



Original Article

Enhancing Independence in Activities of Daily Living, Cognitive, and Physical Skills for Elderly with Dementia: A Randomized Controlled Trial of Meaningful Task-Oriented Intervention

Farzad Rabiei¹, MSc; Malahat Akbarfahimi^{2*}, PhD; Mahtab Roohi-Azizi³, PhD; Marjan Ghandi⁴, MSc

¹Department of Occupational Therapy, School of Rehabilitation, Rehabilitation Research Center, Iran University of Medical Sciences, Tehran, Iran

²Department of Occupational Therapy, School of Rehabilitation Sciences, Neuroscience Research Center, Iran University of Medical Sciences, Tehran, Iran

³Rehabilitation Research Center, Department of Rehabilitation Sciences, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran

⁴Department of Health Technology Assessment, Faculty of Management and Medical Information Sciences, Kerman University of Medical Sciences, Kerman, Iran

ARTICLE INFO

Article History:

Received: 03/01/2023

Revised: 08/05/2023

Accepted: 18/06/2023

Keywords:

Activities of daily living

Cognitive function

Dementia

Physical functional performance

Task

Please cite this article as:

Rabiei F, Akbarfahimi M, Roohi-Azizi M, Ghandi M. Enhancing Independence in Activities of Daily Living, Cognitive, and Physical Skills for Elderly with Dementia: A Randomized Controlled Trial of Meaningful Task-Oriented Intervention. *JRSR*. 2024;11(2):102-108. doi: 10.30476/JRSR.2023.97679.1340.

ABSTRACT

Background: Dementia is recognized as a neurodegenerative disease that gradually causes serious cognitive, motor, and functional impairments in affected individuals. This study explored the impact of a meaningful task-oriented intervention on independence in activities of daily living, cognitive status, and physical abilities, including gait speed and balance, among elderly patients diagnosed with mild to moderate dementia.

Methods: In this randomized controlled trial, 40 participants aged 60-70, with a Functional Assessment Staging Tool (FAST Scale) score of 1-5, were recruited. They were randomly assigned to either a control group (n=20) receiving standard care, including medication and routine consultation, or an intervention group (n=20) receiving standard care along with eight 45–60-minute sessions of task-oriented interventions. These interventions were centered around familiar daily life activities in the home environment and were conducted twice a week. The primary outcome measure was the participants' independence in activities of daily living, assessed using the Barthel Index. Secondary outcome measures included cognitive function, evaluated using Addenbrooke's Cognitive Examination-Revised, and physical performance, assessed through the Timed Up and Go test, 10 Meter Walk Test, and Berg Balance Scale.

Results: The meaningful task-oriented intervention demonstrated significant improvements in independence in activities of daily living ($P<0.01$) compared to the control group. Additionally, improvements were observed in cognitive function and physical performance, including balance, lower limb strength, and walking speed ($P<0.05$).

Conclusion: The integration of meaningful task-oriented interventions centered around familiar activities within the home environment appears to offer significant benefits for elderly patients with dementia. By engaging in tasks that resonate with their daily routines, these interventions can support the maintenance of essential skills and foster a sense of independence among affected individuals.

2024© The Authors. Published by JRSR. All rights reserved.

Introduction

Dementia is recognized as a neurodegenerative

*Corresponding author: Malahat Akbarfahimi, PhD; Department of Occupational Therapy, School of Rehabilitation Sciences, Iran University of Medical Sciences, Madadkaran Alley, Shah Nazari St, Madar Square, Mirdamad Blv, Tehran, Iran. Tel: +98 9123362925; Email: akbarfahimi.m@iums.ac.ir

disease that causes irreversible cognitive, functional, and behavioral deterioration. Patients with dementia experience a range of cognitive and non-cognitive symptoms, including memory impairment, language difficulties, perceptual and motor impairments, disorientation, and executive function impairments [1]. They may also experience motor dysfunctions,

such as muscle weakness, imbalance, and diminished mobility, particularly in the lower extremities. Other non-cognitive symptoms include behavioral and psychological symptoms of dementia (BPSD), such as agitation, aggression, depression, wandering, apathy, and sleep disorders [2]. These changes result in substantial economic burdens, engender dependency in activities of daily living, and increase the caregiving load [3].

The primary aim of interventions for individuals with dementia is to alleviate cognitive impairments, mood fluctuations, and behavioral disturbances while also slowing the progression of cognitive decline. Two primary approaches - non-pharmacological and pharmaceutical - are employed to achieve this objective [2, 4]. Despite limited or inconclusive evidence regarding the efficacy of non-pharmacological interventions, they are frequently utilized due to their cost-effectiveness and safety profile [2, 5]. Among non-pharmacological interventions, the literature suggests that home-based occupational therapy may yield positive outcomes for patients with dementia and their caregivers by enhancing their involvement in meaningful activities, roles, and relationships [6]. Occupational therapists aim to optimize the alignment between occupation, the individual's capabilities, and their physical and social surroundings [7]. This involves assisting patients with dementia in identifying meaningful activities, simplifying them to enhance engagement, and reducing environmental stressors and distractions [8]. Individuals with mild dementia perceive activities as meaningful when they experience a sense of connection to themselves, others, and their environment [9, 10].

Task-oriented interventions have effectively enhanced motor behavior among individuals with cognitive disorders [11]. However, meaningful task-oriented interventions go beyond standard task-based approaches by utilizing everyday activities that hold personal significance to patients, as outlined by Hubbard et al. [12]. Literature suggests that incorporating individualized therapy goals centered around specific tasks may result in decreased disability levels in patients with dementia; nevertheless, it remains unclear whether patients can generalize learned skills and autonomously initiate tasks in their natural settings [13]. In a case study conducted by Cirio et al., Task-Oriented Motor Practice (STOMP) enhanced functional skills in a patient diagnosed with moderate dementia with Lewy bodies. The authors propose that STOMP has the potential to assess and address occupational performance deficits in individuals with dementia and warrants further exploration [13].

Likewise, Son et al. demonstrated that task-oriented activities can enhance hand function, cognitive function, and self-expression in elderly individuals with early-stage dementia [14]. Additionally, Gbiri et al. found that Progressive Task-oriented Circuit Training is superior to conventional treatment with home exercise programs in enhancing cognition, improving functional performance, and fostering societal participation in rehabilitating individuals with dementia [15].

In conclusion, the evidence suggests that task-oriented interventions centered around familiar activities within the home environment may hold promise in improving

outcomes for individuals with dementia. However, further research is warranted to validate their efficacy and explore their long-term effects and applicability across different settings. This study serves as an initial exploration into the potential benefits of such interventions and lays the groundwork for future investigations in this area.

Moreover, the innovation of this study lies in developing a comprehensive program that utilizes meaningful task-oriented interventions based on activities commonly performed in patients' homes. This program targets cognitive and physical abilities to enhance independence in daily activities and improve walking speed, lower extremity strength, and balance. While prior research has shown the positive impacts of task-oriented training on the cognitive and functional abilities of dementia patients, this study specifically focuses on implementing these interventions within the home setting. The authors posit that this approach has the potential to be more effective than traditional methods, which may not always align with patients' daily routines or may not consider the unique aspects of their home environment.

The main aim of this study was to evaluate the influence of meaningful task-oriented interventions on patients' independence in activities of daily living. Secondary objectives encompassed assessing their impact on cognitive status and physical abilities, including gait speed, functional lower extremity strength, and balance.

Materials and Methods

Participants

Forty patients diagnosed with dementia were enrolled in the study according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5). The diagnosis was confirmed by a specialist neurologist with brain and cognition expertise at a clinic in Tehran, Iran. Inclusion criteria comprised individuals aged between 60 and 70 years, with an educational level of more than seven years, a FAST score ranging from 1 to 5, and a Mini-Mental Status Test score below 18 [16]. Additionally, participants were required to reside with their families in their own homes, possess the ability to comprehend and adhere to one-step commands, and exhibit motor, functional, and cognitive impairments, as reported by their families. Adequate vision and hearing with correction were also necessary. Exclusion criteria included the presence of delirium, Parkinson's disease, and receptive or global aphasia.

Setting

All pre-tests, post-tests, and intervention sessions were conducted in the participants' homes, with their caregivers or family members present, ensuring a calm and motivating environment. Intervention sessions were scheduled at times when participants were most cooperative and alert. This clinical trial was approved by the Ethical Committee of the Iran University of Medical Sciences (IR.IUMS.REC 1398.1010) and registered in the Iranian Registry of Clinical Trials IRCT20191027045253N1 (<https://irct.behdasht.gov.ir/trial/43327>). Both participants and their significant others

provided written informed consent before participating in the study.

Intervention

The intervention group comprised 20 participants who underwent eight sessions twice weekly, lasting 45-60 minutes each, from April to November 2019. In the initial session, participants were briefed on the intervention's objectives, and feedback was gathered on selecting training goals based on the needs of the clients and their families. Pre-tests were administered before the first session, with post-tests conducted on the day following the final session.

Randomization, Allocation, Concealment, and Blinding

An assessor, unaware of the aims of the current research, objectively evaluated the eligibility of 40 participants using the FAST test, stages 1 to 5. Eligible participants were randomly assigned to either the intervention or control group in a 1:1 ratio. The intervention group received the designed meaningful task-oriented interventions in addition to medication, while the control group solely received medication. Both groups received standard psychological consultations from brain clinics. A random number generator and sealed opaque envelopes were employed to ensure unbiased group allocation. Unaware of the study's objectives, an impartial individual facilitated the number generation for group allocation and concealed the allocation using sealed opaque envelopes.

Procedure

The study's aims and objectives were communicated

to the participants, who were informed of their right to withdraw from the study at any time without facing adverse consequences. To minimize bias in the study results, a blinded assessor, unaware of the study's aims and objectives, was provided with the participants' FAST test scores to assign them to either the intervention or control group. Subsequently, cognitive and physical abilities and functional independence were evaluated in a randomized order. Following this, an occupational therapist, blinded to both the assessment results and the study's aims, conducted the intervention sessions based on Table 1. The flowchart outlining the participants' enrollment and progression is presented in Figure 1. The five key elements of the designed meaningful task-oriented activities, which are considered crucial components, include intervention sessions in the presence of a family member, repetitive task performance with feedback, errorless practice, and establishing a close rapport. Additionally, this program's significant aspect was preventing fatigue during interventions and incorporating engaging tasks [17].

Outcome measures

Primary Outcome Measure

Barthel Index

The Barthel Index is a comprehensive measure of functional disability that evaluates the patient's ability to perform ten daily activities, which can be classified under self-care abilities (e.g., feeding, grooming, bathing, dressing, continence, and toileting) and mobility (e.g., ambulation, transferring, and climbing stairs). The total score ranges from 0 to 100, with higher scores indicating

Table 1: The Task-Oriented Intervention Program Based on Occupational Performance

Sessions	Home-based tasks
First	The session begins with warm-up exercises, followed by a 15-minute supervised walk led by an occupational therapist to prepare tea and serve it to family members. Isotonic exercises are conducted against an external force in the patient's lower extremities, involving pushing and pulling a chair. The home environment is adapted to various obstacles, and the patient is guided through navigating them individually while counting numbers, all under the therapist's guidance. The chosen household chore for this session is breakfast preparation.
Second	The session starts with warm-up exercises and a 15-minute walk simulated by sweeping the house. Strengthening exercises entail sitting and standing on a chair for 15 repetitions. Following a short break, the patient is tasked with opening the refrigerator door and memorizing the correct location of the items inside. The therapist then rearranges the items and prompts the patient to return them to their correct places. Cleaning the refrigerator is designated as the household chore for this session.
Third	The session begins with warm-up exercises, followed by a task involving various kitchen utensils, such as spoons, glasses, and plates. These utensils are strategically hidden around the house while the patient observes. The therapist then prompts the patient to locate and retrieve each utensil by recalling its location. Next, the patient is guided to lift the opposite leg while seated on a chair and count down from 50 to 5 by fives. After a brief rest, the patient is asked to stand in a stationary position and identify and retrieve various objects presented by the therapist in different directions while verbalizing their names. Towards the end of the session, the patient is encouraged to kick a ball towards a designated target using their foot. Categorizing kitchen utensils is designated as the household chore for this session.
Fourth	The session begins with warm-up exercises, followed by a task involving walking in tandem while naming the objects in the patient's surroundings. After a brief rest, the patient is instructed to walk around the house with long strides, counting from 30 to 1. A set of kitchen utensils is then placed on the table, and the patient is asked to categorize each utensil and return it to its designated place. Exploring familiar objects at home and correctly placing them in their appropriate locations is designated as the household chore for this session.
Fifth	Following warm-up exercises, if a yard is available, the therapist guides the patient to attend to gardening tasks such as weeding, planting, and watering the garden. If no yard is available, the patient can perform these tasks using flowerpots at home. Planting a flower is designated as the household chore for this session.
Sixth	After the warm-up exercises, the patient is directed to prepare their preferred meal by selecting the required ingredients and measuring them, with guidance from the therapist and family members. The household chore selected for this session is preparing lunch.
Seventh	Following the warm-up exercises, the patient is requested to clear the food table and bring the utensils to the kitchen. Then, the patient is instructed to wash the dishes while standing on a platform with one foot, ensuring they are correctly placed in their designated location after washing. The selected household chore for this session is dusting and sweeping the home.
Eighth	After the warm-up exercises, the patient accompanies the therapist for a walk in the park and subsequently goes to the supermarket to purchase necessary household items, completing all payment procedures independently. The selected household chore for this session is going shopping with the therapist.

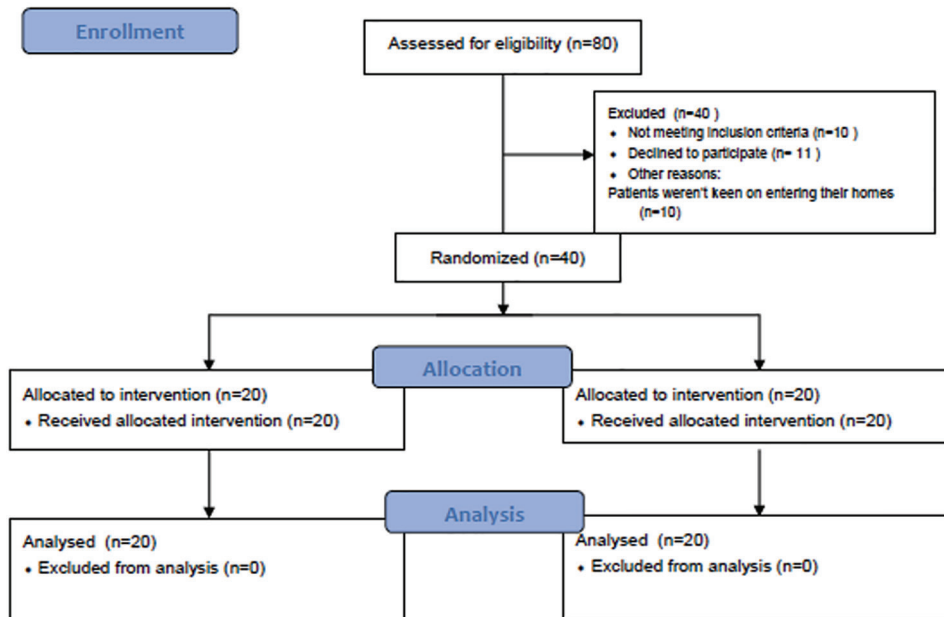


Figure 1: Flowchart of the study.

better physical functioning and greater independence, while zero indicates complete dependence. The Iranian version of the Barthel Index has demonstrated a significant reliability coefficient of 0.938, indicating its clinical utility [18].

Secondary Outcome Measures

Addenbrooke's Cognitive Examination (ACE)

The Addenbrooke's Cognitive Examination (ACE) is a specific screening instrument developed for the early detection of dementia. Unlike the Mini-Mental State Examination (MMSE), the ACE emphasizes executive function over verbal abilities. With an administration time of approximately 15-20 minutes and high reliability and diagnostic accuracy, the ACE is a suitable instrument for clinicians and general clinical services that prioritize accuracy in diagnoses. A score of 76 is considered the optimal cut-off point to distinguish dementia cases from normal subjects, with a sensitivity of 0.92 and a specificity of 0.93 [19].

Timed Up and Go Test

The Timed Up and Go (TUG) test assesses the patient's mobility by requiring them to stand up from a chair, walk 3.0 meters at a comfortable pace to a designated mark on the floor, turn around at the mark, walk back to the starting point, and return to a seated position in the chair. The test score is the time the patient takes to complete the test. The TUG has demonstrated high interrater and intratester reliability, making it a reliable tool for assessing mobility [20].

The 10-Meter Walk Tests (10MWT)

The 10-Meter Walk Test (10MWT) is a suitable instrument for evaluating gait capacity in patients with various neurological conditions, including dementia. This test is useful for assessing and investigating gait capacity in such patients [21].

Berg Balance Scale (BBS)

The Berg Balance Scale (BBS) was initially developed to

assess functional balance in older adults. The BBS consists of 14 items, each graded on a 5-point Likert scale (0 to 4), representing varying levels of effort, with a total score ranging from 0 to 56. Higher scores indicate higher levels of functional balance. The BBS takes 10 to 20 minutes to complete and can be used to describe the balance of older adults and detect changes in balance following an intervention program or a disease process [22].

Statistical Analysis

The statistical analysis was conducted using SPSS, version 16.0, SPSS Inc., Chicago, IL, USA. Non-parametric variables such as gait speed, functional lower extremity strength, balance, performance in activities of daily living, and functional and cognitive status were compared using the Mann-Whitney U test. Pre- and post-test data within each group were compared using the Wilcoxon Signed Ranks Test. The significance level was set at $P=0.05$, and familywise adjustments for multiple comparisons were made using the Error-Rates-Method. Significant differences between the test and control groups were identified. Cohen's d was calculated, with 0.20 indicating a small effect size, 0.50 indicating a medium effect size, and 0.80 indicating a large effect size [23].

Results

The analysis results involving 40 patients with dementia who participated in the study are summarized in Table 2. According to the table, there were no significant differences observed between the intervention group (comprising ten males and ten females) and the control group (comprising seven males and 13 females) concerning sex, age, and pretest scores of all variables, except for the chair stand ($P>0.05$). Additionally, based on the FAST, the distribution of participants in each group was as follows: 2:3, 7:10, and 11:7 for FAST stages 3, 4, and 5, respectively, with no significant difference between the groups for stages 3 and 4, each having 5 participants in both groups of the study ($P=0.17$).

Table 2: The Mean (SD) of Participant Characteristics in the Control and meaningful Task-Oriented Intervention Group at the Baseline

Characteristic	Control	Intervention.	P value
	Mean (SD)	Mean (SD)	
Age	79 (8.02)	74.35 (7.09)	0.06
BI	66.5 (16.31)	72.75 (20.16)	0.19
TUG	18.80 (9.26)	18.2 (8.81)	0.70
BBS	43.1 (11.78)	41.6 (13.74)	0.68
10M	19.6 (6.87)	21.1 (6.35)	0.37

Data were presented as mean (standard deviation). *Mann-Whitney U; ** Independent T; BI: Barthel index; TUG: timed up and go; BBS: Berg balance scale; 10M: 10-meter test

Table 3: The Analysis of Personal Independency, Cognitive Status, Gait Speed, Functional Lower Extremity Strength, and Balance Scores in the Intervention Group (n=20) and Control Group (n=20)

	Control G.		Within G.	Intervention G.		Within G.	Between G. after treatment		
	Baseline Mean (SD)	Outcome Mean (SD)	P	Baseline Mean (SD)	Outcome Mean (SD)	P	Mean difference (SE)	P	Effect size
BI	66.5 (16.31)	63.25 (14.26)	0.01*	72.75 (20.2)	72.76 (20.16)	1	-9.5 (5.22)	0.004**	0.21
ACE-R	0.40 (0.16)	0.41 (0.17)	1	0.54 (0.17)	0.59 (0.17)	0.003*	-0.45 (0.19)	0.001	0.29
TUG (sec)	18.80 (9.26)	20.30 (9.91)	0.01*	18.2 (8.81)	16.25 (8.81)	<0.001*	4.05 (2.96)	<0.001**	0.52
BBS	43.1 (11.78)	40.45 (11.02)	0.003*	41.6 (13.74)	44.45 (15.27)	0.001*	-4 (4.21)	<0.001**	0.62
10M (m/s)	19.6 (6.87)	20.9 (6.92)	0.01*	21.1 (6.35)	19.39 (6.78)	0.002*	1.6 (2.16)	<0.001**	0.48

G: Group; Data were presented as mean (standard deviation) and Mean difference (Std. Error Difference). *Wilcoxon Signed Ranks Test; ** Mann-Whitney U; BI: Barthel index; TUG: timed up and go; BBS: Berg balance scale; 10M: 10-meter test

To precisely evaluate the outcomes of the primary and secondary interventions, significant differences between the two groups and the gain difference (post-test score compared to baseline score) were calculated.

Primary Outcome

In the intervention group, the total score of the Barthel Index, as the primary outcome, remained unchanged (P=1); however, in the control group, the performance in activities of daily living (ADL) significantly diminished (P=0.012). The results of the Mann-Whitney U test indicated a significant difference (Z=-2.85, P<0.003, effect size=0.21) in total Barthel Index scores between the two groups (Table 3).

Secondary Outcomes

As depicted in Table 3, the mean post-test score of the BBS decreased in the control group while increasing in the intervention group, with significant differences observed between the two groups. Additionally, the two groups' gain difference in BBS scores showed a significant distinction, as indicated by the Mann-Whitney U test. Furthermore, the post-test duration for the TUG and the 10-meter walk test (10MWT) increased in the control group. They decreased in the intervention group, highlighting a significant difference between them. The two groups' gain difference between TUG and 10MWT scores also exhibited significant disparities according to the Mann-Whitney U test results. Moreover, although the mean score of the Addenbrooke's Cognitive Examination-Revised (ACE-R) post-test increased in both groups, the difference was significant only in the intervention group. The two groups' gain difference between ACE-R scores was also significantly different based on the Mann-Whitney U test results.

Discussion

The primary focus of this study was personal

independence, assessed through the Barthel Index (BI). Results indicated a significant difference in the BI scores between the intervention and control groups, aligning with findings from Bennett et al.'s systematic review, which highlighted the efficacy of home-based occupational therapy in enhancing independence in ADL and instrumental activities of daily living (IADL) among individuals with moderate-stage dementia [6]. However, a closer examination within each group revealed contrasting trends. While the intervention group showed a non-significant increase in BI scores post-test, the control group experienced a significant decrease. This suggests that the task-oriented interventions implemented in our study may have contributed to maintaining the participants' current functional status. In contrast, a lack of similar engagement in the home environment led to functional decline in the control group. Although the interventions may not have reversed the progression of dementia, they likely facilitated the application of remaining skills and abilities during daily activities. Moreover, conducting familiar tasks in their home environment likely boosted participants' motivation and indirectly educated family members on better supporting the patient. Family involvement is crucial in implementing tailored interventions aimed at preserving functional abilities. By equipping families with task breakdown techniques and providing appropriate cues, individuals with dementia can engage more autonomously in meaningful activities, enhancing their overall quality of life and satisfaction.

The Addenbrooke's Cognitive Examination-Revised (ACE-R) evaluated cognitive function as a secondary outcome. Given the progressive nature of dementia, improvements in cognitive function were not anticipated. However, intriguingly, the intervention group exhibited increased ACE-R scores, whereas the control group showed no significant change. This unexpected finding suggests that task-oriented interventions involving daily

activities and chores may have compelled patients to utilize their executive function abilities and tap into their remaining cognitive capacities. It's important to recognize that cognitive impairments can significantly impact personal independence in individuals with dementia. This underscores the need to account for cognitive status as a critical confounder in studies assessing cognitive skills in this population [24]. Indeed, the structured tasks implemented in this study, encompassing routine daily activities, appeared to sustain outcomes across various domains, including activities of daily living, functional capacity, and cognitive status, among patients with mild to moderate dementia.

Physical function was evaluated through gait speed and balance as secondary outcomes. Interestingly, the results indicated a decrease in gait speed within the intervention group, contrasting with an increase observed in the control group. This divergence may stem from the higher level of physical activity undertaken by the intervention group, aligning with existing evidence [25]. Moreover, improvements were noted in the intervention group regarding balance, with moderate effect sizes observed across all components of the BBS test. In contrast, a decline was observed in the control group. It's important to note that a lack of motivation and reluctance to engage in daily living activities can contribute to significant deficits in balance, muscle weakness, and diminished walking speed [26].

In conclusion, meaningful task-oriented interventions can help patients use their remaining abilities and prevent secondary disability stemming from dementia progression. The study findings underscore the efficacy of tailored interventions grounded in occupational performance principles, highlighting improvements in functional outcomes, including activities of daily living independence, balance, and cognitive status among dementia patients. Future research endeavors should delve into the long-term effects of these interventions to further elucidate their impact and the effect of this approach in their caregivers [27]. The absence of a control group receiving alternative forms of occupational therapy intervention or standard care presents a limitation in interpreting the effectiveness of the interventions in this study. Additionally, resource constraints restricted the ability to expand the number and duration of intervention sessions, potentially constraining the impact on functional outcomes. Future research endeavors should aim to mitigate these limitations by exploring optimal frequencies and durations of intervention sessions and facilitating comprehensive comparisons of the efficacy of task-oriented interventions.

Conclusion

While this study offers valuable insights into the potential benefits of meaningful task-oriented interventions for enhancing functional outcomes in patients with dementia, addressing the outlined limitations in future research will be crucial to bolster the rigor and generalizability of its findings.

Conflict of Interest: None declared.

References

- Kiselica AM, Bengtson JF. Quantitative and qualitative features of executive dysfunction in frontotemporal and Alzheimer's dementia. *Appl Neuropsychol Adult*. 2021;**28** (4):449-63. doi:10.1080/23279095.2019.1652175. [PubMed:31424275].
- Arvanitakis Z, Shah RC, Bennett DA. Diagnosis and Management of Dementia: Review. *JAMA*. 2019;**322** (16):1589-99. doi:10.1001/jama.2019.4782. [PubMed:31638686].
- Huggins M, Pesut B, Puurveen G. Interventions for Caregivers of Older Adults with Dementia Living in the Community: A Rapid Review of Reviews. *Can J Aging*. 2023;1-9. doi:10.1017/S0714980823000016. [PubMed:36799030].
- Cho E, Shin J, Seok JW, Lee H, Lee KH, Jang J, et al. The effectiveness of non-pharmacological interventions using information and communication technologies for behavioral and psychological symptoms of dementia: A systematic review and meta-analysis. *Int J Nurs Stud*. 2023;**138**:104392. doi:10.1016/j.ijnurstu.2022.104392. [PubMed:36434931].
- Travers C, MacAndrew M, Hines S, O'Reilly M, Fielding E, Beattie E, et al. The effectiveness of meaningful occupation interventions for people living with dementia in residential aged care: a systematic review protocol. *JBI Database System Rev Implement Rep*. 2015;**13** (4):87-99. doi:10.11124/jbisrir-2015-2058. [PubMed:26447075].
- Bennett S, Laver K, Voigt-Radloff S, Letts L, Clemson L, Graff M, et al. Occupational therapy for people with dementia and their family carers provided at home: a systematic review and meta-analysis. *BMJ open*. 2019;**9** (11):e026308-e. doi:10.1136/bmjopen-2018-026308. [PubMed:31719067].
- Rostami HR, Akbarfahimi M, Ghaffari A, Kamali M, Rassafiani M. Relationship between Work-Related Quality of Life and Job Satisfaction in Iranian Occupational Therapists. *Occup Ther Int*. 2021;**2021**:6692752. doi:10.1155/2021/6692752. [PubMed:34629996].
- Strong S, Rigby P, Stewart D, Law M, Letts L, Cooper B. Application of the Person-Environment-Occupation Model: a practical tool. *Can J Occup Ther*. 1999;**66** (3):122-33. doi:10.1177/000841749906600304. [PubMed:10462885].
- Han A, Radel J, McDowd JM, Sabata D. Perspectives of People with Dementia About Meaningful Activities: A Synthesis. *Am J Alzheimers Dis Other Dement*. 2016;**31** (2):115-23. doi:10.1177/1533317515598857. [PubMed:26340962].
- Kielsgaard K, Horghagen S, Nielsen D, Kristensen HK. Approaches to engaging people with dementia in meaningful occupations in institutional settings: A scoping review. *Scand J Occup Ther*. 2021;**28** (5):329-47. doi:10.1080/11038128.2020.1791952. [PubMed:32776817].
- Ciro CA, Hershey LA, Garrison D. Enhanced task-oriented training in a person with dementia with Lewy bodies. *Am J Occup Ther*. 2013;**67** (5):556-63. doi:10.5014/ajot.2013.008227. [PubMed:23968794].
- Hubbard IJ, Parsons MW, Neilson C, Carey LM. Task-specific training: evidence for and translation to clinical practice. *Occup Ther Int*. 2009;**16** (3-4):175-89. doi:10.1002/oti.275. [PubMed:19504501].
- Ciro CA, Poole JL, Skipper B, Hershey LA. Comparing Differences in ADL Outcomes for the STOMP Intervention for Dementia in the Natural Home Environment Versus a Clinic Environment. *Austin Alzheimers Parkinsons Dis*. 2014;**1** (1). [PubMed:28261703].
- Son BY, Bang YS, Hwang MJ, Oh EJ. Effect of task-oriented activities on hand functions, cognitive functions and self-expression of elderly patients with dementia. *J Phys Ther Sci*. 2017;**29** (8):1357-62. doi:10.1589/jpts.29.1357. [PubMed:28878462].
- Gbiri CAO, Amusa BF. Progressive task-oriented circuit training for cognition, physical functioning and societal participation in individuals with dementia. *Physiother Res Int*. 2020;**25** (4):e1866. doi:10.1002/pri.1866. [PubMed:32776698].
- Arevalo-Rodriguez I, Smailagic N, Roqué I Figuls M, Ciapponi A, Sanchez-Perez E, Giannakou A, et al. Mini-Mental State Examination (MMSE) for the detection of Alzheimer's disease and other dementias in people with mild cognitive impairment (MCI). *The Cochrane database of systematic reviews*. 2015;**2015** (3):CD010783-CD. doi:10.1002/14651858.CD010783.pub2. [PubMed:25740785].
- Dehghanizadeh M, Akbarfahimi M, Zareyan A, Khalafbeigi M, Soleimani F. Research Paper: Predictors of Interest in Performing Activities Among Iranian Adolescents with Cerebral Palsy. *Iranian Rehabilitation Journal*. 2020;**18** (4):377-85.
- Hormozi S, Alizadeh-Khoei M, Sharifi F, Taati F, Aminorroaya

- R, Fadaee S, et al. Iranian Version of Barthel Index: Validity and Reliability in Outpatients' Elderly. *International Journal of Preventive Medicine*. 2019;**10**:130. doi:10.4103/ijpvm.IJPVM_579_18.
19. Bruno D, Schurmann Vignaga S. Addenbrooke's cognitive examination III in the diagnosis of dementia: a critical review. *Neuropsychiatr Dis Treat*. 2019;**15**:441-7. doi:10.2147/NDT.S151253. [PubMed:30858702].
 20. Christopher A, Kraft E, Olenick H, Kiesling R, Doty A. The reliability and validity of the Timed Up and Go as a clinical tool in individuals with and without disabilities across a lifespan: a systematic review. *Disabil Rehabil*. 2019:1-15. doi:10.1080/09638288.2019.1682066. [PubMed:31656104].
 21. Chan WLS, Pin TW. Reliability, validity and minimal detectable change of 2-minute walk test, 6-minute walk test and 10-meter walk test in frail older adults with dementia. *Exp Gerontol*. 2019;**115**:9-18. doi:10.1016/j.exger.2018.11.001. [PubMed:30423359].
 22. Salavati M, Negahban H, Mazaheri M, Soleimanifar M, Hadadi M, Sefiddashti L, et al. The Persian version of the Berg Balance Scale: inter and intra-rater reliability and construct validity in elderly adults. *Disabil Rehabil*. 2012;**34** (20):1695-8. doi:10.3109/09638288.2012.660604. [PubMed:22380626].
 23. Aberson CL. *Applied power analysis for the behavioral sciences*. Routledge; 2019.
 24. Booth V, Harwood RH, Hood-Moore V, Bramley T, Hancox JE, Robertson K, et al. Promoting activity, independence and stability in early dementia and mild cognitive impairment (PrAISED): development of an intervention for people with mild cognitive impairment and dementia. *Clin Rehabil*. 2018;**32** (7):855-64. doi:10.1177/0269215518758149. [PubMed:29436253].
 25. Willey JZ, Moon YP, Kulick ER, Cheung YK, Wright CB, Sacco RL, et al. Physical Inactivity Predicts Slow Gait Speed in an Elderly Multi-Ethnic Cohort Study: The Northern Manhattan Study. *Neuroepidemiology*. 2017;**49** (1-2):24-30. doi:10.1159/000479695. [PubMed:28810247].
 26. Zhang W, Low LF, Schwenk M, Mills N, Gwynn JD, Clemson L. Review of Gait, Cognition, and Fall Risks with Implications for Fall Prevention in Older Adults with Dementia. *Dement Geriatr Cogn Disord*. 2019;**48** (1-2):17-29. doi:10.1159/000504340. [PubMed:31743907].
 27. Farajzadeh A, Akbarfahimi M, Maroufizadeh S, Miri Lavasani N. Factors Associated with Quality of Life among Caregivers of People with Spinal Cord Injury. *Occup Ther Int*. 2021:9921710. doi:10.1155/2021/9921710. [PubMed:34729057].