Kaohsiung Journal of Medical Sciences (2018) 34, 360–362

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://www.kjms-online.com

Letter to the Editor

Transcranial direct current stimulation (tDCS) improved psychomotor slowness and decreased catatonia in a patient with schizophrenia: Case report

Dear Editor,

Psychomotor slowness and catatonia in schizophrenia could be associated with the limbic system, the hippocampus, and the dorsolateral prefrontal cortex (DLPFC) [1]. Transcranial direct current stimulation (tDCS) is getting known as a safe, non-invasive neurostimulation technique for treating patients suffering from these conditions; however, the clinical evidence regarding the efficacy of tDCS in treating psychomotor slowness and catatonia is very scarce [2,3].

A 40-year-old female patient with schizophrenia had received a long-acting antipsychotic (flupentixol decanoate, 20 mg per 4 weeks) for 17 years. However, motor slowing, mild depression, a lesser influence of external stimuli, motor stereotypies, and sometimes reaching the point of immobility were gradually noted over several months. She demonstrated mild catatonic excitement and stupor. Sometimes the patient stayed in her car at the parking lot for hours, after finish her working hours, while the patient was unable to explain why demonstrate this behavior when she was found by family members. Also the patients would park her car on the roadside until night, without any explanation. Given the presence of psychomotor retardation and mild depression, the prescription was changed to different kinds of oral antipsychotics several times. Under treatment with bupropion 150 mg/day, amantadine 100 mg/day, propranolol 20 mg/day, amisulpride 400 mg/day and diazepam 10 mg/day for 6 weeks, little to get improved. Add-on treatment with tDCS was therefore recommended, and the patient and her legal proxy consented to participate in this trial.

At baseline, the Bush-Francis Catatonia Rating Scale (BFCRS), the Positive and Negative Syndrome Scale (PANSS), and the Clinical Global Impression – Severity (CGI-S) were indices of catatonia, clinical syndromes, and disease severity, respectively. The patient's general cognitive ability presented a defective profile in Montreal Cognitive Assessment (MoCA). Deficits in attention control, manual dexterity, executive functions, working memory and verbal learning were verified (Table 1).

The patient underwent tDCS sessions on 10 consecutive days, excluding the weekend, with the anode on the left dorsal lateral prefrontal cortex (F3) and the cathode on the collateral side (F4). Each session consisted of the same stimulation protocol (i.e., 2 mA direct current for 20 min) [3]. Outcome assessment was conducted after the final tDCS session, followed by a one-month follow-up assessment.

Outcome assessment showed that, in terms of the immediate effect after treatment, the patient got improved in motor function, executive functions, verbal working memory, and processing speed, among them, the motor function seemed to benefit most from it. However, only some improvement hold over in the executive functions and processing speed after one-month follow-up. Noted that we couldn't administer FTT at follow-up again due to patient's uncooperativeness, despite this, the sustained effect in processing speed partially confirmed the patient's motor function may keep improved. The promising effect of tDCS on the patient's motor function could also be confirmed by the severity of catatonia decreased right after the treatment, although the score of BFCRS nearly bounced back at the follow-up. Nonetheless, the psychiatrist obtained that the patient's attention was worse

Conflicts of interest: All authors declare no conflicts of interests.

https://doi.org/10.1016/j.kjms.2017.12.003

Table 1 Neuropsychological profile and clinical symptomatology ratings.

Domain	Test	Baseline	Post tDCS	1-month F/U
Global Cognition	MoCA	20	23 +	25 +
Executive Function	WCST			
	Perseverative errors	13	10 +	7 +
	Complete categories	1	3 +	4 +
	CTT			
	Trial 2	127$^{\delta}$	104$^{\delta}$ +	80$^{\delta}$ +
Processing Speed	Trial 1	54$^{\delta}$	60$^{\delta}$ −	35$^{\delta}$ +
Manual Dexterity	FTT			
	Right	29	46 +	N/A
	Left	24	39 +	N/A
Attention	CPT-AX			
	Hit in task A	29	31 +	28 −
	Hit in task B	30	26 −	20 −
Working Memory	WAIS-R			
	Digit span total	23	26 +	25 −
	Digit span backward	10	12 +	12 =
	WMS-R			
	Spatial span total	14	14 =	15 +
	Spatial span backward	7	7 =	7 =
Verbal Learning	Logical memory I	10	17 +	11 −
	Logical memory II	10	15 +	4 −
Linguistic Function	Verbal Fluency Test			
	Semantic retrieval	27	30 +	30 =
Catatonia	BFCRS	7	3	6
Symptomatology	PANSS	68	52	48
Disease Severity	CGI-S	5	4	4

+ Indicates improvement of test performance; − Indicates decreased performance; = Indicates plateau; δ Indicates values of time in seconds.
Abbreviations: MoCA (Montreal Cognitive Assessment), WCST (Wisconsin Card Sorting Test), CTT (Color Trails Test), FTT (Finger Tapping Test), CPT-AX (Continuous Performance Test — AX version), WAIS-R (Wechsler Adult Intelligence Scale — Revised), WMS-R (Wechsler Memory Scale — Revised), BFCRS (Bush-Francis Catatonia Rating Scale), PANSS (Positive and Negative Syndrome Scale), and CGI-S (Clinical Global Impression — Severity). The Verbal Fluency Test was adopted from the Multilingual Aphasia Examination.

than the one obtained at baseline, as also evidenced by the test performance in the CPT. According to the recent literature reviewing the applicability of tDCS in clinical trials [4], we should aware that the parameters of tDCS can vary a lot and that different effects, also side effects, derive from association between intra-individual variables and the parameter settings. Although little is known about the specific mechanism of tDCS in brain repair [4], we observed improved manual dexterity, executive functions, verbal working memory and processing speed immediately after the intervention phase as Table 1 shows. We speculated that the left DLPFC could be a potential mediator that exerts control over general cognitive processing, which benefited from restored executive function via regulation of subcortical activity and communication with other association cortex, as Northoff hypothesized and termed "vertical modulation" and "horizontal modulation" [5]. Noted that our result was contrary to the findings of another case report [3], the effect of tDCS did not appear to be long-lasting. Whether this effect could be sustained is still an unresolved question [2,4], a large-scaled, randomized controlled trial is needed to further address this issue.

Acknowledgments

This study was supported by grant from the Ministry of Science and Technology, R.O.C. (MOST 106-2314-B-006-036). The authors wish to thank Wei Hung Chang, Kao Chin Chen,and Po See Chen from National Cheng Kung University Hospital for their administrative support.

References

[1] Harrison PJ. The neuropathology of schizophrenia. Brain 1999; 122:593—624.
[2] Mondino M, Brunelin J, Palm U, Brunoni AR, Poulet E, Fecteau S. Transcranial direct current stimulation for the treatment of refractory symptoms of schizophrenia. Current evidence and future directions. Curr Pharm Des 2015;21:3373—83.
[3] Shiozawa P, da Silva ME, Cordeiro Q, Fregni F, Brunoni AR. Transcranial direct current stimulation (tDCS) for catatonic schizophrenia: a case study. Schizophr Res 2013;146:374—5.
[4] Brunoni AR, Nitsche MA, Bolognini N, Bikson M, Wagner T, Merabet L, et al. Clinical research with transcranial direct current stimulation (tDCS): challenges and future directions. Brain Stimul 2012;5:175—95.

[5] Northoff G. What catatonia can tell us about "top-down modulation": a neuropsychiatric hypothesis. Behav Brain Sci 2002; 25:555–77.

Chia-Wei Chen
Institute of Behavioral Medicine, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Shih-Hsien Lin
Department of Psychiatry, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Li Chung Huang
Department of Psychiatry, Chia-Yi Branch, Taichung Veterans General Hospital, Chia-Yi, Taiwan

Chia Nan University of Pharmacy and Science, Tainan, Taiwan

Yen Kuang Yang*
Department of Psychiatry, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

*Corresponding author. Department of Psychiatry, National Cheng Kung University Hospital, 138 Sheng Li Road, North Dist., Tainan 70403, Taiwan.
E-mail address: ykyang@mail.ncku.edu.tw

20 October 2017