

# Chronic migraine and sleep quality: benefit of deep transcranial magnetic stimulation (dTMS)

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## Objective

The debilitating nature of migraine and challenges associated with treatment-refractory migraine have a profound impact on patients. With the need for alternatives to pharmacologic agents, dTMS could be efficacy in treatment-refractory chronic migraine in absence of side effects. We investigated the use of dTMS over left dorsolateral prefrontal cortex (DLPFC)<sup>2</sup> for prevention of migraine attacks in chronic migraine<sup>1</sup> and evaluated the impact of dTMS on migraine-associated sleep disturbance and disability.

## Methods

Twelve dTMS sessions were administered on alternate days over bilateral DLPFC with left prevalence. Fourteen patients with chronic migraine were randomized to dTMS (N=7; 6 women, 1 man, mean age 45 years) and treatment-as-usual (TAU; N=7; 5 women, 2 men, mean age 47 years). Diagnosis of chronic migraine was established according to the ICHD-3 criteria. All patients had severe daily or almost daily ( $\geq 15$  days/month) headaches in the last three months, did not respond to  $\geq 3$  preventive medications and to drug overuse. Patients completed the self-rated Pittsburgh Sleep Quality Index (PSQI) to evaluate quality of sleep, MIDAS scale (Migraine Disability Assessment Scale) useful to value the level of disability and rated their pain through a visual analog scale (VAS). Attack frequency, headache index, number of analgesic medications, disability and sleep quality were recorded at baseline, during treatment, and three month following end of treatment.

## Results

The use of the PSQI questionnaire in chronic migraine patients demonstrated that these subjects were prone to sleep poor quality. Global Sleep Quality scores from the PSQI correlated with the scores obtained from the MIDAS questionnaire and with the VAS Pain results, indicating a relationship between quality of sleep, disability and pain. Mediation analysis showed that quality of life influences quality of sleep both directly and indirectly by its effect on pain. Patients treated with dTMS showed significant improvement on all outcome measures during treatment and three month after, compared to baseline: mean VAS scores (baseline vs 3 months:  $5.75 \pm 0.64$  vs  $1.50 \pm 0.76$ ; 95 % CI;  $p < 0.0001$ ), and mean number of migraine attacks per month (baseline vs 3 months:  $8.9 \pm 3.85$  vs  $3.45 \pm 2.08$ ; 95 % CI;  $p < 0.01$ ); Significant improvements were noted in MIDAS along with a trend toward improvement in PSQI daytime dysfunction subscore ( $p < 0.01$ ).

## Conclusion

dTMS was associated with significant reduction in migraine attack frequency, pain intensity, painkiller use, and improved sleep quality in patients with treatment-refractory migraine in absence of side effects. The role of dTMS in migraine therapy is being further explored in ongoing large-scale, randomised, sham-controlled trials with long-term follow-up.

## References

- <sup>1</sup>Klein MM et al. (2015) Pain 156:1601-14.
- <sup>2</sup>Kanda M et al. (2003) Clin Neurophysiol 114:8606.

