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Review article

A review of Indian research on cognitive remediation for schizophrenia

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ABSTRACT

Cognitive deficits play a central role in recovery from Schizophrenia (SZ). Cognitive remediation (CR) is increasingly being examined to improve cognitive functions in SZ. It is becoming an inevitable component of treatment for this debilitating illness. This review article presents the current status of research on CR for SZ in India. In contrast to the numerous studies reported from across the globe, there are only five studies on CR for SZ published from India. Of the five, only two are randomized controlled trials, two are non-randomized studies and one is a series of case reports. With different strategies used for CR and a variety of tools and measurements as outcome measures, combined analysis of the data was not feasible. Improvement in cognitive functions and sustenance of the improvement observed at follow-up period ranging from 2 to 6 months duration was underscored by all the four studies. Indigenous methods such as home-based CR techniques and Yoga therapy as an adjunct CR technique have been researched upon. Established method of CR such as the Integrated Psychological Therapy (IPT) has been used with modifications made to suit the cultural scenario. Other treatment methods such as family therapy have been added along with CR for chronic patients. The limited number of research studies has tried to encompass various dimensions. However, there is a dire need for studies with larger sample size with stringent research methods. Culturally feasible CR technique and multi-centric studies with larger sample size can be the next way forward.

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The incidence rate of schizophrenia (SZ) is estimated to be 0.35 per 1000 in India (Rajkumar et al., 1993). Prevalance of SZ is estimated to be 2.3 per 1000 with a range of 1.1–14.2 across studies (Ganguli, 2000; MadhavS, 2001). The term 'prevalence' refers to the estimated population of people living with schizophrenia at any given time. The term 'incidence' refers to the annual diagnosis rate, or the number of new cases of schizophrenia diagnosed each year. Direct and indirect costs are the major concern for patients, the caregivers as well as the society at large. Indirect costs are estimated to be higher than the direct costs (Grover et al., 2005). SZ manifests in early adolescence and adulthood affecting overall functioning due to poor skill acquisition, decline in academic performance and inability to maintain work performance during this phase of life. Patients with schizophrenia experience poor quality of life due to social, vocational and overall functional disability (Swartz et al., 2007). Despite pharmacological treatment and newer antipsychotic medications, nearly two-thirds of the patients continue to have persistent or fluctuating symptoms. The family members bear the financial burden, which is higher in

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unemployed patients. Drug costs are high and many patients often fail to afford newer antipsychotic medications (Grover et al., 2005). Functional recovery in this debilitating illness has been a major challenge to mental health professionals and clinicians across the globe. Increased functional recovery will in turn be important to reduce burden due to the illness. In the last two decades, there has been an increase in evidence linking functional recovery or the overall functioning with cognitive functioning such as everyday living skills, independent social and work functioning (Green, 1996; Green et al., 2000; Mueser, 2000). Cognitive deficits are present in prodromal, psychotic and chronic phases of schizophrenia. Cognitive deficits, deficits in social cognition and metacognitive processes are regarded as key illness related factors that determine functional recovery in SZ. Cognitive functions play a key role in one's ability to manage symptoms and in benefitting from psychosocial interventions such as work training and social skills training. Such interventions facilitate the chances of integrating back into the community (Silverstein et al., 1998; Green et al., 2004; McGurk and Mueser, 2004; McGurk et al., 2004; Bowie and Harvey, 2006).

1. Cognitive deficits and functional recovery in schizophrenia

Close to 80% of patients with SZ perform one to two standard deviations below the healthy controlled group, and nearly all of the patients perform poorly on the cognitive tests in comparison to their cognitive abilities prior to the onset of the illness (Green 1993; Palmer et al., 1997; Green et al., 2000; Heaton et al., 2001). A meta-analytic study which included studies published till March 2010, on a total of 247 controlled studies with 18,300 cases underscored five domains of cognitive deficits, namely deficits in attention (76 studies), executive functions (67 studies), memory (128 studies), global cognitive functioning (131 studies), and language (70 studies) (Fioravanti et al., 2012). There are only a handful of studies from India, examining the nature of cognitive deficits and some of these studies have examined patients in the chronic phase (Ananthanarayanan et al., 1993; John et al., 2001; Sabhesan and Parthasarathy, 2005; Srinivasan et al., 2005; Bhatia et al., 2009), patients in remission (Krishnadas et al., 2007; Taksal et al., 2015) and cognitive deficits in early phase of SZ (Hegde et al., 2013). Recent studies have reported deficits in social cognition (Mehta et al., 2013) as well as musical deficits (Chandrashekaran, 2015). Although research studies from India delineating cognitive deficits in SZ are few in number, the nature of cognitive deficits appears to be similar to what has been reported from across the globe. Apart from duration of illness and psychopathology, cognitive deficits predict functional recovery and affect work performance (Hegde et al., 2013). With cognitive deficits playing a key role in recovery, evaluation and treatment of cognitive deficits is considered as an important component of schizophrenia treatment methods (Keefe and Fenton, 2007; Keefe, 2008). Newer methods are emerging to improve cognitive functions in schizophrenia.

2. Cognitive remediation: an intervention program to improve cognitive deficits

Cognitive remediation (CR) is considered as the best available treatment method to restore cognitive functions and to facilitate compensatory strategies in traumatic brain injury and other acquired brain injury (Volpe and McDowell, 1990; Cicerone et al., 2000, 2005, 2011; Gordon et al., 2006). The origin of CR dates back to World War I and World War II. Techniques were developed to ameliorate deficits in attention and memory observed in the war veterans following brain injury (Boake, 1991). Methods of cognitive remediation have emerged from the field of neurorehabilitation (Twamley et al., 2003). The terms cognitive retraining, cognitive rehabilitation and CR have been used interchangeably in the literature (Hegde, 2014; Keshavan et al., 2014). CR is described as a set of procedures designed to provide patients with the behavioral repertoire needed to solve problems or to perform tasks that appear difficult or impossible. Functional improvement is achieved by re-establishing or reinforcing previously learned adaptive patterns of behavior, facilitating improvement in cognitive functions through compensatory mechanisms and sometimes facilitating new patterns of activity through external compensatory mechanisms (Ben-Yishay and Prigatano, 1990; Prigatano, 1997; Wilson, 1997; Cicerone et al., 2008).

The basic assumption in cognitive remediation is that cognitive deficits such as deficits in attention, executive functions, verbal or visual memory are a manifestation of the underlying dysfunction in the neuronal connectivity and brain functions. The dysfunction in the brain is reversible due to the malleability of brain functions as well as the neuronal connectivity. Opportunities for new learning and planned changes in the environment lead to alteration and improvement in cognitive processing at basic neurobiological level (Bruel-Jungerman et al., 2007). The improved cognitive functions would then generalize to overall functioning and in turn facilitate recovery. Neuralplasticity, the veritable nature of the brain, is the basic tenet on which the methods of cognitive remediation programs have been conceptualized and developed as an intervention program to improve cognitive deficits in various clinical conditions, such as head injury, stroke and extending to psychiatric conditions such as schizophrenia (Sohlberg and Mateer, 1986; Bin-Yishay and Piasetsky, 1987; Boake 1991; Hogarty and Flesher, 1999).

3. Cognitive remediation for schizophrenia

Intervention programs to improve cognitive functions are emerging as an inevitable component in the treatment of SZ. CR for SZ is defined as a behavioral training based intervention that aims to improve cognitive processes(attention, memory, executive function, social cognition or metacognition) with the goal of durability and generalization (as defined by the cognitive remediation Experts Workshop, 2010) (Wykes et al., 2011). The definition by the same group was updated in 2012 as 'an intervention targeting cognitive deficits using scientific principles of learning with the ultimate goal of improving functional outcomes'. The effectiveness of CR is enhanced when provided in a context (formal or informal) that supports and provides opportunity for improving everyday functioning (Saperstein and Kurtz, 2013).

Over the past two to three decades, heterogeneous methods and approaches to CR have been attempted for schizophrenia with variation in treatment efficacy, generalization and transfer of improvement in cognitive functions to overall functioning in the real life situations. Heterogeneity of cognitive deficits in schizophrenia has also perhaps furthered the challenge in development of uniform methods of cognitive intervention (Joyce and Roiser, 2007). Several approaches to CR have been studied in SZ such as repeated practice/drill and practice versus practice and teaching strategies, varying in number of sessions, usage of paper-pencil tasks and computers. The CR approaches have targeted selected cognitive functions such as attention, working memory, social cognition or a host of cognitive functions. Some CR methods have been provided along with other methods of treatment such as work skill training, social skills training such as the Neurocognitive enhancement therapy (NET) (Bell et al., 2005) and the Integrated Psychological Therapy (IPT) (Brenner and Roder, 1994). From 1973 to 2009, there have been close to forty studies carried out on CR in schizophrenia across the globe (Wykes et al., 2011). A number of