DOI: *http://dx.doi.org/10.18502/cjn.v22i3.13793*

Current Journal of Neurology

Original Paper

Curr J Neurol 2023; 22(3): 155-61

The role of transcranial direct current stimulation in diminishing the risk of pneumonia in patients with dysphagia: A double-blinded randomized clinical trial

Received: 09 Mar. 2023
Accepted: 10 May 2023

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Keywords
Deglutition; Stroke; Electrical Stimulation; Transcranial Direct Current Stimulation; Randomized Clinical Trial; Dysphagia; Pneumonia

Abstract

Background: Dysphagia can be a life-threatening issue for post-stroke patients, with aspiration pneumonia (AP) being a common risk. However, there is hope through the potential combination of transcranial direct current stimulation (tDCS) and classical behavior therapy. Our study aims to investigate the effectiveness of this combination in diminishing the risk of AP in patients with dysphagia who suffered from stroke.

Methods: In this randomized, parallel-group, blinded clinical trial, 48 patients were allocated into the sham group (speech therapy + 30 seconds of tDCS) and the real group (speech therapy + 20 minutes of tDCS). We used the Mann Assessment of Swallowing Ability (MASA) as an assessment tool. We assessed patients at baseline, one day after treatment, and at a one-month follow-up.

How to cite this article: Farpour S, Asadi-Shekaari M, Borhani-Haghighi A, Farpour HR, Rostamihosseinkhani M. The role of transcranial direct current stimulation in diminishing the risk of pneumonia in patients with dysphagia: A double-blinded randomized clinical trial. Curr J Neurol 2023; 22(3): 155-61.

Published by Tehran University of Medical Sciences

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AP; therefore, instrumental assessments such as chest X-ray was not performed for any patient. On the other hand, silent aspiration is a very important issue which can be undiagnosed during clinical assessments. Silent aspiration can be detected via video fluoroscopic swallowing (VFS) assessment. Therefore, we recommend conducting such studies with more objective ways to detect AP and silent aspiration in the future.

None of the patients in this study developed AP at any stages of assessment. It seems that regardless of the type of treatment, dysphagia therapy of any kind has the potential to prevent AP; however, speech therapy combined with tDCS would be an ideal. This result is in the same line with previous results which showed swallowing therapy would reduce AP rate in patients with post-stroke dysphagia.[9,10] Despite these advances, we should remember that these studies, as well as ours, investigated the risk of AP in the acute onset phase, which may develop within the first month after a stroke.[31] However, we should also consider the chronic phase, which develops one-month after stroke. Therefore, we recommend that such studies be conducted in the chronic phase of stroke in the future.

On the other hand, dysphagia is not the only risk factor of AP, and there are other factors which have the potential to develop this disease, such as dependency on eating/drinking, oral health, enteral feeding, polypharmacy, malnutrition, and smoking.[32,33] Therefore, it is recommended that the patients should be managed from a holistic point of view. Using pharmacological treatments alongside rehabilitation techniques including physical and pulmonary rehabilitation as well as dysphagia rehabilitation combined with appropriate nutritional management are recommended to manage AP effectively.[30,31]

However, we should consider that even VFS is unable to detect aspiration of small amounts of oropharyngeal secretions such as saliva aspiration during sleep or after finishing the assessment process. These micro-aspirations have the potential to develop AP. Therefore, alongside the approaches which we mentioned before, we should consider a comprehensive approach to prevent aspiration at home.[34]

Some of these techniques are regarding preparing the meals such as: changing the physical properties of the meals under the supervision of swallowing experts which can be done by using thickeners to modify the texture of the diet,[34,35] changing the temperature of, and spices in the meals which can stimulate the transient receptor potential (TRP) receptors that have the potential to sharpen the swallowing and cough reflexes. Hot temperatures above 60 ˚C have the potential to stimulate TRP vanilloid 1 (TRPV1) receptors and cold temperatures below 17 ^{0}C have the potential to stimulate TRP melastatin 8 (TRPM8) receptors. On the other hand, spices such as chili peppers and mint have the potential to stimulate TRPV1 and TRPM8 receptors, respectively. The other techniques are sitting and holding position after meals and oral care. It is recommended that people who are at risk of developing aspiration such as elderly people and patients with dysphagia are placed with a head-of-bed elevated to 30˚ or higher known as a "semi-recumbent position" after taking meals for two hours. Studies show that oral care which can reduce gram-negative bacteria has the potential to prevent the onset of pneumonia.[34]

Conclusion

Swallowing management of any type may decrease the risk and the severity of AP. However, holistically viewing AP and complementing classical speech therapy techniques with the new neuro-rehabilitation ones would be ideal. There is a need for further studies in implementing these new neuro-rehabilitation techniques to individualize these techniques for all types of patients. Besides, to draw a better picture of developing AP, we recommend conducting studies on the stroke population in chronic phase. Moreover, there is a need to develop guidelines to avoid malpractice.

Conflict of Interests

The authors declare no conflict of interest in this study.

Acknowledgments

This manuscript was a part of the PhD thesis by Sima Farpour that was approved by the Vice-Chancellor of Research, Kerman University of Medical Sciences. The study method was approved by the Medical Ethics Committee of Kerman University of Medical Sciences with the reference number "IR.KMU.REC.1399.366".

The authors would like to thank Kerman Neuroscience Research Center, Kerman University of Medical Sciences, for their funding support, Shiraz University of Medical Sciences and also Center for Development of Clinical Research of

Nemazee Hospital, Shiraz, for their statistical support, and Dr. Nasrin Shokrpour for editorial assistance. The authors also would like to thank all the patients and their families/care givers and all the residents, head nurses, and nurses who helped in conducting this project.

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