Pakistan Journal of Social and Clinical Psycholoogy
2020, Vol. 18, No. 1, 3-10

Remedying Mild Cognitive Impairment with Cognitive Stimulation Therapy: A Trial Study in Pakistan

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Present study aimed to explore if Cognitive Stimulation Therapy (CST) is effective for better cognitive functioning and quality of life (QoL) in mild cognitive impairment (MCI). Sample comprised of 41 participants shortlisted to 24 consenting participants, assigned to treatment and waitlist control groups. Participants age range was 50 to 75 years (M = 56.48, SD = 7.09) and they met criteria for mild cognitive impairment (Peterson's, 2004).Participants were from Punjab, Pakistan. ABA (within and between groups) research design was employed in this outcome study and assessed cognitive function and QoL through Montreal Cognitive Assessment Scale (MoCA) and QoL in Alzheimer's disease **(**QoL-AD). The therapy consisted of 14 biweekly sessions over a period of 8 weeks with pre- and post-intervention sessions and 2-month follow-up assessment. The therapy proved effective in the management of MCI. Improvements in cognitive function and QoL were more pronounced at the post session rather than at follow-ups particularly for QoL. We propose more CST sessions should be used or group CST should be supplemented with individual sessions with interventions targeting coping with stress so that longer lasting impact could be seen in cognitive function and QoL. Waitlist control group was offered CST, after sessions were over for the treatment group.
Keywords: cognitive functioning, CS, CST, MCI, QoL

Older people exhibit a continuum of cognitive impairments with symptoms not meeting criteria of any disorder to obvious dementia (Bennett, et al., 2002). Mild cognitive impairment (MCI) can a precursor to dementia, which may be prevented through treatment, improving the quality of life (QoL). Cognitively stimulating activities helps in enhancing the cognitive reserve (Zunzunegi, Alvarado, Ser, & Otero, 2003) and optimizes QoL in old age (Ba'rrios, et al., 2013). The benefits of cognitive training programs elucidate the need to establish such intervention programs for older adults in order to prevent deterioration in their cognitive capacities (Prado,Conlon, Mayán-Santos, & Gandoy-Crego, 2012).

In Pakistan, population of above 65 years has increased to 8 million and expected till 2050 it could exceed till 32 million, as per U.S. Census Bureau (2015). Around .2 percent of Pakistan's population was projected to be suffering from dementia in 2015 with 642 million US Dollars in health burden (Alzheimer's disease International, 2014). The proportion of people suffering from dementia is anticipated to increase from 0.38% of the wider Asia Pacific population to 1.4% in next 45 years (Akter et al., 2011).

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With the technological advancements and increase in life expectancy interest has shifted to exploring ways that could influence cognitive functions in ageing population. The degree of cognitive decline varies in older population with majority of older people experiencing slight cognitive decline while a minority experiences severe difficulties in cognition and have increased likelihood of developing dementia (Martin, Clare, Altgassen, Cameron, & Zehnder, 2011).

The concept of mild cognitive impairment (MCI) was originated in reference to dementia, where patients have impaired cognitive functioning with normal global cognitive functioning (Jean, Bergeron, Thivierge, & Simrd, 2010). The diagnostic criteria proposed by Peterson (2004) is most often utilized in clinics and research situations, and is based on deficits in memory, normal overall cognitive functioning with very little or no difficulties in engaging in daily activities and without dementia (Jean et al., 2010). Mild cognitive impairment (MCI) is common in older adults and reported to increase with age, and it puts many individuals at increased risk of dementia (Peterson et al., 2018).

To date, no medical intervention has been proved to prevent MCI (Peterson et al., 2018). There are some non-medical treatments that have recently emerged and find to be helpful in providing cognitive and psychological help to people with cognitive impairment. One among those intervention is cognitive stimulation (CS), which is aimed at improving cognitive functioning and

decreasing the risk of cognitive deterioration (Peterson et al., 2018; Woods, Thorgrimsen, Spector, Royan, & Orrell, 2006).

Available treatment options for management of MCI include computerized cognitive stimulation, cognitive stimulation techniques, engagement program, etc. (Djabelkhir, et al., 2017; Wenisch, et al, 2007; Zhang, et al., 2019). Mainly such interventions emphasis on cognitive stimulation for MCI. Therefore, we chose cognitive stimulation therapy (CST) for the present study. CST is a proven, flexible and individual need based intervention strategy which includes such group activities that improve person's recall ability, sharing and social connections etc. Initially it was developed and verified for management of dementia in Europe (Niederstrasse, Hogervorst, Giannouli & Bandelow, 2016) but research is being carried out on this therapy in many other countries. This therapy improves QoL in normal older individuals and patients suffering from dementia (Ball et al., 2002). Luis et al. (2003) assert that efficacy of CST is good and it can save billions of dollars for patients and the healthcare in general when MCI is prevented to progresses into dementia; largely due to decreased use of healthcare system (as cited in Wenisch, et al., 2007). Burden of dementia in Pakistan on healthcare is high as mentioned, so it will be helpful to assess CST efficacy on MCI.

For healthy older adults, CS-based interventions have proved effective in immediate and delayed verbal recall compared to control group (Martin, Clare, Altgassen, Cameron & Zehnder, 2011). There is also empirical evidence that CS and other rehabilitation strategies like memory support system are useful for individuals with MCI improving their memory, sense of self-efficacy and engagement in daily activities (Aguirre et al., 2013; Bellevile et al., 2006; Greenway, Duncan, & Smith, 2012; Greenway, Hanna, Lpeore & Glenn,2008; Greenway, Hanna, Lepore & Smith, 2015; Mowszowski, Bactchelor & Naismith, 2010; Wenisch et al., 2006). Few studies have also reported that cognitive activity prevents Alzheimer from becoming more chronic (Ball et al., 2002).

Overall, CST is considered an effective preventive therapeutic intervention for cognitive impairment, and also serves as a secondary preventive method for people at risk of developing dementia (Mowszowski, Bactchelor & Naismith, 2010). McDermott et al. (2018) in their synthesis reported that group CS could also consistently benefit dementia patients. Previous literature suggests that memory problems begin at 50 years of age, for example, Kremen et al. (2014) reported that heritable MCI could be identified around 51-59 years of age. After testing different cognitive domains and avoiding ceiling effects, they found that MCI can be predictable before 60 years, making it imperative for patients to have preventive intervention early on.

In many countries CST is effectively used for dementia patients; however, in Pakistan use and efficacy of CST still need to be established. Present study is first study of its kind that establishes CST efficacy in Pakistan for older adults with MCI and explores the usefulness of CS in treating MCI; we believe that CST will be effective and will not only help dementia patients with their cognitive functioning but also diminish the ensuing disorder; improving QoL. Given low life expectancy (66.5 years) in Pakistan (WHO, 2018), we speculated that MCI patients should be screened around 50 years (also considered WHO, 2018 for age recommendations of older adults for developing countries) and that is what we did when we recruited our patients. We expect, cognitive functioning and QoL of MCI participants will improve significantly after CST compared to waitlist control group and would continue to express this improvement at two-month follow-up for the treatment group.

Method

Participants

G power was used to determine sample size with medium effect size of f = .25, α=.05, power =.8 and r =.8, for repeated measures ANOVA for three measurements of single sample. Estimated sample size was 12.

Participants that met Peterson's criteria (2004) for MCI were included in the study (January 2017 to September 2018) were recruited from cities of Punjab, Pakistan. Forty-one individuals, ages between 50 to 75 years, were shortlisted and requested to participate in CST; 24 gave their consent and were randomly assigned to treatment or waitlist groups (see Figure 1). Assessments at pre-intervention level were carried out for both groups and CST was administered to treatment group (N =12) and waitlist group (N = 12) was informed to wait for their turn for intervention was provided to intervention group for eight weeks followed by post-intervention assessment for this and waitlist group. Two months (16 weeks) after the termination of CST follow up assessments for intervention groups were conducted.

Assessment Measures

Montreal Cognitive Assessment Scale (MoCA). Cognitive functioning was assessed with MoCA (Nasreddine et al., 2005) and for identification of MCI. The instrument could distinguish normal older individuals (cognitively intact) from dementia. For MCI, reliability of MoCA was found as .88 and for control group it was .90 (Freits, Simoes, Maroco, Alves & Snatana, 2012). This test measures 7 cognitive domains and this tool is available in more than 35 languages. This test yield score range of 0 to 30, while 26 and above score signify normal. The cut-off of MoCA was decided 23 rather than 26 to avoid the false positive rate (Lu et al., 2011). In the present study Urdu version (available on website) of MoCA was administered (Nasreddine et al., 2005).

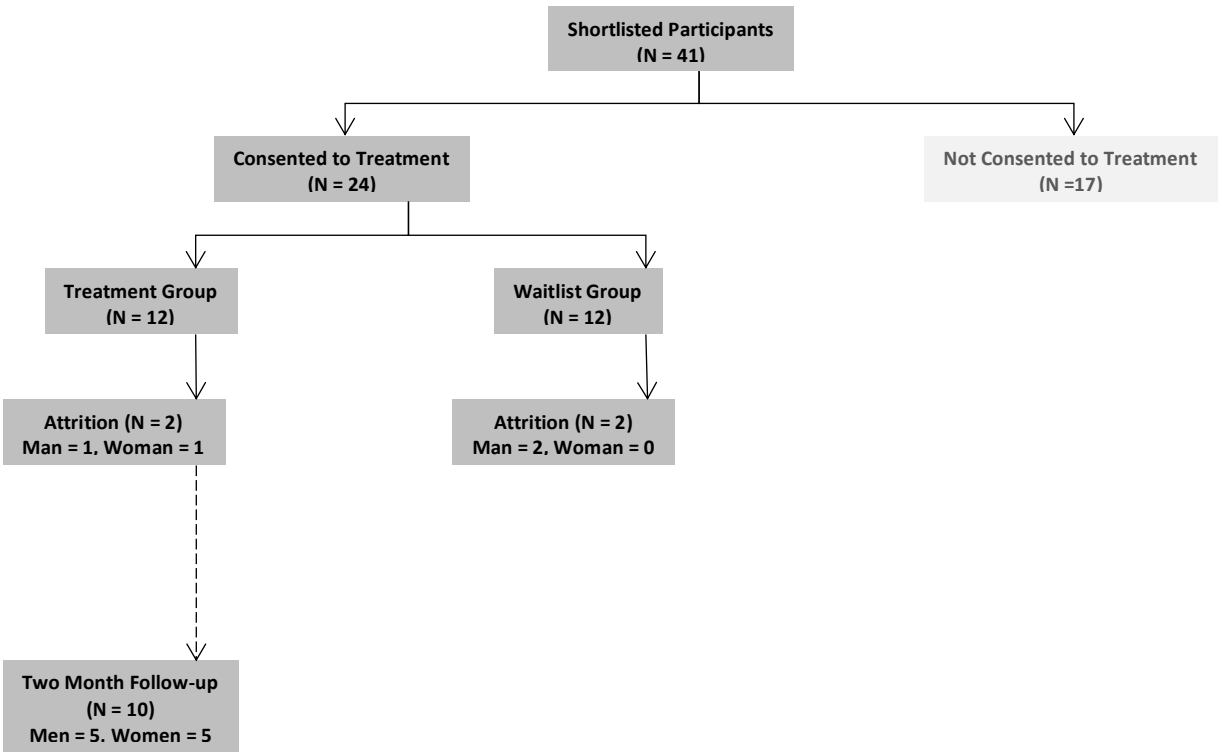
Quality of Life in Alzheimer's Disease (QoL-AD). To measure QoL Logsdon et al. (1999) QoL-AD was employed. It comprised on 13 items assessing the Qol of individuals in aspects of energy, mood, health, living conditions , memory, family, marriage, friends, tasks, enjoyment, money, self and life as a whole. It has high reliability (α = .88-.89) according to Logsdon et al. (1999) good concurrent validity based on reports of both patient and caregiver, as supplemented by correlation with Dementia Quality of Life Scale (0.69) and Euroqol-5D scale (.54). Qol marked as poor, fair, good and excellent. The composite score ranges between 13 and 52, with higher numbers representing better Qol. In the present study individuals depicting poor to adequate Qol (score ranged from 13 to 25) were taken. QoL-AD was translated by researcher in Urdu following MAPI guidelines (MAPI Institute, 2008) to use in the present study.

Process

Treatment and Waitlist Groups. Intervention group comprised of six-male and six-female participants initially however, a man and a women participant dropped out of therapy leaving ten to complete the study. We ran parallel gender groups of men and women participants because of cultural norms and preferences. 14 biweekly group sessions (each 45 minutes long) were conducted over 8 weeks (Aguirre et al., 2013; Mahmood, Ahmad & Kinsler, 2012). CST sessions were conducted by lead researcher following the adapted manual for the therapy (Mahmood et al., 2012). Post-assessments were carried out at week eight and participant feedback was recorded and future plans were discussed. After the termination of

therapy, follow up assessment was done at two months for the intervention group, (see Figure 1).

Figure 1. Flowchart of shortlisted, treatment and waitlisted participants at different stages of the study.



Waitlist group involves 12 members (6= men, 6= women) those were assessed at pre-intervention time like the treatment group. The waitlist group was briefed that they have to wait for their turn for treatment. Wait- list group was again assessed done at the end of week eight when intervention for the treatment group concluded. Two participants could not be approached for being out of station, thus their pre-assessments were excluded. When waitlisted participants were asked to come for therapy after the therapy was concluded, a majority did not show any willingness for it. So handouts on strategies to improve memory were given to wait- list group too. Only three participants (2 women, 1 man) showed willingness for the intervention. But it was not possible to run group separately gender wise with three participants. Thus individual's sessions were offered to them but they did not turn later on for it.

Arrangements of Sessions. Female participants decided to take session from 10:00 to noon, while male participants preferred 4:00-6:00 evening sessions after their work. We provided transportation to the participants, which insured participation in the intervention. Two sessions were conducted in one day because to travel arrangements and availability of the participants as followed in adapted manual too. Between these two sessions refreshment were provided. Participants at regular sessions generally spent 2.5-3 hours a week.

For few group sessions culturally appropriate and relevant items were prepared / arranged such as local toys, games, food items and old local quotations. Sessions were arranged in a spacious room, connected to accessible rest room and toilet. Other than that, a detached sitting area was also arranged where group members used to sit before the start of session; facilitator used to welcome and greet them there. Once all participants had arrived, they were taken to the group sessions room. The designated room had table and chairs along with a white board.

Structure of Sessions. There were some general and session specific activities for each session. At the start of each session some general activities were carried out such as welcome of participants, singing the group song and calling out the names of group members. Activity of catch and throw ball was also carried out in which each group member was required to share their details, i.e., call out their name, interest, etc., before throwing the ball to another member. Then members used to recall the date, day, time, month, year and season; later on, they used to discuss current news from newspaper of that day. After general activities, structured activities pertinent to that session were practiced. At end of session, feedback was taken from members and thanked for their participation in group. Then group song was sung and participants were informed about the date, timing and content of the next session.

Compliance and Treatment Integrity

Participants who attended 12 sessions and were present at pre, post and follow-up assessments, were considered as compliant to CST. In the present study, treatment integrity was ensured as the therapist was a clinical psychologist, who had clinical experience and expertise in psychotherapy. Furthermore, by using MAPI guidelines (2008), detailed training manual was purchased and

translated in Urdu. Further, throughout the process of therapy therapist remained in contact with original authors of the manual, and with those who translated adapted manual that was employed in the study. While delivering the content of therapy, cultural norms were in consideration too. Another clinical psychologist was also actively involved in group formation and session planning. Furthermore, a group facilitator was present to ensure quality of the CST session. In order to ensure the reliability and treatment effect in participant's daily life, family members were also approached and their feedback was taken. Sessions were also audio and video taped.

Table 1

Session Structure and Outline of CST Activities

Wk	Session	Theme	Aims and Goals	Activities
1	Introduction			Getting to know participants and develop rapport; details about structure and nature of sessions.
2	1 & 2	Physical and Number Games	To indulge participants in physical activities which would make them physically active and cognitively stimulating number games	1. Group name and group song was decided. 2. Playing gulli danda (tip-cat), beetay (pebble playing) and rassa kodna (skipping rope) playing carom board and Luddo.
3	3 & 4	Sound Recognition	Brainstorming activities; recognition of animals by calls and pictures.	1. Recognizing animals and birds using picture cards and their calls. 2. Recognizing songs by tune and beginning lyrics.
4	5 & 6	Memories	Childhood memories and foods.	1. Filling out printed sheets about personal information. 2. Discussing sweet dishes of childhood.
5	7 & 8	Memories	Childhood memories and games.	1. Recalling events of war of 1965/**1971** 2. Childhood toys and games.
6	9 & 10	Categorizing Food Objects	Naming and categorizing foods and related memories.	1. Recognizing food items in pictures. 2. Writing three vegetable recipes. 3. Taste food items and talk about memories associated with them. 4. Brainstorming food categories 5. Making fruit salad.
7	11 &12	Faces, Places and Current Affairs	Recalling games related to faces and places. Discussion on current affairs and "then and now" and "old and new" games.	1. Recognizing faces of famous people and places of Pakistan. 2. Playing games with picture cards of old and new coins, cars and engines. 3. Discussing current affairs.
8	13 &14	Word games and Using Money	Word Games; Old Sayings; Songs and Guessing grocery item price.	1. Supplying missing words in phrases. 2. Recognizing old songs from initial few words and singing them. 3. Estimating prices of real life grocery items. 4. Discussion on changes of prices and values

Ethical Considerations

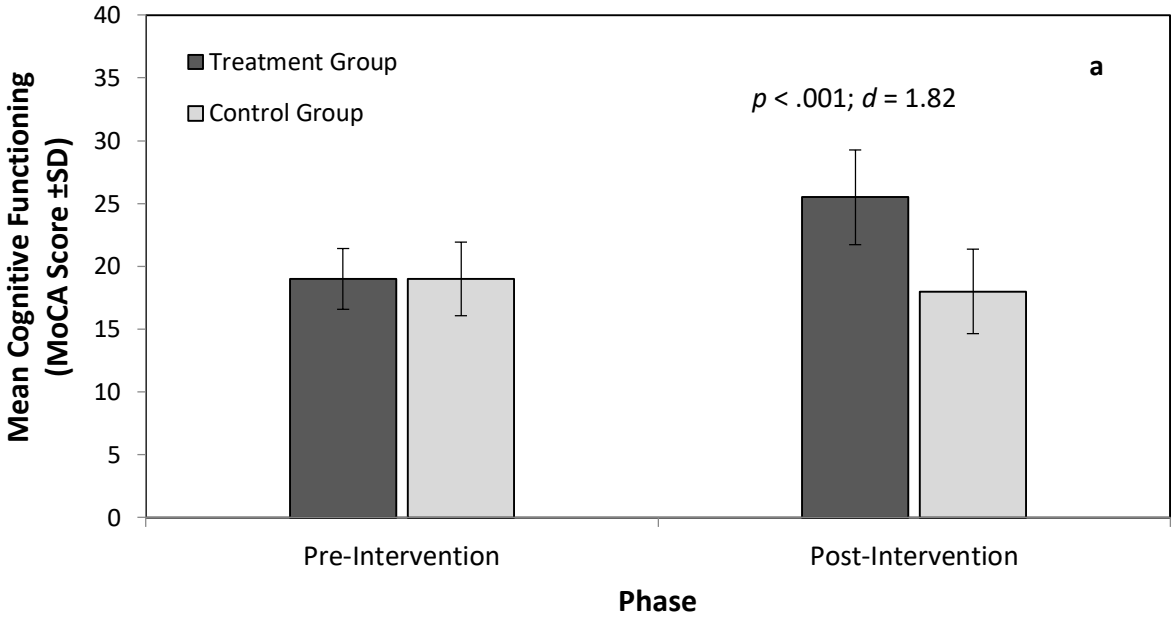
Ethical considerations of the study were ensured and approval for the study was taken from Departmental Doctoral Program Committee (DDPC) and Advanced Studies Research Board (ASRB), of University of the Punjab, Lahore. Informed consent was obtained from the participants. Participants of Waitlist control group were also approached, therapy handouts were given to them and they were also informed that CST was available to them after the experimental sessions were over. Those participants, who reported additional need of counseling, were offered free psychological services at the Centre for Clinical Psychology, University of the Punjab, Lahore, Pakistan.

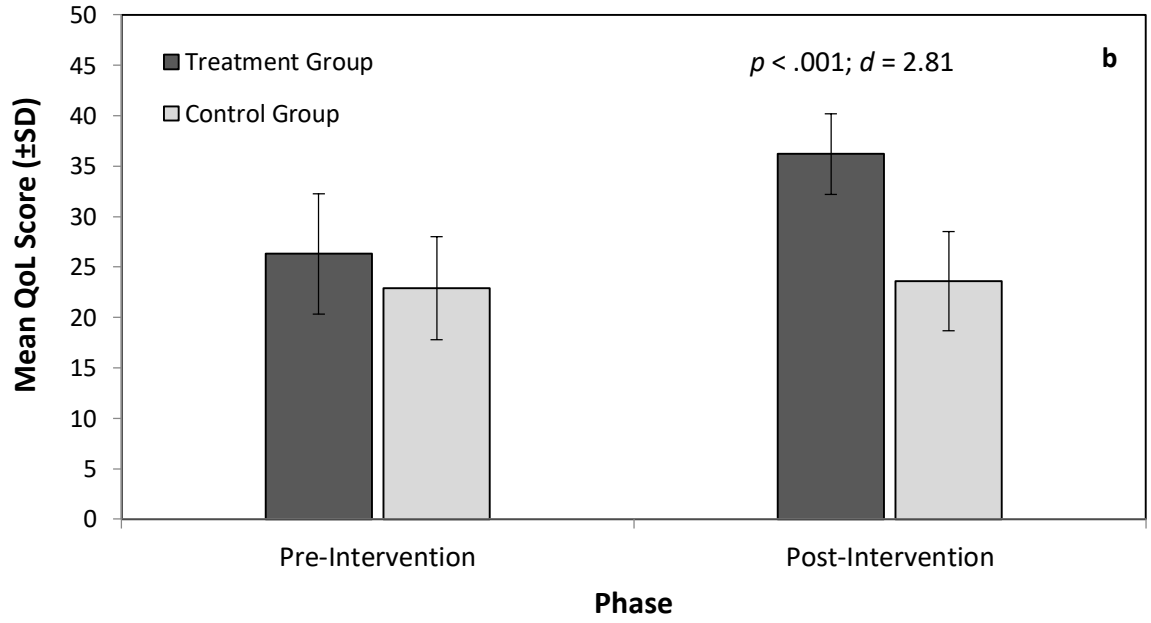
Results

Cognitive functioning and QoL data met parametric assumptions, i.e., normal distribution, homogeneity of variance, interval data and independence of observations and the researcher employed *t*-test to

analyze intervention and waitlist group differences; and a repeated measure ANOVA for differences in pre, post and follow-up scores in just intervention group. ANCOVA for intervention and control group comparison on post assessment cognitive functioning significantly improved (p < .001, Cohen's d = 1.82) for the intervention group from pre-intervention (M = 19.00, SD = 2.44) to post-intervention (M = 25.50, SD = 3.77), however cognitive functioning showed no improvement (p > .05) from pre-intervention (M = 19.00, SD = 2.94) to post-intervention (M = 18.00, SD = 3.37) for the control group (see Figure 2a). Similarly, QoL significantly improved (p = .001, Cohen's d = 2.81) for the intervention group from pre-intervention (M = 26.30, SD = 5.94) to post-intervention (M = 36.20, SD = 3.99), however cognitive functioning showed no improvement (p > .05) from pre-intervention (M = 22.90, SD = 5.08) to post-intervention (M = 23.60, SD = 4.92) for the control group (see Figure 2b).

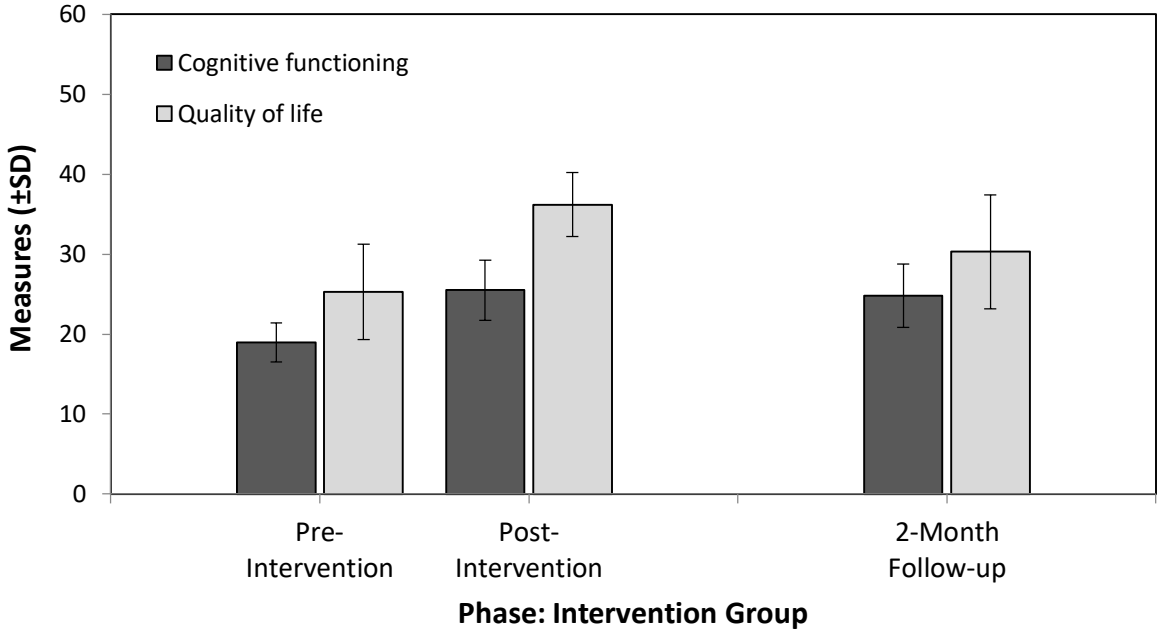
Figure 2. Shows significant improvement in mean cognitive function in MCI patients over eight weeks of CST when no change was observed in the control waitlist group (panel a); a similar result is observed for QoL (panel b).





Cognitive functioning and QoL in individuals with MCI improved significantly after intervention through follow-up for the treatment group. To run a repeated measure ANOVA and quantify differences in pre-, post- and follow-up interventions, Mauchly's test of sphericity indicated that data met the requirements for cognitive functioning χ^2 (2) = 0.781, $p > .05$, and QoL, χ^2 (2) = 0.49, $p > .05$. Cognitive functioning at pre-intervention (M = 19.00, SD = 2.44) assessment was lower than post-intervention (M = 25.50, SD = 3.77) and follow-up (M = 24.80, SD = 3.93) assessments and these differences were significant, F (2, 18) = 49.06, $p < .001$, $\eta^2 = .93$**.** Bonferroni analysis (post-hoc) suggested significant differences in pre and post level of intervention (MD = -5.70, $p < .001$) as well as at pre and follow up level of intervention (MD= -4.40, $p = .009$) but not significant difference was found between post and follow up intervention level (MD = 1.30, $p = .58$). It shows that the sustainability of cognitive functioning was present till follow up level. For QoL, significant improvement was observed between pre and post level of intervention (MD = -9.70, $p < .009$) but no significant improvement in pre and follow up level (MD = -2.60, $p = .100$). Thus, QoL improved at post -level but improvement did not maintain at follow up intervention level (MD = 7.10, $p < .01$) (see Figure 3 for details).

Figure 3. Shows significant improvement for intervention group in cognitive functioning and QoL over an 8-week period of CST that was and maintained at 2-month follow up.



ANCOVA revealed for that for cognitive functioning, Levene's Test for pre-intervention F (1, 18) = 4.09, $p = .06$, was not significant, reflecting that assumption of homogeneity of variance was met. After controlling both pre-intervention scores, cognitive functioning at post-intervention levels were greater for intervention group (M = 36.20, SD = 3.99) than for control group (M = 23.60, SD = 4.93), this difference in scores could attribute to treatment condition. For QoL, the Levene's test for pre-intervention, F (1, 18) = 2.69, $p = .12$, indicating assumption of variance was met, while controlling covariates, QoL of treatment group was better (M = 25.50, SD = 3.78) than control group (M = -18.40, SD = 3.37).

Discussion

Using CST for MCI patients in this study have shown encouraging results in Pakistan. This non-pharmacological approach proved effective for people who are leading towards mild to moderate dementia and focuses on enabling such individuals to engage in daily activities by supporting their cognitive functioning (Yuill & Hollis, 2011) and QoL (Spector et al., 2003).

In the present study, CST was delivered in groups, where members enjoyed social interactions and looked forward to future sessions. Social engagement facilitate the cognition and QoL, which can ultimately enhance wellbeing (Cheung & Peri, 2014). Although, available literature has shown that the improvements in QoL were mediated by improvements in cognitive function in CST sessions (Woods et al., 2005); improvements in memory, feeling energetic in maintaining relationships and managing chores. Therefore, it should be noted that in Qol improvement did not arise simply due to non-specific factors and were associated with individually tailored challenging cognitive activities that led participants to use their potential in activities related to QoL (Woods, et al., 2005).

Findings depicted that QoL of individuals with MCI was better at post level due to provision of CST, as no significant differences were found between pre and follow-up level. But this Improvement in QoL at post assessment level did not sustain till follow-up level. Two reasons could be attributes for this, first there was no further availability of cognitive stimulating environment for participants and secondly, they also had to face stressors between post-assessment and follow up. At 2-month follow-up, there was significant reduction in the scores of Qol of intervention group and

reasons were those facing different stressors by seven participants such as divorce of a daughter, son's depression, death in family, financial and health issues etc. Present finding also depicted that after termination of CST therapy, improvement in participants reverts due to discontinuation of cognitive practice and non-availability of stimulation. Thus there is need to continue booster sessions or individual CST for better functioning. Available researches also suggested that for extending therapeutic effects, booster sessions are helpful (Greenway, Duncan & Smith 2012). In this study, cognitive functioning was improved and maintained at follow up level while improved QoL did not maintain at 2 months follow up signifying that cognitive improvements are not at risk due to life stressors.

Overall, present findings evidently depict the efficacy of CST in Pakistan for better cognitive functioning. Existing literature also supports the efficacy of CST for MCI (Jean, Bergeron, Thivierge, & Simard, 2010; Martin, Calre, Altgassen, Cameron & Zehnder, 2011). Further, Peterson et al. (2018). In their systematic review suggested that cognitive training has the potential to prevent cognitive decline. Mowszowski, Bactchelor and Naismith (2010) concluded that CST offers promise as a preventive therapeutic technique in healthy older adults and particularly as secondary preventive method for at risk people.

Implications of the study

Provision of CST to MCI population in Pakistan should be available at federal, provincial and municipal levels. Many professional psychologists can learn simple forms of CST to help aging patients as this segment of population rises in Pakistan. By engaging in cognitive activities, MCI patients will improve their cognitive processes and QoL that ultimately enhance their interest in themselves too. Another implication is that while implementing CST in Pakistan, stress management should also part of it for this aging group.

Limitations and Suggestions for Future Research

Findings depicted that more CST sessions were needed in order to sustain improvement in QoL. Therefore, CST therapy should be provided for longer duration to maximize its impact on QoL of individuals. The follow-up assessment was conducted at two months which was insufficient to get clear idea regarding long-term impact of the therapy. Therefore, future studies should look at longer follow-up assessments in order to establish long term impact of CST.

Conclusion

This study has assessed the impact of CST in improving cognitive functioning and QoL in patients with MCI in Pakistan and noted that CST improved memories, self-interest, and self-realization in maintaining relationships and chores. CST was effective in improving cognitive functioning and QoL at post-intervention assessment level. At 2 months follow up level of intervention, a decline in QoL was observed from post intervention.

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Received: 28th Jan, 2020
Revisions Received: 20th Jan, 2021