Review Article

Transcranial Magnetic Stimulation: New Sapience into How Brain Stimulation palliates symptoms of PTSD

ABSTRACT : Posttraumatic stress disorder (PTSD) is a chronic, often debilitating psychological state disorder that may develop after a traumatic life event. Most patients get over the initial symptoms naturally, but those that experience persistent symptoms require standard treatment approaches such as 1: 1 psychotherapy, psychotropic medications, or both whichever have relevance. However, there are secondary hindrances such as drug safety and drug tolerability associated with these psychotropic medications, that interdict an appropriate course of treatment.[1] The upshot of those events is that it creates a breach in our potential to properly manage PTSD in a significant number of patients, leaving them endangered to surfacing complications like employment-related incapacities, suicidal ideations, co-morbid medical disorders, and illicit drug abuse. Thus, there's a need for more worthwhile, tolerable, and long-standing approaches. Transcranial magnetic stimulation may be a safe and non-invasive treatment technique used to treat various psychiatric and neurological disorders. This neuromodulation technique involves stimulation of specific deep brain regions by the assembly of high and low-intensity magnetic fields thus filling the therapeutic void. this text mainly kingpins on the results of controlled and pragmatic trials for efficacy, safety, and tolerability of patients affected by PTSD.[2][3]

Keywords: Antipsychotics; Post-traumatic stress disorder; psychotherapy; efficacy, brain stimulation.

ABBREVIATIONS

1. PTSD-Posttraumatic stress disorder (PTSD)
2. TMS: Transcranial Magnetic stimulation

1. INTRODUCTION

1.1 Pathophysiology of PTSD

The development of posttraumatic stress disorder in an individual is linked to a large number of factors. These include experiencing a traumatic event, like a severe threat or a physical injury, a bad experience, combat-related trauma, sexual abuse, interpersonal conflicts, maltreatment, or after a medical illness. Chronic PTSD occurs in patients who are unable to get over the trauma due to maladaptive responses.[4]

The risk factors for the development of PTSD include biological and psychological factors such as gender (more prevalent in women), childhood adversities, pre-existing mental disease, low socioeconomic status, less education, and lack of social support. Nature and therefore the severity of the trauma is also accountable while determining the risk factors for PTSD. The pathophysiology of posttraumatic stress disorder involves alterations within the neurotransmitters and neurohormonal functioning.[8] Individuals with PTSD have been shown to possess normal to low levels of cortisol and elevated levels of corticotropin-releasing factor (CRF) despite their ongoing stress. CRF stimulates the discharge of norepinephrine by the anterior cingulate cortex, which results in an

increased sympathetic response, which manifests as increased pulse, vital signs, increased arousal, and a startle reaction[9]. Also, some studies have shown altered functioning of other neurotransmitter systems like GABA, glutamate, serotonin, neuropeptide Y, and other endogenous opioids in patients with PTSD. there's a decrease in GABA activity and an increase in glutamate, which fosters dissociation and derealization. Serotonin concentration is additionally decreased in the dorsal/median raphe, which likely changes the dynamic between the amygdala and hippocampus.

1.2 Pharmacotherapy for PTSD

As per the guidelines of the Australian Centre for Posttraumatic Mental Health (ACPMH), consistent with NICE, recommended that pharmacological interventions should not be used in preference to trauma-focused psychological treatment. Other reviews have been more positive about pharmacological treatment, grouping selective serotonin reuptake inhibitors (SSRIs) together and rating them as equivalent to trauma-focused psychological treatments. A Cochrane review reported strong benefits, but the Institute of Medicine found inadequate evidence to determine the efficacy of pharmacological treatment for PTSD[12]. There are, however, major differences between the methodological quality of these reviews, making direct comparison problematic[13].Given the inconsistent findings of previous meta-analyses and the increasing number of randomized controlled trials (RCTs) of pharmacological treatments, the World Health Organization (WHO) commissioned an update of the information obtained by the most methodologically robust systematic reviews published to date: those by NICE, ACPMH, and the Cochrane Collaboration.[6][5]

2. Focal Brain Stimulation for Posttraumatic Stress Disorder

This technique offers a unique alternative to psychotherapeutic and pharmacologic treatments for psychiatric disorders. Focal brain stimulation interventions are based in a paradigm that views psychiatric disorders as resulting from dysfunction within a structurally and functionally connected network of brain regions. The most common focal brain stimulation approaches used for the treatment and study of psychiatric disorders include transcranial magnetic stimulation, transcranial direct current stimulation, and deep brain stimulation. Transcranial magnetic stimulation (TMS) is a noninvasive technique that uses a rapidly changing magnetic field, delivered at the scalp surface, to induce an electric current in the underlying cerebral cortex.[10] Depending on stimulation location and parameters, TMS can depolarize cortical neurons and have inhibitory or excitatory effects[11]. Typically, stimulation is limited to a 2–3 centimeter area of cortex, allowing for stimulation of discrete neural regions; however, due to the rapid decay of the magnetic field strength with distance from the coil, functionally relevant stimulation of deeper cortical and subcortical structures is not feasible with most available devices. Transcranial direct current stimulation (tDCS) is a noninvasive technique that applies a low-intensity electrical current to the brain via an anode and cathode. This approach does not directly depolarize neurons but may alter the likelihood that groups of neurons will activate with subsequent provocation. Deep brain stimulation (DBS) is an invasive technique involving the neurosurgical placement of stimulation electrodes within the brain, with the delivery of focal electrical stimulation to a specific deep brain region. With DBS, stimulation is controlled by an implanted pulse generator that can be tuned via an external programming wand.[7]

Conclusion

The SSRI may occasionally induce Extra-pyramidal side effects and or akathisia. Long-term use of SSRIs can cause Obesity and other metabolic disorders.
Transcranial magnetic stimulation (TMS) is a noninvasive procedure that uses magnetic fields to stimulate nerve cells in the brain to improve the cortical function of the brain[15]. TMS is typically used when other treatments haven't been effective.
Approximately 50%-60% of PTSD patients who have tried and failed to benefit from SSRI experience a clinically meaningful response with TMS[16].
About one-third of these individuals experience complete remission, and their symptoms completely disappear.[17]
Most TMS patients feel better for many months after treatment stops, with the average length of the response being little more than one year.[18]

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