

# Non-pharmacological rehabilitation interventions might improve spasticity in adults with Spinal Cord Injury

## Aim

To investigate the effectiveness of non-pharmacological rehabilitation interventions on spasticity in adults with spinal cord injury.

## Methods

- **Systematic Review of Randomized Controlled Trials (RCTs);**
- Six databases were searched on July 29<sup>th</sup>, 2019;
- RCTs addressing effectiveness of non-pharmacological and non-surgical rehabilitation interventions for spasticity in adults with traumatic or non-traumatic spinal cord injury;
- Methodological quality assessed with Cochrane “Risk of Bias Tool” (RoB);
- PROSPERO registration number: *CRD42020155747*.

## Conclusions

Transcutaneous electrical nerve stimulation, whole-body vibration and continuous passive motion might improve spasticity in adults with SCI. But because of **heterogeneity of interventions** and **outcome measures**, **no definitive conclusion** can be drawn. **Further primary studies** are needed to improve the quality of RCTs on the topic.



## Key Results

- **10 studies** (322 participants) included in the analysis:
  - ✓ Therapy with physical agents vs placebo, exercise or sham intervention (5 studies, n=134);
  - ✓ Strengthening exercise vs usual care exercise (1 study, n=30);
  - ✓ Robotic intervention (1 study, n=30);
  - ✓ Continuous passive motion (CPM) vs no treatment or routine physical therapy (3 studies, n=128).
- RoB assessment showed **high risk of bias**.

### Included studies

1. Kapadia N, Masani K, Catharine Craven B, Giangregorio LM, Hitzig SL, Richards K, et al. A randomized trial of functional electrical stimulation for walking in incomplete spinal cord injury: Effects on walking competency. *The Journal of Spinal Cord Medicine*. 2014 Sep;37(5):511–24.
2. Varoqui D, Niu X, Mirbagheri MM. Ankle voluntary movement enhancement following robotic-assisted locomotor training in spinal cord injury. *J NeuroEngineering Rehabil*. 2014;11(1):46.
3. Harvey LA, Herbert RD, Glinesky J, Moseley AM, Bowden J. Effects of 6 months of regular passive movements on ankle joint mobility in people with spinal cord injury: a randomized controlled trial. *Spinal Cord*. 2009 Jan;47(1):62–6.
4. Chang Y-J, Liang J-N, Hsu M-J, Lien H-Y, Fang C-Y, Lin C-H. Effects of Continuous Passive Motion on Reversing the Adapted Spinal Circuit in Humans With Chronic Spinal Cord Injury. *Archives of Physical Medicine and Rehabilitation*. 2013 May;94(5):822–8.
5. Oo WM. Efficacy of Addition of Transcutaneous Electrical Nerve Stimulation to Standardized Physical Therapy in Subacute Spinal Spasticity: A Randomized Controlled Trial. *Archives of Physical Medicine and Rehabilitation*. 2014 Nov;95(11):2013–20.
6. Ping Ho Chung B, Kam Kwang Cheng B. Immediate effect of transcutaneous electrical nerve stimulation on spasticity in patients with spinal cord injury. *Clin Rehabil*. 2010 Mar;24(3):202–10.
7. Kumru H, Benito-Penalva J, Valls-Sole J, Murillo N, Tormos JM, Flores C, et al. Placebo-controlled study of rTMS combined with Lokomat® gait training for treatment in subjects with motor incomplete spinal cord injury. *Exp Brain Res*. 2016;234(12):3447–55.
8. Bye EA, Harvey LA, Gambhir A, Kataria C, Glinesky JV, Bowden JL, et al. Strength training for partially paralysed muscles in people with recent spinal cord injury: a within-participant randomised controlled trial. *Spinal Cord*. 2017 May;55(5):460–5.
9. Rayegani SM, Shojaee H, Seddighpour L, Soroush MR, Baghbani M, Amirani OB. The effect of electrical passive cycling on spasticity in war veterans with spinal cord injury. *Front Neurol*. 2011;2:39.
10. In T, Jung K, Lee M-G, Cho H. Whole-body vibration improves ankle spasticity, balance, and walking ability in individuals with incomplete cervical spinal cord injury. *NRE*. 2018 Jun 29;42(4):491–7.

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## Effectiveness of non-pharmacological rehabilitation interventions in adults with spinal cord injury: a systematic review.

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