

Repetitive Transcranial Magnetic Stimulation (rTMS) therapy to improve symptoms in Dysthymia patients: a case report

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ABSTRACT

Introduction: Dysthymia, or persistent depressive disorder (PDD), is a state of chronic depressive mood that currently does not meet the criteria for depressive disorder and occurs all the time or persists for at least 2 years. Management of dysthymia is a combination of antidepressants and psychotherapy. Transcranial magnetic stimulation (TMS) is referred to as adjuvant therapy for depression. However, there have been no studies that specifically provide TMS for dysthymia.

Case Presentation: A 27-year-old male, came to the Psychiatric Poly of regional mental hospital with complaints of not having the spirit of life for 8 years. The total Beck Depression Inventory (BDI) score starts at 10. This patient received rTMS 20 times with a frequency of 5 Hz, a motor threshold of 60%, and the dorsolateral prefrontal left cortex (DLPFC) improved, as evidenced by the BDI score being 4.

Discussion: Dysthymia conditions affect neuron cells and make them less active, so neurotransmitter instability is not achieved, especially with serotonin, norepinephrine, and dopamine. So, it can provide stimulation to reactivate neuron cells and help neurotransmitters reach their balance point. This patient has been given 20 rTMS. The reason for giving a frequency of 5 Hz is because a high frequency is excitatory, so it can provide stimulation to activate neuron cells again. The location at DLPFC is because it adapts to previous research that the location has been linked to depressive states and plays a role in a person's executive function. Stimulation using motor threshold is 60% because it is the average human intensity.

Conclusion: rTMS is effective for improving the symptoms of patients with dysthymia.

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INTRODUCTION

According to the World Health Organization (WHO), in 2023, there will be at least 3.8%, or around 300 million people, in the world experiencing depression, including dysthymia, 15.6 million of whom are Indonesians (World Health Organization, 2023). The prevalence of its occurrence is 50% more experienced by women than men (Nazneen, 2019). Unfortunately, only about 9% of the total seek professional treatment (Pangerapan et al., 2023).

One type of depression that is very rarely encountered in health services is dysthymia, because most dysthymia patients still do not experience interference in daily activities, so they feel no need to seek help (Sansone & Sansone, 2009). Dysthymia, also called persistent depressive

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disorder, is a chronic depressive state of mood (mood) that at present does not meet the criteria for depressive disorder and almost occurs all the time or persists for at least 2 years. In dysthymia, the depressive symptoms are not too severe, but often the depressive form lasts forever (Ishizaki & Mimura, 2011).

Dysthymia generally begins in childhood, adolescence, or in parents after age 52. Dysthymia that occurs before the age of 21 is called early-onset dysthymia. Dysthymia that occurs after age 21 is called late-onset dysthymia. Early-onset dysthymia is associated with comorbid personality disorders, while dysthymia after the age of more than 50 years is associated with health problems and the loss of family members (Rosyanti et al., 2018).

According to Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM V), the criteria for dysthymia are when someone experiences two or more complaints abbreviated as SECASH (sleep disturbance, energy decrease, concentration decrease, appetite change, self- and hopelessness). These complaints persist for at least 2 years, and the individual is never free from symptoms for more than 2 months at a time (American Psychiatric Association, 2013).

The best management for dysthymia patients is a combination of pharmacological therapy and psychotherapy. The pharmacological options are antidepressants such as selective serotonin reuptake inhibitors (SSRIs), serotonin norepinephrine reuptake inhibitors (SNRIs), and tricyclic antidepressants (TCAs). The psychotherapy options that are proven to help dysthymia patients are cognitive behavioral therapy (CBT), psychodynamic psychotherapy, or psychotherapy oriented to interpersonal insights (Ishizaki and Mimura, 2011). Along with electromedical developments, depressed patients today can also be given therapies such as neurofeedback and transcranial magnetic stimulation (TMS) (Chekroud & Cristea, 2019).

In this case report, the patient had already felt disturbed by his illness. Lectures that were completed to the point of being threatened with dropping out, feelings of confusion that made the patient unable to make a decision, and increasingly less interaction with others. The patient came alone with a journal about the symptoms he felt and the choice of therapy that could help him. The patient requested TMS treatment because he did not want to be treated with other therapies such as pharmacology and psychotherapy.

TMS is a relatively new neuroscientific tool, around the 1980s it was developed and approved by the FDA (Food and Drug Administration) as a technique to treat many mental health disorders. TMS uses non-invasive methods that can change the cortical activity of the brain focally and explore and understand the function of cortical neurons (Luber et al., 2013). Research shows that TMS has therapeutic effects on a wide variety of psychiatric disorders (Reddy & Vijay, 2017). In several studies, repetitive TMS therapy has been shown to help patients with major depression recover. For cases of dysthymia itself, there has been no research devoted to rTMS therapy. So this case study was conducted with the aim of documenting or reporting the results of the application of rTMS in dysthymia patients. The hope is that with this study, further research will be carried out on the effects of rTMS administration in dysthymia patients.

CASE PRESENTATION

The patient who was the subject of the study was a 27-year-old man who was not working and a bachelor's degree graduate. The patient came to the Psychiatric Poly, with complaints that the patient did not have the spirit of life. Complaints have been felt for 8 years, namely since the beginning of college. The patient feels his life is empty; life seems to have no purpose. Patients can still do daily activities with their families, but there is no passion for doing activities outside the home. The patient's relationship with his friends is good; sometimes patients still communicate

through social media, but very rarely do activities together directly. Patients also complain of difficulty initiating sleep. Before going to bed, the patient does nothing; he just lies down and is confused by his thoughts. Often, patients think that the world is not real, only the setting. Complaints are felt throughout the day and are getting worse until they interfere with the patient's life. In fact, the patient has received several warnings from both parents to increase activities outside the home. Actually, the patient has a desire to continue studying abroad, but because of his feelings and thoughts, it is difficult for him to decide what steps to take. So sometimes it makes patients feel hopeless in the future. Complaints related to diet are denied.

The patient had seen a psychiatrist in 2020 and was diagnosed with depression. The patient is given the drug, but the patient forgets the name of the medicine. The patient only took the medicine once and felt nausea and palpitations, so the patient no longer continued taking the medicine. Then the patient consulted with an other psychiatrist in 2021 and was advised to do a series of rTMS. Patients do TMS only once because it is expensive, even though, based on the advice of psychiatrists and journals read, rTMS will be more effective in providing benefits.

Then patients browse back on the internet and get information about the cost of TMS in one of the hospital is more affordable, so patients come to the their polyclinic. Because he did not want to be treated with other therapies such as pharmacology and psychotherapy, so the doctor gives TMS therapy. Patients do rTMS for 4 cycles, where each cycle is done 5 times a week, or a total of 20 times rTMS. Location in the left DLPFC (dorso lateral prefrontal cortex), frequency 5 Hz, motor threshold 60% each time TMS. Patients are also accompanied by residents to be given psychoeducation.

When first coming to the Psychiatric Poly in a mental status examination, patients appear to be age-appropriate, have good self-care, are normoactive psychomotor, have spontaneous talk, and are cooperative. Compos mentis consciousness, unchanged, hypothyroid mood, narrowed affect, no hallucinations, illusions, or depersonalization. Patients obtained derealization with good cognitive and sensorium abilities. The assessment of BDI score at the first meeting was 10.

After the rTMS series was completed, the patient said that he felt better and was willing to start being active in socializing, such as playing at relatives' houses, inviting friends to gather, and starting English lessons to realize his dreams of continuing his masters degree abroad. At the end of the rTMS, the total BDI score was evaluated at 4. The current follow-up of patients has succeeded in getting a masters degree aboard.

DISCUSSION

Dysthymia is a depressive mood disorder characterized by the presence of chronic, persistent, but mild depression, affecting 3–6% of individuals in the community and as many as 36% of outpatients in mental health settings (Sansone & Sansone, 2009). Although, by definition, depressive mood due to dysthymia is not severe enough to meet the criteria for major depressive disorder, it is accompanied by significant subjective distress or disruption of social, occupational, or other important activities as a result of the mood disorder. Dysthymia manifests as a depressed mood that lasts for at least two years (one year for children or adolescents) and lasts most of the day (Ishizaki & Mimura, 2011).

As in this case, the patient's dysthymia has lasted for 8 years and is getting worse because it has disrupted the patient's daily functions. The patient also does not want to be treated with pharmacology or psychotherapy. So other therapies are needed that can help in the patient's recovery process. TMS was chosen because it is one of the available modalities and at the patient's request based on the journal he read.

Dysthymia conditions affect neuron cells and make them less active, so neurotransmitter instability is not achieved, especially with serotonin, norepinephrine, and dopamine. So symptoms appear that make him uncomfortable. This patient has been given 4 cycles of rTMS, where each cycle is done 5 times a week, for a total of 20 rTMS. Location in the left DLPFC (dorso lateral prefrontal cortex), frequency 5 Hz, motor threshold 60% each time TMS. The reason for giving a frequency of 5 Hz is because a high frequency is excitatory, so it can provide stimulation to reactivate neuron cells. The location in the DLPFC is because previous research has shown that this location has been associated with depression and plays a role in a person's executive function. Stimulation using Motor Threshold 60% because it is the average human intensity (Barnes et al., 2023). Based on the follow-up results, the patient has experienced improvement in clinical symptoms, as evidenced by a decrease in the BDI score from 10 to 4.

TMS is a relatively new neuroscientific tool, developed and approved by the FDA (Food and Drug Administration) around the 1980s as a technique to treat many mental health disorders. TMS uses a non-invasive method that can change the brain's cortical activity focally and explore and understand the function of cortical neurons (Luber, McClintock, and Lisanby, 2013). Research shows that TMS has a therapeutic effect on a variety of psychiatric disorders (Reddy and Vijay, 2017). In several studies, repetitive TMS therapy has been shown to help patients with major depression recover. The most common side effect of TMS is dizziness (Stultz et al., 2020).

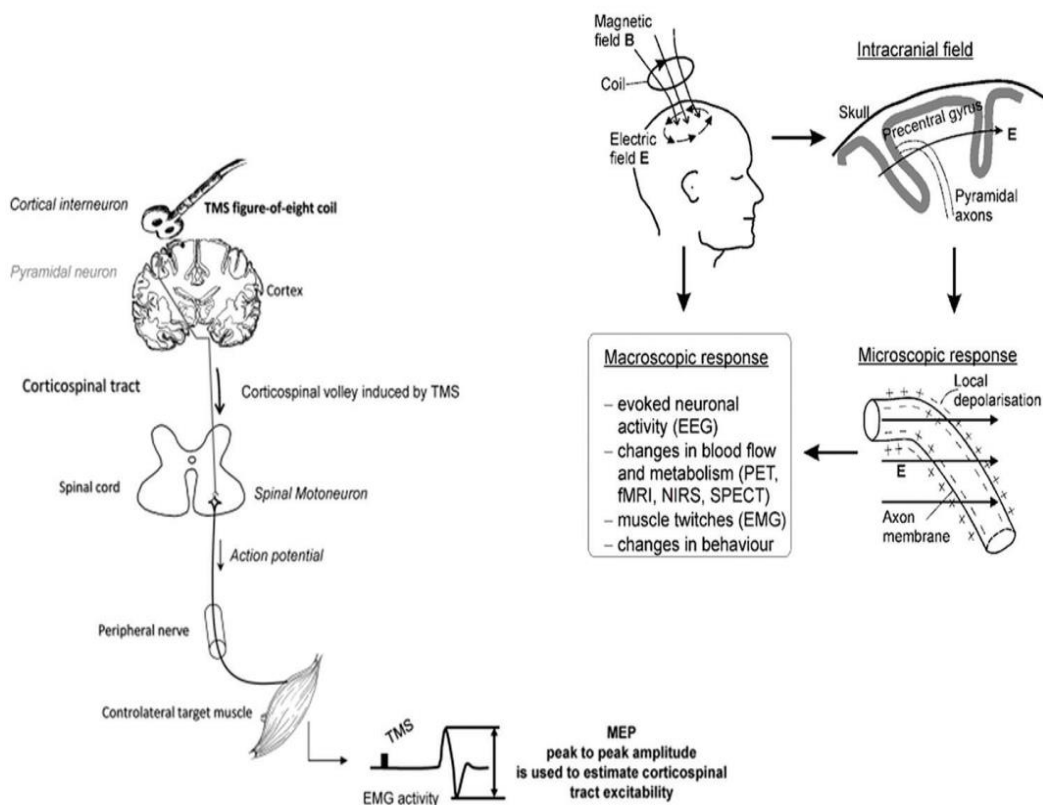


Figure 1. TMS Stimulation Diagram (Udupa, 2020)

The way TMS works follows Faraday's law of electric current induction: magnetic fields with time variations produce secondary electric currents in nearby conductors, including brain structures that align with the orientation of the coils. Secondary current induction depends not only on the characteristics of the pulse and coil but also on several other factors. The induced current will cause a direct depolarization of the neural structure, generating an action potential

or changing the excitatory state of the tissue. The application of a single TMS stimulation (pulse) to the motor cortex can then produce potential movement in the muscle according to location (Farzan et al., 2016).

When the coil is placed on the head, there will be an electric current (about 100 microseconds) through the coil. The electric current that changes in the wire coil induces a magnetic field; this magnetic field will penetrate the patient's scalp and skull bones until it reaches the brain and is accepted as weak electricity. The penetrating power can reach a maximum of 1.5–2 cm in the vertical plane, depending on the power emitted; even certain types of coils can reach 5–6 cm. The magnetic field exposed to these brain cells will affect the threshold value of electricity in these cells so that an explosion (action potential) occurs, which is then forwarded through the axons to the place innervated by these cells. Clinically, it can be seen the movement of the fingers or toes when the stimulus is carried out on the side of a particular head. The TMS effect depends on the intensity of the induced magnetic field and the shape and orientation of the induced current, so that a response can be seen in the form of EEG, EMG, or behavior changes (Udupa, 2020). As for the magnitude of the frequency, TMS with a frequency of 1 Hz (low frequency) is inhibitory and is associated with therapy for patients with auditory hallucinations, maniacs, panic disorders, anxiety, and addiction, while the frequency of >5 Hz (high frequency) is excitatory and is associated with the therapy of depression, PTSD, and negative symptoms (Udupa, 2020).

CONCLUSION

rTMS is effective for improving the symptoms of patients with dysthymia. High-frequency TMS is excitatory, so it can provide stimulation to reactivate neuron cells and help neurotransmitters reach their balance point. The use of TMS can be a therapeutic option for dysthymia patients. Further research with a larger sample size and variations in dysthymia management, such as a combination of pharmacotherapy and TMS, can be considered to obtain more valid results.

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