

# Combining Repetitive Transcranial Magnetic Stimulation and Cognitive Behavioral Therapy for Effective Treatment of Tinnitus and Insomnia – A Case Report

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## OBJECTIVE

We present the case of a 53-year-old male patient, who had been suffering from symptoms of decompensated and chronified tinnitus for four years, most likely caused by work stress (1). In addition, the patient developed comorbid decompensated insomnia.

It has been estimated that up to 80% of people will experience tinnitus over the course of their lives (2), with rates of comorbid sleep problems as high as 77% (3). With regard to effective

treatment tinnitus „remains a clinical enigma“ (4) due to its high levels of complexity and heterogeneity as well as its high numbers of possible etiologies and comorbidities. We therefore hypothesized, that a multidisciplinary, combinatory approach to treatment targeting multiple blocks could improve the treatment outcome. CBT, relaxation techniques, and rTMS likewise have been shown to increase quality of life and lower tinnitus symptoms without adverse events.

## METHODS

The treatment plan we developed consisted of two parts:

- **ten sessions of 1 Hz rTMS** for tinnitus over consecutive working days with a stimulation intensity of 110% of the individual resting motor threshold, applying 2000 stimuli per session, with coil position 10-20 guided over the left primary auditory cortex (5,6)
- **ten sessions of CBT** for tinnitus and insomnia, as recommended by German guidelines, including progressive muscle relaxation and breathing exercises

We used the Tinnitus Questionnaire (TF) to assess tinnitus severity, the Beck Depression Inventory (BDI-II) for depressive symptoms, as well as the WHO Well-being Index (WHO-5) for subjective well-being.

## RESULTS

### Test scores (see Fig. 1a-c)

- Within the 3 weeks of rTMS treatment, TF scores decreased from 48 (degree 3 of 4, decompensated tinnitus) to 38 (degree 2 of 4, compensated tinnitus). BDI-II scores slightly changed from 10 to 9 (minimal depressive symptoms). WHO-5 scores increased from 52 (critical cut-off) to 76 (normal well-being).
- Within the 15 weeks of CBT treatment, the patient's TF scores decreased from 36 (degree 2 of 4, compensated tinnitus) to 12 (degree 1 of 4, compensated tinnitus). BDI-II scores decreased from 8 (no depressive symptoms) to 1. WHO-5 scores increased from 64 (average well-being) to 84 (above average well-being).

### Further development

There were great improvements regarding emotional balance, drive, the level of daytime sleepiness, the patient's ability to concentrate and his general mood. Light improvements were reported concerning the ability to relax and the ability to perform. The patient could be discharged from treatment with a clearly increased self-efficacy. Throughout the entire course of

## DISCUSSION

Improvements were achieved with regard to everyday functioning, as the patient went from decompensated and severe to clinically negligible TF scores, from minimal to no depressive symptoms, and from just above critical to above average well-being. Combining equipment-based and psychological approaches to treatment proved to be successful in this case. **We conclude that a combination of rTMS and CBT may be considered as an effective treatment for chronic tinnitus and comorbid sleep disorders.** If healthcare professionals were to choose a

Fig. 1a. Development of BDI-II scores.

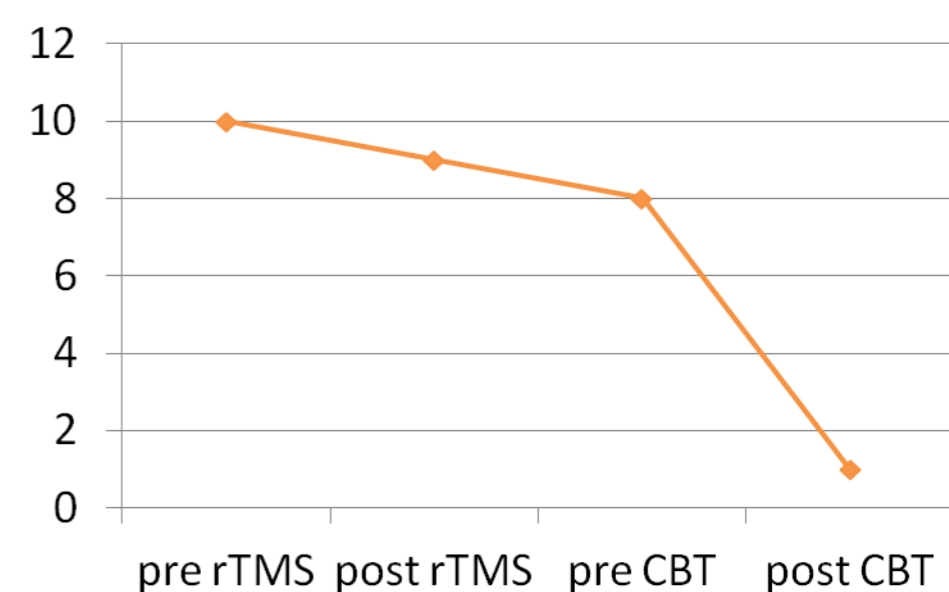


Fig. 1b. Development of WHO 5 scores.

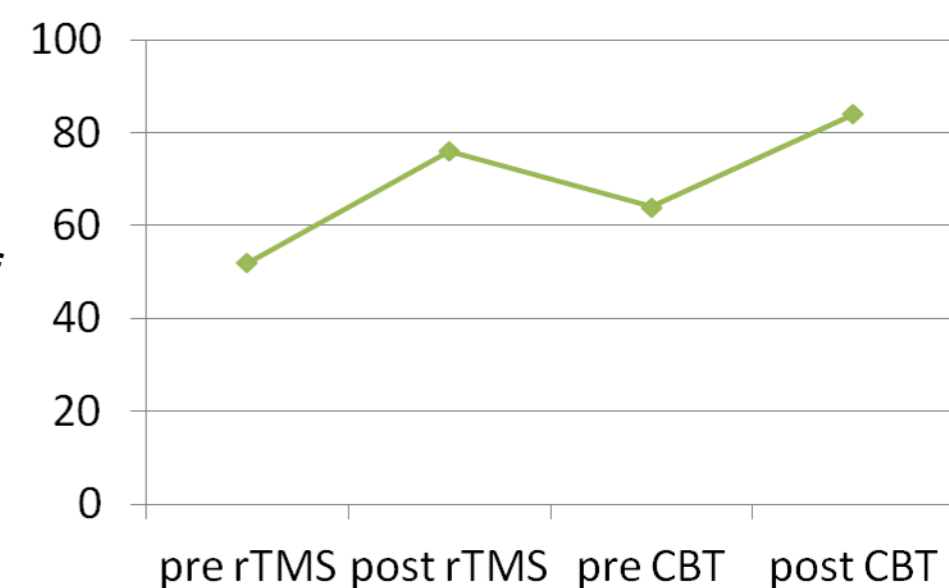
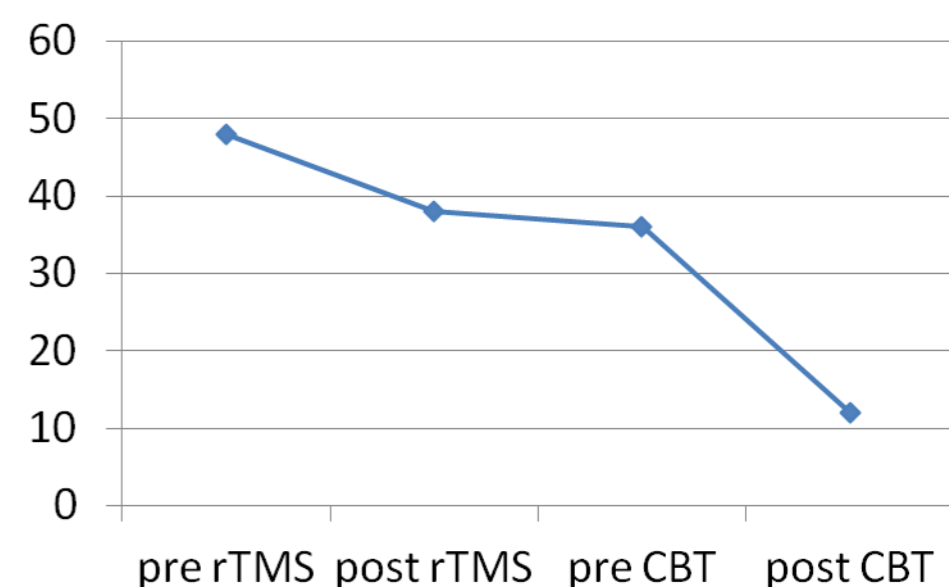


Fig. 1c. Development of TF scores.



standalone treatment for tinnitus symptoms, current evidence suggests selecting validated tinnitus-specific CBT over alternatives, such as rTMS. In our case however, rTMS therapy made it possible to start therapy at all because of a somatically fixated disease model. An optimization of the treatment protocol to improve the sustainability of the therapy seems sensible. The efficacy of this personalized combined treatment approach in larger samples will be investigated in future research.

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