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Transcranial Direct Current Stimulation Is Safe and Relieves Post-Herpetic Neuralgia in Patient with Dermatomyositis: A Case Report

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Abstract

To the best of our knowledge, this is the first report in the literature showing the efficacy of transcranial direct current stimulation (tDCS) in treating refractory post-herpetic neuralgia in a patient with dermatomyositis. In addition, our results showed that tDCS sessions are safe and do not lead to disease relapse. Therefore, despite the limitations of being a case report, this study provides encouraging results that need to be widely explored in studies with a representative number of patients and with an appropriate design for patients with this systemic rheumatic autoimmune disease.

Keywords

Cerebral Neuromodulation, Dermatomyositis, Neuralgia, Pain, Treatment

1. Introduction

Transcranial direct current electrical stimulation (tDCS) is a non-invasive brain stimulation technique that has been widely studied for the treatment of chronic pain, including neuropathic pain [1] [2] [3] [4]. In general, this technique is well tolerated, safe, without significant adverse effects, and is capable of inducing neuroplasticity and modulating cortical excitability to modulate the pain [1] [2] [3] [4].

Dermatomyositis is a rare systemic autoimmune myopathy characterized by symmetrical and predominantly proximal muscle weakness in the limbs and classical cutaneous lesions [5].

Currently, few studies have assessed tDCS in systemic autoimmune myopathies, including dermatomyositis [6] [7]. Of note, De Sousa *et al.* showed that this tech-

nique is also safe in these autoimmune diseases, without disease relapse [6].

To the best of our knowledge, no studies have assessed the safety and potential effects of tDCS in treating refractory post-herpetic neuralgia in a patient with dermatomyositis.

2. Case Report

The patient was a 49-year-old white woman with definite dermatomyositis (European League against Rheumatism/American College of Rheumatology classification criteria [5]) since 2016. The patient was promptly treated with methylprednisolone and intravenous human immunoglobulin pulse therapies multiple times, in addition to several immunosuppressive drugs (azathioprine, methotrexate, and/or leflunomide), and immunobiological therapy (rituximab and abatacept) in our tertiary center. The disease was controlled within three weeks with tofacitinib (5 mg every 12 h, orally). In 2019, she presented with a herpes zoster infection (5th right thoracic dermatome) that was treated orally with acyclovir, and tofacitinib was temporarily suspended. Owing to new cutaneous disease relapse, tofacitinib was reintroduced immediately, with sustained remission thereafter. However, the patient had refractory post-herpetic neuralgia, despite the use of gabapentin, duloxetine, and pregabalin.

Because of the poor control of painful symptoms with pharmacotherapy, the patient underwent five daily tDCS sessions with an electric current intensity of 2 mA for 20 min on five consecutive days. The anode and cathode were positioned according to the 10/20 International EEG System at C3 (contralateral to the dominant limb) and at supraorbital region Fp2 (ipsilateral to the dominant limb), respectively.

The protocol was part of our previous study, which was approved by our local ethics committee (CAAE 16768219.7.1001.0068), and the patient was informed of it and signed the informed consent protocol.

During the sessions, the patient underwent combined systemic exercises (e.g., aerobic and strength exercises). The routine consisted of a 5-min warm-up on a treadmill (low intensity on the Borg scale) followed by strength exercises: bench press, bench-squat, cable seated row, and leg press at 45˚ (three series of 10 - 12 repetitions with a rest interval between 45 and 60 s, with light intensity). Finally, the patient performed a 5-min walking exercise on a treadmill. All these activities were conducted in 2019 in our institution.

Disease status was evaluated at baseline and after 45 days, using the International Myositis Assessment and Clinical Groups Studies (IMACS) set scores [8]: patient's visual analog scores (VAS) (range value: 0.0 to 10.0 cm), physician's VAS (0.0 to 10.0 cm), Manual Muscle Testing-8 (MMT-8) (0 to 80), Health Assessment Questionnaire (HAQ) (0.00 to 3.00), Myositis Disease Activity Assessment VAS (MYOACT) (0 to 60), and serum level of creatine phosphokinase (75 to 230 U/L). In addition, to understand the multidimensional impact of pain and its intensity, the Pain Quality Assessment Scale (PQAS) [9], McGill Pain Questionnaire (McGill) [10], and Short Form Health Survey (SF-36) [11] ques-

tionnaires were used. The perceptual changes were expressed by the delta formula: $\Delta = [(\text{post-pre})/\text{pre}] \times 100$, where "pre" is baseline, and "post" is 45 days after the last tDCS intervention.

No significant changes were observed in the IMACS set scores; patient's VAS was 1.0 cm and 0.2 cm, at baseline and after 45 days, respectively; physician's VAS was 0.0 cm and 0.0 cm; MMT-8 was 80 and 80; HAQ was 0.12 and 0.00; MYOACT was 0.0 and 0.0; serum levels of creatine phosphokinase were 73 and 76 U/L, respectively.

Concerning post-herpetic neuralgia, we found improvement in pain and general health in the SF-36 (Figure 1(a)) and a significant reduction in sensory,

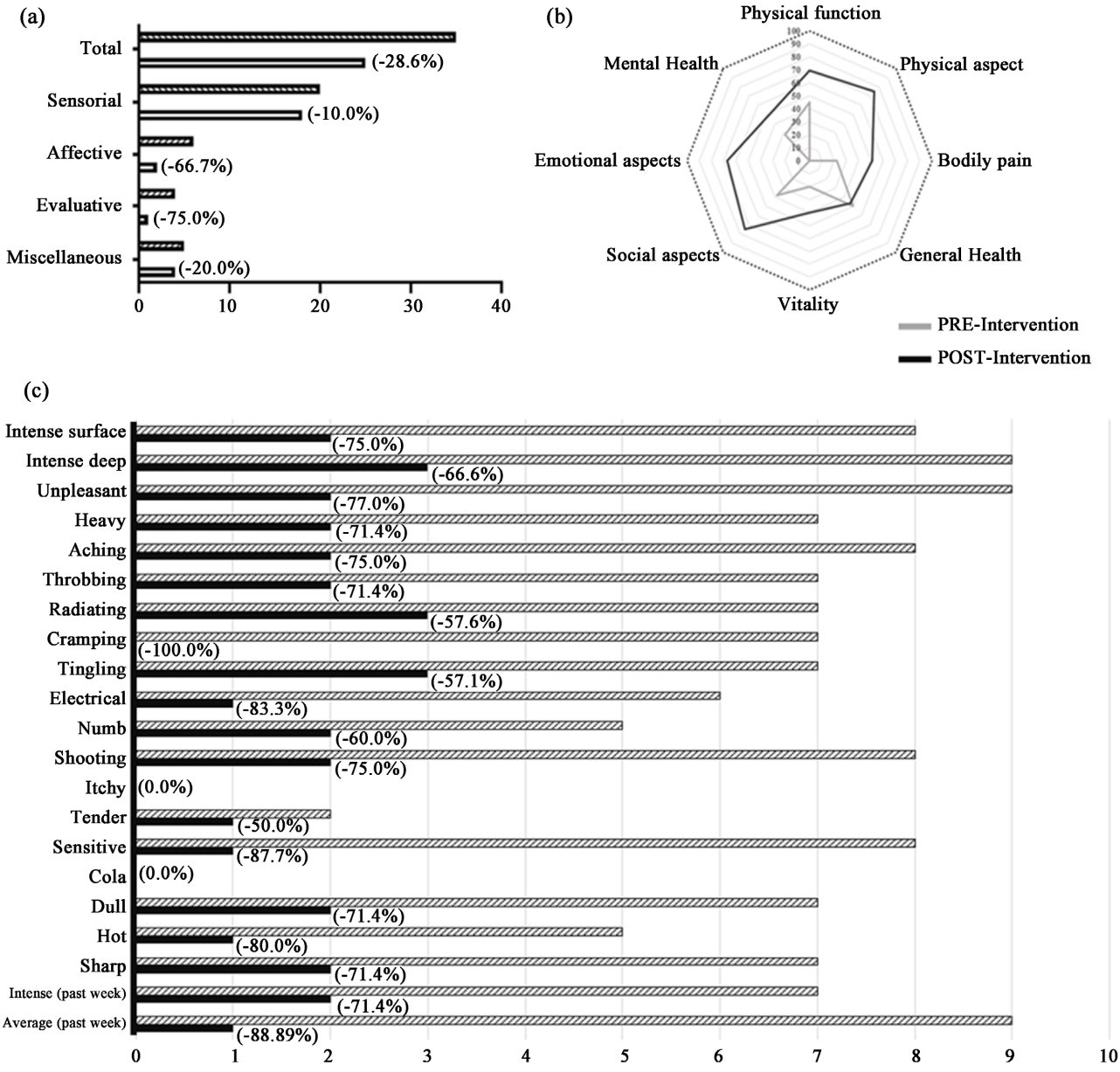

Figure 1. Pain assessment (a), quality of life (b) and general health (c) in the patient with dermatomyositis from the present study.

miscellaneous, affective, and total pain scores (**Figure 1(b)**), based on the McGill questionnaire. Moreover, a reduction in pain and its variants was observed on the basis of the PQAS questionnaire (**Figure 1(c)**). Finally, the patient reported no differences in relation to her physical activity, and she performed no structured exercise program during the post-intervention period.

3. Discussion

Our results showed that tDCS sessions were safe and did not lead to disease relapses. The patient also experienced notable pain reduction, as assessed by multidimensional pain questionnaires and, in particular, a significant improvement in post-herpetic neuralgia.

Studies have demonstrated the impact of pain on the quality of life of patients with dermatomyositis. tDCS is commonly used for pain management in patients with fibromyalgia [12] and neuropathic pain [1] [2] [3]. Currently, few studies have assessed tDCS in dermatomyositis [6] [7]. In general, tDCS appears to be safe, without disease relapse [6] [7].

To corroborate these studies, our data showed that tDCS was safe and effective in the control of pain in refractory post-herpetic neuralgia in a patient with dermatomyositis. In addition, we included physical training simultaneously with tDCS. The aim was to increase the integration between the central and peripheral stimuli, increase the connectivity of the neural network, and improve the patient's symptoms. In addition, as shown by the results, there was significant improvement in the patient's quality of life.

Despite the limitations of being a case report, this study provides encouraging results that need to be widely explored in studies with a representative number of patients and with an appropriate design for patients with dermatomyositis.

In conclusion, this study showed that tDCS is safe and effective on post-herpetic neuralgia in a patient with dermatomyositis.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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