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Review Article

Animal-Assisted Therapy in Dementia: An Updated Literature Review

Esteban A. Alarcón-Braga[1,2], *Farley E. Salazar-Valdivia[1,2], Valeria A. Valdez-Cornejo[1,2], Melany D. Mosquera-Rojas[1,2], Jenny C. Rondon-Saldaña[1,2], Eddy R. Segura[1,3]

[1]Facultad de Ciencias de la Salud, Universidad Peruana de Ciencias Aplicadas, Lima, Perú
[2]Sociedad Científica de Estudiantes de Medicina de la Universidad Peruana de Ciencias Aplicadas, Lima, Peru
[3]Department of Medicine, Division of Infectious Diseases, David Geffen School of Medicine, University of California, Los Angeles, CA, USA

***Correspondence**
Dr. Farley E. Salazar-Valdivia
Facultad de Ciencias de la Salud, Universidad Peruana de Ciencias Aplicadas, Lima, Perú
E-mail:
u201610832@upc.edu.pe

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ABSTRACT

Non-pharmacological interventions have shown to affect the symptoms of patients diagnosed with dementia. One of these interventions is animal-assisted therapy, which has been analyzed in multiple studies. However, the results of these interventions are mixed and no consensus has been reached. An electronic search was conducted in August 2021 in 4 databases (PubMed, Ovid Medline, Scopus, and Web of Science) to identify studies evaluating the role of animal-assisted therapy in patients diagnosed with dementia. The titles and abstracts of each article were independently analyzed. Subsequently, a full text of those articles that met the selection criteria was read. The narrative review was carried out based on the articles found. The effect of animal-assisted therapy on the psychiatric, psychological, and cognitive symptoms derived from dementia remains mixed and does not allow to draw specific conclusions. On the other hand, improvements have been observed in patients at a physical level and in terms of quality of life, since the patients showed a greater capacity when it comes to socializing, better communication skills, and greater motor skills. The published literature on the effects of animal-assisted therapy in patients with dementia is contradictory. A large number of articles claim to have found significant neurocognitive, motor, and quality of life improvements, while others claim not to have this effect.

1. INTRODUCTION

Dementia is a mental health disorder characterized by deficits in multiple higher cortical functions (memory, thinking, orientation, comprehension, calculation, learning capacity, language, and judgment) and is sometimes preceded by a deterioration of emotional control, social behavior, or motivation. Regarding etiology, it is classified into primary and secondary. Primary dementias such as Alzheimer's disease, senile dementia, Huntington's disease, Parkinson's disease, supranuclear paralysis, and multiple sclerosis are degenerative and cause brain atrophy. Secondary dementias are those conditions that occur due to another physical disease/injury. They can be caused by structural lesions (subdural hematomas, brain tumors, etc.), nutritional deficits (B12 deficiency, Folate deficiency, etc.), vascular diseases, endocrine pathologies, etc.[1]

Symptoms such as agitation/aggression are the most common manifestations of dementia and are related to frequent hospitalizations and decreased quality of life in both the patient and caregivers.[2]

Dementias have been described in young adults, adults, and older adults and their prevalence increases exponentially with age.[1] Because of this, dementia cannot be labeled as exclusive to the elder population. Worldwide, dementia is the main cause of dependency and disability in the elderly.[3] According to WHO estimates the number of cases will continue to rise in the coming years, reaching 65.7 million people with this disease by 2030. In 2010, the costs derived from dementia reached 604,000 USD million.[4]

Regarding the treatment of behavioral/psychological symptoms of dementia, non-pharmacological strategies have been suggested as an option before and as a complement to psychotropic agents. Among the non-pharmacological options, we have physical activity, sensory-based intervention, music, and animal-assisted therapy (AAT).[5] The latter intervention is proposed as a potential treatment option due to the close relationship between animals and humans. Scientists have observed that patients with dementia respond to this interaction, reducing blood pressure and increasing neurochemicals related to relaxation and bonding.[5] Because of this, AAT is positioned as a hopeful method for the treatment of dementia.[6] This intervention not only promotes the improvement of cognitive functions, but also enhances the physical and psychosocial capabilities of these patients.[7] In the last decades, several studies have been published with conflicting results. That is why it is important to review the literature, to summarize the latest evidence.

2. METHODS

An electronic search was performed in August 2021 in 4 databases (PubMed, Ovid Medline, Scopus, and Web of Science) to identify studies that assessed the role of animal-assisted therapy in patients diagnosed with dementia. The search strategy was developed in Pubmed using Mesh and free-text terms and later adapted to the other databases. The full version of the search strategy can be found in Table 1.

The articles found in each database were uploaded into the "Rayyan QCRI" platform, where studies were grouped, and duplicates eliminated. The title and abstract of each article were screened independently by three authors (EA, FS, and VV). The articles fulfilling the inclusion criteria were read in full text and included in this literature review if the authors agreed that the study would contribute to the review. We included studies that evaluated the role of animal-assisted therapies in patients with dementia. We excluded studies that used robotic animals focused on the caregiver rather than the patient or that did not contribute with relevant information. The selection process is represented in Figure 1 and Table 2 we summarized the systematic reviews about the role of ATT in dementia.

3. RESULTS

3.1. AAT and Psychiatric/Psychological Effects

3.1.1. Aggressive behavior and agitation

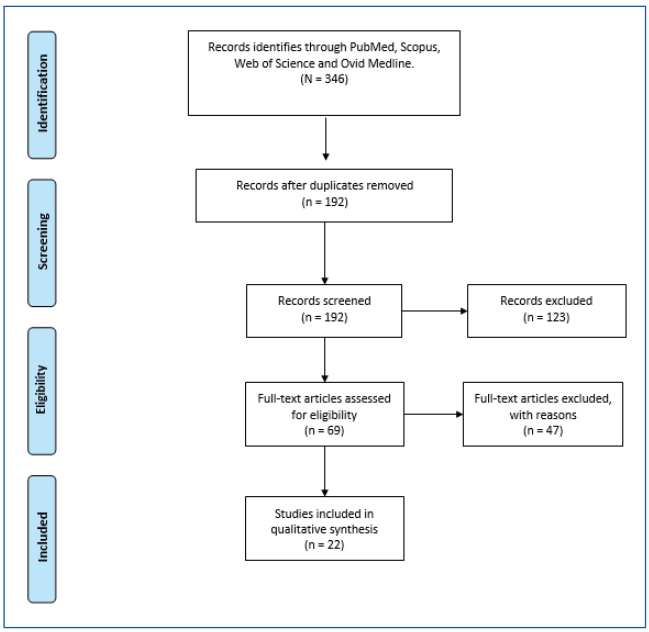
The psychological symptoms that occurs most frequently in patients with dementia are aggression and agitation.[8] It has been seen that aggressive behaviors can occur in up to 50% of patients with dementia.[9] Aggression has been linked to internal and external factors. Among the external factors, we have the quality of the relationship between caregiver and patient, caregiver burden, social stimulus, etc. Among the internal determinants, we have pain, depression, and psychosis.[10] Several studies have analyzed the

Table 1. Search strategy

Pubmed
"animal assisted therapy"[MeSH Terms] OR "Animal Assisted Therapies"[Title/Abstract] OR "Animal Facilitated Therapy"[Title/Abstract] OR "Pet Therapy"[Title/Abstract] OR "Pet Therapies"[Title/Abstract] OR "Pet Facilitated Therapy"[Title/Abstract] OR "pet assisted therapy"[Title/Abstract] OR "animal assisted intervention*"[Title/Abstract] OR "animal intervention*"[Title/Abstract] OR "pet intervention"[Title/Abstract] AND ((((((Dementia[MeSH Terms]) OR (dementias[Title/Abstract])) OR (amentia[Title/Abstract])) OR (Senile Paranoid Dementia[Title/Abstract])) OR (Senile Paranoid Dementias[Title/Abstract])) OR (Familial Dementia[Title/Abstract])) OR (Familial Dementias[Title/Abstract])
Scopus
(TITLE-ABS-KEY ("animal assisted therapy") OR TITLE-ABS-KEY ("Animal Assisted Therapies") OR TITLE-ABS-KEY ("Animal Facilitated Therapy") OR TITLE-ABS-KEY ("Pet Therapy") OR TITLE-ABS-KEY ("Pet Therapies") OR TITLE-ABS-KEY ("Pet Facilitated Therapy") OR TITLE-ABS-KEY ("Pet assisted therapy") OR TITLE-ABS-KEY ("pet assisted therapies") OR TITLE-ABS-KEY ("animal assisted intervention*") OR TITLE-ABS-KEY ("animal intervention*") OR TITLE-ABS-KEY ("pet intervention")) AND (TITLE-ABS-KEY (dementia) OR TITLE-ABS-KEY (dementias) OR TITLE-ABS-KEY (amentia) OR TITLE-ABS-KEY ("Senile Paranoid Dementia") OR TITLE-ABS-KEY ("Senile Paranoid Dementias") OR TITLE-ABS-KEY ("Familial Dementia") OR TITLE-ABS-KEY ("Familial Dementias")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014) OR LIMIT-TO (PUBYEAR , 2013) OR LIMIT-TO (PUBYEAR , 2012))
Ovid Medline
("animal assisted therapy" or "Animal Assisted Therapies" or "Animal Facilitated Therapy" or "Pet Therapy" or "Pet Therapies" or "Pet Facilitated Therapy" or "Pet assisted therapy" or "pet assisted therapies" or "animal assisted intervention*" or "animal intervention*" or "pet intervention").ab. AND (dementia or dementias or amentia or "Senile Paranoid Dementia" or "Senile Paranoid Dementias" or "Familial Dementia" or "Familial Dementias").ab.
Web of Science
(((((((TS=(dementia)) OR TS=(dementias)) OR TS=(amentia)) OR TS=("Senile Paranoid Dementia")) OR TS=("Familial Dementia")) OR TS=("Familial Dementias")) OR TS=("Senile Paranoid Dementias")) AND ((((((((((TS=("animal assisted therapy")) OR TS=("Animal Assisted Therapies")) OR TS=("Animal Facilitated Therapy")) OR TS=("Pet Therapy")) OR TS=("Pet Therapies")) OR TS=("Pet Facilitated Therapy")) OR TS=("Pet assisted therapy")) OR TS=("pet assisted therapies")) OR TS=("animal assisted intervention*")) OR TS=("animal intervention*")) OR TS=("pet intervention")

effects of animal-assisted therapy about aggression and agitation. A systematic review by Zafra-Tanaka et al. found that dog-assisted therapy did not affect the agitation of patients diagnosed with dementia (3 RCTs, SMD: -1.12; 95% CI: -2.67 to 0.43).[11] This finding was replicated in a second systematic review, where animal-assisted therapy did not show any association with improvements in agitation symptoms (SMD: 0.70, 95% CI -0.18 to 1.57).[12] Regarding aggressive behavior, a systematic review encompassed 15 articles evaluating the association between animal-assisted therapy and aggressive behavior. Of these, nine articles found that AAT was associated with less agitation and less aggressive behavior.[8]

Figure 1. PRISMA flow diagram



3.1.2. Social behavior

Published studies regarding the effects of animal-assisted therapy on social behavior reported mixed conclusions. On one hand, primary studies such as that of Pope et al. reported that no significant association was demonstrated between animal-assisted therapy and an improvement in social behavior. In 2019, a Cochrane review of randomized trials reported that no conclusions could be reached regarding the effect of this intervention due to the great imprecision of the estimated effect size and the low certainty of evidence. There are also primary studies such as that

Table 2. Systematic reviews about AAT in dementia

Author	Outcome Assessed	Effect metric	Country	Year	Number of studies included	Effect measure	Animal studied
Zafra-Tanaka et al.	QOL, agitation, depression, DLA, cognitive impairment	SMD and MD	Perú	2019	10	QOL: SDM: 0.16; 95% CI: -0.41 to 0.73. Agitation: SDM: -1.12; 95% CI: -2.67 to 0.43, depression: SMD: -0.48; 95% CI: -1.93 to 0.98, DLA: SMD: 0.16; 95% CI: -0.80 to 1.12, cognitive impairment: SDM: -0.52; 95% CI: -1.33 to 0.30	Dog
Yamicki et al.	Agitation and Aggression, Mood, Social Behavior, QOL, activity and diet	No meta-analysis	USA	2018	32	No meta-analysis	Dog, Cat, Horse, Fish
Leng et al.	Agit ation	SMD	China	2019	65	1. massage therapy (SMD=-5.22, 95% Crl= -8.21 to -2.49) 2. light therapy (SMD=-5.25, 95% CI=-9.90 to -0.61) 3. music therapy (SMD=-3.61, 95% Crl= -7.29 to -0.23) 4. reminiscence therapy (SMD=-4.59, 95% Crl=-8.97 to -0.51) 5. animal-assisted intervention 11 (SMD = -3.14, 95% Crl=-5.89 to -0.46) 6. personally tailored intervention (SMD = -2.98, 95% Crl=-5.18 to -0.85)	pet animal , PARO (robotic animal)
Virués-Ortega et al.	Depression, anxiety, behaviour disturbances, functional status	SMD	Spain	2010	21	1. depression, anxiety and behaviour disturbances: -0.34 (95% CI: -0.63 - -0.05, *p*=0.02) 2. functional status: 1.47 (95% CI: -1.04 -3.97, *p*=0.25)	dolphin, dog, cat, rabbit, bird, ferret, robotic dog (PARO)
Park et al.	Agitation, QOL and depression	SMD	Korea	2020	9	1. agitation: SMD 0.70 (95% confidence interval: *p*=0.12, I2=89%) 2. depression: SMD–0.47 (95% confidence interval: *p* <0.001, I2=0%)	DOG or PARO (robotic animal)
Klimova et al.	QOL behavioral aspects, cognitive function, physical health.	no meta-analysis	Czech Republic	2019	6 (3 controlled studies, 2 experimental, 1 observational)	no meta-analysis	dog

of Richerson et al. and Thodberg et al. that showed an improvement in social behavior in those patients included in the animal-assisted therapy group.

3.1.3. Depression

Multiple systematic reviews have studied the association between AAT and the improvement of depressive symptoms in dementia over the years. The most recent systematic review published on the matter is that of Ming-Lai et al. which showed that animal-assisted therapies reduced depression in patients with dementia (MD –2.87, 95% CI –5.24 to –0.50).[13] However, it is worth clarifying that the aforementioned review only included randomized trials and the analysis only included two studies. In contrast, the systematic review carried out by Zafra-Tanaka et al. on dementia and dog-assisted therapies found, in the analysis of clinical trials, that there was no association between the two variables (SMD: -0.48; 95% CI: -1.93 to 0.98). However, the analysis of quasi-experimental studies showed that this type of therapy derived in improvements in the symptoms of depression (SMD: -0.59; 95% CI: -1.00 to −0.18).[11] Therefore, we cannot draw strong conclusions based on these results. Before this study, in 2008, Han et al. performed a meta-analysis that combined both quasi-experimental studies and randomized clinical trials and found that AAT had a positive effect on reducing the symptoms of depression (SMD=-1.39, 95% CI (-2.17 to -0.08)).[14]

3.2. AAT, Cognitive and Physical Benefits

Some examples of skills that can be trained with a certified dog are memory, communication and language, problem-solving ability, focus and concentration, balance and muscle strength, fine motor skills, grip, and precision ability. However, these activities cannot be carried out by all people with dementia due to their limitations.[15] Animal therapy may be considered a valuable non-drug treatment, as it improves motor activity significantly.[16] However, the major constraints that were found in the "code of organizational limitations" such as the time to develop the projects, the hygiene of the animal, and the budget that the therapy would use.[17] Greater body movement is observed, particularly in the upper part of the body, in those in contact with the pet.[18]

In studies with equines, in particular, they demonstrated a greater physical commitment to activities such as brushing and painting the horses.[8]

Short-term memory improves when the patient is involved in various events such as calling the pet by his name, rewarding him with prizes, or remembering her favorite food or toys. A reinforcement of spatial concepts has also been demonstrated.[19] Other studies improved verbal interactions with the pet owner, as well as increase communication time. AAT participants often called out to the dog or spoke to it calmly while petting it.[17] In another meta-analysis carried out by Javier Virués-Ortega et al, little intervention effect was found on daily activities and cognitive capacity, where the pooled effect of six studies was 0.13 (SMD, 95% CI: -0.09-0.34, p=0.26); with substantial heterogeneity (I2=71%, 95% CI: 32-87%).[20]

Finally, studies carried out on people who lived with dogs, showed that they provide an external source of motivation and responsibility with physical benefits and on the state of mind in people with adequate health. On the contrary, when the person is not in good health, additional stress and worry are generated that results in negative effects due to the load that is generated, so it is important to be clear about this before starting the intervention.[21]

3.3. AAT and Quality of Life and Daily Living

As mentioned above, dementia has a wide variety of symptoms, which affect the patient's development in their day-to-day life and, in the long run, affect their quality of life. Animal-assisted therapy has shown consistent improvements in the lives of patients with dementia who use it as an alternative treatment since it promotes mental health through patient-animal contact.[20]

Interaction with the animal increases the production of neurochemicals that are associated with relaxation and bonding, which can lead to a decrease in the behavioral and psychological symptoms present in dementia.[22] It has been shown that the short-term effects that would improve the day-to-day of patients are the expression of emotions, voluntary activities, and concern towards other people. On the other hand, regarding the long-term effects, improvements in the daily life of the patient have evidenced thanks to the reduction of problem behaviors, thus facilitating the relationship with the caregiver.[20]

Another beneficial effect of animal-assisted therapy was the calming effect on the patient, which led to better communication in therapies, in the same way, the animal unconditionally accepting the patient increases its self-esteem and contributes to forming a safer environment. The interaction with the dogs showed improvements in the patients' capacity for social interaction.[23] Interaction with animals reduces anxiety and helps reduce loneliness in patients, it also helps to recall memories, and improve short-term memory and communication skills. This therapy positively improves the behavior of patients, since when being with a dog; patients seem to be calm, relaxed, and happy, which shows a reduction in their feelings of depression, anxiety, agitation, and aggression.[24]

This therapy not only helps with the mental symptoms of the patient but also improves physical symptoms, such as lowering blood pressure and improving

cardiovascular health, which reduces the load of medications, also reduces physical pain and improves physical activity by caressing the animal like a dog and even taking it out for a walk. Finally, there was an improvement in the eating habits of the patients. On the other hand, as it is a non-pharmacological approach, it reduces the economic burden on families.[25] However, studies mention that although animal-assisted therapy has shown to be significant and clinically positive in patients with dementia, it was not enough to cause effects their quality of life.[25]

4. CONCLUSION

The published literature on the effects of animal-assisted therapy on patients with dementia is conflicting. A large number of articles claim to have found significant neurocognitive, motor, and quality of life improvements, while others claim that they did not find this effect. A similar scenario occurs when it comes to the benefits of AAT regarding social behavior, aggressive behavior, agitation, and depression. That is why we recommend that more high-quality studies with bigger study samples should be carried out. In general, given the current evidence on the subject, it is not possible to draw definitive conclusions in any of the studied topics.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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