TRANSCRANIAL DIRECT CURRENT ELECTRICAL STIMULATION ASSOCIATED WITH AEROBIC EXERCISE IS SAFE AND EFFECTIVE IN REDUCING PAIN AND FATIGUE ASSOCIATED WITH POST-COVID-19 SYNDROME IN PATIENTS WITH SYSTEMIC AUTOIMMUNE RHEUMATIC DISEASES: A PILOT OPEN STUDY

Rafael Giovane Missé^{1,*}, Alexandre Moura dos Santos¹, Isabela Bruna Pires Borges¹, Marlise Sitima Mendes Simões¹, Lorenza Rosa Silveiro¹, Bruna Lindoso Correia¹, Ana Wook Sook Kim¹, Aline Marques Caetano¹, Sandra Gofinet Pasoto¹, Carla Gonçalves Schahin Saad¹, Diogo Domiciano Souza¹, Clarice Tanaka¹, Júlia Maria D'Andrea Greve¹, Abrahão Fontes Baptista¹, Samuel Katsuyuki Shinjo¹

1.Universidade de São Paulo, São Paulo (SP), Brazil.

*Corresponding author: rafael.gmisse@fm.usp.br

BACKGROUND

Currently, no studies have evaluated the safety and efficacy of transcranial direct current stimulation (tDCS) in systemic autoimmune rheumatic disease patients with fatigue and pain-associated with post-COVID-19 syndrome.

METHODS

This was a pilot experimental study from March 2021 and June 2021 that included nine patients (three with rheumatoid arthritis, two with spondylarthritis, two with Sjögren's syndrome, one with systemic erythematous lupus, and one with antisynthetase syndrome). All patients had confirmed RT-PCR COVID-19, as well as significant persistent (more than 12 weeks) pain or fatigue clearly associated with post-COVID-19 syndrome. The tDCS was administered in five consecutive daily sessions with 2 mA for 30 min on the C3 or C4 (contralateral the dominant limb) and negative electrode was placed in the supraorbital region (FP2) ipsilateral to the dominant limb. In addition, the patients were submitted to concomitant aerobic exercise controlled by Borg perceived exertion. The patients were evaluated in three periods: within one week before and after tDCS intervention, as well as 30 days after the intervention. Disease status was assessed by current experts' guidelines. The impact of post-COVID-19 syndrome on the disease was assessed by visual analog scale (VAS). The pain was assessed by VAS, and fatigue was assessed by fatigue severity scale (FSS), modified fatigue impact scale (MFIS), and fatigue assessment chronic illness therapy (FACIT). The quality of life was assessed by EuroQual (EQ-5D), and physical activity by IPAQ. Mobility and muscle resistance were assessed by the timed up and go and sit-to-stand tests, respectively.

RESULTS

The samples were composed of eight women and one man, with a mean age of 48.7 ± 9.6 . All patients had stable disease; 50.6% were using prednisone (6.0 [IQR 0.0–6.0] mg/day) and 5.9% were using immunosuppressive drugs. Seven and two patients showed a low and moderate physical activity levels, respectively. After tDCS intervention, the VAS for pain and fatigue reduced significantly (Table 1). Moreover, the physical domains of the fatigue and physical function improved significantly. All these improvements were maintained for at least 30 days, when patients were re-evaluated. No adverse effects or disease relapses were observed in all protocols, which had 100% of patients' adherence.

CONCLUSION

The present pilot study shows that tDCS associated with aerobic exercise was safe and effective in significantly reducing the fatigue and pain in systemic autoimmune rheumatic disease patients with post-COVID-19 syndrome. Clinical trials: NCT04890483.

FUNDING

FAPESP Grant No. 2019/12155-5 (RGM), Grant No. 2019/11367-9 (IBPB), Grant No. 2019/11776-6 (SKS); CNPq Grant No. 303379/2018-9 (SKS).

KEYWORDS

Systemic autoimmune rheumatic diseases, Post-COVID-19 syndrome, Long-COVID, Pain, Fatigue.

Table 1. Pain, fatigue, physical function, and strength before and after tDCS intervention

	Pre-tDCS	Post-tDCS	P value
Pain VAS (0–10)	7.8 ± 1.7	2.7 ± 1.5	0.011
Fatigue VAS (0–10)	6.8 ± 2.1	1.7 ± 1.3	0.007
MFIS domains			
Physical (0–36)	23.2 ± 2.2	19.1 ± 1.8	0.026
Cognitive (0–40)	21.0 ± 5.6	21.6 ± 6.3	0.583
Psychosocial (0–8)	4.3 ± 2.9	3.7 ± 1.3	0.516
FACIT domains			
Physical well-being (0–28)	15.4 ± 5.0	20.1 ± 5.0	0.005
Family and social well-being (0–28)	16.4 ± 3.6	17.0 ± 3.7	0.697
Emotional well-being (0–24)	16.3 ± 4.4	19.3 ± 4.4	0.052
Functional well-being (0–28)	15.3 ± 6.1	17.6 ± 3.9	0.225
Physical function			
Timed-up-go test (s)	9.5 ± 2.7	6.8 ± 0.8	0.012
Sit-to-stand test (reps)	10.3 ± 3.7	15.1 ± 4.0	0.011
Strength			
Handgrip (kg)	21.1 ± 5.7	24.5 ± 8.3	0.204

FACIT: Fatigue assessment chronic illness therapy; MFIS: modified fatigue impact scale; VAS: visual analog scale.