

# ORIGINAL RESEARCH

## ANODAL TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS) INCREASES ISOMETRIC STRENGTH OF SHOULDER ROTATORS MUSCLES IN HANDBALL PLAYERS

Fuad Ahmad Hazime<sup>1,4</sup>  
Ronaldo Alves da Cunha<sup>2</sup>  
Renato Rozenblit Solieman<sup>2</sup>  
Ana Clara Bezerra Romancini<sup>2</sup>  
Alberto de Castro Pochini<sup>2</sup>  
Benno Ejnisman<sup>2</sup>  
Abrahão Fontes Baptista<sup>3</sup>

### ABSTRACT

**Background:** Weakness of the rotator cuff muscles can lead to imbalances in the strength of shoulder external and internal rotators, change the biomechanics of the glenohumeral joint and predispose an athlete to injury. Transcranial direct current stimulation (tDCS) is a non-invasive brain stimulation technique that has demonstrated promising results in a variety of health conditions. However few studies addressed its potential approach in the realm of athletics.

**Hypothesis/Purpose:** The purpose of this study was to investigate if transcranial direct current stimulation (tDCS) technique increases the isometric muscle strength of shoulder external and internal rotators in handball athletes.

**Study Design:** Randomized, double-blind, placebo-controlled, crossover study.

**Methods:** Eight female handball players aged between 17 and 21 years (Mean=19.65; SD=2.55) with 7.1 ± 4.8 years of experience in training, participating in regional and national competitions were recruited. Maximal voluntary isometric contraction (MVIC) of shoulder external and internal rotator muscles was evaluated during and after 30 and 60 minutes post one session of anodal and sham current (2mA; 0.057mA/cm<sup>2</sup>) with a one-week interval between stimulations.

**Results:** Compared to baseline, MVIC of shoulder external and internal rotators significantly increased after real but not sham tDCS. Between-group differences were observed for external and internal rotator muscles. Maximal voluntary isometric contraction of external rotation increased significantly during tDCS, and 30 and 60 minutes post-tDCS for real tDCS compared to that for sham tDCS. For internal rotation MVIC increased significantly during and 60 minutes post-tDCS.

**Conclusions:** The results indicate that transcranial direct current stimulation temporarily increases maximal isometric contractions of the internal and external rotators of the shoulder in handball players.

**Level of Evidence:** 2

**Key words:** Isometric contraction, handball, shoulder rotator muscles, Transcranial direct current stimulation (tDCS)

<sup>1</sup> Department of Physical Therapy. Federal University of Piauí, Piauí, Brazil.

<sup>2</sup> Sports Traumatology Center. Federal University of São Paulo, São Paulo, Brazil.

<sup>3</sup> Laboratory of Functional Electrical Stimulation, Department of Biomorphology, Federal University of Bahia, Salvador, Brazil.

<sup>4</sup> Department of Physical Therapy, Speech-Language and Hearing Science and Occupational Therapy of the Medical School, University of São Paulo, Brazil. Postgraduate Program in Rehabilitation Sciences of the Medical School, University of São Paulo, Brazil.

#### Conflict of interest

The authors have no conflicts of interest to declare.

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#### CORRESPONDING AUTHOR

Fuad Ahmad Hazime

<sup>1</sup>Department of Physical Therapy. Federal University of Piauí

Piauí, Brazil

E-mail: fuad@ufpi.edu.br.

Phone: + 55863323-5209