

‘SEEING IS BELIEVING’: OBSERVING THE EFFECT OF MINDFULNESS ON SLEEP QUALITY AND BRAIN NEUROCHEMISTRY USING ADVANCED QUANTITATIVE MRI TECHNIQUES

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Mindfulness is the awareness that emerges through paying attention, on purpose, and nonjudgmentally to the present moment. Among many beneficial effects, mindfulness is shown to improve sleep quality and reduce sleep disturbances – a common problem in all strata of society.

Sleep quality is commonly assessed through subjective reports, or objective tools like actigraph-based assessments or EEG. MRI has been used to show the influence of mindfulness practice on several brain regions post meditation. The majority of MRI studies, however, are based on functional MRI (**fMRI**), meaning that brain morphology and neurochemistry are rarely studied. This also includes changes to the microstructure and neurochemistry of **sleep-related** brain regions following mindfulness practice, e.g., hypothalamus, pons, locus coeruleus and the pineal gland.

In this study we employed novel quantitative MRI (**qMRI**) and microscopic MRI (**μMRI**) techniques to identify changes in the brain microstructure, white matter tracts, and functional activity following mindfulness practice and improvement in sleep quality. The study followed 43 subjects, out of which 22 passed a Mindfulness-Based Stress Reduction (MBSR) course, and 21 constituted a control group. Subjects underwent MRI scans before, during, and after the course followed by filling sleep and anxiety questionnaires. Objective markers of sleep quality were also extracted using a smart watch and complemented by a daily questionnaire about sleep quality and mindfulness practice.

Preliminary results show that the intervention significantly improved the subjective sleep quality of the experimental group compared to controls (no intervention, $p < 0.001$). MRI measures are currently being analyzed in brain regions and functional networks known to be influenced by mindfulness practice and involved in sleep regulation.

In the long run, this research has the potential to identify unexplored facets of sleep disorders and advance the development of better and personalized treatment for sleep disorders.