Chapter 1.0

INTRODUCTION

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Schizophrenia is a chronic psychotic disorder affecting 1% of world population. The three important symptom clusters in schizophrenia are as follows,

Positive symptoms (Hallucinations, Delusions, Disorganization), Negative symptoms (Avolition, Apathy, Alogia, Asociality, Affective flattening) and Cognitive symptoms (Attention, Executive function, Working memory & Episodic memory impairment and social cognition impairment).

As conceptualized by Kraepelin, cognitive impairment is very much central to schizophrenia. It begins early in the course of schizophrenia and persist even after the remission of other symptoms. It's also related to the negative symptoms and social-occupational functioning.

Cognitive deficit in schizophrenia covers both neuro cognition and social cognition. Neurocognitive deficits are more pronounced in attention, working memory, problem solving, processing speed(Steven D, Targum MD and Richard S.E. Keefe, 2008). Many targeted treatment approaches like cognitive remediation therapy are available for improving neurocognitive deficit. Though social cognition deficit is strongly correlated with functional outcome, it has not been the focus for many decades, as it was understood as a subset of neurocognition.

But recent evidences suggest that social cognition is not just neurocognition applied in social situations. Though overlapping, social cognition is distinct from neurocognition in many aspects including its independent neural pathways and its strong impact on functional outcome(Fett, Viechtbauer, Penn, van Os, & Krabbendam, 2011). Considering the significance of social cognition, NIMH-MATRICS (National Institute of Mental Health- Measurement and Treatment Research to Improve Cognition in Schizophrenia) initiative had considered social cognition in schizophrenia as a central topic and included it as one of the seven domains in the MATRICS consensus cognitive battery for clinical trials in schizophrenia.

In the recent years, there has been increased number of publications exponentially, in the area of social cognition in schizophrenia (Fig-1.1). It has

led to development of many treatment approaches for enhancing the social cognitive deficit in schizophrenia, majority of them being psychosocial interventions few being pharmacological interventions.

In spite of availability of varied modern medical interventions, increased disability in terms of social and functional outcome is still a major concern. Because atypical antipsychotics which are the main stay of treatment in schizophrenia, do not help much in management of cognitive symptoms and negative symptoms(Szöke, Trandafir, Dupont, Méary, Schürhoff, & Leboyer, 2008)(Joanna Moncrieff, 2011). In fact, the functional outcome in terms of a productive life, economically and socially,

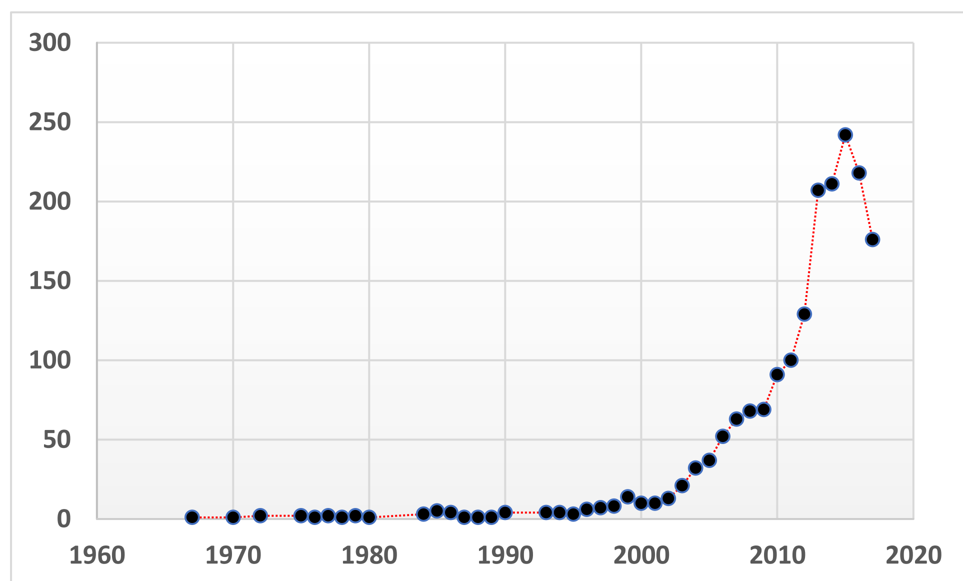

Figure – 1.1 Social cognition research in schizophrenia

which is very much related to the cognitive function is severely impaired and constitutes the major cost burden of schizophrenia.

On the other hand, psychosocial interventions like Cognitive Enhancement Therapy(CET), Social Cognition Interaction Training (SCIT) are very much resource intensive. Moreover, these psychosocial interventions developed in western countries were found to be efficacious in their patient population. Its cultural validity for eastern countries like India is yet to be investigated.

Adding to this deadlock in the treatment of cognitive symptoms (including social cognitive deficit) is the complexity of the concept of social cognition itself. Until the recent NIMH workshop in 2006 at USA, social cognition and its domains were not clear for the researchers in schizophrenia patient population. The workshop consensus statement has given guidelines on various domains of social cognition (Theory of Mind, Emotion processing, Attribution style, Social perception and social knowledge) for its utility in research in schizophrenia. However, these guidelines were only a beginning to explore and understand the social cognitive deficit in schizophrenia.

A recent review by Green et al, clarifies the evolving and dynamic nature of social cognition including and hence the complexity of investigating the social cognition especially in schizophrenia patient population. This review tried to conceptualize the concept of social cognition in a broader, social psychological perspective by clubbing all the social cognitive impairments under two categories-impairment in reflective processing and reflexive processing. Summary of the review is shown in fig-1.2. This dual processing theory of reflective and reflexive processing would fit well with the of hypo frontality and dopamine salience hypothesis of schizophrenia.

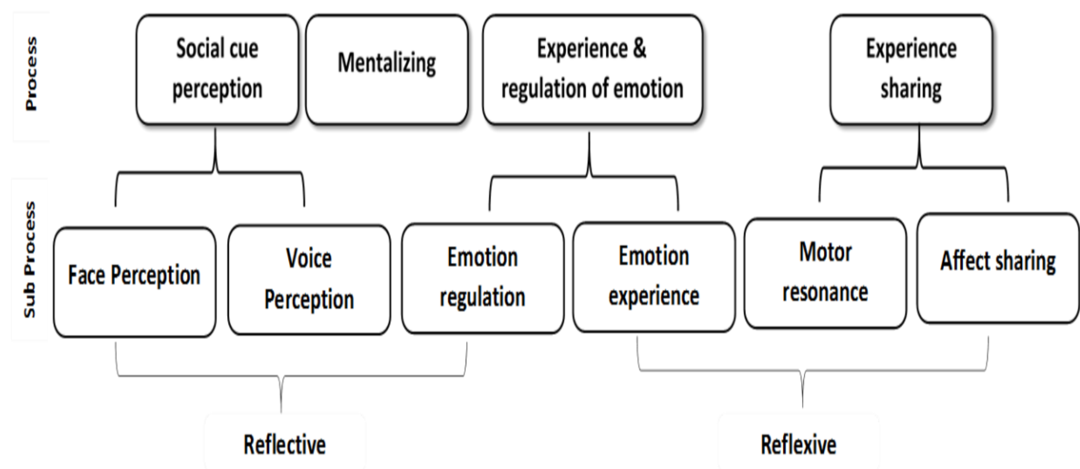

Fig-1.2 Social cognition process & sub process (from Green et al, 2015)

So, on one hand, concept of social cognition and the underlying mechanisms are being evolved and on the other hand, social cognitive interventions are simultaneously developed targeting a particular domain of social cognition or on a broad-based approach.

In this context of evolving concepts/mechanisms and intervention for social cognition in schizophrenia, our study had two broad aims,

1) To investigate the effect of add-on yoga therapy on social cognition in schizophrenia

2) To explore the possible connection between Mirror Neuron Activity (MNA) measured by functional Near Infra Red Spectroscopy (fNIRS) and social cognition including the clinical and functional outcomes in schizophrenia.

Studying the role of add-on yoga therapy intervention is relevant, considering the resource intensiveness of available psychosocial interventions; cultural diversity of social cognition aspects (most of the available psychosocial interventions are developed in western population) and easy acceptability of yoga based interventions in Eastern countries like India. Previous studies with yoga intervention have shown to improve clinical symptoms, functional outcome and some aspects of social cognition like Facial Emotion Recognition and plasma oxytocin levels in patients with schizophrenia. Hence the current study focused on all the four domains of social cognition measured by SOCRATIS (Social Cognition Rating Tool for Indian Setup)-Theory of Mind (ToM), Attribution style, social perception and Emotion processing assessed by TRENDS (Tool for Recognizing Emotions in Neuropsychiatric DisorderS).

We have also aimed at exploring the relation between MNA and clinical symptoms including social cognition as it would enhance the scientific knowledge for refining the social cognition interventions in the future for the betterment of the patient population.

In our study, MNA was studied with fNIRS unlike previous studies which has used fMRI (functional Magnetic Resonance Imaging), TMS (Transcranial Magnetic Stimulation), EEG (Electroencephalograph) & MEG (Magnetic Encephalograph) (indirect measurements) or direct single cell recording. fNIRS works on the principle of neurovascular coupling similar to fMRI. Using fNIRS is unique in two ways,

1) Cost effective compared to all the other modalities

2) Motor paradigms could be used for eliciting MNA, without any motion artefacts unlike other imaging modalities.

In our study, we used fNIRS with conventional MNA paradigms (observing a pincer hand grasp video and static image). Along with the conventional paradigms, we also used a motor task paradigm (subject performing a motor task while undergoing fNIRS recording) for eliciting MNA.