Neuroimaging studies have indicated that this occurs through activation of the nociceptive systems. Experimental trials on pain perception by modulating nociceptive processes have been conducted.

Objective

The aim of the present study was to examine whether WM engagement leads to pain inhibition and how this could be modulated by tDCS and whether this effect involves descending inhibition of spinal nociceptive transmission.

Methods

Participants: Forty healthy volunteers (23 women and 17 men; range 19-38 years; mean ± standard deviation [SD], 25.77 ± 4.61 years).

Experimental design

The protocol included five blocks of 60 trials as a baseline without brain stimulations, repeated once during tDCS (sham or anodal). Participants verbally rated their mean pain intensity and pain-related anxiety after each block which contain painful electrical stimuli (ES).

Results

WM and selective attention inhibited pain

Figure 3.

- (A) Accuracy was significantly decreased by painful distractors, in the 0-back condition only (p=0.04).
- (B) Pain intensity was decreased by the 0-back and the 2-back (both p<0.001).
- (C) NFR amplitude was decreased by the 0-back (p=0.000) but not by the 2-back condition.

Improvement of WM by anodal tDCS

Figure 4.

- (A) Anodal tDCS decreased reaction times in the 2-back condition alone (p=0.001) and the 2-back with painful stimulation (p=0.002).
- (C) and (D) No significant effect on accuracy by either anodal or sham tDCS, except for accuracy during the 2-back task with painful stimulation that tended to be improved by anodal tDCS (p=0.057).

Improvement of pain inhibition by WM with anodal tDCS

Figure 5.

- (A) Pain inhibition by 2-back task was marginally enhanced by anodal tDCS (p=0.052), while pain or pain inhibition by 0-back were not significantly affected compared with baseline.
- (B) Sham tDCS did not produce significant effect for any of the 3 conditions compared with baseline.

Acknowledgement

This project was funded by the Natural Science and Engineering Research Council (NSERC) of Canada. Nabi Rustami was supported by a grant from the Fondation Chiropratique de Recherche du Québec.

References