Not Where or When, but How: Improving depression outcomes with TMS + an online workbook

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Abstract

Background: This objective was to see if the clinical outcomes of a combination of repetitive TMS and an online educational behavioral activation workbook were significantly improved compared to TMS alone and TMS + 1:1 live psychotherapy with a licensed therapist.

Methods: A retrospective review of three groups of patients who were identified from a population of patients with recurrent, Major Depressive Disorder treated between 2011 and 2022 in one practice: Group A = patients treated with TMS alone, Group B = patients treated with TMS + 1:1 psychotherapy with a licensed therapist (LCSW), Group C = patients treated with TMS + online workbook. All patients were ages 18-70 who received repetitive TMS with a standard LDLPFC placement, and a standard protocol: 10Hz 120% of MT, 4 Seconds on, at least 10 Seconds off, 3000 pulses. Patient self-rated PHQ-9 scores from baseline, at least every other week during treatment, and at the end of the course of care were obtained from retrospective chart records.

Results

Results were analyzed using data corresponding with rates of remission (REM), response (RESP), limited response (LR), non-completers (NC), and no benefit (NB). The findings for these rates have been displayed in the chart below:



Discussion/Conclusion

This analysis shows that the implementation of the online workbook within the course of TMS treatment did improve outcomes, compared to TMS alone. This is consistent with existing literature, which supports the potential for increased efficacy with combination treatment approaches. The outcomes suggest that if patients receiving TMS use this workbook with a course of TMS treatment, they might have improved outcomes or similar outcomes as that of a TMS + psychotherapy. These outcomes suggest the potential for additional effective behavioral intervention without having a credentialed mental health clinician in session. Behavioral activation in particular has been shown to increase treatment efficacy of TMS in MDD populations, showcased by clinically significant reduction in self-reported depressive symptoms⁴. Results in our study showed a significant difference between combination treatment groups and the TMS alone group, further supporting existing evidence of the efficacy of CBT based interventions and rTMS treatments being used concurrently. While the analysis did indicate significantly improved clinical outcomes with the addition of the online workbook into TMS treatment, there are several potential factors that may have contributed to the increased effectiveness. The clinic that completed the study has highly experienced operators and medical staff. The operators who worked with patients in this study included Master's level clinicians, as well as operators with years of experience. Additionally, the author of the workbook directs the clinic, and has been working with TMS and depression for over a decade. In an effort to continue working towards improving patient outcomes, a larger scale clinical study examining the effectiveness of the workbook in concurrent usage with TMS treatment would likely increase the power and generalizability of the study.

Results: The populations were compiled and any patients who did not meet diagnostic or protocol criteria were excluded. Outcomes: Group A-remission (REM)=54%, response (RES)=72%, nonresponse (NR) =28%; Group B: REM= 63%, RES=80%, NR=20%; Group C: REM= 63%, RES=90%, NR=10%.

Conclusion: The addition of the online workbook to TMS led to improved outcomes than TMS alone, higher response rates overall, & resulted in outcomes at least as good as TMS + 1:1 psychotherapy. Groups B and C showed identical remission rates between groups, while Group C displayed a higher clinical response rate than Group B, indicated by a reduction in self-rated depression symptoms. Group A, TMS alone, was least efficacious of the treatment groups, suggesting that the inclusion of a behavioral activation modality into the treatment course may increase treatment effectiveness.

Introduction

Depression is among the most commonly occurring mental health conditions in the world, with a lifetime prevalence rate of 10%¹. Combination treatments have largely been considered the gold standard for maximizing treatment efficacy, especially for depressive disorders, such as major depressive disorder (MDD). Research shows that combination treatments of psychopharmacological intervention and psychotherapy shows superior patient outcomes when compared to either of these interventions being implemented as a singular modality². This construct is also largely supported when applied to treatment efficacy within MDD patients being treated with repetitive transcranial magnetic stimulation (rTMS), specifically when rTMS is combined with a CBT modeled approach³. To maximize the treatment efficacy in rTMS treatment and improve patient outcomes, we implemented a combination treatment approach of the standard figure 8 TMS protocol and a CBT based online workbook. In implementing this combination approach, patients used the workbook throughout the entirety of their treatment course. Literature suggests with strong consistency, that combining psychotherapy and psychiatric care generally increase patient outcomes, with this principle being especially true when the theoretical basis of the psychotherapy includes CBT and elements of behavioral activation.⁴

Within group analysis of the data determined that participants in the TMS + workbook Group (Group C) had remission rates of 65.3% (68.8 of those who completed reached remission). Additionally, as seen below in figure 2, we have tracked the trends in clinical response, non-response, and remission, in correlation with the week of treatment. We found that patients were experiencing the most significant change in clinical response between weeks three and four, as roughly 79% of patients were in the "no response" group at the end of week two, which declined to 42% by the end of week four. Following weeks four and five, we observed a consistent upward trend in clinical response at each weekly data point. Remission rates followed a similar trend, most notably from week three to week eight. Remission rates increased from 12% to 61% during this five-week time span. All data points are charted below:

Proportional Outcomes Per Week



References

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Method

Statistical analysis of the respective collected data was completed through the use of computerized statistics software, Statistical Package for Social Sciences (SPSS). Descriptive statistics and post-hoc analyses were run to determine and chart the trends within each group. Treatment locations were determined using the Beam F3 method, which has been shown to exhibit consistently accurate results in treatment position determination⁵. Following the determination of each patient's target location, their motor threshold was determined for use of individual specific dosage. Patients included in the study were treated using the standard protocol, which targets the left dorsolateral prefrontal cortex (LDLPFC). The standard protocol has been shown to yield significant antidepressant effects.⁶ All individuals were treated once daily with an average of 40.1 sessions completed. There was no control for individuals on simultaneous antidepressant or mood augmentation medications. Excluded from the study were individuals who had previously received rTMS treatment, which included patients receiving full repeated treatment courses, as well as individuals receiving maintenance rTMS. All individuals included in the data were actively diagnosed with MDD, though some individuals carried co-morbid diagnoses. Patient outcomes were tracked through weekly administration of the PHQ-9 self-report assessment, which were used to measure patients' self-rated depression symptom severity throughout the course of treatment. All patients in this dataset completed their course of TMS treatment and the subsequent sessions in the online workbook. For standardization purposes, patients included in the analysis completed the full course of treatment. Non-completers were excluded from the analysis, even if they exhibited clinical response.

Response

Additionally, we analyzed the differences in between-group score distributions, which further showed that the TMS + therapeutic intervention groups were more positively skewed than group A. By week 7, group B not only reported a higher concentration of scores in remission, but also averaged lower reported scores within each PHQ-9 clinical threshold, as well as a smaller range of recorded scores. Notably,

non-responders and non-completers were absent in Group B data. This trend is indicated in the charts below, as Group B is more positively skewed and has a smaller score distribution (score range: 0-21), while group A is less peaked in a larger score distribution (score range: 0-26).



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Conflicts of Interest

 Dr. Cochran is the owner & co-author of Train Your Brain: Your record of Care with TMS, <u>www.TMSworkbook.com</u> and is the CMO and a partner in NeuroScience & TMS Treatment Center (NSTMS), which has four locations; NSTMS uses both MagVenture & NeuroStar devices
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