Psychiatria Danubina, 2026 Vol. 38, No. 2, pp 212-216 https://doi.org/10.24869/psyd.2026.212 *Case Report*

Silent currents of healing: The role of rTMS in treating depression during pregnancy

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Summary

Objective: *This article highlights the potential of repetitive Transcranial Magnetic Stimulation (rTMS) in treating antenatal depression (AD), particularly in pregnant individuals for whom standard treatments are limited due to psychological and pharmacological concerns. AD often goes underrecognized and undertreated, despite serious risks to maternal and fetal health.*

Methods: *We present a case report of a pregnant patient with chronic, recurrent major depressive disorder (MDD) who received rTMS using an intermittent theta burst stimulation (iTBS) protocol. Treatment was safely administered and well tolerated during pregnancy. Clinical outcomes were assessed using the Hamilton Depression Rating Scale (HAM-D) and the Generalized Anxiety Disorder 7-item scale (GAD-7).*

Results: *The patient showed rapid, sustained improvement in depressive and anxiety symptoms, with no adverse effects.*

Conclusions: *This case suggests that rTMS, particularly iTBS, may represent a promising and well-tolerated non-pharmacological option for antenatal depression in selected patients. However, conclusions regarding efficacy and safety remain limited by the single-case design and require confirmation in larger controlled studies.*

Keywords: *Antenatal depression; Repetitive transcranial magnetic stimulation; Intermittent theta burst stimulation; Perinatal mental health; Non-pharmacological treatment.*

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INTRODUCTION

Antenatal depression (AD) is a form of major depressive disorder (MDD) that occurs during pregnancy. It affects approximately 11.3%-19.6% of pregnant individuals, making it a significant public health concern (Dadi et al., 2022; Gavin et al., 2005). AD is associated with a range of adverse outcomes, including preterm birth (Diego et al., 2009), low birth weight (Latendresse & Wong, 2015), fetal growth restriction, and long-term neurodevelopmental disturbances in the offspring (Franke et al., 2017). Furthermore, untreated AD is a strong predictor of postpartum depression (PPD), which can severely impair maternal-infant bonding and contribute to negative maternal outcomes (Chan et al., 2014). Despite its prevalence, treating AD remains challenging due to concerns about pharmacotherapy in pregnancy. The current therapeutic approaches to AD include psychotherapy and pharmacotherapy. Cognitive-behavioral therapy and interpersonal therapy are commonly recommended as first-line treatments. However, their efficacy may be limited in moderate to severe episodes (Kim et al., 2015). Pharmacological treatments are often employed but remain controversial due to potential risks. Research has indicated associations between prenatal antidepressant exposure and congenital malformations, persistent pulmonary hypertension of the newborn, and neonatal adaptation syndrome (Grote et al., 2010; Stein et al., 2014; Bonari et al., 2004). Moreover, a substantial proportion of pregnant individuals report reluctance to use pharmacotherapy, out of concern for fetal safety (Bonari et al., 2004; Battle et al., 2013). Given these limitations, there is growing interest in non-pharmacological alternatives. Repetitive transcranial magnetic stimulation (rTMS) has emerged as a promising intervention in this context (Lee et al., 2021; Mann & Malhi, 2023). rTMS is a non-invasive neuromodulator technique that delivers focused electromagnetic pulses to specific brain regions, mostly the dorsolateral prefrontal cortex (DLPFC), implicated in mood regulation (Mann & Malhi, 2023, Xue & Bai, 2017). The U.S. Food and Drug Administration (FDA) has approved rTMS for treatment-resistant depression (TRD), and its clinical use is

expanding across neuropsychiatric conditions (Mikellides et al., 2023; Mikellides et al., 2021). The antidepressant effects of rTMS are believed to result from enhanced neuroplasticity, modulation of key neurotransmitter systems (including serotonergic, dopaminergic, and glutamatergic pathways), and reorganization of dysfunctional neural networks (Mann & Malhi, 2023, Xue & Bai, 2017). Importantly, rTMS avoids systemic drug exposure, making it attractive to patients wishing to forgo medication during pregnancy (Battle et al., 2013; Lee et al., 2021). Evidence supports the efficacy and safety of rTMS in depression with response and remission rates comparable to conventional therapies (Miron et al., 2021; Cole et al., 2020; Filipčić et al., 2017). Common side effects include scalp discomfort and headache, with no significant cognitive impairment reported (Martin et al., 2017). However, data on the use of rTMS during pregnancy remain limited. Existing studies and case reports suggest potential benefit, but standardized treatment protocols, long-term fetal outcomes, and optimal stimulation parameters are not yet established (Lee et al., 2021; Mann & Malhi, 2023). Thus, rTMS is not routinely included in clinical guidelines for AD, and many practitioners remain uncertain about its application in this population. This paper presents a detailed case study of a pregnant patient with chronic, recurrent depressive disorder who underwent rTMS treatment. We discuss her clinical course and outcomes to evaluate the safety, efficacy, and clinical utility of rTMS as a non-pharmacological option for managing AD.

SUBJECTS AND METHODS

This case report concerns a 37-year-old woman with recurrent depressive disorder, whose first episode occurred at age 20. A severe episode at age 30 marked the transition to chronic, partially remitted symptoms (depressed mood, anhedonia, and irritability). She had a bilateral family history of affective illness and medical comorbidities of autoimmune hypothyroidism and thrombophilia. Obstetric history was notable for two first-trimester miscarriages preceding the birth of her first child; during a later, otherwise uncomplicated gestation she developed severe antenatal anxiety and postpartum depression.

From 2021 she received sertraline 150 mg/day, which provided only partial relief and produced intolerable adverse effects. Dose reductions precipitated relapse, characterised by irritability and suicidal ideation. At first assessment in 2023 she was taking sertraline 150 mg and lamotrigine 50 mg, and exhibited moderate depressive symptoms with episodic binge eating. Sertraline was replaced by fluoxetine and titrated to 60 mg/day; lamotrigine was increased to 100 mg/day, yielding meaningful but incomplete improvement. Ahead of planned conception in early 2024, fluoxetine was tapered and discontinued. A short trial of citalopram was terminated owing to clinical worsening.

Repetitive transcranial magnetic stimulation (rTMS) was then initiated, producing a rapid and substantial remission, notably the strongest response since illness onset. rTMS was continued as monotherapy during a new pregnancy that ended in embryonic demise at eight weeks' gestation. Two months later, a mild depressive relapse resolved after intensification of maintenance rTMS. The patient remained euthymic without psychotropic medication until September 2024, when she conceived again. In view of her miscarriage history and desire to avoid fetal drug exposure, rTMS was recommenced as the sole treatment for emergent mild depressive symptoms.

Therapeutic Approach and Clinical Management

1.1 Therapeutic Course and Outcomes Baseline scores were GAD-7 13 (moderate anxiety) and HAM-D 23 (severe depression). After 10 iTBS sessions, scores fell to GAD-7 7 and HAM-D 12. By session 20 they were 4 and 6, respectively, and by session 30 both indicated remission (GAD-7 3; HAM-D 2).

1.2 Stimulation Parameters and Targeting The patient received intermittent theta-burst stimulation (iTBS) to the left DLPFC, 5 sessions/week for 6 weeks. Coil placement used the Beam_F3 method at 120% of resting motor threshold. Each session delivered 600 pulses in 3 minutes 8 seconds with the standard burst pattern.

1.3 Rationale for iTBS Over Standard rTMS iTBS is FDA-cleared for MDD, matches conventional rTMS efficacy, and achieves neuroplastic effects in far shorter sessions; advantages that are especially valuable for time-limited or higher- risk populations such as pregnant patients.

RESULTS

Significant improvement was evident over the course of treatment. The GAD-7 fell to 7 (mild anxiety) by session 10, 4 by session 20, and 3 at session 30. The HAM-D

Table 1 Clinical Timeline

Time Period	Clinical Status	Treatment	Outcome
Age 20-30	Initial episodes -> chronic course	Various antidepressants	Partial response
2021-2023	Persistent depression	Sertraline + Lamotrigine	Limited efficiency
2023	Medication adjustment	Fluoxetine up to 60 mg	Partial improvement
Early 2024	Planned conception	Discontinued Fluoxetine	Relapse
2024 (pre-pregnancy)	Severe depression	Initiation of rTMS	Marked remission
Early Pregnancy	rTMS monotherapy	Continued	Stable
8 weeks gestation	Embryonic demise	-	-
2 months later	Mild relapse	Maintenance rTMS	Improvement
Late 2024 pregnancy	Mild depressive symptoms	rTMS monotherapy	Remission

likewise dropped to 2 at treatment end. These scores indicate remission of clinically significant anxiety and depression and a rapid, strong response to rTMS. Notably, during the several-year depressive episode, the patient had never achieved such improvement, even when not pregnant. This change occurred without concomitant pharmacotherapy.

DISCUSSION

Pregnant patients frequently express hesitancy toward pharmacological treatments due to concerns about fetal harm, long-term developmental risks, and societal pressures (Kishi et al., 2024; Kim & Wang, 2014; Patel & Wisner, 2011). A majority prefer nonpharmacological options (Kim & Wang, 2014). rTMS, being non-invasive and free of systemic drug exposure, represents a particularly attractive alternative. Clinical trials support the safety of rTMS in pregnancy. Kim et al. (2019) demonstrated efficacy in a randomized controlled trial of 22 pregnant women treated with right DLPFC stimulation (1 Hz, 900 pulses/session). No adverse fetal outcomes were reported (Esposito et al., 2022). Hizli Sayar et al. (2014) observed a 41.4% response rate and 20.7% remission rate in 30 TRD patients treated with left DLPFC rTMS (Kim et al., 2019). Mechanistically, rTMS enhances synaptic connectivity, modulates neurotransmitter release, and promotes neuroplasticity (Hizli Sayar et al., 2014; Saabneh et al., 2025). Hormonal shifts during pregnancy, particularly in estrogen and progesterone levels, may augment cortical excitability and potentially increase responsiveness to neuromodulatory interventions (Mikellides, Michael & Tantele, 2021; Michael et al., 2022). These interactions merit further study to optimize protocols for perinatal populations. Despite encouraging findings, standardized rTMS protocols for AD remain lacking. Treatment regimens typically include 1 Hz (right DLPFC) or 10 Hz (left DLPFC) stimulation for 3–6 weeks (Rivas-Grajales et al., 2023). Supine hypotensive syndrome, though rare, has been documented in late pregnancy rTMS, but resolves with repositioning (Konstantinou et al., 2020). No major maternal or fetal adverse events have been consistently reported. Unresolved issues include the long-term neurodevelopmental impact of in utero exposure to rTMS, the comparative effectiveness versus antidepressants, and individual predictors of treatment response. More robust, controlled trials are needed to address these questions and guide clinical integration (Angeline, Tiyatiye & Akosile, 2025; Eryılmaz et al., 2015)

Limitations

This report is subject to several limitations. As a single-case study, causal inferences regarding the efficacy of rTMS cannot be established, and spontaneous remission or placebo effects cannot be excluded. The absence of a control condition further limits interpretability. Additionally, generalizability is restricted, as treatment response may vary across patients with differing clinical profiles, pregnancy stages, and comorbidities. Long-term maternal and fetal outcomes were not systematically assessed, and therefore the safety profile remains incompletely characterized. Future randomized controlled studies with larger samples are required to clarify efficacy, optimize protocols, and assess long-term safety in perinatal populations.

CONCLUSIONS

This case highlights the potential clinical utility of rTMS, specifically iTBS, in the management of AD in a treatment-resistant, high-risk patient. rTMS was associated with rapid, sustained symptom remission and was well tolerated throughout pregnancy. Given the patient's reluctance to use pharmacotherapy, rTMS appeared to provide a viable, safe, and effective alternative in this instance. Current evidence suggests that rTMS holds promise as a nonpharmacological treatment for AD, especially for individuals unable or unwilling to take antidepressants. However, its implementation in perinatal care remains limited by gaps in the literature and lack of standardized protocols. This case contributes to the evolving understanding of rTMS in pregnancy and supports considering its inclusion in individualized treatment planning. Further studies are needed to establish safety, refine guidelines, and expand access for this vulnerable population.

Informed consent/Patient consent: Patient provided written informed consent after receiving a complete description of the study.

Ethical considerations: This work describes a single clinical case and does not involve systematic investigation; therefore, it does not meet the regulatory definition of research requiring Institutional Review Board or Ethics Committee approval. Written informed consent for both treatment and publication was obtained from the patient prior to manuscript submission.

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