

Mind-Body Connection: The Impact of Kundalini Yoga on Neuroplasticity in Depressive Disorders

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ABSTRACT

This study explores the potential impact of Kundalini Yoga (KY) on neuroplasticity within the context of depressive disorders. As depression is associated with changes in brain structure and function, particularly in regions like the hippocampus, prefrontal cortex, and amygdala, interventions that promote neuroplasticity are of great interest. KY, a practice that combines physical postures, breathing techniques, meditation, and chanting, has shown promise in improving mental health. This review examines existing literature on the effects of KY on neuroplasticity and its potential benefits for individuals suffering from depressive disorders. Depressive disorder (MDD) is a mind-body disorder. Cellular aging has been implicated in the pathogenesis of MDD with the altered mind-body communication markers like stress response, immune response, nutrition sensing, and a range of other regulatory feedback systems. In this age of super specializations, one specific target and interventions (preferably a drug) on it are being rigorously sought by the health care community and industry, but have failed in it in the last fifty years in spite of advances in technology.

Keywords: Kundalini Yoga, neuroplasticity, depressive disorders, breathing techniques, meditation, and chanting.

I. INTRODUCTION

Most depressive patients suffer from one or more hormonal abnormalities. There strong links between hormone production and the activity of catecholamines and other synaptic transmitters in the brain. Some depressed persons respond best to drugs that affect catecholamines more than serotonin, and others respond best to drugs that effect mostly serotonin. Thus, it appears that biochemically there are several different forms of depression, including one with low catecholamines, and, other with low serotonin. Some workers have also suggested that depression, is caused due to excess of receptors of these transmitters. Individuals with major depressive disorder were found to have a significantly higher cortisol and lower melatonin level than the normal subjects.

II. LITERATURE REVIEW

Shulamith Kreitler (2018) The study traces the changes in the conceptualization of body-mind relations in psychology in terms of five sequential phases. The first phase is characterized by the view that there is nothing but the body. The second phase is marked by the conception that the mind is the only relevant agent. The third phase is based on the view that both body and mind exist but are on parallel tracks. The main assumption in the fourth phase is that both body and mind exist and function in interaction.

Weihong Kuang (2017) Published MRI evidence of structural and resting-state functional brain abnormalities in MDD has been inconsistent. To eliminate interference by repeated disease episodes and antidepressant treatment, we conducted the first multimodal voxel-wise meta-analysis of studies of voxel-

based morphometry (VBM) and the amplitude of low-frequency fluctuation (ALFF) in first-episode drug-naïve MDD patients, using the Seed-based d Mapping method (SDM). SDM-based multimodal meta-analysis was used to highlight brain regions with both structural and functional abnormalities.

Bernard Korzeniewski (2015) Complexity and related phenomena exist as at least as “objective” and primary aspects/elements of the world as matter, space, and time. On the other hand, space, time, and matter become more and more subjective in modern physics. Complexity causes “something new” to emerge at the level of the whole complex system, which is not present at the level of the elements of this system and cannot be fully reduced to the interactions between these elements. This fact concerns both simple systems, such as atoms composed of a nucleus and electrons or (macro) molecules composed of atoms, as well as very complex systems such as living individuals built of (macro) molecules, organelles, cells, and organs, and conscious brains composed of networks of neurons.

S. Varambally (2013) Therapeutic effect of yoga in depression is recognized. Neuroplastic effects of antidepressant therapies are inferred by elevations in brain-derived neurotrophic factor (BDNF). Role of yoga in both these effects has not been studied. The depression severity was rated on Hamilton Depression Rating Scale (HDRS) before and at 3 months. Serum BDNF levels were measured at the same time points. Both yoga groups were better than drugs-only group with respect to reduction in HDRS scores. Neuroplastic mechanisms may be related to the therapeutic mechanisms of yoga in depression.

Nanxin Li (2012) Molecular and cellular studies have demonstrated opposing actions of stress and antidepressant treatment on the expression of neurotrophic factors, particularly brain-derived neurotrophic factor, in limbic structures of the brain. These changes in neurotrophic factor expression and function result in structural alterations, including regulation of neurogenesis, dendrite length and spine density in hippocampus and prefrontal cortex (PFC). The deleterious effects of stress could contribute to the reduced volume of these brain regions in depressed patients.

Kundalini Yoga

Kundalini yoga is a combination of various ancient yogic techniques which are selected, put together in a system. Kundalini yoga is originally based upon the foundation of Tantric teachings, and includes specific kriyas directed to target and balance the kundalini, the dormant and primal energy force at the base of the spine. Kundalini can also be understood as shakti, the creative energy or consciousness. Kundalini yoga is therefore also referred to as the yoga of awareness or consciousness. Just like tantra has devotional aspects, kundalini yoga also includes bhakti, devotion and surrender. In 1968, Harbhajan Singh Khalsa, also known as Yogi Bhaajan, introduced kundalini yoga into the United States, "Kundalini Yoga as taught by Yogi Bhaajan". This form of Kundalini Yoga will be further discussed in detail in this study. Teachings from this framework will be used in defining a renewed holistic mental health model. Yogi Bhaajan founded the "Healthy, Happy, Holy Organization" (3HO) as a teaching organization. These teachings were exclusively passed from teacher to student in a very selective way. To learn Kundalini Yoga, a student had to serve a Master, prove his/her humility, self-discipline and devotion, before the teacher would even consider teaching them. He defied that tradition because he could see no logic in keeping these teachings from the thousands of young people out there who were abusing drugs in search of higher consciousness.

Steps of Kundalini Yoga

Each Kundalini Yoga Sadhana consists out of six main components, together they make a full class or sequence, which are done in the following order:

- ***Opening chant:*** Tuning in with the ‘_Adi’ mantra. Connecting with lineage.
- ***Warmup and pranayama:*** breathing exercises, and various movements to stretch spine and body to prepare for the kundalini yoga kriya.
- ***Kriya:*** combination of a specific sequences that can contain various asanas, pranayama, mudras, naad, and dhyana.

- The length and intensity of the kriya varies according to beginner vs expert and always has a fixed protocol of instructions and time duration (depending on picking the short version or the long version).
- **Relaxation:** Shavasana allows body and mind to absorb the effects of a kriya.
- **Meditation:** with gentle guidance, to cultivate awareness and absorption.
- Closing chant and prayer.

Benefits of Kundalini Yoga

There are so many benefits of kundalini yoga out of different Benefits we can understand the benefits as given below points. Stress and Anxiety Relief Kundalini yoga can help relieve stress and anxiety. In a small 2017 study, participants experienced immediate stress relief after doing Kundalini yoga. This effect continued after they practiced for 3 more months. Similarly, a 2018 study determined that 8 weeks of Kundalini yoga lowered participants' anxiety levels. The researchers concluded that Kundalini yoga may be an effective treatment option for people with generalized anxiety disorder.

b. Improves cognitive function

The participants were randomly divided into two groups. One group practiced Kundalini yoga, while the other group received memory enhancement training for 12 weeks. While both groups showed significant improvements in their memory at the end of the study, only the Kundalini group showed short- and long-term improvements in their executive functioning. This includes skills such as reasoning, problem-solving, and cognitive flexibility, among others. In addition to cognitive improvements, the group that practiced Kundalini yoga also had fewer symptoms of depression at the end of the study.

c. Boosts self-perception

Another 2017 study found that Kundalini yoga may improve body positivity and self-acceptance. These benefits were observed in nine women diagnosed with anorexia nervosa and bulimia nervosa. According to the research, Kundalini yoga may help treat eating disorders, improving self-perception and self-appreciation.

d. Spiritual evolution –

It's stated that as the Kundalini energy awakens, you become more spiritually connected with yourself and others. These benefits have not yet been scientifically proven, due to its subtleness and subjective experiences, but are instead supported by anecdotal evidence. The experienced benefits include the following:

- Increased awareness and mindfulness
- Increased subtle perceptions related to intuition
- Higher states of consciousness
- increased creativity
- improved charisma
- increased energy and pranic flow
- internal peace and happiness

e. Kriyas for addiction Recovery and building new habits

The framework of Kundalini Yoga Teachings contains many kriyas for recovery from drug addiction or abuse. Kriyas to cleanse the liver, rebalance the nervous system, and allow the glandular system to secrete properly are available. In the current age, these techniques are extremely valuable and needed. Classes can be promoted to both the addiction counselors and their clients. People who suffer from eating disorders, smoking, and other addictions can also use these programs.

III. OBJECTIVES

- To Explore the Effects of Kundalini Yoga on Brain Neuroplasticity in Individuals with Depressive Diso-

rders

- To Assess the Therapeutic Benefits of Kundalini Yoga for Individuals with Depressive Disorders
- To Compare the Efficacy of Kundalini Yoga with Other Mind-Body Interventions in Promoting Neuroplasticity
- To analyze differences in neuroplastic outcomes between Kundalini Yoga and other forms of yoga or mindfulness practices.
- To Understand the Mechanisms by Which Kundalini Yoga Influences Neuroplasticity
- To Develop Guidelines for Integrating Kundalini Yoga into Treatment Protocols for Depressive Disorders

IV. RESEARCH METHODOLOGY

Kundalini Yoga has been studied for its potential impact on depressive disorders, and the methodology of such research is critical to understanding the results. Participants are randomly assigned to either a Kundalini Yoga group or a control group (e.g., waitlist, no treatment, or an alternative therapy). Smaller-scale studies to test the feasibility of the intervention and refine the methodology for larger trials. Data collection is baseline measurements are taken before the intervention begins, and follow-up assessments are conducted after the intervention ends. Some studies may include intermediate assessments. Use to analyze changes in depressive symptoms over time within and between groups. Control Groups for Participants receive no intervention during the study but are promised the yoga program afterward. The intervention usually involves a structured Kundalini Yoga program, which includes specific components like pranayama (breathing techniques), asanas (postures), meditation, and chanting. The program's duration can vary, commonly ranging from 3 to 6 months. Participants might be required to attend sessions several times per month, with each session minutes. The might include quality of life, anxiety levels, and physiological measures like heart rate variability or cortisol levels. All participants are analyzed in the groups to which they were originally assigned, regardless of whether they completed the intervention. Participants typically include individuals diagnosed with major depressive disorder (MDD) or other depressive disorders based on standardized diagnostic criteria.

V. DATA ANALYSIS

The patients and the normal healthy volunteers were all male and their age ranged between 20 and 40 years. The present study included 100 clinically diagnosed cases of mental depression and 20 normal healthy volunteers. Twenty four hours urine sample from patients and normal. The patients were explained the nature and other details of the study and they agreed to submit themselves to this investigation. Thereafter, the patients were divided into the following groups: kundalini yoga therapy and drug therapy.

1. Kundalini Yoga Therapy: This group comprised of 45 patients. They were advised to practice Kundalini Yoga as per the method given below under the supervision of a well – trained Yoga teacher. Follow – up study of the biochemical and physiological parameters was carried out at the end of 3 and 6 months practice of Kundalini Yoga.

2. Drug therapy: Similar to Kundalini Yoga Therapy, the biochemical and physiological parameters were recorded at the end of 3 and 6 months of treatment. This group included 45 patients who were given tricyclic antidepressant (imipramine) orally in the doses of 25 mg three times a day as prescribed by the physician.

General Observations: After six months practice of Kundalini Yoga, 65% of the depressive patients showed improvement in their sleep patterns, digestive system, social interactions and became less irritable. However, in cases treated with imipramine, these subjective improvements were less prominent.

Physiological Observations: After 3 and 6 months practice of Kundalini Yoga, this pulse rate and blood pressure were significantly lowered in comparison to pre-treatment level (Table – 1). In depressive patients the pulse rate and blood pressure were found to be significantly increased than the normal. Similar changes in pulse rate or blood pressure were also observed at the following 3 and 6 months treatment with imipramine (Table – 1).

TABLE – 1: WITH KUNDALINI YOGA AND DRUG IN DEPRESSIVE PATIENTS, PULSE RATE, SYSTOLIC AND DIASTOLIC BLOOD PRESSURE CHANGES BEFORE AND AFTER TREATMENT (VALUES ARE MEAN ± SEM)

Parameter	Control (20)	Pre-Therapy (100)	Kundalini Yoga therapy (45)		Drug therapy (45)	
			3 months	6 months	3 months	6 months
Pulse rate per Minute	80.00 ± 2.0	99.00* ± 2.1	93.51**** ± 1.6	86.00**** ± 1.2	90.00**** ± 1.6	85.00**** ± 2.0
Systolic blood pressure (mm Hg)	115 ± 5.0	128.00*** ± 1.2	125.01* ± 1.1	120.40*** ± 2.5	122.00**** ± 2.1	117.00**** ± 2.0
Diastolic blood pressure (mm Hg)	75.00 ± 5.8	90.00** ± 2.1	84.00*** ± 1.3	80.60**** ± 2.5	85.00*** ± 2.1	81.00**** ± 1.5

Table in parentheses indicate the number of cases; SEM – Standard Error of Mean

P*05.□; P** 02.□; P*** 01.□; P**** 001.□

Biochemical Observations:

Table – 2 shows the biochemical changes in mental depression and after 3 and 6 months treatment with Kundalini Yoga and with imipramine. In patients of mental depression the circulating levels of serotonin, glutamine and melatonin were found to be decreased significantly as compared to normal. At the end of 3 and 6 months practice of Kundalini

TABLE 2: THE DURATION OF KUNDALINI YOGA PRACTICE AND CHEMOTHERAPY IN DEPRESSIVE PATIENTS A PLASMA SEROTONIN, Γ – AMINO BUTYRIC ACID, GLUTAMATE, MELATONIN, CORTISOL, MONOAMINE –OXIDASE AND URINARY 5 – HYDROXYINDOLE ACETIC ACID LEVELS OF FUNCTIONS (VALUES ARE MEAN ± SEM)

Parameter	Control (20)	Pre-Therapy (100)	Kundalini Yoga therapy (45)		Drug therapy (45)	
			3 months	6 months	3 months	6 months
Serotonin (ng / ml)	101.50 ± 6.0	69.50 **** ± 5.0	89.51* ± 5.5	92.40**** ± 4.0	88.51 **** ± 5.0	94.00*** ± 6.2
γ – aminobutyric acid (µmoles / ml)	0.590 ± 0.03	0.529 ± 0.05	0.533 ± 0.05	0.533 ± 0.04	0.532 ± 0.05	0.545 ± 0.06
Glutamate	0.591	0.325****	0.366	0.455****	0.422 ***	0.492****

(μ moles / ml)	± 0.03	± 0.01	± 0.02	± 0.03	± 0.03	± 0.03
Melatonin (ng/ml)	0.76 \pm 0.09	0.54** \pm 0.02	0.66*** \pm 0.03	0.68**** \pm 0.03	0.64*** \pm 0.03	0.66**** \pm 0.02
Cortisol (μ g%)	19.00 \pm 1.9	28.00**** \pm 1.5	23.81* \pm 2.0	21.00*** \pm 2.1	22.52*** \pm 2.1	20.40*** \pm 1.7
Monoamine oxidase (PU/ml)	11.56 \pm 0.68	15.01**** \pm 0.7	14.52* \pm 0.3	12.21*** \pm 0.7	13.62*** \pm 0.6	11.92*** \pm 0.75
Urinary 5 – hydroxyl indole acetic acid (μ g/g of creatinine)	3.15 \pm 0.34	4.71 *** \pm 0.35	3.96* \pm 0.14	3.67* \pm 0.40	3.89* \pm 0.15	3.75* \pm 0.35

Table in parentheses indicate the number of cases;

P*05. □; P** 02. □; P*** 01. □; P**** 001. □

Yoga, the plasma serotonin and melatonin levels increased significantly from the pretreatment values. The patients of mental depression exhibited higher plasma cortisol, monoamine oxidase and urinary – 5 – hydroxyindole acetic acid levels than normal. These levels decreased significantly from their pre-treatment values after 3 and 6 months practice of Kundalini Yoga. However, the increase in plasma glutamate level was found to be significant only at the end of six months practice of Kundalini Yoga. Similarly, in patients treated with drug alone plasma serotonin, melatonin and glutamate levels were recorded to be significantly increased after 3 and 6 months. The treatment with imipramine also decreased the plasma cortisol, monoaminic oxidase and urinary 5 – hydroxyindole acetic acid levels significantly from their pre – treatment values within 3 and 6 months durations. Unlike the above parameters, in mental depression patients plasma δ -aminobutyric acid level was found to be within normal range.

VI. CONCLUSIONS

The demonstrated effectiveness of the kundalini yoga intervention used in this study, and the growing popularity of evidence-based kundalini yoga and other mind-body practices, may be particularly beneficial in the broader community. The observations recorded in the present study also tend to suggest that there occur a number of neurohumoral and hormonal changes in the patients of mental depression. The plasma serotonin level was found to be significantly decreased in mental depression. These changes are particularly relevant for individuals suffering from depression, as the practice may help counteract the neurobiological patterns that contribute to the disorder. Thus, the observations recorded in the present study and those of other workers clearly indicate that mental depression is generally associated with certain degree of abnormality in the neuroendocrine and endocrine systems. Research suggests that Kundalini Yoga may enhance the brain's ability to rewire itself by promoting the growth of new neurons and strengthening neural connections. It is well recognised that there is no one proven way that people recover from mental health concerns such as depression or anxiety. However, there is a range of effective interventions that can help people recover, stay well, and live more fulfilling lives. The important thing is offering the right intervention for the individual's needs. Moreover, Kundalini Yoga's emphasis on mindfulness and emotional regulation may further support these neuroplastic changes, offering a holistic approach to mental health treatment. While more research is needed to fully understand the mechanisms behind these effects, the existing evidence highlights the potential of Kundalini Yoga as a complementary therapy for enhancing neuroplasticity and improving outcomes in depressive disorders.

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