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The use of cognitive rehabilitation and cognitive training by Occupational Therapy in elderly people with Alzheimer's Disease: an integrative review

O uso da reabilitação cognitiva e do treino cognitivo pela Terapia Ocupacional em idosos com a Doença de Alzheimer: uma revisão integrativa

El uso de la rehabilitación cognitiva y el entrenamiento cognitivo por la Terapia Ocupacional en ancianos con Enfermedad de Alzheimer: una revisión integradora

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Objective: to carry out a survey of the main interventions used by Occupational Therapists in the Rehabilitation and Cognitive Training of elderly people with Alzheimer's Disease. **Methods:** integrative review, including articles published between 2011 and 2021, in English, Portuguese and Spanish in the Scientific Electronic Library Online, Latin American and Caribbean Health Sciences Literature and National Library of Medicine databases, using the descriptors : "*terapia ocupacional*" (occupational therapy), "*reabilitação*" (rehabilitation), "*cognição*" (cognition), "Alzheimer", "*treino cognitivo*" (cognitive training), "*disfunção cognitiva e treino cognitivo*" (cognitive dysfunction and cognitive training). **Results:** nine articles were considered, mostly produced in Asia, quantitative and cross-sectional, with no uniformity in experimental designs, and interventions with different approaches in cognitive rehabilitation. Occupational therapists prefer to perform Cognitive Rehabilitation instead of Cognitive Training, and use activities and occupations that are significant for the elderly in the intervention process. **Conclusion:** in the works surveyed, Occupational Therapists use Cognitive Rehabilitation as a way of working on cognitive and functional aspects in elderly people with Alzheimer's Disease, notably the functional aspects that help maintain independence in Activities of Daily Living.
Descriptors: Occupational Therapy; Cognition; Dementia; Rehabilitation; Aged.

Objetivo: realizar levantamento das principais intervenções utilizadas por Terapeutas Ocupacionais na Reabilitação e no Treino Cognitivo de idosos com a Doença de Alzheimer. **Método:** revisão Integrativa, incluindo os artigos publicados entre 2011 a 2021, nos idiomas inglês, português e espanhol nas bases de dados *Scientific Electronic Library Online, Literatura Latino-americana e do Caribe em Ciências da Saúde* e *National Library of Medicine,* utilizando os descritores: "terapia ocupacional", "reabilitação", "cognição", "Alzheimer", "treino cognitivo", "disfunção cognitiva e treino cognitivo". **Resultados:** foram considerados nove artigos, a maioria produzidos na Ásia, quantitativos e transversais, sem uniformidade nos desenhos experimentais, e as intervenções com diferentes abordagens na reabilitação cognitiva. Os terapeutas ocupacionais apresentam preferência em realizar a Reabilitação Cognitiva ao invés do Treino Cognitivo, e se utilizam de atividades e ocupações significativas para os idosos para o processo de intervenção. **Conclusão:** nos trabalhos levantados os Terapeutas Ocupacionais utilizam a Reabilitação Cognitiva como forma de trabalhar os aspectos cognitivos e funcionais em idosos com Doença de Alzheimer, notadamente os aspectos funcionais que auxiliam na manutenção da independência nas Atividades de Vida Diária.
Descritores: Terapia Ocupacional; Cognição; Demência; Reabilitação; Idoso.

Objetivo: realizar un estudio de las principales intervenciones utilizadas por Terapeutas Ocupacionales en la Rehabilitación y Entrenamiento Cognitivo de ancianos con Enfermedad de Alzheimer. **Método:** Revisión integradora, incluyendo artículos publicados entre 2011 y 2021, en los idiomas inglés, portugués y español en las bases de datos. *Scientific Electronic Library Online, Literatura Latinoamericana y del Caribe en Ciencias de la Salud* y *National Library of Medicine,* utilizando los descriptores: "terapia ocupacional", "*reabilitação*" (rehabilitación), "*cognição*" (cognición), Alzheimer, "*treino cognitivo*" (entrenamiento cognitivo), "*disfunção cognitiva e treino cognitivo*" (disfunción cognitiva y entrenamiento cognitivo). **Resultados**: se consideraron nueve artículos, en su mayoría producidos en Asia, cuantitativos y transversales, sin uniformidad en los diseños experimentales y las intervenciones con diferentes enfoques en la rehabilitación cognitiva. Los terapeutas ocupacionales muestran preferencia en realizar Rehabilitación Cognitiva en lugar de Entrenamiento Cognitivo, y utilizan actividades y ocupaciones significativas para los ancianos para el proceso de intervención. **Conclusión**: en los estudios encuestados, los Terapeutas Ocupacionales utilizan la Rehabilitación Cognitiva como forma de trabajar los aspectos cognitivos y funcionales en los ancianos con enfermedad de Alzheimer, especialmente los aspectos funcionales que ayudan a mantener la independencia en las Actividades de la Vida Diaria.
Descriptores: Terapia Ocupacional; Cognición; Demencia; Reabilitación; Anciano.

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INTRODUCTION

Among the diseases with the highest prevalence in the elderly population, those that impair cognition can be highlighted, among which is Alzheimer's Disease (AD). It is a disease that affects the functionality of the elderly, due to its chronic and neurodegenerative nature, with irreversible damage to neurons as one of the cellular damages[1]. Without the immediate intervention of adequate treatment, the affected individual may experience a decline in the most important functions, including cognitive capacity, a crucial component for the functionality of the elderly[2].

AD is symptomatology linked to the growing deficit of several cognitive domains, which can manifest itself through the decline of memory, language, logical reasoning and even neuropsychiatric and behavioral symptoms, showing that its degenerative and progressive aspect directly influences the involvement of the elderly in occupations[3].

In this scenario of growing restrictions, the American Occupational Therapy Association (AOTA)[4] declares that the work of Occupational Therapy with elderly people with AD is composed of interventions that aim to improve or promote participation in occupations, in addition to preventing, adapting and compensating possible limitations. There are several possibilities for interventions with this public, including Cognitive Training (CT) and Cognitive Rehabilitation (CR).

CT is characterized by a set of standardized tasks that aim to reflect on cognitive components[5]. This modality has either a unimodal format, aimed at training only one specific skill, or a multimodal one, aimed at training several cognitive skills. Meanwhile, CR is characterized by involving the patient in various activities aimed at the general improvement of everyday, cognitive and social functioning[5].

However, despite studies including the use of CT and CR as therapeutic options used by Occupational Therapy with elderly people with AD, it is still unclear how these interventions are used by professionals. Thus, this work aims to carry out a survey of the main interventions used by Occupational Therapists in the Rehabilitation and Cognitive Training of elderly people with Alzheimer's Disease.

METHODS

This is an integrative review, an approach that allows synthesizing empirical and theoretical data, to present them in a systematic and orderly way, resulting in deepening and updating on the subject[6]. To elaborate an integrative review research, it is necessary to define

a guiding question[6], considered here: *What types of CT and CR are most used by Occupational Therapists in cases of AD?*

Subsequently, a search was carried out to select the articles, which took place on April 6, 2021. The search for scientific literature publications was carried out in the Scientific Electronic Library Online (Scielo), Latin American and Caribbean Health Sciences Literature (LILACS) and National Library of Medicine (PubMed).

To refine the search, Health Sciences Descriptors (DeCS) were used, as follows: Search 1 - (OCCUPATIONAL THERAPY) AND (REHABILITATION) AND (COGNITION) AND (COGNITIVE DYSFUNCTION); Search 2 - (OCCUPATIONAL THERAPY) AND (REHABILITATION) AND (COGNITION) AND (ALZHEIMER DISEASE). Then, the search for free terms was performed as follows: Search 3 - (OCCUPATIONAL THERAPY) AND (COGNITIVE TRAINING) AND (COGNITIVE DYSFUNCTION); Search 4 - (OCCUPATIONAL THERAPY) AND (COGNITIVE TRAINING) AND (ALZHEIMER DISEASE). Besides English, searches were also carried out in Portuguese and Spanish. The Boolean AND search engine was used to relate the terms.

Inclusion criteria were: studies that address CT and/or CR performed by Occupational Therapists in cases of AD; published between January 2011 and March 2021; in Portuguese, English or Spanish; articles fully available online, that could be original research, case studies and/or experience reports. The established exclusion criteria were: gray publications, articles not fully available online and review articles.

To carry out the identification and selection, the articles were exported to the Zotero 97 Software (search assistant), in which they were gathered from the search of the DeCS and Free Terms, and duplicated files were removed. Then, the titles and abstracts of all articles were read, seeking to exclude productions that did not comply with the inclusion criteria, and after that, the remaining articles were read in full.

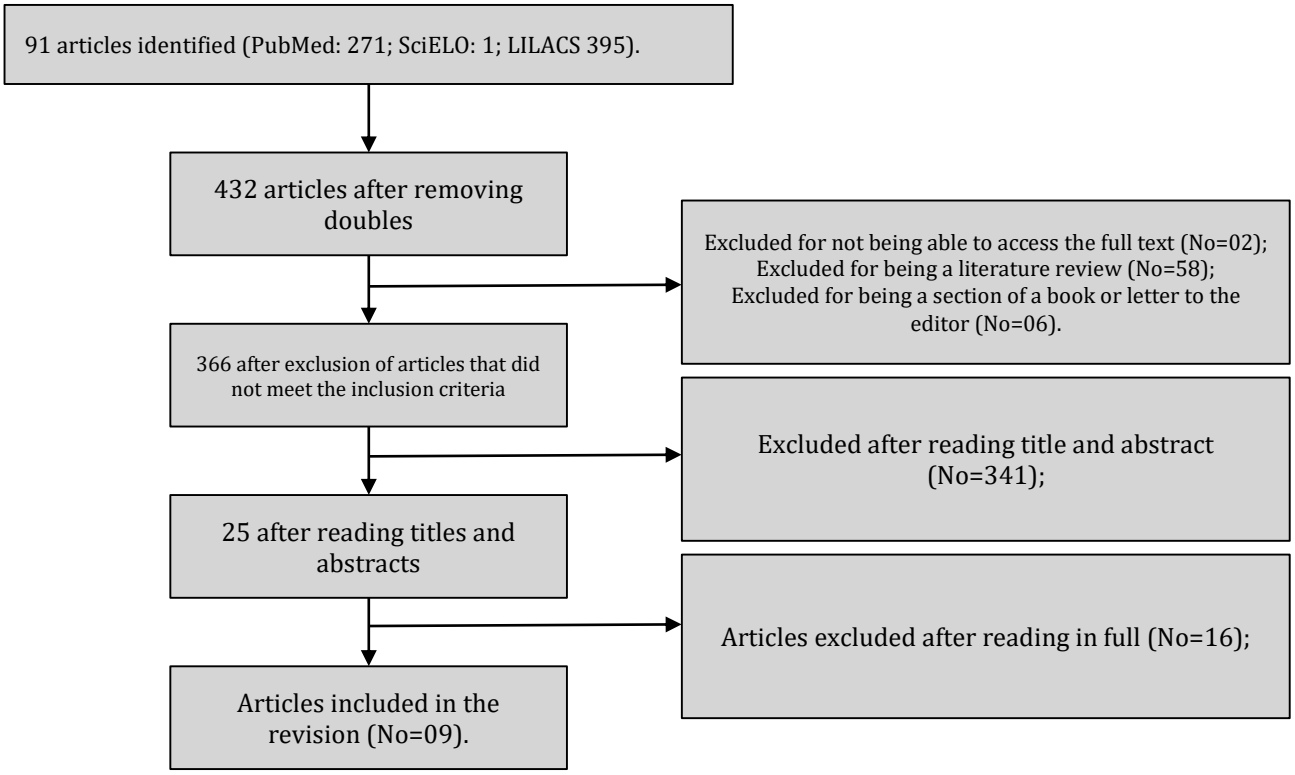
For data collection, a Google Form was used, prepared by the authors, which was based on the instrument for data collection validated by Ursi[6], and adapted to the needs and interests of the study. The form has 5 topics, namely: Identification of the article, institution of the study, methodological characteristics of the study, description of the CT or CR and the results of the studies.

For the analysis of the data, an analytical framework was created that allowed gathering and synthesizing the main information of the articles included in this study. Data were compared and presented descriptively.

RESULTS

It is observed in Figure 1 information regarding the search process, selection steps and reasons for exclusion of the studies selected for the review.

Figure 1. Flowchart of the article selection process, Belém, PA, 2021.



Among the selected articles, there are articles from different nations, with East Asian countries being prevalent, specifically China and South Korea, as shown in Chart 1.

Chart 1. Studies considered in Cognitive Rehabilitation and Cognitive Training by Occupational Therapists. Belém, PA, 2021.

Article	Database	Article title	Journal	Authors	Country
1	LILACS	Functional approach and centered-client pratic in rehabilitation of severe Alzheimer disease's older adult – case report	Rev. Ter. Ocup. Univ. São Paulo.	Cunha FCM da, Cintra MTG, Cunha LCM da, Silva HM da, Couto Érica de AB[7]	Brazil
2	PubMed	Cognitive rehabilitation for elderly people with early-stage Alzheimer's disease.	J. Phys. Ther. Sci.	Kim S[8]	Republic of Korea
3	Pubmed	Effects of spaced retrieval training with errorless learning in the rehabilitation of patients with dementia	J. Phys. Ther. Sci.	Jang JS, Lee JS, Yoo DH[9]	Republic of Korea
4	Pubmed	Evaluation of a computer-assisted errorless learning-based memory training program for patients with early Alzheimer's disease in Hong Kong: a pilot study.	Clin Interv Aging.	Lee GY, Yip CC, Yu EC, Man DW[10]	China
5	LILACS	Multistimulation group therapy in Alzheimer's disease promotes changes in brain functioning.	Neurorehabilitation and Neural Repair	Baglio F, Griffanti L, Saibene FL, Ricci C, Alberoni M, Critelli R, et al[11]	Italy
6	PubMed	Music therapy and Alzheimer's disease: Cognitive, psychological, and behavioural effects.	Neurologia	Gómez Gallego M, Gómez García J[12]	Spain
7	LILACS	Promoting functional independence in people with Alzheimer's disease: Outcomes of a home-based occupational therapy intervention in Spain.	Heal. soc. care community	Ávila A, De-Rosende-Celeiro I, Torres G, Vizcaíno M, Peralbo M, Durán M[13]	Spain
8	PubMed	The Effects of a Recollection-Based Occupational Therapy Program of Alzheimer's Disease: A Randomized Controlled Trial.	Occup Ther Int	Kim D[14]	Republic of Korea
9	PubMed	The effects of cognitive rehabilitation on Alzheimer's dementia patients' cognitive assessment reference diagnosis system performance based on level of cognitive functioning.	Journal of Physical Therapy Science	Hwang JH, Cha HG, Cho HS[15]	Republic of Korea

Chart 2 shows the methodology of the selected studies, which shows variability in the selection of the sample, and the predominance of cross-sectional studies with a quantitative approach.

With regard to the sample size, variability was observed between the selected studies, as well as the duration of each intervention, ranging from the shortest study with four weeks and the longest with 32 weeks (Chart 2).

Chart 2. Methodological characteristics of studies considered in Cognitive Rehabilitation and Cognitive Training by Occupational Therapists included in the review. Belém, PA, 2021.

Article	Study design	Study approach	Sample selection	Sample	Study duration
1	Longitudinal	Quantitative	Convenience	1 elderly person with AD	32 weeks
2	Cross-sectional	Quantitative	Random	Elderly with AD or probable AD: Intervention: 22 elderly; Control: 21 elderly.	8 weeks
3	Cross-sectional	Quantitative	Convenience	Elderly people with Vascular Dementia (VD): 22 elderly people. DA: 7 elderly. (Select for convenience)	5 weeks
4	Cross-sectional	Quantitative	Conglomerate	19 elderly people with AD. CELP: 7 seniors; TELP: 6 elderly; Waiting list control: 6 elderly	6 weeks
5	Longitudinal	Quantitative	Conglomerate	Elderly with AD. Intervention: 28 seniors Control: 24 elderly.	32 weeks
6	Cross-sectional	Quantitative	Convenience	42 elderly with AD	6 weeks
7	Longitudinal	Quantitative	Convenience	21 elderly with AD	26 weeks
8	Cross-sectional	Quantitative	Convenience	Elderly with AD. Intervention: 18 elderly. Control: 17 elderly	5 weeks
9	Cross-sectional	Quantitative	Convenience	Elderly with AD. 30 elderly groups: CDR; CDR-0.5; CDR-1 or CDR-2 (No= 10 per group)	4 weeks

Regarding the interventions carried out, it is observed that no study used only CT as a form of intervention in the cognitive aspects of the elderly, with a predominance of the use of CR or a combination of the two types of intervention. A prevalence of training for activities of daily living is noted in the CR (Chart 3).

Among the selected studies, eight showed significant improvement in the intervention group. Only one study had insignificant results[9], however, in none of the studies was there any cognitive decline perceived by the assessment instruments used among the participants,

suggesting that the cognitive aspects measured did not decline after the interventions (Chart 3).

In a survey, improvements in the tests were verified after three months of CR, and not only right after the interventions, but also in reassessment after five months of follow-up, observing that the effects of CR persisted for at least five months[7] (Chart 3).

In addition, based on the evaluation instruments used, they highlighted aspects that were modified more frequently in the results presented, namely: reduction of depression, aspects such as temporal and spatial orientation, attention, concentration (Chart 3).

The types of interventions found do not have a uniform experimental design, with different ways of approaching CR, as observed in Chart 3.

Chart 3. Types of interventions and results found in studies considered in Cognitive Rehabilitation and Cognitive Training by Occupational Therapists. Belém, PA, 2021.

Article	Type of Rehabilitation or Cognitive Training	Results
1	Home intervention, using the functional and client-centered approach, associated with environmental adaptation strategies, ADL training, reality orientation therapy, reminiscence therapy, stimulus pairing and error-free learning.	Improvements in the test were observed after three months of treatment, continued for five months, in addition to improvements in the patterns of activities performed, increased time spent in carrying out other activities, such as self-care and socialization.
2	Individualized CR intervention focused on a personally meaningful goal indicated by the COPM, using compensation strategies and stress management techniques. Group CR sessions involved some CT tasks.	Significant improvements were seen in occupational performance and satisfaction scores, quality of life on the AD and orientation subscales of the MMSE in the intervention group, whereas there was no statistical difference between participants in the control group.
3	Spaced Retrieval (SRT) training with Errorless Learning (EL) was administered by first providing patients with an immediate question and an associated target response.	All CERAD-K score items in the vascular dementia group, except constructive praxis, increased significantly after SRT and EL, but there was no significant difference in the AD group. There was no significant difference in the mean MBI score.
4	Computer-aided error-free learning program (CELP) and therapist-led training program (TELP). The basic principles of training were: task divided into components; repetition and practice; simple to complex gradation training; providing immediate positive feedback; providing tips; and incorporating escape lanes and spaced recovery strategies.	GDS was the only variable that showed a statistically significant difference. The greatest improvement was seen in the TELP group. For CELP, there were significant positive changes in MMSE, CDRS and BAPM, respectively, as well as a marginally significant change in HKLLT. No significant differences were found in TELP and control groups, except in MBI and GDS, and a marginally significant change in MMSE in TELP.
5	Multidimensional Stimulation Group Therapy (MST) was performed, divided into 3 levels: 1 - multidimensional treatment protocols for people with AD; 2 - Caring for the caregiver, where they received psychological support; and 3 - Subjects performed additional stimulation at home.	A reduction in the score of the Neuropsychiatric Inventory scale was observed; Improved AD Rating Scale memory score and Cognitive subscale; in addition, functional magnetic resonance imaging showed increased activations in areas of the temporal brain, right insular cortex, and thalamus.

Article	Type of Rehabilitation or Cognitive Training	Results
6	Music therapy - group intervention: welcome song, rhythmic accompaniment activities with palms and musical instruments, movements with background music, song recognition games and their respective artists and farewell music.	Significant increase in MMSE score. Significant improvement in memory, orientation, depression and anxiety (HADS) in mild and moderate cases; in anxiety (NPI) in mild cases; and in delirium, hallucinations, agitation, irritability and language disorders in the moderate AD group.
7	Multicomponent approach including: meaningful activities/tasks, cognitive stimulation, activation of psychomotor and sensory skills, home modification, caregiver counseling, ADL training. All participants received an individualized combination, according to the significant occupations for each participant.	The level of functional independence improved significantly. In addition, there was moderate to substantial improvement in several cognitive functions after each of the two intervention periods: local orientation, temporal orientation, and attention/concentration.
8	Cognitive stimulus program based on memory where the intervention group performed physical activities, horticulture, activities with music, art and performance of IADLs.	The intervention group showed improved cognitive functions, reduced depression, and improved quality of life.
9	Cognitive rehabilitation program with items aimed at visual and perceptual attention, attentive discrimination ability, attentive tracking, maintenance of attention, simple recognition memory, simple spatial memory, sequential recall memory, sequential memory recall language and recall memory combined. The tests used in this study were 10-Word Recognition, 10-Word List, Recent Memory, Delayed 10-Object List, and 10-Object Recognition.	CDR-0.5 and CDR-1 groups: Significant increases in the performance of the Delayed 10 Word List, Delayed 10 Object List, and 10 Object Recognition when compared to the CDR-2 group. CDR-0.5: Significant decreases in 10-word recognition performance compared to the CDR-1 group.

Key: MMSE: Mini-Mental State Examination; **COPM:** Canadian Occupational Performance Measure; **MBI:** Modified Barthel Index; **CDR:** Clinical Dementia Rating Scale; **CDRS:** Mattis Dementia Rating Scale; **GDS:** Geriatric Depression Scale; **CERAD-K:** Korean version of the Consortium to Establish a Registry for the Alzheimer's disease; **HKLLT:** The Hong Kong List Learning Test; **BAPM:** Brief Assessment of Prospective Memory-Short Form BAPM**; NPI:** Neuropsychiatric Inventory scale; **HADS:** Hospital Anxiety and Depression Scale.

DISCUSSION

During the survey of studies, it was possible to observe the predominance of articles published in East Asia (Republic of Korea and China). This can be explained by the fact that the Republic of Korea is one of the only countries in East Asia to have a national dementia management plan[16]. This plan aims to raise awareness and reduce the stigma of dementia by providing specific guidelines, protocols and policies to address dementia care and stigma reduction[16]. In addition, the plan mentions an information system to track and share data, knowledge and progress related to dementia within the country and/or between other countries[16].

On the other hand, China has the most significant number of people with dementia in the world, but social and health services related to the care of this public are scarce, in addition to the country not having a national plan for the management of dementia[17]. This suggests that the number of studies published in the country related to the subject seek to encourage the qualification of professionals to care for these elderly people, in addition to the creation of a national plan.

There was a preference for quantitative research. Quantitative research as the study that aims to provide accurate and impartial estimates of parameters of interest for the entire population[18]. Furthermore, based on the rigor of its methodology, quantitative research allows access and dissemination of valuable information to the population. Quantitative research is closely related to the complexity of the statistical model, the level of planning, change and confidence in the choice of variables[19], the tools used and the theoretical basis for a better analysis of the hypothesis[19], which may justify the use of this type of research in the analyzed studies, due to the need to demonstrate the effectiveness of interventions used by professionals.

There was a greater number of studies with a cross-sectional perspective, which can be characterized as a type of observational study, as it involves examining data from a population in a specific period of time, with no prospective or retrospective follow-up. Once subjects are selected, researchers will collect data and assess associations between outcomes and exposures[20]. Thus, cross-sectional studies have some disadvantages related to their sensitivity and specificity, not allowing a long-term follow-up on the results obtained. While in longitudinal studies it is possible to obtain more accurate results[21]. On the other hand, having a picture of the researched situation can be considered the first step in conducting an investigation.

Another important data observed in the studies concerns the non-consistency in relation to the intervention time, which can be justified by the preference for interventions with a shorter time frame, as they have a lower cost when compared to those of a longitudinal nature, which is characterized by following the trajectory of a population group for a long period, which justifies the non-preference for this type of study, since there is a possibility that the sample is compromised by evasion of participants for various reasons, requiring the replacement of the lost sample, to guarantee the maintenance of the study quality[22].

The results also demonstrate that no research used only the CT. It is possible to suggest that the low use of CT is due to the non-observance of the impact on the secondary efficacy outcomes investigated (cognition, functional skills in ADL, behavioral disorder, quality of life, depression or caregiver burden) compared to the control group[23].

In studies that focus rehabilitation on a significant goal for each patient, each cognitive component was worked on in the context of an activity or occupation of the elderly person's daily life[8,13]. On the other hand, it was observed that one study used music therapy as the main means of CR[12].

Another work, in its procedures, used functional magnetic resonance imaging (fMRI) as a biomarker, in order to test language function, being the only one to use biological variables to compare the effectiveness of the therapeutic approach[11].

In addition, the Occupational Therapist, when using CR, intervenes through combined approaches, including simplification of activities, environmental modification, adaptive aids, problem-solving strategies, skills training and caregiver education[24]. However, compared to the use of Reminiscence Therapy and CT, CR presents more significant clinical improvements[23], which would justify its more frequent use and because CR refers to a tailor-made approach that sets realistic goals to help patients and their families in everyday life.

The CT can be combined with the CR[8]. Multidimensional treatment is based on the hypothesis that combining multiple approaches may be the most appropriate intervention for AD, as a multicomponent approach may represent an effective strategy, according to the biopsychosocial care model[24].

Only one investigation used imaging exams in its assessment and reassessment process, with fMRI being an advanced tool to assess brain functions in healthy individuals and in neuropsychiatric patients. This tool allows identifying and locating specific phenomena related to metabolism and neuronal activity[25]. With this, there is the possibility of adequate monitoring of the responses, individually in the performance of the task[11]. This demonstrates the importance of using imaging exams during interventions, as it brings reliability to the results found. However, there are limitations on their use, as they are expensive technologies, difficult to access, invasive or even inconvenient[26], which may justify the use of this biomarker in only one of the studies.

Regarding the aspects modified by the interventions, it was observed that, even using different approaches in CR, positive results were obtained in maintaining the cognitive functions of the elderly with AD. In this sense, CR as an intervention that aims to improve functioning and independence, in addition to reducing the functional deficiencies of the brain and cognitive aspects, also aims to reduce the disabling impacts of these deficiencies[27].

Among the impacts, there was an improvement in depression after the intervention[10,12,14]. However, in another study, the change was perceived from the GDS being significant only in one of the groups that received the RC[10]. In another study with a beneficial impact on depression, music therapy was associated with the intervention[12].

CR was identified as having an impact on quality of life[12,14], which corroborates another investigation that identified CR focused on global cognitive function, memory and other non-

cognitive aspects such as ADLs, IADLs and quality of life, improving these aspects, an improvement in depression was also observed[24,28].

CONCLUSION

The present review showed that most Occupational Therapists use CR as a way of working on the cognitive and functional aspects of elderly people with AD, as this type of intervention makes it possible to work on functional aspects that help the elderly to maintain their independence in carrying out their ADLs, in addition to presenting better results when analyzing cognitive assessments.

There was a predominance of research with intervention on dementias in China and the Republic of Korea, showing the need to expand the use of CR in other countries and increase the number of publications on the subject.

As limitations, the lack of access to languages other than Portuguese, English and Spanish stands out, in addition to the fact that it is not possible to have access to some studies in their entirety, which could compromise the number of articles analyzed. Also, from the works considered, it was not possible to observe long-term effects of CR, due to the cross-sectional nature, limiting researchers to follow the results in a prospective period.

Regarding the experimental design, it is observed that they were not uniform, making the comparative analysis between them difficult, making it impossible to point out which approach within the CR can present better results. Further studies are suggested with methodologies that can be reproduced, with a certain intervention time so that one can compare which approach performed by occupational therapists, within the perspective of CR, can be more effective and bring benefits to the population with AD.

We point out the need for more studies that analyze the most effective therapies in the cognitive rehabilitation of elderly people diagnosed with AD, which are carried out to help in the best choice among professionals who work with this population.

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