Thalamic Gamma Aminobutyric Acid Level Changes in Major Depressive Disorder After a 12-Week Iyengar Yoga and Coherent Breathing Intervention

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Introduction

Although yoga is considered as a science for spiritual growth of mankind, many studies have shown that various streams of yoga render many physical as well as psychological benefits to the practitioners. Studies based on Yogic intervention (YI) on Major Depressive disorders (MDD) have shown extremely positive outcomes in recent times (1,2).

The antidepressant medications which target the monoamine framework were unable to answer to the neurobiological mechanisms of MDD. Gamma aminobutyric acid (GABA), an amino acid neurotransmitter is known to be an important factor in the pathophysiology of mood disorders (3).

In this US based study the design was to track the changes in GABA in MDD through a Yogic Intervention based on Iyenger yoga tradition. The study reports that YI does influence the change in GABA level through the stimulation of parasympathetic response.

Study design

The participants were randomized and divided between a high dose group (HDG) and a low dose group (LDG) for the Yogic Intervention of 12 weeks. The HDG intervention consisted of three 90-min yoga sessions and four 30-min homework sessions per week. The LDG intervention consisted of two 90-min yoga sessions and three 30-min homework sessions per week. The participants were included on the criteria of age (18 to 55 years old) currently diagnosed with MDD with Beck Depression Inventory II (BDI-II) score ranging from 14 to 28 (moderate level). Later the BDI-II upper limit of 28 was dismissed and upper age limit was shifted from 55 to 65 to achieve the requisite recruitment.

Method

The 90-min yoga protocol comprised of 60 min Iyengar yoga, 10 min of relaxation, and 20 min of coherent breathing exercise. Homework assignment is composed of 15 min of body postures and 15 min of breathing practices. Magnetic resonance imaging (MRI) and proton (1 H) MRS scans were acquired using a volumetric head coil (XLR Imaging, London, Canada). Difference-edited GABA-optimized spectra were obtained using MEGAPRESS. The 3.00-ppm GABA doublet resonance and coedited resonance structures of glutamate (Glu), glutamine (Gln), N-acetylaspartate (NAA), and the 0.93-ppm macromolecule (MM) resonance from MEGAPRESS 68 msec and difference-edited spectra were fitted using LC Model.

Implications

30 participants completed this 12-week intervention (15 HDG and 15 LDG), and 28 of them completed the second scanning session (15 LDG and 13 HDG) which included Scans-2 and 3. There were no significant differences for either group in tissue segmentation data across Scans- 1, 2, or 3, for GM content (55.1%–16.1%, F2, 52 = 0.15, p = .86), confirming reproducibility of the voxel placement algorithm across MRS sessions. This study shows that yoga sessions probably have an effect on the GABA levels. While the total group did not show any significant correlation between BDI-ll scores and GABA levels, the HDG showed a significant relation between BDI-ll scores and change in GABA scores, consistent with the GABA deficit hypothesis of depression. This manuscript supports the hypothesis that yoga along with coherent breathing practices increase GABA level, which affects the change in mood. This study suggests that the change in GABA level can be maintained through the regular (at least once a week) practice of Yoga.

Inference

1. This study finds a substantial co-relation between changes in BDI-II scores and changes in GABA scores in the HDG.
2. This study marks the change in GABA levels. The bilateral thalamic data may give more information about the lateralized changes which was not included in the study.
3. Given the small sample size (15 LDG and 13 HDG) the research provides tentative support that one of the mechanisms through which yoga along with coherent breathing affect mood is by increasing GABA levels. But a large scale study is needed to establish this hypothesis.

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