

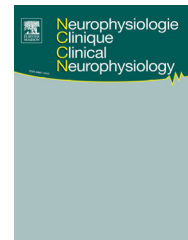


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ORIGINAL ARTICLE/ARTICLE ORIGINAL

Motor cortical excitability in obsessive-compulsive disorder: Transcranial magnetic stimulation study



Excitabilité corticale motrice dans le trouble obsessionnel compulsif : étude par stimulation magnétique transcrânienne

Eman M. Khedr*, Khaled A.M. Elbeh, Yasser Elserogy, Hossam E. Khalifa, Mohamed A. Ahmed, Mahmoud H. Hafez, Anwar M. Ali, Noha A. Elfetoh

Department of neuropsychiatry, faculty of medicine, Assiut university hospital, 71511 Assiut, Egypt

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KEYWORDS

Cortical excitability;
Cortical silent period;
Intracortical facilitation;
Intracortical inhibition;
Transcallosal inhibition

Summary

Objectives. – Transcranial magnetic stimulation is a non-invasive method of stimulating the brain that is increasingly being used in neuropsychiatric research. Previous work has suggested that the pathophysiology of obsessive-compulsive disorder (OCD) may involve dysfunction of excitatory and/or inhibitory brain function. This study aimed to extend those findings.

Methods. – The study included 45 OCD patients and 15 age- and sex-matched healthy volunteers. Clinical evaluation was conducted using the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), Hamilton Anxiety Rating Scale (HAM-A), and Clinical Global Impression rating scale (CGI). Physiological measures were resting and active motor thresholds (RMT and AMT), motor evoked potential (MEP) amplitude, cortical silent period (CSP) and transcallosal inhibition (TCI) durations, short-interval intracortical inhibition (SICI), and intracortical facilitation.

Results. – RMT and AMT were significantly lower in patients than in the control group. The mean duration of the CSP and TCI were also significantly shorter. Obsessive trait was associated with significant reduction of TCI duration compared to compulsive trait. There was significant reduction in SICI in OCD patients compared to controls. There were no significant correlations between the Y-BOCS, HAM-A and CGI scores and the cortical excitability parameters.

Conclusion. – These results provide further evidence for inhibitory deficits or increased facilitation in cortical circuits of patients with OCD.

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* Corresponding author.

E-mail address: emankhedr99@yahoo.com (E.M. Khedr).

MOTS CLÉS

Excitabilité corticale ;
Facilitation intracorticale ;
Inhibition intracorticale ;
Inhibition transcalleuse ;
Période de silence corticale

Résumé

Objectifs. – La stimulation magnétique transcrânienne est une méthode non invasive de stimulation cérébrale qui est de plus en plus utilisée dans la recherche neuropsychiatrique. Des travaux antérieurs ont suggéré que la pathophysiologie du trouble obsessionnel compulsif (TOC) peut impliquer un dysfonctionnement des fonctions cérébrales excitatrices ou inhibitrices. Cette étude vise à étendre ces conclusions.

Méthodes. – L'étude a porté sur 45 patients atteints de TOC et 15 volontaires sains appariés pour l'âge et le sexe. L'évaluation clinique a été basée sur la Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), l'Hamilton Anxiety Rating Scale (HAM-A) et la Clinical Global Impression Rating Scale (CGI). Les mesures physiologiques comprenaient les seuils de moteur de repos et actifs (RMT et AMT), l'amplitude des potentiels évoqués moteurs (MEP), la durée de la période de silence corticale (CSP) et de l'inhibition transcalleuse (TCI), l'inhibition intracorticale à court intervalle (SICI) et la facilitation intracorticale.

Résultats. – Les seuils moteurs (RMT et AMT) étaient significativement réduits chez les patients par rapport au groupe témoin. Les durées moyennes de la CSP et de la TCI étaient également significativement plus courtes. Le trait obsessionnel était associé à une réduction significative de la durée de la TCI par rapport au trait compulsif. Il y avait une réduction significative de la SICI chez les patients atteints de TOC par rapport aux témoins. Il n'y avait pas de corrélation significative entre les scores de Y-BOCS, HAM-A et CGI et les paramètres d'excitabilité corticale.

Conclusion. – Ces résultats fournissent une preuve supplémentaire de l'existence de déficits inhibiteurs ou d'une facilitation excessive dans les circuits corticaux chez les patients souffrant de TOC.

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Introduction

Obsessive-compulsive disorder (OCD) is characterized by recurrent intrusive thoughts (obsessions) and ritualized, repetitive behaviors or mental acts (compulsions) [1]. It has been hypothesized that malfunctioning of cortico-striato-thalamocortical circuitry, and in particular deficits in inhibition of irrelevant information and response control [3,5], may account for the reduced ability of patients with OCD to inhibit intrusive thoughts, impulses, or images, as well as repetitive motor responses and/or mental rituals. This deficient inhibition is thought to have a neurophysiological signature that is an increased level of cortical excitability [25,33]. In a number of studies of our group, transcranial magnetic stimulation (TMS) of motor cortex has been used to evaluate both cortical facilitatory and inhibitory mechanisms in different groups of patients [16–22]. In OCD a recent meta-analysis [31] was published and concluded that there is deficient cortical inhibition in OCD. Thus, compared with healthy subjects, patients with OCD have reduced short-interval intracortical inhibition (SICI), a marker of GABA(A)ergic function [12,13,44]; a shorter cortical silent period (CSP), a marker of GABA(B)ergic function [35]; and an increased intracortical facilitation (ICF), a marker of glutamatergic function [32,43]. One other commonly used marker of cortical excitability, the minimum magnetic field intensity required to elicit a twitch in a relaxed hand muscle (resting motor threshold [RMT]), has been reported to be reduced in OCD compared with healthy subjects [12], but this has not been confirmed in all reports [31]. However, many of these reports were on small numbers of patients, and in some cases, reports from one group were not replicated by another. We have therefore performed a careful analysis of cortical

excitability, also including transcortical inhibition (TCI), in a new group of OCD individuals.

Methods**Patients and subjects**

Forty-five patients diagnosed with OCD participated in the study. The patients were selected consecutively from those attending the outpatient clinic of the Neuropsychiatry department, Assiut University Hospital, Assiut, Egypt. Diagnosis of OCD was based on the Structured Clinical Interview of DSM IV axis I (SCID-I) [9]. Patients with comorbid psychiatric disorder, e.g. major depressive disorder (MDD) (defined on SCID-I and Hamilton Depression Rating Scale [HAM-D] with score ranging from 24 > 20) [15] and those with a history of seizure or with metal objects implanted in the skull were excluded. Patients taking antiepileptic medication and those involved in substance abuse or dependence were also excluded. The mean age of the patients was 27.1 ± 4.5 years ranging from 20 to 36 years, including 28 males and 17 females. The mean duration of illness was 19.2 ± 11.5 months ranging from 6 to 60 months. Twenty-seven patients were taking selective serotonin reuptake inhibitors (SSRIs), 2 patients were taking SSRI plus benzodiazepines, 8 patients were treated with tricyclic antidepressants, 4 patients were treated with mixed tricyclic with risperidone (antipsychotic drugs), and 4 patients were unmedicated.

Fifteen healthy volunteers, matched for age, sex and education with OCD patients, were enrolled as a control group for neurophysiological assessment. They had no history of psychiatric disorders determined after a brief clinical

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