



RAPID IMPROVEMENT IN CHRONIC INSOMNIA WITH DEEP TRANSCRANIAL MAGNETIC STIMULATION (D TMS) IN A PATIENT WITH TREATMENT RESISTANT DEPRESSION AND INSOMNIA.

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ABSTRACT

Objective: In addition to repetitive transcranial magnetic stimulation (rTMS), deep transcranial magnetic stimulation (dTMS) has also been shown to be effective in treatment of various neuropsychiatric disorders including depression. The objective of this case study is to demonstrate differential and rapid improvement of Insomnia comorbid with MDD with dTMS.

Methods: Brainsway deep TMS device was used with an H1-coil. The usual procedure for dTMS stimulation for MDD was followed. After determining MT the coil was located 6 cm anterior to the MT location. dTMS sessions were given daily on week days for 5 weeks. The primary outcome was clinical response of depression as seen on clinical assessment, self-report, Hamilton Depression Rating scale (HDRS-21) and Montgomery Asberg Depression Rating scale (MADRS). Insomnia severity index (ISI), Patient Health Questionnaire (PHQ-9) and Global assessment of functioning (GAF) were used as secondary outcomes.

Results: Improvement in insomnia symptoms was seen first as early as day 2 of treatment that was reflected on ISI. Improvement in insomnia was followed by gradual improvement in depressive symptoms.

Conclusion: This case with insomnia and co-morbid treatment resistant depression is the first report of rapid improvement in insomnia with co-morbid MDD with dTMS. While dTMS is a treatment option for major depressive disorder, its role in insomnia and insomnia co-morbid with depression merits further study.

Key words: Insomnia, Treatment resistant depression, Transcranial magnetic stimulation, Brain stimulation.

INTRODUCTION

Both insomnia and MDD are significant public health problems that affect about 15-20% and 10% of US population respectively.^{1,2} Insomnia can be a symptom of depression or a co-morbid disorder in a significant number of patients presenting for treatment of MDD. Patients with persistent insomnia are at increased risk of relapse for MDD. Existing treatment modalities for depression do not always result in remission of this disorder and may cause significant side effects.³ Medication treatments result in improvement in symptoms only 40% of the time (STAR* D).⁴ Treatment resistant depression (TRD) is a significant clinical problem found in 29%-46% of depressed patients treated with standard-

dose antidepressants for at least 6 weeks.⁵ There has been a steady evolution of newer brain stimulation treatments for depression in addition to electroconvulsive therapy. Repetitive Transcranial Magnetic stimulation (r-TMS) is one such novel office based procedure that was approved by FDA in 2008 as a treatment for major depressive disorder patients who failed to respond to at least one medication trial. R-TMS is a noninvasive, safe and very well tolerated therapy.^{6,7} Over past two decades efforts have been made to develop therapeutic potential of rTMS for wide variety of neuropsychiatric disorders like schizophrenia, PTSD, OCD, ASD, ADHD, Sleep Disorders, Stroke Rehabilitation, Parkinsonism, Amyotrophic lateral sclerosis (ALS), tinnitus, chronic pain, migraine and epilepsy. Deep TMS that offers a deeper tissue penetration has also been shown to be effective in treatment of major depressive disorder.⁸

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While there is ample research in the role of TMS for MDD, there is limited research as to the use of this treatment in insomnia. Most of psychopharmacological and psychotherapeutic modalities have not proven to provide the satisfactory relief of insomnia symptoms. TMS may have a role in treatment of insomnia. There are some small and preliminary studies indicating usefulness of r-TMS in treatment of insomnia. There is no data regarding use of deep TMS in treatment of insomnia.

In this case study we report rapid and significant improvement in insomnia severity in this patient who received d- TMS for MDD.

MATERIALS AND METHODS

Deep TMS device and procedure:

Brainsway deep TMS device was used with an H1-coil. The usual procedure for dTMS stimulation for MDD was followed. Patient was instructed to use ear plugs. H1 coil was positioned over patients head and motor threshold (MT) was determined by recording abductor pollicis brevis (APB) stimulations using single pulse stimulations by using both visual and electromyographic recordings. MT was defined as the lowest stimulation required to evoke a motor contraction/ motor potential of at least 50 microvolts in 5 out of 10 stimulations. Subsequently the coil was located 6 cm anterior to the MT location. dTMS stimulation parameters: Train duration: 2 seconds, inter-train interval 20 seconds, total duration 20.2 minutes, total pulses 1980. dTMS sessions were given daily on week days for 5 weeks.

Clinical measures:

Patient was diagnosed with MDD, severe using DSM- IV-TR through a detailed clinical assessment. To assess and monitor treatment efficacy we used Hamilton depression rating scale (HDRS-21), Montgomery Asberg Depression rating scale (MADRS); Patient Health Questionnaire(PHQ-9),

Insomnia severity index(ISI) and Global assessment of functioning (GAF) at baseline and at the end of dTMS sessions 5,10, 15, 20 and 25.

Patient’s MT was 36%. He was stimulated at 120% MT (43 % power) daily on week days for 5 weeks.

Case report:

Patient is a middle age single male with major depressive disorder. He presented to our clinic at the behest of his treating psychiatrist seeking treatment with TMS. He reports persistent depressive symptoms for last 5 years. His symptoms include depressed mood with passive SI, anhedonia, lassitude, poor energy, insomnia, poor appetite, and difficulties concentrating. He does not give any history suggestive of mania or psychotic symptoms. He rarely uses alcohol and denied the use of illicit drugs. He gives long history of being depressed most of his life since his early teenage years. The last time he felt well for more than a couple of weeks was 5 years ago. He has family h/o depression in his mother and his uncle who had depression committed suicide.

He does not have any acute or unstable medical problems. He has been treated with multiple medications with mostly limited benefit but reported doing better with Fluoxetine plus amphetamine stimulant medications and Mirtazapine plus stimulants. Current medications: Vortioxetine 60 daily, lisdexamfetamine dimesylate 40 mg daily, trazodone 100 nightly, Clonazepam 0.5mg twice a day.

RESULTS

The primary outcome was clinical response of depression as seen on clinical assessment, self-report, HDRS-21 and MADRS. Insomnia severity index (ISI), PHQ-9 and GAF were used as secondary outcomes.

He reported and showed improvement in

Table 1: Clinical measures

TMS session	Baseline	5 th session	10 th session	15 th session	20 th session	25 th session
MADRS	32	27	22	23	16	14
HDRS-21	28	27	25	23	15	13
PHQ-9	24	23	22	20	15	11
ISI	27	21	16	15	10	5
GAF	55	60	65	65	70	70

insomnia symptoms on day 2 that was reflected on ISI. His insomnia symptoms were first to improve followed by depressive symptoms. He continued to show improvement in both depressive and insomnia symptoms. (See table 1)

DISCUSSION

This case showed that insomnia and treatment resistant depression improved in this patient with use of dTMS. Insomnia symptoms improved rapidly and were first to improve followed by improvement in depressive symptoms. There was continued improvement in both insomnia and depressive symptoms with dTMS, patient achieved response in depression by dTMS session 20 and there was significant improvement in insomnia by session 5 and continued improvement with dTMS and ISI scores dropped to 5 by session 25. This rapid improvement in insomnia symptoms was rather unusual. Insomnia symptoms have reported to improve along with improvement in depressive symptoms in patients with major depression with rTMS.^{8,9} Both depressive and insomnia symptoms continued to improve in this patient with remission in depression achieved by session 15 and remission in insomnia achieved by session 10. While dTMS has been shown to improve depressive symptoms in treatment resistant depression, this case is the first of its kind to show rapid improvement in insomnia symptoms in this patient with co-morbid insomnia and depression

This case raises few clinical and research questions that merit further study:

Does dTMS improve co-morbid insomnia in patients with major depressive disorder? rTMS has been shown to improve insomnia in patients with major depressive disorder that is related to overall improvement in depressive symptoms.⁸ This case points towards a possible similar if not more beneficial effect of dTMS on insomnia in patients with major depressive disorder and insomnia.

Does dTMS differentially improve insomnia in patients with co-morbid insomnia and depression? The existing studies do not show rapid improvement in insomnia in patients with major depressive disorder and insomnia. Whether dTMS has an advantage over rTMS in such patients needs further study.

Can dTMS improve insomnia in patients with insomnia in absence of co-morbid depression? The

existing literature about this is limited and further studies are needed to answer that question.

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