

## Integration of yoga in clinical psychiatric practice

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The time has come to move towards a multi-disciplinary approach to mental health care. The department of Psychiatry, National Institute of Mental health and Neurosciences (NIMHANS), Bengaluru, India, has initiated such a multi-disciplinary approach to patient care. As a general norm, psychologists, social workers, psychiatric nurses and psychiatrists work together for the overall care of the patient. In addition to this, the role of Yoga is now being increasingly recognized and applied in mental health. Our honourable prime minister alluded to yoga in his speech at the United Nations in 2014 that made a significant impact. Moreover, the UN accorded recognition to Yoga and the world celebrates the International Day of Yoga on June 21 every year. This event has created a unifying effect on the world community and Yoga has gained popularity even among research scientists. In the last 10 years, the number of research articles on yoga have increased exponentially. A good number of scientific journals encourage publications on yoga. NIMHANS has set up a Department of Integrative Medicine. Yoga, Ayurveda and modern medicine services are available under the same roof. Illustrated below are some applications of integrating yoga in clinical psychiatry.

### Need for Evidence-based Approach

Any therapeutic application in modern medicine demands evidence-based approach. Yoga interventions too demand evidence. Evidences in the form of double-blind randomised clinical trials have posed challenges in yoga or other traditional interventions.<sup>1</sup> There is no ideal placebo for Yoga. The main reason for using a placebo is to blind the subject from knowing what he/she received. Subjects doing yoga will know that he/she has performed yoga. Researchers have used physical exercise as a control,<sup>2</sup> but this will not serve the purpose of blinding as electronic media has popularised yoga and the public are aware of the yoga practices. An ideal control situation is far from sight and we may not get one at all.

The next requirement for generating evidence-based data is the objective measurement of outcome. This too poses a challenge in psychiatry. As an alternative to objective clinical measurements, one can examine the neurobiological effects of yoga. Correlation of these with the clinical outcome may partially exclude mere placebo effect. Although one could argue that placebo effects too can have some neurobiological consequences. However, the focus of the brief review is on the neurobiological markers of yoga in psychiatric illnesses. These findings could form the evidence-base for applying yoga in clinical practice. For

this purpose, two diagnostic conditions have been examined; depression and schizophrenia. Depression is a highly prevalent condition and schizophrenia a highly burdensome one.

### Yoga for Depression

Meta-analyses support the benefits of yoga in depression.<sup>3,4</sup> Comparators with yoga were standard treatment, relaxation, and aerobic exercises. Yoga conferred an advantage over these in depression. Effect of yoga given with or without anti-depressant drug was studied in NIMHANS. The study showed that yoga brings down the depression scores substantially even when given alone.<sup>5</sup> However, this was not a randomised clinical trial. Hence, 'comparison' has limitations. Yet, there was a substantial reduction in depression scores when yoga was the sole treatment. Yoga produced effects that 'correct' the existing neurobiological substrate of depression. For example, it is known that in depressed individuals the deeper brain structures, the amygdala or the cingulum are hyperactive, and corollary to that the frontal cortex has a lowered activity. Though one can debate the cause-effect relationship, these two observations have been consistent.

### How does yoga confront this neurobiological effect?

Chanting of 'OM' is one of the commonly practiced components of yoga. When healthy subjects chanted 'OM', cingulum and the deeper limbic structures were deactivated.<sup>6</sup> Depressed individuals too can obtain this effect when they chant OM as part of yoga therapy. The biology of depression is hyperactivity of the limbic structures and yoga seems to act by countering this process by deactivating it. This provides one biological evidence that yoga should work in depression. Second is the role of Gamma-Aminobutyric Acid (GABA). GABA levels are lower in depression.<sup>7</sup> The group practising yoga, showed an increase in the levels of GABA as measured using Magnetic Resonance Spectroscopy.<sup>8</sup>

Another study used a physiological measure to examine the role of GABA in depression.<sup>9</sup> The measure used was the silence of the Electromyography (EMG), which can be demonstrated by Transcranial magnetic stimulation (TMS). A TMS pulse produces a spike in the EMG (electromyogram) of the corresponding (thumb) muscle of the individual. This EMG signal flattens after the stimulus pulse for a short period (50-100 msecs) and then the signal returns. The EMG silence, also called Cortical Silent Period (CSP), is a result of cortically-induced inhibitory effects

mediated by GABA. The length of this CSP reflects indirectly the GABA tone in the brain. The CSP gets longer, almost double the value, after yoga indicating that GABA tone had increased in these individuals.<sup>9</sup> What happens in depression? CSP was lower in depressed than in healthy subjects.<sup>10</sup> The depressed individuals received yoga or did walking on randomized allocation to these two groups. Both groups showed improvements in depression. The GABA tone (length of CSP) increased with the practice of yoga in depression. The 'correction' of the neurobiological deficit was more profound and demonstrable in the yoga group.<sup>10</sup>

Yet another study had subjects who received antidepressants alone, yoga with anti-depressants or yoga alone. In both the yoga groups, cortisol levels dropped after treatment. With practice of yoga, 65% of patients had a decrease in blood cortisol levels.<sup>11</sup> Brain-Derived Neurotrophic Factor (BDNF) is lower in Depression patients.<sup>12</sup> Effective treatments 'correct' this. There was a substantial elevation in the BDNF in both the yoga groups compared to their levels before the treatment. The decrease in cortisol was proportional to the increases in the levels of BDNF.<sup>11</sup> This suggests that sustained elevations of cortisol for longer periods may lead to a lowered level of BDNF, which may reflect on the brain structures of depressed individuals, as loss in grey matter.

Can yoga reduce this loss of grey matter? There are studies, which demonstrated that yoga increases the grey matter.<sup>13</sup> The grey matter size in the hippocampus of seven elderly subjects who practiced yoga was studied. After six months of regular yoga practice, a statistically significant increase in the grey matter volume in the hippocampus was observed.<sup>1</sup> This study was done with a small sample and without a control arm. Another study has shown a protective effect of yoga on the age-dependent loss of grey matter in the cortex.<sup>15</sup>

There are levels/stages of neurobiological pathology in depression. Starting from the decreased frontal activity, increased limbic activity leading to decrease of GABA, increase in the cortisol, then leading to decrease in the BDNF resulting in cortical thinning. 'Correction' of this deranged neurobiology by yoga at each of the levels described in depression is an objective evidence in support of yoga in depression.

### Schizophrenia: Related Symptoms

Schizophrenia is another condition where there is sufficient evidence for the utility of yoga. Effect of yoga in schizophrenia individuals were demonstrated on chronically ill patients stabilised on anti-psychotic drugs who had not attained complete recovery. In these subjects, when yoga was added, negative symptoms reduced, but this did not happen in the exercise arm (active control) or in the wait-listed.<sup>2</sup>

A more recent study confirmed the beneficial effects of yoga.<sup>16</sup> Social cognition deficit in schizophrenia is a challenge to treatments and yoga improves social cognition. Clinical effects of yoga in schizophrenia have been consistent in all these studies. Results of two trials on Yoga

in schizophrenia have influenced a clinical Guideline to recommend yoga as a need of treatment in stabilized schizophrenia individuals who are attending out-patient services. Interestingly there is a biological effect as well. Schizophrenia people have low levels of oxytocin, which is related to low social cognition. Nasal oxytocin is employed for improvement in social cognition. In a study, oxytocin levels were measured before and after 4 weeks of yoga.<sup>17</sup> Schizophrenia subjects obtained elevation in oxytocin levels (nearly three folds). The waitlisted individuals did not have such increase. Yoga can cause an autogenous elevation in the oxytocin. Yoga also has demonstrated efficacy in children with autism,<sup>18</sup> a condition that is also associated with social cognition deficits.

In chronic schizophrenia subjects, the Default Mode Network (DMN) has poor coherence, which perhaps explains some behaviours. Coherence improved in both posterior and anterior DMN after yoga intervention in such chronically ill schizophrenia subjects demonstrating that the network physiology gets better with yoga. Schizophrenia as the term suggests, breaks mental operations. Yoga is something that unites. The root word for yoga is *Yuj* that means to unite (*'samyoga yoga ityukto jivatmah paramatmanah'*). Yoga perhaps unites the disconnected behaviours by uniting the poorly connected brain networks. This is another objective evidence to support yoga for schizophrenia.

### Effect of Yoga on ECT- induced Cognitive Deficits

A randomized clinical trial was conducted to examine the effects of yoga on cognitive deficits observed in patients receiving Electroconvulsive Therapy (ECT). Patients referred for ECT (n = 38) were randomly allocated to two groups: yoga or wait-list control. ECTs were given on alternate days over 3 or 4 weeks depending upon how long the physicians wanted them to receive ECTs. On the day of ECT, they would do yoga in the afternoon and on the other days they would in the morning. On each of the 6 days of the week, they had a session of yoga, all through the course of ECT. They were trained in yoga practice, which was tailored to help prevent cognitive decline<sup>14</sup> (i.e., practices, which we have been using for elderly individuals). Wait-listed patients were offered Yoga after ECT course. The two groups were comparable at baseline (before the start of ECTs in clinical and demographic variables). The Yoga group had significantly lower proportion of patients who had a higher percentage of decline in performance on the Controlled Oral Word Association Test (COWAT; survival analysis; log-rank chi-square = 6.44; p<0.01). There was no difference between the two groups in performance on other memory and non-memory tests. This study provides a preliminary evidence that yoga can protect the cognitive dysfunction effects of ECT. Thus, yoga can be recommended for practice in patients being treated with ECT.

Thus, there is neurobiological evidence supporting the role of yoga in depression and schizophrenia and of course empirical evidence today with a small research data, that

yoga could prevent the cognitive dysfunction in ECT individuals. At NIMHANS, studies have demonstrated effect of yoga in many other clinical conditions as well. Yoga can be successfully integrated with clinical psychiatry practice.

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### Conflict of Interest

The authors declare that there is no conflict of interest.

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