

# **ABSTRACT**

## **INTRODUCTION**

Schizophrenia is a severe mental disorder affecting young adults with a lifetime prevalence of 1%. It's characterized by three important symptom clusters namely positive, negative & cognitive symptoms. Except for the positive symptoms, there are no effective treatments available for the negative and cognitive symptoms. In addition, the existing treatments are not free of side effects; some causing extrapyramidal side effects and others causing metabolic side effects.

Unavailability of effective biological treatments for negative and cognitive symptoms adds to the already existing burden of socio-occupational dysfunction associated with these symptom clusters. Psychosocial interventions are available targeting a few or most of the domains of social cognition with or without neurocognition training. But majority of them [for example, Cognitive Enhancement Therapy(CET), Social Cognition Interaction Training(SCIT)] are highly resource intensive and its feasibility in developing countries are questionable, though they might be effective. Moreover, they were developed among the western patient population and its cultural validity in eastern countries with more of religious inclination is yet to be tested. Hence, there is a need to explore the role of other complementary therapies like yoga for an integrated approach in treating patients with schizophrenia.

Yoga as a mind-body therapy is useful in lifestyle related disorders, including neuropsychiatric disorders. In healthy adults and elderly, yoga is found to be efficacious in improving cognitive skills. Yoga has been shown to significantly improve negative symptoms and functioning in schizophrenia patients. In a recent study, along with improvements in functioning, yoga also increased oxytocin levels along with improvement in Facial Emotion Recognition Deficit (FERD) in patients with schizophrenia.(Jayaram et al., 2013). In this study, we hypothesized that practice of yoga for one month would improve social cognition in patients with schizophrenia.

## **LITERARY REVIEW**

Yoga being a science of spirituality, does not have direct descriptions related to any disorder including schizophrenia. Hence Ayurveda -one of the ancient literatures on health and disorders, is focused elaboratively pertaining to psychosis and its management with a brief review on mind, different states of mind & control of mind as per *Yoga vāsis̥ṭha*, *Māṇḍūkya Upaniṣad*, *Shiva Swarodaya*, *Hatha Yoga Pradipika* and *Patanjali Yoga Sutra*. Concepts of social cognition described in yoga literatures has been explored.

In the modern scientific literature, with a brief outline on social cognition, all the available psychosocial interventions for social cognition improvement has been reviewed thoroughly and the need for complementary therapies like yoga for social cognitive deficits in schizophrenia is emphasized.

## **AIM**

To study the effect of yoga-based intervention on social cognition in patients with schizophrenia.

## **OBJECTIVES**

Primary:

1. To study the effect of add-on yoga therapy on Social Cognition measures (composite score of SOCRATIS and TRENDS)

Secondary:

1. To study the effect of add-on yoga therapy on Mirror Neuron Activity (MNA) using functional Near Infrared Spectroscopy (fNIRS) in patients with schizophrenia

## **METHODS**

Study was conducted at National Institute of Mental Health & Neurosciences (NIMHANS) at Bengaluru in collaboration with S-VYASA Yoga University. Study design was Randomized Controlled Trial (RCT)

Schizophrenia patients attending services at psychiatry department (outpatients=29; inpatients=11) of NIMHANS, were assessed for eligibility by a psychiatry resident and the diagnosis was confirmed using Mini-International

Neuro Psychiatric Interview (MINI). With written informed consent, patients who were stabilized on antipsychotics for at least 6 weeks and were co-operative for yoga practices were recruited. The data was collected from March 2016 to July 2017. Random assignment of eligible and willing subjects to Yoga Therapy Group(YT) or Waitlist Control (WL) was done by the research scholar with Sequentially Numbered Opaque Sealed Envelope(SNOSE) method. Computer generated random numbers were used for treatment assignment. Random numbers were generated by a scientific officer who was not involved in assessment or recruitment of the subjects.

The subjects recruited were of either gender, coming from the age group of 18-45 years with Clinical Global Impression-Severity(CGI-S)(Guy W, 2000) score of 3 or more. Patients with history of risk of harm to self or others; who had received Electroconvulsive Therapy (ECT) or Yoga therapy in the last six months; patients with significant neurological disorder or head injury; patients with substance abuse in last one month or dependence in last six months except nicotine were excluded.

Validated Yoga module was administered to the Yoga group for 60 min, 4-5 sessions per week, with a total of 20 sessions to be completed within 6 weeks. Maximum 3 subjects were taught together in a session. Waitlist participants were offered Yoga after 6 weeks.

All the subjects underwent the following assessments,

- 1) Social Cognition Rating Tool in Indian Setting (SOCRATIS)
- 2) Scale for Assessment of Negative Symptoms (SANS)
- 3) Scale for Assessment of Positive Symptoms (SAPS)
- 4) Groningen Social Disabilities Schedule (GSDS-II)
- 5) Clinical Global Impression (CGI)
- 6) Brief Cognitive Assessment Tool for Schizophrenia (B-CATS) comprising of three tasks i.e., Digit Symbol-Coding, Semantic Fluency, and Trail Making Test-B
- 7) Mirror Neuron Activity (MNA) assessment by functional Near Infrared Spectroscopy (fNIRS)

A trained yoga therapist gave the yoga intervention to subjects. A Psychiatry resident did the clinical assessments and was blind to the treatment allocation. Clinical assessments (positive symptoms, negative symptoms and social disability/functioning) which are subjective were assessed by a blind assessor (Psychiatry resident) and the social cognition assessment which is a computer based objective test (less prone to bias), was done by non-blinded research scholar.

## **RESULTS**

Out of 478 screened subjects, 339 were eligible for study and 40 eligible subjects agreed for participation in the study.

Data was analyzed with SPSS (version 24). Data was screened for outliers and tested for normality. Baseline and demographic data for the groups were comparable.

The results can be summarized as follows,

After 6 weeks of add-on yoga therapy, there was significant improvement over time and between the groups favoring yoga intervention for Social Cognition Composite Score (SCCS), SANS & GSDS; there was significant improvement over time but not between groups for SAPS and Verbal Fluency Test (VFT); Digit Symbol Substitution Test (DSST) and Colour Trial-B (CT) neither showed significant change over time nor between groups.

There was no Mirror Neuron Activity(MNA) at Left Ventral Premotor Cortex, measured by fNIRS. Hence further comparison of MNA between pre- and post-intervention and between groups was not done.

## **DISCUSSION**

Social cognition & MNA:

This is one of the first studies exploring the role of yoga in social cognition. Previous studies have looked into the effect of yoga on Facial Emotion Recognition Deficit (FERD) in patients with schizophrenia. Previous studies (Jayaram et al., 2013) (R V Behere et al., 2011) have shown that yoga improves FERD in patients with schizophrenia. In this current study, social cognition is

measured as a composite score which includes ToM (1<sup>st</sup> order and 2<sup>nd</sup> order), FERD, Social perception and Attribution Style (AS).

In our study, failure to detect the presence of MNA could be due to inadequate sample size. This is one of the first studies using fNIRS to assess MNA the possibility of studying MNA with fNIRS and hence its utility with yoga intervention needs to be tested with adequate sample size.

Clinical symptoms & Social functioning:

Results of this study is consistent with previous studies (Duraiswamy, Thirthalli, Nagendra, & Gangadhar, 2007) (Varambally et al., 2012) (Jayaram et al., 2013) (R V Behere et al., 2011) which shows that yoga is useful in improving negative symptoms (measured by SANS) more than the positive symptoms (measured by SAPS). Improvement in the social functioning along with the negative symptoms following yoga suggest that these may be related to each other as evidenced by prior studies.

Neuropsychological tests:

There was no significant improvement in any of the neuropsychological tests scores (VFT, DSST, CT-B) following yoga intervention. Previous studies with yoga intervention were mainly on healthy population. One of the consistent findings in majority of prior studies were improvement in attention (Gothe & McAuley, 2015)

Yoga could possibly work by both bottom-up and top-down approaches - promoting relaxation through asana and pranayama, and mindfulness through chanting and positive resolution respectively. This dual effect of Yoga might well fit in with the dual processing theory of Social Cognition (Evans, 2008) , with mindfulness (yoga mediated) promoting controlled (reflective) processing and relaxation modulating the reflexive (automatic) processing.

## **CONCLUSION**

One-month add-on yoga therapy improves social cognition, negative symptoms and social functioning. Add-on yoga therapy could also be considered along

with available social cognition interventions, especially in Indian setup, as it is more culturally acceptable and feasible for its applications in clinical setup.