

Benefits of Individualized Cognitive Stimulation Therapy (iCST) in Mild Cognitive Impairment (MCI): A Case Report

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In this report, we explored to personalize cognitive stimulation therapy and develop a program for a home-based individualized CST (iCST) in a patient with MCI. The Addenbrooke's Cognitive Examination and Neuropsychiatric Inventory were administered to the patient, and a questionnaire was administered to the caregiver for understanding the strengths and symptoms of the patient, following which an iCST program was devised. A re-evaluation was done after 6-months, and the results indicated an increase in patient's cognition scores and reduction in his neuropsychiatric symptoms. The iCST can be used to improve overall cognition in patients with MCI.

Keywords: Cognitive Stimulation Therapy; Individualized Cognitive Stimulation Therapy; iCST; Mild Cognitive Impairment; Dementia.

India has a rapidly rising elderly population with increasing burden of neurological disorders. Ageing is a continuum with normal ageing on one end and neurodegenerative conditions on the other. Mild cognitive impairment (MCI) is a transitional phase between normal ageing and Alzheimer dementia (Petersen, 2004), characterized by problems in one or more of the cognitive domains but not impairing the daily functioning (Albert et al., 2011). The prevalence of MCI varies widely ranging from 0.5 to 42% globally (Ward et al., 2012).

Although the outcome of MCI is still debatable, early preventive measures have been advocated for healthy population. There are a few non-pharmacological interventions (reality orientation, cognitive rehabilitation, cognitive training, reminiscence, and cognitive stimulation therapy (CST)) available to enhance cognitive functioning of those living with MCI (Liao et al, 2020; Kurz et al., 2009). Among the many intervention measures, CST is well researched globally in MCI and dementia. It is a group intervention that encourages patients to engage in activities that are designed to enhance or maintain their cognition. The CST program

has shown promising improvements in global cognition, associative memory, processing speed, attention and executive function, quality of life, and well-being in MCI and dementia (Spector et al., 2014, Gómez-Soria et al., 2020).

Although the effectiveness of CST is established, there are a few challenges to implement the intervention in India. In addition to the lack of structural resources available for executing a group intervention, limited trained professionals creates a barrier in the administration of protocol. The educationally, culturally, and socio-economically diverse population in India makes it more challenging to develop a standardized CST protocol. A possible solution to these hurdles is a carer-based individualized CST (iCST) which can be delivered by caregivers of those living with dementia in the comfort of their homes. Research on iCST has shown improvements in cognitive functioning in MCI and dementia (Gibbor et al. 2020). In this paper, we present the effectiveness of personalized iCST, a cognition-focused intervention program in a patient with MCI with high education, strong social network and premorbid cognitively stimulating lifestyle.

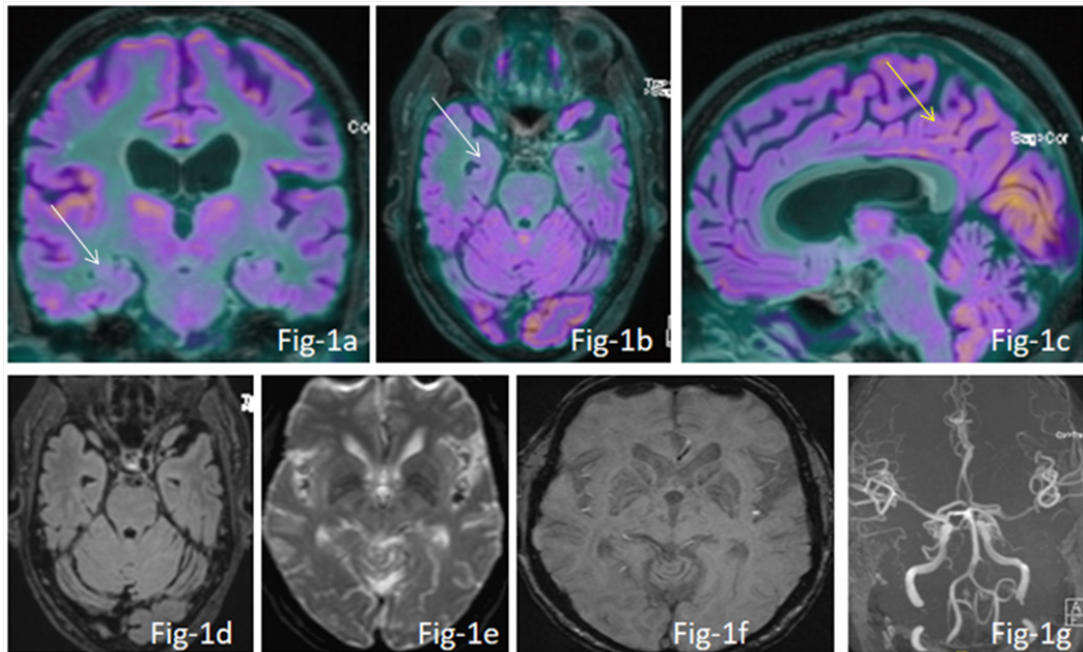


Figure 1: FDG PET Brain (a, b, c) shows mild to moderate hypometabolism in medial temporal lobe (white arrow) with normal physiological FDG uptake in parietal lobe (yellow arrow) and rest of the brain and brainstem. T2WI Brain (d) reveals mild medial temporal lobe atrophy. DWI images (e) show no diffusion restriction. SWI images (f) were normal with no evidence of hemorrhages. TOF MRA Brain (g) reveals intracranial vessels unremarkable.

Case presentation

Mr. H.A, a 75-year-old man with 17 years of education was evaluated in the Cognitive Disorders Clinic (CDC) of National Institute of Mental Health and Neurosciences (NIMHANS) Bengaluru, India. The patient had subjective complaints of forgetting recent conversations, misplacing objects, and difficulty in recalling a few daily events. The symptoms gradually progressed over time. He is a known case of hypothyroidism and hypertension for 5-6 years and is on regular medications for the same.

The patient was evaluated by a multi-disciplinary team consisting of cognitive neurologist, psychologist, and speech-language pathologist. Detailed neurological examination, routine blood investigations, and specific blood tests for reversible cognitive impairment were within normal limits. Cardiac evaluation including ECG and 2D Echo showed no abnormalities. Global cognition and neuropsychiatric symptoms were assessed using the Addenbrooke's

Cognitive Examination (ACE-III) (ACE-III; Mekala, Paplikar, Mioshi et al., 2021) and the Neuropsychiatric Inventory (NPI) (Neuropsychiatric Inventory; Jeffrey Cummings, 2020) respectively.

MRI and PET: Mutiplanar and multisequence MR was acquired in 3-D mode. Reconstruction of the data was performed to obtain fused MR PET-images in transaxial, coronal and sagittal views. FDG PET MRI brain revealed bilateral subcortical white matter hyperintensities of grade I to II and mild reduction in bilateral medial temporal metabolism (Figure1).

After the required investigations, a clinical diagnosis of MCI was made by a cognitive neurologist experienced in evaluating neuro-degenerative disorders. The patient was started on neuro-protectives (cholinesterase inhibitor in low dose and vitamin B-12) and was advised to participate in the iCST program. A detailed questionnaire was administered to the caregiver to understand the patient's contextual realities,

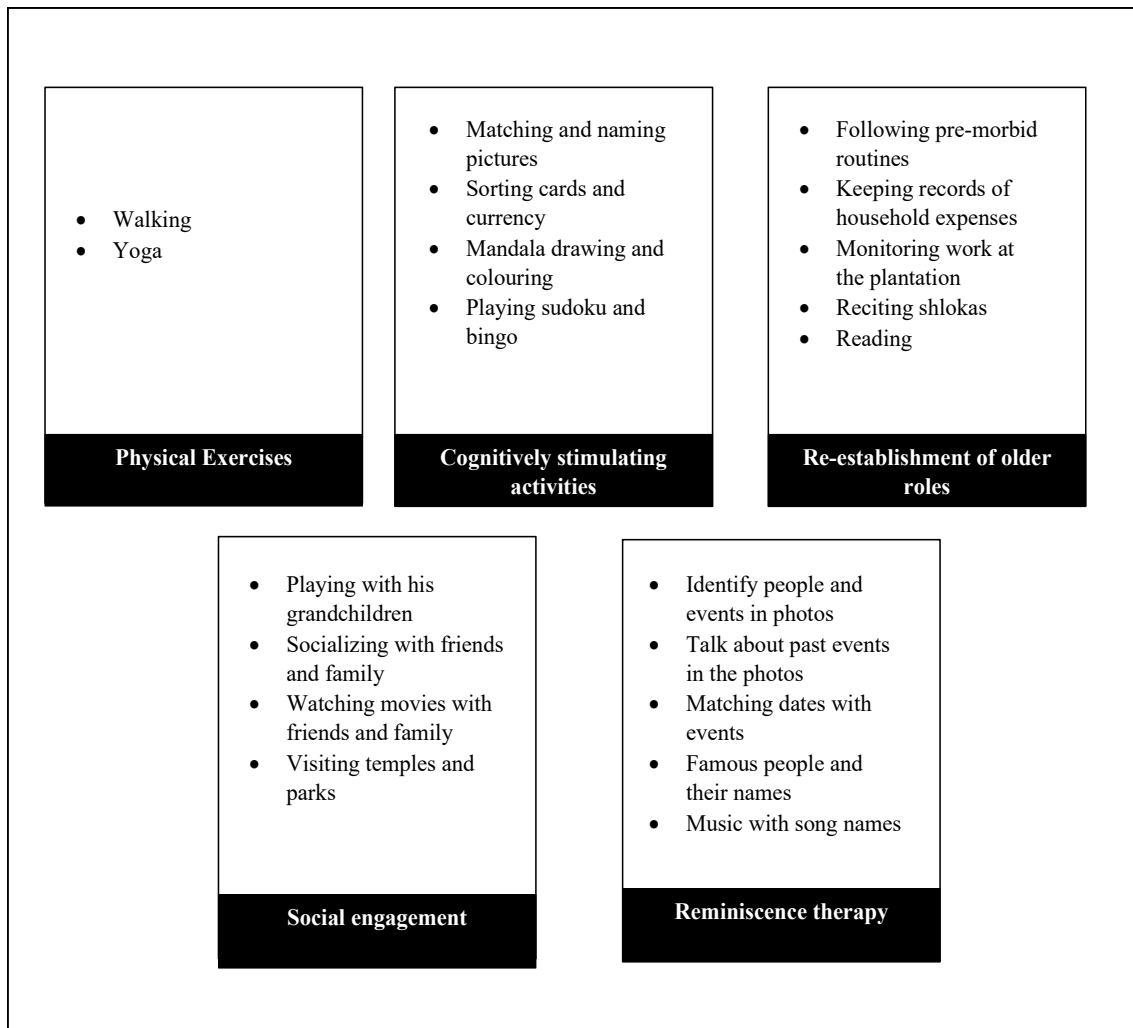


Figure 2: Individualized cognitive stimulation therapy (iCST) guidelines provided to the patient and his caregiver

his strengths, and the ecosystem within which he is placed. Brief interview was done with the patient to understand his interests, capacities, and needs. After the interview, a comprehensive iCST program was developed and the guidelines were explained. Patient was asked to follow the protocol every day for 6-months.

The patient was in regular contact with the psychologist to review progress. The iCST program had guidelines to incorporate various activities into the patient's lifestyle. These included a) physical exercises; b) cognitively stimulating activities; c) re-establishing previous

roles and responsibilities; d) social engagement; and e) reminiscence activities (Figure 2). The caregiver was requested to provide support towards successful implementation of iCST program. Informed consent for participation in the iCST was obtained from the participant and his caregiver.

The cognitive assessments were done at baseline (April 3, 2021) and 6-month follow-up (October 8, 2021) (Table 1). On follow-up, the patient demonstrated overall improvement in global cognition and reduction in his neuropsychiatric symptoms. There was

a significant improvement in the visuospatial, attention and memory domains. On baseline NPI, the patient had complaints of sleep/nighttime disorders, appetite changes and depression, which was reduced at follow-up. The patient stated that he was regularly following the iCST program and had observed 60% improvement in his symptoms. The caregiver highlighted that the iCST was easy to incorporate the activities in daily routine of the patient.

Table 1: Addenbrooke's Cognitive Examination-III (ACE-III) and Neuropsychiatric Inventory (NPI) scores at baseline and 6-month follow-up

	Baseline	Follow-up after 6 months
Addenbrooke's Cognitive Examination-III		
Attention	13	14
Memory	16	18
Fluency	13	11
Language	26	26
Visuospatial	9	15
Total score (100)	77	84
Neuropsychiatric Inventory (NPI)		
Delusions	0	0
Hallucinations	0	0
Agitation/Aggression	0	0
Depression	1	1
Anxiety	0	0
Elation/Euphoria	0	0
Apathy	0	0
Irritability	0	0
Aberrant motor behavior	0	0
Sleep/nighttime behavior disorders	6	2
Appetite and eating changes	6	3
Total score	13	6

Discussion

A home-based iCST model was explored in a patient with MCI. Our aim was to understand how personal and social identity can be used for provision of quality psychosocial care to patients. The iCST activities presented in this case report were chosen based on the patient's subjective capacities and preferences. Our approach focused on using the patient's strengths and highlighting the same for facilitating a positive change within the patient and his environment.

The patient and the caregiver reported the iCST program to be highly beneficial which is also reflected on the neuropsychological test scores. While there were improvements in the cognitive scores, long term follow-up might be needed to understand the role of protective factors such as education, early diagnosis, and the effects of neuro-protectives on cognitive improvement. Our attempt at personalization of CST revealed a few challenges that can be expected while implementing an iCST program at a large scale. The first challenge is the lack of adequate monitoring as the iCST is designed to be home-based intervention. Another challenge could be the nature of iCST itself. Development of a home-based personalized CST program takes time and needs to be continuously updated. This may be challenging in high burden setups such as hospitals and clinics.

Despite the challenges, iCST model is a promising alternative to CST which may be difficult to administer in a country like India. The program can be modified and scaled up to understand its feasibility and impact on patients. Individualized therapy is a way to establish person-centered values within the context of dementia care. iCST can lead to improvements in global cognition and help people with MCI to maintain a sense of self and competence ensuring positive well-being.

Conclusion and Clinical Implications

Neuropsychological testing revealed overall improvement in cognitive profile of the patient and a reduction in neuropsychiatric symptoms. Findings from this case indicated that a combination of pharmacological and non-pharmacological (iCST) intervention methods might lead to improvements in global cognition

and reduced neuropsychiatric symptoms in cases of early amnesic MCI syndromes.

Declaration of statement of interest

The authors declare no competing interests.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

Appendix A

Individualized Cognitive Stimulation Therapy Questionnaire:

File No/UHID:

Name:

Age:

Sex:

Education:

Diagnosis:

Residing location:

Home Environment:

1. Is the patient currently married and stays with his/her spouse?

- Yes, married but does not stay with the spouse
- Yes, married and stays with the spouse
- No
- Widowed

2. How many children does the patient have?

3. Does the patient live with his/her children?

- Yes
- No

4. What type of house does the patient live in?

Apartment

- Villa
- Other (Specify)

5. How many family members does the patient live with?

6. Does the patient have any stay-at-home caregiver?

- Yes
- No

7. What is the family income per annum?

Education and Employment:

1. How many years of education has the patient had?

- No formal education
- 10th
- 12th
- Graduate
- Post-graduate
- Other (Specify)

2. Is the patient currently employed?

- Yes
- No
- Retired

3. For how many years has the patient been employed?

4. If the patient has had multiple jobs, kindly mention them

5. What was the patient's designation?

6. How many people did the patient supervise on a daily basis?

- Less than 5
- More than 5
- More than 10
- More than 20

Health and Physical Activity

1. Does the patient have any of the following conditions?

- Hypertension
- Diabetes
- Parkinsonism
- Heart Disease
- Asthma
- Visual Impairment
- Hearing Impairment
- Fracture
- Rigidity of limbs (Specify)
- Others (Specify)

2. Does the patient have any of the following problems?

- Trouble falling asleep/ sleeping too much
- Trouble walking
- Knee pain
- Stomach Pain
- Acidity
- Chest Pain

- Spells of dizziness
 - Feeling of tiredness or low energy
 - Tremors
 - Poor Appetite/ Overeating
3. Does the patient engage in low intensity work [work that does not increase heart rate or cause heavy breathing] such as walking slowly, light housework etc for at least 20 minutes?
- Everyday
 - Every alternate day
 - Twice a week
 - Weekly
 - Monthly
4. What low intensity work out does the patient engage in and for how many minutes per day?
5. Does the patient in moderate intensity work [work that slightly increases heart rate and cause an increase in breathing] such as brisk walking, daily housework, climbing staircases etc for at least 20 minutes?
- Everyday
 - Every alternate day
 - Twice a week
 - Weekly
 - Monthly
6. What moderate intensity work out does the patient engage in and for how many minutes per day?
7. Does the patient engage in high intensity work [work that causes a significant increase in heart rate, increases breathing significantly, leads to sweating] such as any sports activity, cycling etc for at least 20 minutes?
- Everyday
 - Every alternate day
 - Twice a week
 - Weekly
 - Monthly

8. What high intensity work out does the patient engage in and for how many minutes per day?

Cognitive Status

1. Does the patient have any of the following symptoms?

- Memory disturbances
 - Speech difficulties
 - Difficulty with orientation (trouble with time relationship and orientation to places)
 - Difficulties in paying attention
 - Difficulties in comprehending and following instructions
 - Difficulty in handling finances
 - Difficulty in dealing with numbers
 - Difficulty in problem solving
 - Difficulty in concentrating on tasks
 - Others (Specify)
2. If the patient has memory disturbances, which of the following symptoms have you observed?
- Forgetting where things were kept
 - Problems remembering routes to places
 - Forgetting names of family members
 - Forgetting names of objects
 - Forgetting functions of objects (what things are used for)
 - Forgetting steps involved in daily tasks such as cooking, driving, cleaning
 - Trouble following instructions
 - Other (Specify)
3. If the patient has speech difficulties, which of the following symptoms have you observed?
- Word finding difficulty
 - Paraphasia (Substitution of one sound for another; such as saying spot instead of pot)
 - Inappropriate grammar
 - Unclear speech
 - Increased pauses
 - Decreased speech rate
 - Mutism (unable to speak)
 - Other (Specify)
4. Does the patient have any of the following symptoms?
- Restlessness
 - Anxiety
 - Hallucination (seeing or hearing things that are not present)
 - Disinhibition (inappropriate laughter)

and crying spells, removing clothes in front of others etc)

- Suspiciousness
- Hyperactivity
- Apathy
- Loss of interests
- Fatigue and tiredness
- Depression

Interests

1. Which of the following activities did the patient enjoy before the onset of the illness?

- Reading
- Listening to music
- Watching Tv
- Cooking
- Gardening
- Walking
- Sports
- Spending time with family
- Art based activities like Rangoli
- Craft
- Embroidery
- Knitting
- Cycling
- Religious activities
- Writing
- Board games
- Playing musical instrument
- Singing
- Dancing
- Volunteering
- Other (Mention)

2. How often did the patient engage in the above-mentioned activities before the onset of illness?

- Daily
- Weekly
- Less than Weekly
- Monthly
- Yearly

3. Which of the following activities is the patient currently engaged in?

- Reading
- Listening to music
- Watching Tv

- Cooking
- Gardening
- Walking
- Sports
- Spending time with family
- Art based activities like Rangoli
- Craft
- Embroidery
- Knitting
- Cycling
- Religious activities
- Writing
- Board games
- Playing musical instrument
- Singing
- Dancing
- Volunteering
- Other (Mention)

4. How often does the patient engage in the above-mentioned activities?

- Daily
- Weekly
- Less than Weekly
- Monthly
- Yearly

5. Which of the following activities do you think the patient can still perform if given proper support?

- Reading
- Listening to music
- Watching Tv
- Cooking
- Gardening
- Walking
- Sports
- Spending time with family
- Art based activities like Rangoli
- Craft
- Embroidery
- Knitting
- Cycling
- Religious activities
- Writing
- Board games

- Playing musical instrument
- Singing
- Dancing
- Volunteering
- Other (Mention)

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