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Efficacy of Cognitive Remediation Training in Improving Psychopathology and Cognitive Functions in a Patient with Schizophrenia: A Case Study

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Researchers have consistently shown that individuals with schizophrenia experience cognitive impairment throughout the last few decades. Cognitive deficits cause functional impairment in patients. Cognitive remediation training has been found to aid in symptom reduction as well as functional improvement in patients with schizophrenia. DB After being diagnosed with schizophrenia by a qualified psychiatrist from the outpatient department of the Institute of Mental Health and Hospital Agra, a 32-year-old man who is right-handed, a graduate, single, and from a middle socioeconomic background was referred for cognitive evaluation and remediation. He currently lives with his parents in Agra. A cognitive evaluation of the patient showed impairment in attention, memory and executive function. For thirty sessions, six days a week, he received the cognitive remediation training; each session lasted roughly sixty to seventy minutes. Significant progress was observed in all areas of cognitive functioning in the post-intervention scores.

Key words: Schizophrenia, Cognitive Remediation Training, cognitive Functioning and Psychopathology.

Introduction

Schizophrenia patients are known to have cognitive deficits. These deficits include declines in both general and domain-specific cognitive abilities, including executive processes, memory, attention, processing speed, and social cognition [1, 2]. When compared to samples of the general population, individuals with schizophrenia often exhibit cognitive function losses of one to two standard deviations [2]. In individuals with schizophrenia, cognitive deficits are more reliable indicators of functional outcomes, persist even during periods of notable symptom remission, and manifest early in the illness (even before the first psychotic episode [1]. The overall gestalt of psychiatric treatment for schizophrenia depends heavily on cognitive deficiencies. They may be essential to the likelihood of effective skills training and psychosocial

rehabilitation, and they may limit patients' capacity to actively engage in and follow medication management (3).

It has been demonstrated that the evidence-based treatment known as cognitive remediation training (CRT) helps people with schizophrenia think more clearly (1,4). Evidence-based cognitive remediation training (CRT) has been demonstrated to improve cognitive function in people with schizophrenia (4). Cognitive remediation techniques have recently been divided into two primary models: compensatory and restorative (5). While the "compensatory" model aims to lessen reliance on cognitive function by making use of residual cognitive processes or other environmental resources, the "restorative" model concentrates on addressing cognitive deficiencies through training on particular cognitive activities. Despite being "restorative," It has been demonstrated that while "restorative" therapies can improve cognitive function in patients with schizophrenia, their effects on functional results and symptoms vary (4,5,6). Unless the "restorative" approaches were incorporated into more comprehensive mental rehabilitation interventions, such the neuropsychological educational approach, it has been noted that (7) or Goal-setting and real-world simulations (8) had less substantial effects on symptoms and functional outcomes. The "compensatory" methods enhance symptoms and adaptive function in addition to cognitive function (9.10). These phenomena can be attributed to two factors.

First, compensatory techniques use contextual resources like signs and labels and behavioral sequencing to enhance patients' adaptive function at home and at work (11). It could support the continuation of social activities and enhance social problem-solving skills. Second, when these techniques progressively become ingrained in everyday routines, patients gain confidence in carrying out tasks they had previously attempted to avoid, which improves their unpleasant symptoms (12). Additionally, the "compensatory" methods can help patients develop lifelong habits that lessen their reliance on residual cognitive performance, which may assist individuals with schizophrenia experience better functional outcomes and mental symptoms. A type of "compensatory" treatment for cognitive impairments in patients with psychosis, compensatory cognitive training (CCT) focuses on four cognitive domains that were chosen due to their potential for modification and the strong relationships they have with functional outcomes (13,14). (1) Adaptability and problem-solving skills, (2) memory for the future (3) verbal learning and memory, and (4) focus. Teaching patients to become proficient in "compensation" techniques and develop new routines to lessen the cognitive load in day-to-day living is the main goal of CCT (15). At the 3-month follow-up, research revealed that CCT enhanced psychotic patients' attention, verbal memory, negative symptoms, functional abilities, and quality of life(16). Another study showed that CCT had moderate-to-large effects on working memory, depressive symptom, and quality of life in patients with severe mental illnesses at the post-treatment (17). Even though CCT has shown encouraging outcomes in a number of studies, more study is necessary to determine how CCT and medication adherence training affect cognitive performance in schizophrenia patients. This could be because relapse was linked to the neurodegenerative course in certain defective brain regions in schizophrenia (18).

Design

Pre-post interventional single case study design was adapted.

CASE REPORT

AB was a 32 -year-old man from Agra who was right-handed, had graduated, was married, and lived with his parents. The clinical psychology department was consulted for psychosocial assistance after the psychiatry department diagnosed paranoid schizophrenia.

Mr. DB had been suffering from episodic schizophrenia for five years. Delusions, hallucinations, and the negative symptoms of apathy, social disengagement, and flate affect had been the hallmarks of his problem. His social functioning was also compromised, as seen by his poor social skills, communication difficulties, and interpersonal interactions. No history of psychiatric illness was present in the family. The patient had been a calm child in terms of temperament.

A suitable dosage of antipsychotic medication (Risperidone, 4 mg BD) was being administered to DB. When DB first arrived to the clinical psychology department, he complained of having less friends, bad interpersonal relationships with family, difficulty remembering what he had learned, difficulty doing household chores, and difficulty going shopping on his own. While flat affect, poor abstraction, emotional withdrawal, and social disengagement.

Procedure

A semi-structured socio-demographic and clinical data sheet was used to gather information during the clinical interview. The following measures were subjected to neuropsychological evaluation before and after cognitive rehabilitation: Positive and Negative Syndrome Scale (19), Cognitive Symptom Checklist (20), Digit Symbol Substitution (21), PGI Memory Scale (22), Trail Making Test (23) and Wisconsin Card Sorting Test (24).

Intervention

Therapeutic package:

Cognitive remediation training module adapted from brainwave- R developed. Attention, Visual Processing, Memory, Information Processing, and Executive Functions are the five hierarchically graded modules that make up the comprehensive pen-and-paper-based cognitive rehabilitation programmed known as Brainwave-R. Although in present study three modules will be taken for cognitive remediation training.

The following module will be taken for cognitive remediation training.

Attention Remediation Training

Through practice, that module will assist the patients in improving their sustained, selective, alternating, and split attention. Speed of information processing is a important aspect of attention, in module addressing each level of attention in increasing patients speed and processing demands. It involves the techniques like paced random number, word targeting, category targeting, reverse counting, task maintenance, number blocks, decoding, simultaneous tasks, self evaluation awareness etc.

Memory Remediation Training

This module has been designed to teach the patients about memory processes and emphasizes the use of strategies to compensate for memory problems. The memory process involves encoding, organization, maintaining the information in working memory (short term memory), consolidating or storing information into long term memory and retrieval of storage information when needed. In brain wave R module have several technique like learning the stage of memory, types of memory, retrieval, external and internal aids, learning new skills, card matching, functional memory exercises and some other techniques.

Executive Function Remediation Training

There are two sections to this module. The patients learn about executive function in part one, along with techniques for making up for any deficiencies. The patients can choose from a variety of projects in part two, which they can organize, plan, and carry out using the method they learned in part one. It's includes tasks like self organization, planning, cognitive flexibility, goal setting, self planning, initiation and regulation some other similar tasks.

Table 1: Pre and Post intervention scores on psychopathology and neuropsychological test

Neuropsychological Test		**Pre-Assessment**	**Post-Assessment**
PANSS	Positive	15	9
	Negative	32	15
	General	54	32
Cognitive Symptom Checklist	Attention / Concentration	34	10
	Executive Function	56	17
	Memory	47	27
	Visual Processing	12	7
	Language	14	5
Digit Symbol Substitution Test		18	37

PGI Memory Scale		21	12
Trail Making Test	Trail Making Part- A	167	68
	Trail Making Part- B	269	102
Wisconsin Card Sorting Test	Number of trials Administered	128	128
	Total Number of Correct	61	82
	Total Number of Errors	67	46
	Percent Errors	52	35
	Perseverative Responses	40	19
	Percent Perseverative Responses	31	16
	Perseverative Errors	37	19
	Percent Perseverative Errors	29	16
	Non-perseverative Errors	29	16
	Percent Non-perseverative Errors	25	13
	Conceptual Level Responses	37	74
	Percent Conceptual Level Responses	29	62
	Number of Categories Completed	1	5
	Trials to Complete First Category	67	26

DISCUSSION

The case study provides insight into the use of cognitive remediation training as an intervention for a patient suffering schizophrenia with predominant cognitive impaired. Pharmacological intervention programs combined with cognitive remediation training were found to improve psychopathology and cognitive functioning in a patient with schizophrenia. In order to use cognitive remediation training as a therapy target. Drastic improvement was seen after post intervention in all domains of psychopathology, attention, memory and executive function. In the current case study significant improvement was seen in all domain of PANSS score, is closely tie with the findings (25). He also found improvement in positive, negative and depressive symptoms after ten session of cognitive remediation training with patients with schizophrenia. Improvement of in attention span in case after remediation training is showing good agreement with several study conducted researcher to find out efficacy of cognitive remediation training in improving attention span of patients (26, 27,28). After receiving 30 session of memory enhancement training Mr. DB have shown improvement in his memory functions like immediate memory, delayed recall, working memory etc. The similar findings reported by several study (27,29,30). At post intervention Mr. DB have shown significant improved his planning, decision making, and the same has reported by his family members, now he is able to go market for shopping, started taking with neighbor, started doing house hold activity etc. Similar findings reported in several study (31, 32, 33,34).

Conclusion

Cognitive remediation training has been demonstrated to benefit individuals with schizophrenia. Cognitive remediation training improves cognitive processes like attention, memory, executive function and as well as positive symptoms, negative symptoms and general symptoms of individual suffering with schizophrenia. It improves social and professional functioning. When used in conjunction with psychosocial intervention, interpersonal relationships improve. Subjectively, the patient reported significant improvements in their focus, patience, and attentiveness.

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Conflicts of interest

There are no conflicts of interest.

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