

REVIEW ARTICLE

The effect of Montessori program in the elderly with dementia: a literature review

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ABSTRACT

The elderly population of the world is growing fast. The aging phenomenon causes changes in the body's systems, leading to mental and emotional disorders. Dementia is established as one of the most important challenges associated with the aging process. In this respect, the Montessori-based cognitive rehabilitation program is an increasingly popular choice in dementia care. Therefore, we decided to conduct a review study on the effect of Montessori therapy on different psychological aspects of the elderly with dementia. This narrative review was performed using narrative synthesis. An extensive literature search was performed in databases of ScienceDirect, Google Scholar, PubMed, and ISI Web of Knowledge using OR, AND, and NOT operators and the selected keywords. Only studies published in journals between March 2010 and March 2022 were used for this purpose. The articles chosen in this study were those that have studied the effect of a Montessori-based cognitive rehabilitation program on the elderly with dementia. Studies that involved the Montessori program on other neurological disorders were excluded. Finally, 32 articles were selected from the final evaluation. It can be concluded that the Montessori program effectively reduces anxiety, destructive behavior, and agitation, increases pleasure, hope, optimism, job satisfaction, social skills, and cognitive function, and improves the quality of life and feeding capacity.

Key words:

dementia; elderly; Montessori; rehabilitation

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INTRODUCTION

The elderly population of the world is growing very fast, such that it is estimated to be 973 million and 2 billion by 2030 and 2050, respectively.¹ Increasing age causes changes in the body's systems that lead to disorders in the elderly such as mental and emotional disorders.² In this respect, about 35% of the elderly suffer from different mental and emotional disorders due to aging.³ Psychiatric and neurological disorders associated with aging cause physical and psychological complications and lead to dysfunction in the elderly.⁴ One of the most common diseases in the elderly is dementia, which is established among the most important challenges associated with the aging process.⁵ Dementia is the progressive erosion of memory and other cognitive functions.⁶ Some criteria such as gender, genetics, drugs, environmental factors, and blood pressure are risk factors for dementia. However, age is the most important cause of this disease.^{7,8} Symptoms of dementia are a combination of neurological and cognitive disorders. This health problem leads to an impairment of memory and intellectual function such as judgment, abstract thinking, attention, language, orientation, flexibility, learning, understanding, and behavioral disorders.^{4,9}

It takes much time and money to care for these patients. As a result, the elderly, their family, and society may suffer several problems. In this respect, the diagnosis and treatment of this disease in the early stages can slow down the disease's progress, reduce individual dysfunction, lower treatment costs, and delay going to nursing homes.¹⁰ Several treatments can effectively increase the psychological capital or its components in the elderly with dementia, such as cognitive behavioral therapy,¹¹ targeted cognitive rehabilitation therapy,¹² self-efficacy training,¹³ aromatherapy,¹⁴ family care education,¹⁵ communication and problem-solving

training^{16, 17} and therapeutic reminders.¹⁸ Another treatment method for this purpose is Montessori-based dementia programming. This methodology was developed and introduced by Dr. Cameron Camp and adapted from the ideas of Maria Montessori in a targeted framework to improve the cognitive functions of people with dementia.^{19, 20} Since it is a non-pharmacological treatment, it has no pharmacological side effects.^{4,21} One of the advantages of this method compared to other methods is that it is multigenerational and has a multi-disciplinary design. Also, it is a person-centered method depending on purposeful activities.²² The Montessori method is based on different principles, including guided repetition, task breakdown, progressions from simple to complex and from concrete to abstract, and reliance on implicit memory.^{23,24} Jeras et al. stated that the Montessori-based cognitive rehabilitation program, in addition to improving cognitive functions, is effective in improving emotions and behavioral symptoms in people with dementia.²⁵ Also, Ploeg et al. considered this method among the effective treatments in reducing confusion, increasing cognition, and improving emotions in subjects with dementia.²⁶ The effect of this treatment has been investigated using various variables such as cognition, interactions, quality of life, awareness, and optimism.^{22, 27} As Montessori-based cognitive rehabilitation program becomes increasingly popular in dementia care, the present review study was conducted on the effect of Montessori therapy on different psychological aspects in the elderly with dementia. Therefore, this research aims to investigate the effect of the Montessori program on the elderly with dementia.

MATERIALS AND METHODS

Search Strategy

This study is a narrative review conducted using narrative synthesis. The

search strategy was based on Population Intervention Comparison Outcome (PICO) (Table1), which included all studies published from 2010 to March 2022. The search was performed using “OR”, “AND”, and “NOT” on the selected keywords (i.e., elderly, aged, old, senior, geriatric, aging, dementia, Montessori, Montessori-based cognitive rehabilitation program, rehabilitation, cognitive, engagement, behaviors, quality of life, agitation, mental health) in PubMed, ScienceDirect, Scopus, and ISI web of knowledge databases. After completing all database searches, the citations were compiled and entered into the Endnote 20 bibliography manager, where duplicate citations were removed. Our search strategy consisted of analyzing the keywords in the articles' titles, checking the abstracts, and then reviewing the full texts of the articles performed by two reviewers. Two reviewers independently read the titles and screened the abstracts of potentially relevant studies. They removed irrelevant studies and obtained the full paper if the abstract did not provide sufficient data to determine eligibility for inclusion in the review. According to the inclusion criteria, (i.e., participant)

Patients with any severity and stage of dementia), intervention type (any type of Montessori application), and final results and outcome), two reviewers independently categorized these studies as “relevant”, “irrelevant”, or “possibly relevant”. In the case of disagreements, they were resolved by referring to a third review author. The procedure was followed using the preferred reporting items for systematic reviews and meta-analysis methods (PRISMA) (Fig. 1). Finally, 32 articles were selected from the final evaluation. In this study, the articles were reviewed based on the sample population characteristics, study design, and the impact of the Montessori approach on eating behaviors, cognitive function, social interaction, behavioral problems, quality of life, and affect and agitation.

Eligibility criteria

This review included those articles that reported studies evaluating Montessori-based cognitive rehabilitation programs for the elderly with dementia. Studies involving the Montessori program on other neurological disorders or disabilities were excluded.

Table 1. Selected keywords using the PICO method

P: population	I: intervention	C: comparison	O: outcome measure
Dementia Elderly old senior geriatric aged	Montessori program	-	cognitive factors psychological factors mental health engagement quality of life agitation

PICO: population intervention comparison outcome

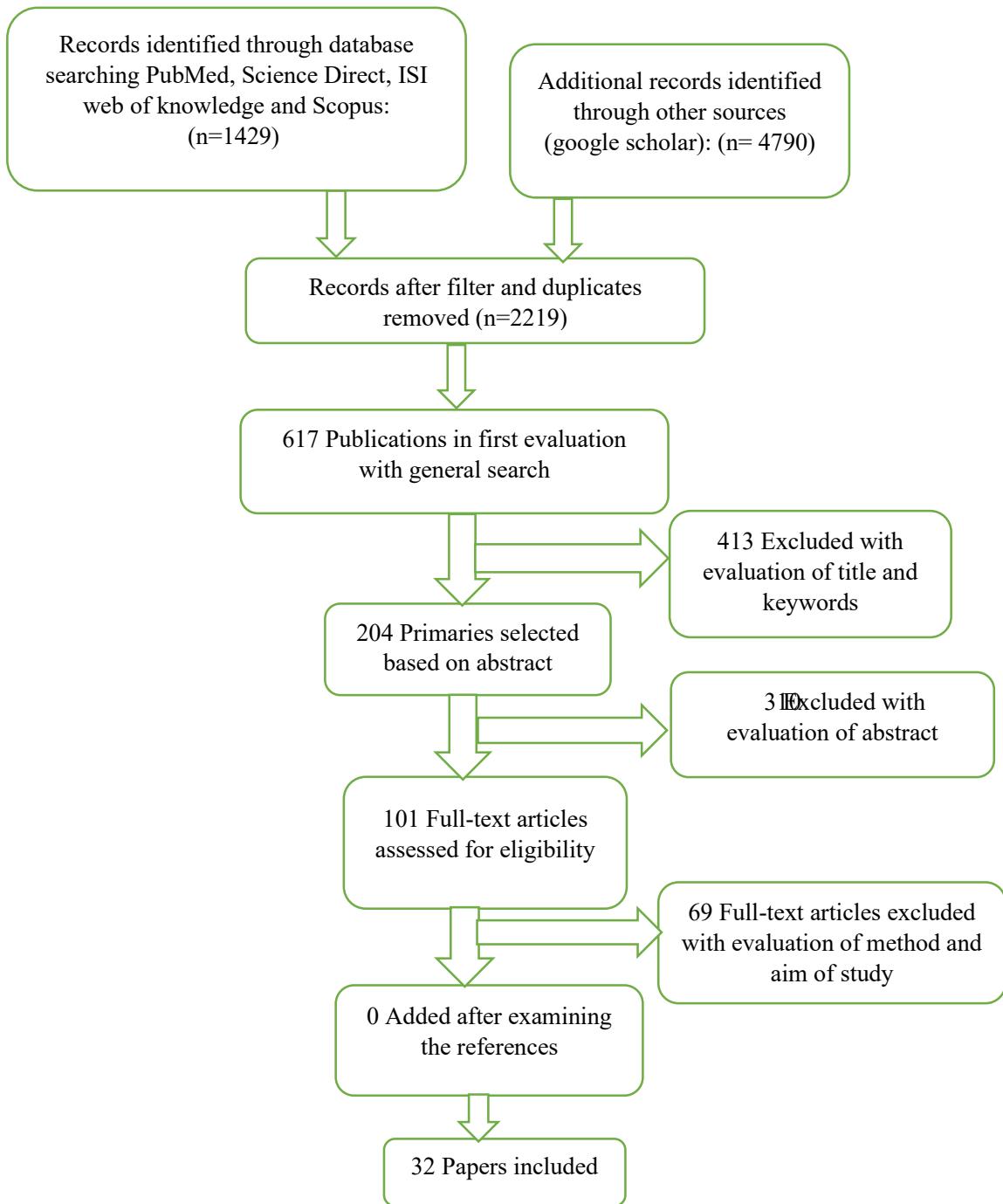


Figure 1: The procedure was followed using the PRISMA (preferred reporting items for systematic reviews and meta-analyses) method

RESULTS

This review included articles that reported studies evaluating the effect of Montessori-based cognitive rehabilitation programs on the elderly with dementia.

Table 2: Montessori-based cognitive rehabilitation program for the elderly with dementia

Author/ year	Sample Size	Outcome measures	Results
Cartwright et al/ 2022 ²⁸	17	Mealtime, social interaction, interactional behaviors	It was reported that the Montessori program increased social interaction and leads to mealtime independence
Chan et al/2021 ²¹	108	Engagement	The findings exhibited more constructive engagement and less passive engagement after the Montessori program
Mousavi et al/ 2021 ⁴	22	Hope, Self-efficacy, Resilience, Optimism, Psychological capital	It has been indicated that the Montessori cognitive rehabilitation increases self-efficacy, improves resilience, optimism, and hope, and generally increases the psychological well-being and mental health of the elderly with dementia.
Li et al/ 2021 ²⁹	100	Engagement	More constructive engagement and less passive engagement were observed in this study.
Douglas /2021 ³⁰	20	Interactional behaviors	Decreased negative qualities of relationships and increased positive qualities of relationships were seen in this study.
Gaspar and Westberg /2020 ³¹	85	Positive engagement, cognitive abilities	Positive engagement and cognitive abilities increased
Author/ year	Sample Size	Outcome measures	Results
Chen and Yu 2020 ³²	85	Cognitive function, feeding capacity score, feeding difficulty	Cognitive function and feeding capacity improved and feeding difficulty decreased.
Chaudhr et al/ 2020 ³³	12	Agitation, quality of life, behavioral symptoms	Improvement in quality of life, mood and interest and reduction in agitation levels were reported in this study.
Booth et al/ 2020 ³⁴	7	Disruptive behaviors and social connection, quality of life, Job satisfaction	The results showed that the Montessori program decreased disruptive behaviors and increased social connection, quality of life and job satisfaction.
Hunter et al/ 2020 ³⁵	21	Quality of life, emotions	Improvements in the quality of life and positive emotions were observed in this study.
Mahlanza et al/ 2020 ³⁶	40	Affect and engagement, carers' satisfaction, anxiety	Participants after the Montessori-based program displayed more positive engagement, affect and satisfaction and less anxiety.
Yuen and Kwok/ 2019 ³⁷	23	Agitation, anxiety	The results indicated that the Montessori method reduced anxiety and agitation.

Author/ year	Sample Size	Outcome measures	Results
Wilks et al/2019 ³⁸	43	Anxiety, quality of life, capacities for activities of daily living, problem behaviors, social engagement	The findings demonstrated that the Montessori method increased the quality of life slightly and decreased social engagement and capacities for daily life activities significantly. A slight decrease in anxiety and problematic behaviors was also observed in this study.
Author/ year	Sample Size	Outcome measures	Results
Ahadi et al/2018 ³⁹	34	Cognitive function	The Montessori method improved cognitive functions.
Rauterberg et al /2018 ⁴⁰	4	Effects and social connectedness, agitation, social behaviors	The results indicated that social behaviors, effects and social connectedness increased and agitation decreased after the Montessori program.
MA et al/ 2018 ⁴¹	64	Eating ability, eating difficulty and self-eating	Improvement in the eating ability of elderly people with dementia, reduction in eating difficulty and increase in self-eating time were observed.
Brush et al /2018 ⁴²	29	Engagement, affect, emotions, quality of life and job satisfaction.	More positive emotions and affect demonstrated after the intervention in this study. The Montessori program moreover expanded engagement, quality of life and job satisfaction.
Hindt et al/2018 ⁴³	8	Active engagement	Participants displayed greater levels of active engagement after the Montessori program in this study.
Hanna et al/ 2018 ⁴⁴	48	The cognitive, behavioral, and emotional functioning, engagement, satisfaction	The results indicated better cognitive, behavioral, and emotional functioning, engagement, satisfaction after the Montessori program.
Hunter et al/2017 ⁴⁵	18	Quality of life	Improving quality of life was demonstrated after the Montessori program in this study.
Feng et al/2017 ⁴⁶	4	Agitation, social behaviors	The findings illustrated that the Montessori method improved communication and social behaviors and diminished agitation.
Author/ year	Sample Size	Outcome measures	Results
Khodaverdi an et al/ 2016 ⁴⁷	58	Cognitive Functions	Subjects have shown an enhancement in their cognitive functions after the intervention.
Roberts et al/ 2015 ⁴⁸	12	Behavioral Symptoms, Satisfaction	The Montessori approach improved the behavioral and psychological symptoms of dementia, staff confidence and awareness of person-centered care and family satisfaction with the care of their relatives.
Fyksen/ 2015 ⁴⁹	5	Self-feeding abilities and food intake	After intervention in this study, self-feeding abilities and food intake increased.

Author/ year	Sample Size	Outcome measures	Results
Boyd / 2015 ⁵⁰	43	Quality of life, anxiety and behavioral problems.	It was reported that the Montessori method expanded the quality of life and diminished anxiety and behavioral problems.
Wu et al/ 2014 ⁵¹	90	Eating ability	This study illustrated increased food intake and weight gain after intervention.
van der Ploeg et al. 2013 ⁵²	44	Engagement, agitation, affect	In this study, agitation and negative engagement decreased, and positive and interesting affect and constructive engagement increased.
Hindt et al/ 2013 ⁵³	8	Engagement and positive affect	This study reported a higher level of active engagement and positive affect after the intervention.
Sterns et al/ 2011 ⁵⁴	40	Engagement	Participants displayed the same or higher levels of engagement after the intervention.
Author/ year	Sample Size	Outcome measures	Results
Lin et al. 2011 ⁵⁵	29	Eating Behaviors	There was a significant reduction in the Edinburgh Feeding Evaluation in Dementia score for the Montessori intervention period but not for the routine activities period, while the mean differences in the Eating Behavior Scale score, self-feeding frequency and self-feeding time were significantly higher than those of the routine activities period.
Lin et al. 2010 ⁵⁶	85	Eating Behaviors	This study demonstrated the benefit of Montessori-based activities for eating difficulty (decreasing negative effects) and eating ability (increasing positive effects).
Giroux et al/ 2010 ⁵⁷	14	Affect and Mood, Disruptive Behaviors, quality of life, anxiety	Montessori activities have a significant impact on affect and quality of life. In addition, greater positive affect and less anxiety have been shown.

Sample Population Characteristics

The total number of participants in the 32 studies of this review is 1220 old people with dementia. 3 studies were performed on 4 subjects^{40,46} 9 studies were conducted on 5-18 subjects (average of n = 11.22)^{28,33,34,43,45,48,49,53,57} and 6 studies were done on 20-30 people (average of n = 24).^{4,30,35,37,42,55} The number of participants in 2 studies was between 30 and 35 (average of n = 33.5),³⁹ the number of samples in another 2 studies was 40^{36,54} and the sample size in the other 2 studies was 43.^{38,50} Also, 4 studies involved 44 to 64 participants

(average of n = 53.5).^{41,44,47,58} There were 3 studies with n = 85^{31,32,56} and 3 studies with more than 90 subjects (average of n = 99.33).^{21,29,44,51}

Patients with severe dementia participated in 5 studies^{30,38,45,49,50} and samples with mild to moderate dementia participated in 7 studies.^{4,21,29,34,35,39,47} 3 studies included samples with moderate to severe dementia^{37,48,57} and 2 studies included patients with moderate dementia.^{33,54} Also, 4 studies were performed on patients with mild to severe dementia.^{28,32,51,52} In one study, it was

mentioned that the length of time subjects had been diagnosed with dementia was 25 months⁵⁵ and, in another study, it had been reported between 25 and 37 months.⁵⁶ Of these 32 studies, participants in 2 studies were in stages 2-3.^{40,46} There are also 7 other studies in which the severity of dementia in the samples has not been reported or is not available.^{31, 36, 41-44, 53}

Details of study design of the reviewed articles

The study design of papers included in this review includes 5 RCT,^{21, 29, 37, 41, 56} 6 quasi-experimental^{4, 39, 42, 47, 51, 57} and 1 experimental study.⁵³ There are also 5 pilot studies^{34, 40, 46, 48, 49} and 3 randomized cross-over trials.^{36, 52, 55} In addition, there are 3 observational or cohort-controlled observational studies,^{28, 44, 54} 1 feasible study,³³ 1 interrupted time series design,³⁸ 1 descriptive design³⁵ and 1 retrospective study.³² There are also 5 other studies in which information about the study design has not been reported or is not available.^{30, 31, 43, 45, 50}

Impact of Montessori Activities on Eating Behaviors

7 studies evaluated the impact of Montessori-based activities on eating behaviors in patients with dementia.^{28, 32, 41, 49, 51, 55, 56} The measures of eating behaviors included self-feeding, eating amount, food intake, eating difficulty and mealtime independence. In 5 studies, the Edinberg questionnaire was used to assess eating behavior, one study used the eating behavior scale and the Mini- Nutritional Assessment score in addition to the Edinberg questionnaire, and in another study, behaviors during different mealtimes were recorded on video and then analyzed. All 7 studies reported that the Montessori intervention reduces the difficulties in eating behaviours during meals, and increases the eating ability and self-feeding in individuals with dementia.^{28, 32, 41, 49, 51, 55, 56}

Impact of Montessori Activities on cognitive function

The effect of Montessori activities on cognitive function (memory, language, visuo-constructual skills, conceptual thinking, calculation and orientation) of the elderly with dementia has been investigated in 5 studies.^{31, 32, 39, 44, 47} The instrument and questionnaires used in these studies included the Mini-Cog test, General Practitioner Assessment of Cognition (GPCOG) and MoCA for improving their cognitive function. It was reported in all studies that the cognitive function of subjects with dementia improved after implementing the Montessori approach.

Impact of Montessori Activities on social interaction

7 studies have examined social interaction in people with dementia after the Montessori intervention.^{28, 30, 34, 38, 40, 44, 46} In these studies, social interaction was evaluated by the face to face interview schedule including questions on the personality, behaviour and engagement levels, the Index of Social Engagement (ISE) and an observation scale for participation in activities developed by Kovach and Magliocco. An increase in social skills in subjects was observed in all studies. So individuals with dementia demonstrated better social connections and were more social with others after the Montessori intervention.

Impact of Montessori Activities on behavioural problems

There were 9 studies that have been done on the effect of the Montessori intervention on behavioral problems in people with dementia.^{33, 34, 36-38, 48, 50, 52, 57} Behavioral problems evaluated in these studies included anxiety, agitation and aggression wandering; trying to get out of locked doors, verbal abuse of others, singing or talking loudly and disruptive vocalization, which were assessed by using the Rating for Anxiety in Dementia

(RAID), Cohen Mansfield Agitation Inventory (CMAI), Philadelphia Geriatric Center Affect Rating Scale (PGCARS) and interview. Wilks et al, reported that the Montessori intervention did not have a significant effect on behavioral problems, while other studies reported a reduction in disruptive behaviors after the Montessori program.

Impact of Montessori Activities on quality of life

Among the reviewed articles, 18 studies have examined the effect of the Montessori intervention on the quality of life of individuals with dementia. In these studies, hope and optimism,⁴ engagement,^{21,29,31,36,38,42-44,53,54,58} job satisfaction,^{34,36,42,44, 48} and other factors of quality of life have been evaluated.^{33-35,38,42,45,50,57} The psychological capital questionnaire was used to investigate hope and optimism. Engagement in these studies was assessed using the Menorah Park Engagement Scale (MPES), Utrecht Work Engagement Scale (UWES), Positive Indicators of Engagement Scale (PIES), and Dementia Attitude Scale. Quality of Life Assessment in Dementia (DEMQOL), Quality of Life-Alzheimer's Disease Scale (QoL-AD), Benjamin Rose Nurse Assistant Job Satisfaction Scale, and interviews were used to collect data about the quality of life and satisfaction. One study by Wilks et al. reported that Montessori's effect on increasing the quality of life of people was not significant.³⁸ However, the results of other studies indicated that participants displayed more positive and less passive engagement and a higher quality of life and satisfaction. Also, findings of the study by Mousavi et al. demonstrated that the Montessori method increases hope and optimism in individuals with dementia.⁴

Impact of Montessori Activities on affect and agitation

In 5 studies, the impact of Montessori intervention on the effects has been investigated.^{36,42,52,53,57} The Philadelphia Geriatric Center Affect Rating Scale was used to assess the affect in these studies. Also, agitation after the Montessori intervention was assessed by Cohen-Mansfield agitation inventory in 5 studies.^{33,37,40,42,46} Overall, these studies showed an increase in affect and a decrease in agitation.

DISCUSSION

This literature review was developed to evaluate the effect of the Montessori approach on people with dementia. Dementia is the most common neurodegenerative disorder in the elderly and has become a rising problem worldwide. The studies showed behavioral and psychological symptoms associated with dementia and progressive decline in cognitive function in these individuals. The results reported that the Montessori program may enhance cognitive performance.

This method offers a personalized way of developing new activities or adapting existing ones to provide the appropriate level of stimulation and meet the individual needs of people with dementia in their particular conditions, locations, and habitats. The Montessori method also begins each lesson at the simplest and most recognizable level, with subsequent lessons increasing in difficulty until the skill is mastered.

It has been reported that cognitive deficiency leads to eating difficulties. Individuals with dementia commonly exhibit eating problems and have limitations in self-feeding function.^{49,59} All studies in this review that examined the effect of Montessori approach on eating

ability demonstrated similar results. They indicated that the eating ability and self-feeding ability of these people improved after the Montessori intervention. Also, they show fewer difficulties with eating tasks, leading to improved eating and body weight. Overall, it can be said that when the cognitive function of people after taking part in the Montessori intervention increases, their eating ability also improves. Also, some studies have assessed people's favorite foods during the Montessori training sessions to encourage them to target and finish eating these foods. Such an intervention helps increase eating skills and carry this procedural skill into mealtimes.

Quality of life assesses social, economic, health, and well-being indicators. People with dementia have poorer quality of life due to psychological problems and decreased cognitive and physical functioning.³⁸ The results of most studies in this review show that the Montessori program improved the quality of life of these people. The possible reason for these findings is that the Montessori approach improves mood and behavior in people with dementia, leading to a greater sense of self-worth and purpose and creating a higher quality of life. Another reason for improving the quality of life after the Montessori approach may be positive activating changes in social and interactive situations, increasing physical, cognitive, and interpersonal activities, taking on roles, and performing tasks as a result of training. Contrary to other studies in this literature, one study did not report a significant effect of the Montessori approach on quality of life because it focused on late-stage dementia. In contrast, previous studies included early-to-middle stage dementia or mixed samples.³⁸

One of the most common behavioral changes accompanied by dementia is mood changes such as increased agitation. Agitation is a distressing behavior seen in about 50 % of individuals with dementia.³⁴ Several authors have highlighted those

subjects with dementia exhibit less agitation after the Montessori method. In this regard, anxiety disorder was reported in 5-21% of people with dementia. Also, anxiety symptoms were detected in 8-71% of these people and increased behavioral problems, declined accelerated cognitive, and lowered quality of life.⁶⁰ According to the data in this study, the Montessori approach is the method that can lower disruptive behavior and anxiety in subjects with dementia. They appear to be more cheerful, show more pleasure signs, and present fewer signs of anxiety. Also, the reason for reducing anxiety and behavioral problems can be the improvement of the mode due to the Montessori method. People with dementia appear to be more cheerful and more enjoyable after taking part in the Montessori method, which can reduce signs of anxiety. Nevertheless, Wilks et al. reported a contradictory result. According to these authors, Montessori approach did not significantly affect anxiety in people with late-stage dementia. The reason for this discrepancy could be the sample type in this study.³⁸

Symptoms associated with dementia negatively affect the social interactions of sufferers with family members, peers, caregivers, and nursing home staff.³⁸ All studies in this review have reported improved social ability and increased social interaction in people with dementia after the Montessori intervention. The Montessori approach consists of various activities that can be easily adapted to people's abilities and supports self-esteem and satisfaction with achievement needs. However, these objectives are accomplished by more active participation in the considered activities. A personalized approach can tailor activities to each person's needs, abilities, and interests and encourage more active participation. The strength of this article is that it provides more comprehensive insights and information on the impact of the Montessori program on various aspects of

dementia patients. The limitation of this review is that it is restricted to papers published between 2010 and 2022. Also, like other qualitative reviews, this manuscript is limited by the author's prejudices. However, the subjective perspective provides a unique human insight into this complex subject.

RECOMMENDATIONS

Future studies should therefore include the following subjects:

- Comparison of the various cognitive therapies with the Montessori approach in people with dementia.
- Combining the Montessori program with other treatments and evaluating its effect on patients with dementia
- Further studies on the effect of Montessori intervention on patients with late-stage dementia
- Evaluation of Montessori program in dementia using larger sample sizes than previously used
- Further studies with RCT design on the effect of the Montessori program on dementia patients
- Paying more attention to the educational aspects and providing training programs on the Montessori method for dementia patients and their caregivers in health centers
- Workshops and cognitive rehabilitation courses for families of dementia patients, caregivers and nurses
- Use of comprehensive media to inform people about dementia treatment planning based on the

Montessori method to effectively deal with dementia and enhance cognitive skills as much as possible

- Considering university courses, including Montessori programs for rehabilitation for psychology students
- Montessori online training that allows patients to upload their homework
- Montessori online training that allows caregivers to upload reports
- Holding group therapy to do homework

CONCLUSION

This literature review has integrated evidence concerning the effects of Montessori intervention on patients with dementia. In summary, this study suggests that the Montessori approach can enhance cognitive function and improve the feeding capacity of patients with dementia. It can be concluded that the Montessori program effectively reduces anxiety, destructive behavior, and agitation, increases pleasure, hope, optimism, job satisfaction and social skills, and improves the quality of life. The findings highlight that the Montessori approach can be considered an optimal non-pharmacological treatment for subjects with dementia.

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CONFLICT OF INTEREST

The authors declared no conflicts of interest

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