TEXAS WOMAN'S UNIVERSITY™

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Effects of Repetitive Transcranial Magnetic Stimulation on Cortical Excitability in Patients with Chronic Pain – A Scoping Review

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Introduction

Background

- rTMS is a non-invasive brain stimulation which has been shown to produce analgesic effects in patients with chronic pain.
- It is unclear whether rTMS has an effect on cortical excitability in patients with chronic rTMS.

Purpose

- To examine the current information available regarding the usage and the effects of rTMS on cortical excitability in those with chronic musculoskeletal conditions.

Methods

- Use of the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) to guide this scoping review.

Search Strategy

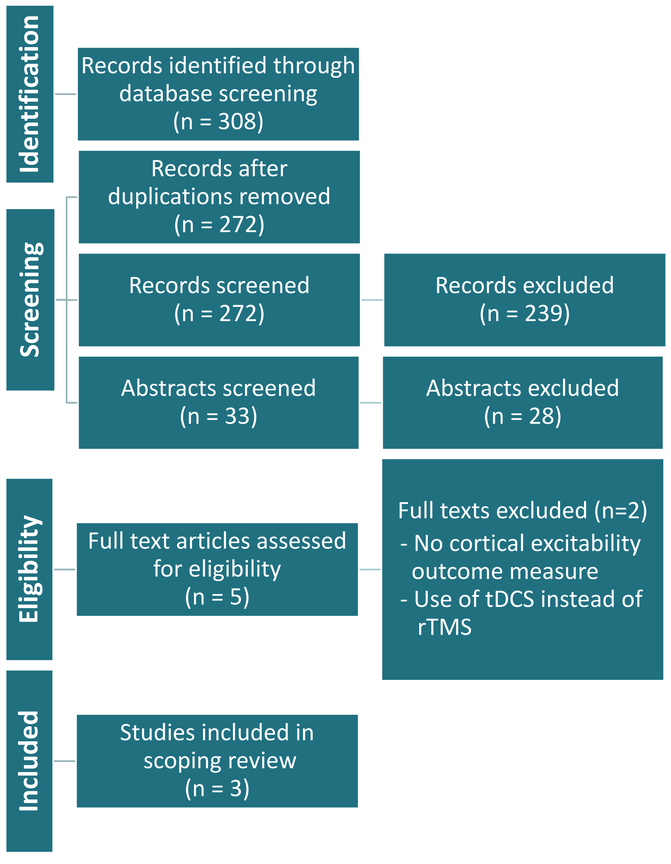
- *Electronic databases:* PubMed, CINAHL, Scopus
- *Search string*: "brain stimulation" OR "repetitive transcranial magnetic stimulation") AND ("cortical excitability" OR "brain excitability") AND (pain)
- Inclusion criteria: Randomized controlled or clinical trials, musculoskeletal conditions, human subjects, in English

Quality Assessment

- Physiotherapy Evidence Database (PEDro) scale (0-10)

Search Results

PRISMA Flow Diagram



Study Quality

- 2 studies of high quality (PEDro score ≥ 8)
- 1 study of low quality (PEDro = 2/10)

	Dall'Agnol et al. (2014) PEDro Score = 9	Mhalla et al. (2011) PEDro Score = 8
Study Population	Chronic myofascial pain syndrome • Active rTMS (*n* = 12) • Sham rTMS (*n* = 12)	Fibromyalgia • Active rTMS (*n* = 16) • Sham rTMS (*n* = 14)
rTMS	• Stimulation site: M1 • Dosage: 10 Hz, 16 series of 10s stimulation pulses (a total of 1,600 pulses), inter-stimulation interval: 26s • EMG recording site: left first dorsal interosseous muscle	• Stimulation site: M1 • Dosage: 10 Hz, 15 series of 10s pulses (a total of 1,500 pulses), inter-stimulation interval: 50s • EMG recording site: left first dorsal interosseous muscle
Results	• rTMS had greater increase of **MEP**s value by 52% than sham rTMS • rTMS had a greater decrease of **ICF** values by 24% than sham rTMS • No difference in **SICI** values • No difference in **CSP**	• No significant difference in **MEPs** • rTMS had a greater increase of **ICF** values than sham rTMS • rTMS had a greater increase of **SICI** value than sham rTMS • Did not collect **CSP**

Cortical Excitability Parameters – MEP: motor evoked potential, ICF: intracortical facilitation, SICI: short-intracortical inhibition, CSF: cortical silent period.

Discussion & Conclusion

Discussion

- Limited, moderate-quality, inconclusive evidence for effects of rTMS on cortical excitability
- Conflicting results could be due to different assessment settings for cortical excitability parameters or that MEPs were not collected from the painful area.

Conclusion

- Further research should assess cortical excitability corresponding to the painful area (i.e., EMG recording site) for examining the effects of rTMS on cortical excitability.