 0.636, p = 0.296). Subgroup analyses by stroke stage also showed no significant differences (acute: SMD = 0.303, 95% CI = -1.300 to 1.905; subacute: SMD = 0.351, 95% CI = -0.200 to 0.903; chronic: SMD = -0.047, 95% CI = -0.634 to 0.539). Subgroup analysis by type of neuromodulation revealed three effective techniques: electroacupuncture (SMD = -0.504, 95% CI = -1.006 to -0.002, p = 0.049), rTMS (SMD = 1.207, 95% CI = 0.246 to 2.168, p = 0.014), and tDCS (SMD = 0.894, 95% CI = 0.323 to 1.465, p = 0.002).
Conclusion	No statistically significant overall effect was found for neuromodulation techniques in treating proprioceptive disorders after stroke, and no differences were observed across stroke stages. However, subgroup analyses suggest that **electroacupuncture**, rTMS, and tDCS may offer therapeutic benefit. These techniques should be prioritized in clinical practice, while further high-quality studies are needed to clarify their efficacy.