
Animal Assisted Therapy and Activities in Alzheimer's Disease

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1. Introduction

Animal-Assisted Therapy (AAT) or Pet Therapy is a supportive goal-oriented intervention which is mainly result from human and animal interaction. [1]- [6] In this treatment process, a health professional/patients' doctor have to determine which animal model should be accompanied with a specific clinical goal. This interventions can be followed by physical therapists, neurologist, psychiatrist, veterinary public health specialists, psychologist, occupational therapists, provided that they have taken a certification in AAT. In addition, all therapy processes should be followed by patients' doctor according to the suggestions of AAT specialist.

Although there are so many approach about the effect mechanism of AAT, it is known that the human and animal interaction is the basis for all of them. The positive-constructive bond result from between human and animal interaction is the key point to initiate the effect mechanism of AAT. This curative effect starts to work four basic mechanism including psychological stimulation, emotional, playing, and physical according to the Ballarini. [4] However all of these mechanisms are different therapy ways, they can become interpenetrate with each others. The important point is that, it is supposed that the psychosomatic effects which give rise to curative features of AAT occurs when these mechanisms start to work. All of the mechanism together revealed that psychosomatic effects of human-animal bond and interaction in people taking an AAT and AAA. [5], [6]

Lafrance et al., reported that patients' social and verbal behaviors have been improved in a presence of a therapy dog. [7] Nathans et al., revealed that Animal Assisted Therapy can be used for improving anhedonia in patients with schizophrenia. In addition, they have found that AAT can be beneficial for rehabilitation of life quality and psycho-social behaviors. [8]

Different researchers have reported that AAT should be considered planning of the treatment of individual with dementia. [1], [9]- [12]

The interaction between an animal and human result in an increase neurochemicals initiating a decrease in blood pressure and relaxation. This relationship may be beneficial for ameliorating agitate behavior and psychological symptoms of dementia. In another study, it has been reported that aquarium assisted therapy may be beneficial for increasing eating behavior of aged people living in a nursing home. [10] Richeson revealed that AAT can be increase social interactions by initiating decrease the agitate behaviors of patients with dementia. [12] Kongable et al., observed that a therapy dog increased patients' some social behaviors such as smile, laugh, look, touch, verbalization. [13]

In aged people, AAT are used for ameliorating agitate behaviors, psychological, occupational, social and physical disorders especially in Alzheimer and Dementia. [14]- [20] People with Alzheimer may have an easier time decoding the simple repetitive, non-verbal actions of a dog. Animals can act as transitional objects, allowing people to first establish a bond with them and then extend this bond to people. Most of the study results revealed that AAT especially dog therapy had an "calming effect" on the patients with dementia and Alzheimer disease. [15]- [17], [20] This effect can be helpful as a communication link during therapy sessions and also decrease agitation behaviors. It is well known that incidence of aggression, agitation, social withdrawal, depression, and psychotic disorders are growing problems in Alzheimer disease for special care units, staff and family members of patients. Furthermore, environmental factors in nursing home or other health care units have been become increasingly forcible barrier for therapy of Alzheimer disease. In this conditions, AAT and other animal activities may be helpful to cope with these difficulties by presenting a different aspect.

AAT should be more commonly used in the world through increasing awareness of public health services about beneficials of companion animal and activities. Especially, AAT can be used for improving health disorders of aged people with physical-mental and social disabilities such as Alzheimer, dementia, aphasia, anxiety, depression, stres, schizophrenia, and feeling of loneliness, quality of life. An aquarium assisted therapy may be a good starting point to learn about benefits and facilities of AAT in developing countries like Turkey which have more lower the socio-economic groups than the developed countries.

Main principle of AAT is based on using psychosomatic effects, which appear as results of biological-physical-chemical changes during human and animal interactions. [4] Feeding animals or being together with animals cause these effects to appear, and play an important role in recovery of mental, social and physical health. [21] The strength of bonding between humans and animals has been revealed in a survey study, which is conducted on 14 veterinarians and 117 patients in Ontario. In the study, patients, whose pets are died, have received a survey to define causes and effects of their worries by a phone call or e-mail. Of 30% of participants has been observed to have severe worries. [22] This strong bonding between humans and animals can also affect physical and mental health, and sometimes death or loss of an animal can be so effective that it can change a subject's life. [23] Dog, horse and dolphin are the most commonly preferred animal species in animal assisted therapy.

There are also studies indicating that keeping an animal has positive effects on the community health. [24] Heady et. al. reported that AAT caused decreasing national health costs. [25] Governments have been recently realized the significance of interaction between humans and animals as well as the contributions into human health, life quality and economy. Many countries have passed laws, which are a new understanding to allow keeping animals in apartments for rent, so as to support pet owners. Positive measures are taken in many European countries to keep pets in houses by laws. [26] AAT is to benefit from animal companionship during a targeted therapy in order to facilitate achievement of optimum results in patients, and to support the therapy. It provides very positive effects like providing adaptations of subjects to stressful situations and hospital environments; decreasing anxiety, stress, pain and blood pressure; increasing mobility and muscle activity. It has been shown that guiding animals increase physical activity, help in prevention of some moods like loneliness and depression, improve daily life activities and provide a social support by increasing the life quality. [27]- [29]

2. Benefits of animal companionship for therapy from past to present

Close relationships between humans and animals are way back to the prehistoric ages. By using DNA techniques, it has been demonstrated that dogs might have been domesticated 100,000 years ago. [30] Animals have been used to improve emotional and functional conditions of humans since ancient Greeks. Ancient Greeks have used dog drawings in their therapeutic temples, and they have provided melancholic people to ride on horses so as to get rid of their diseased souls. These applications have been used later also by Romans. [31] A dog showing the way to a blind man is drawn on armor in Pompeii historical ruins. [32]

The first studies, which have shown animal assistance in therapy, were performed to recover behaviors of mentally ill people in 1792 in York Retreat in United Kingdom by using farm animals. [3] Florence Nightingale defined the significance of assisting animals for therapy as: "Especially during treatment of a patient with a chronic illness, a small pet is a perfect friend for the patient". [32]

Dogs were used in rehabilitation after the World War I, in the first half of the 20th century. To improve moods of American army officers, who experienced depression related to the war, dogs were given to them to keep in company. [33] In the same period, thousands of dogs were trained under a program to support blinded soldiers in Germany. In 1931, "Guiding Dogs Society" was established for blind people. Currently, dogs are being trained in order to support people with hearing problems; to alert people with seizures before the symptoms are started; and to support people with severe physical problems.

Similar applications have been widely spread all over the world, so they have helped thousands of people with disabilities to live freely. Lane et. al. have reported that this ability of dogs was very amazing, and this social support that they have provided for people they have accompanied was very significant. [34]

Since 1980s, animal assisted therapies, which have been performed by planning and an experienced team, have been shown to improve social functions and to be beneficial especially in elderly people, so studies about this issue have been supported. [35]- [37] Therefore, when it was 1990s, study results of many articles are published from different populations. [28], [29], [38]- [40] Sable explained in the manuscript how, especially dogs and cats, could contribute into well being of family members, with whom they lived all their lives, emotionally and socially. [39]

As mentioned before, the first scientific studies indicating effects of human and animal interactions have been conducted in the second half of 20th century. UK originated Society for Companion Animal Studies (SCAS) is established in 1979, whereas the international organization, named International Association of Human-Animal Interaction Organization (IAHAIO) is established in 1990. IAHAIO is an affiliation of the World Health Organization, and it functions as a conductor organ among non-governmental organizations and other affiliations. The most marked point in the studies belonging to 2000s is that animal assisted therapy has been used against specific diseases, and evaluation of human-animal interaction results. [1], [23], [41]- [44]

Current patient healthcare methods, which are developing and containing evidence based interventions, are faced with some problems. Along with conventional treatments, complementary and adjuvant treatments are also included in these methods. Animal assisted therapy (AAT) is discussed as a supportive treatment approach with positive effects on life quality and health. [45]

3. Action mechanism in animal assisted therapies

Gagnon et. al. defined animal assisted therapy as a clinical intervention method, which has aimed to establish natural and improving bonding between humans and animals, and is applied for both preventive and therapeutic requirements. [46] Animal assisted therapy (AAT) can be applied through different action mechanisms in respect with the disease type and individual characteristics. Five factors directing the mechanism are psychological impulse, emotional, physical and playing mechanisms. [4] Although these mechanisms are defined separately, they cannot be considered independent from each other for functioning and developing of psychosomatic effects. The most important point in the treatment is human-animal interaction. This interaction constitutes a strong emotional background. It has been reported result benefits would depend on the strength of the emotional interactions.

In another words, confident, positive and sedative bonding between a human and an animal can trigger beneficial mechanisms by affecting secretions of adrenaline (epinephrine) and other corticosteroid hormones or stress hormones (like cortisol etc.); decreasing arterial blood pressure, cardiac and respiratory rates. Emotional, psychological impulse, playing and physical mechanisms used in AAT applications cause psychosomatic effects.

Understanding of "play" principle is quite important in animal assisted therapy. Ballarini reported that activities like "entertainment" and especially "laughing" are parts of the bonding

between humans and animals. When an ill person plays with a cat or laughs at a dog's behavior, an increase in the healing potential of that illness is initiated. As playing increases mobility, it is a good physical activity source. [4] Haubenhofer and Kirchengast measured cortisol levels in saliva of dogs, which were involved in animal assisted interventions and therapies to investigate their physiological reactions. Cortisol levels, which were monitored during therapy sessions in the earlier time periods of day, were reported to be higher than those measured after the therapy and in the control periods. The study results showed that therapeutic work was physiologically activating for the dogs. [47] At this point, it may be considered that these physiologically changes occurred in dogs can result in positive reactions in humans during animal assisted therapies and activities. But, further research is needed to indicate whether these positive effects related to the animal assisted therapies or not.

We have already mentioned that action mechanism of AAT is based on positive-healing bonding, which has occurred by human-animal interaction, and psychological, emotional, playing and physical mechanisms, which have caused physical and biochemical reactions by activation of this bonding. [4], [46] Key structures activating these mechanisms in patients should be structured according to mainly four theories. These are touching, biophilia hypothesis, learning and cognitive theories. [48] In animal assisted therapy applications, all types of applications, which are performed according to these four theories, can provide various benefits.

Touching theory provides a special and continuous bonding between patient and animal at the first contact. The aim of this bonding is generally due to searching for closeness and tendency to preserve this closeness instinctively. It is normal that such a bonding occurs between an Alzheimer patient and a therapy dog. Because, may be, this is the first time that the patient has met another living organism without any prejudice, without verbal communication and agitated behaviors, and which has accepted him/her as he/she is. In this situation, patient firstly feels comfortable, and a trained dog will allow the patient to direct to itself first by expanding its limits, and allow the patient to touch it. Generally this initial contact in therapies is started with patient directing to the dog and touching it. During therapy period in this comfortable-caring treatment environment, many supportive benefits for clinical treatment compliance (being the leading one), relatives of patients, and healthcare personnel have been achieved.

Another important concept in therapies is *biophilia hypothesis*. As it has been mentioned in this review before, this concept defends that there is an instinctive, strong bonding between humans and all other living organisms, and both sides are in need of his strong bonding in order to survive. According to biophilia concept (short definition may be enthusiasm for life) human beings get in contact with the environment and all living creatures around genetically due to the human nature. This symbiotic relationship was started in the past, and continued in the present by contacting and keeping dogs, cats (the leading animals), other farm animals. As feeling of ownership has affected humans negatively in time, animals have been the mainly damaged side of this relationship. Especially animals, which we are calling currently domesticated, have moved away from their natural environments, and instead of living with humans, or accompanying humans, they have got under protection of humans. All other living creatures that human being as not felt close to himself, or could not domesticate or has not get under

protection have remained as “Undomesticated-Wild”. The reasons why we mention these philosophical approaches is the context of animal assisted therapies especially ethically, are applications, which are performed with animal companionship, and we would very much emphasize to use “living with the company of animals” term rather than “pet ownership” or “keeping an animal”. Thus, “living with the company of animals” will be developed. May be this approach will help to develop the awareness of “living with somebody/living creature that is ill” rather than “having an ill relative”. Then, experiencing the pure form of animal-human interaction at the beginning, and providing patient and his/her relatives to share this humane environment may reveal many positive effects, which we have not known or defined yet.

Learning theory, which is a model in psychology, defends that human beings give various responses to his/her surroundings by the learning principle. In AAT, the learning principle of the patient is triggered in a more human way; so a patient with Alzheimer’s disease can show some behaviors that he or she has started to forget, without the degree of forgetting, in the same way again, or can show some behaviors for longer times without forgetting. For example, while feeding fish in the aquarium, their eating desire may be increased or they remember eating behavior and eat some food; while feeding a dog, they may start to use hand skills, so that these will help them to improve slightly their daily life activities etc. *This interaction with animals may be perceived as a more human approach than verbal reminding of healthcare personnel and/or patient’s relatives or verbal commands of caregivers what to do. While healthcare personnel and/or patient caregivers can be under intensive stress and may unintentionally pronounce these commands at higher and sharp voice tones, and they may even say/ behave in agitated ways for patients.* Therefore, animal assisted therapies and activities can be a good supportive way in long term therapy and care for individuals with chronic diseases like Alzheimer’s disease. *Cognitive theory*, which is another model in psychology, tries to explain human behaviors by investigating how human beings gain, process, and store the knowledge. Main headings in cognitive approach, which investigates perception of knowledge, processing of knowledge, and switching into behaviors, are perception language, attention, memory, problem solving, decision making-judging and intelligence.

As animals do not have any expectations and demands from humans at their first contacts, patients feel self-confidence, and they may feel that everything is under their controls. [48] Therefore, animals do not react like us when they meet a healthy or ill person. We, humans, tend to perceive, remember, shape up, judge with the previously learned concepts, and even show verbal-physical behaviors, when we first meet a healthy or ill person or any living being. This situation is quickly sensed and perceived by the opposite side. When a dog meets a blind, limb or amnesic person in the street, it will behave as if it has met a healthy individual. However, when we meet people with health problems in the street, we define them as “he has got no arm!”, “he is blind!”, “Is he a lunatic?”, “ill person”, and we imply our thoughts sometimes with words or sometimes with our behaviors. Due to these reasons, animal assisted therapies naturally eradicate negative conditions like these, and they provide a more humane surrounding for therapies of subjects with chronic diseases; they support them; they increase adaptation potentials of patients and their relatives to difficult therapy periods, and they

improve their life qualities. After all, we should remembered that the aforementioned paragraphs are theoretical concepts which try to comprise biology, sociology, psychology and philosophy to explain some of the effects AAT on humans in general, not only for patients with Alzheimer’s disease.

4. Fields of Animal Assisted Therapies (AAT)

According to medical studies and field screenings, it is evident that AAT has relaxing and supportive effects on humans. Recoveries obtained in some diseases through these positive interactions are listed in Table 1. [49], [34]- [39], [50], [51]

Decreased anxiety and depression
Increased self-esteem
Increased impulse for communication
Decreased blood pressure
Increase in required motivation for recovery
Decrease in analgesic requirement in some patients, who have had previous operations
Improvement in communication with other patients or hospital personnel

Table 1. Main improvements observed in AAT applied subjects

This supportive therapy with various services is being provided to more than 35000 patients in more than 100 healthcare service units in San Francisco. Subjects mainly benefited from these services are as follows: *Children treated in pediatric clinic; AIDS patients; patients, who require acute care and physical rehabilitation services; children with conduct disorder and physical problems; subjects staying at hospitals (patients, their relatives and hospital personnel), patients with mental diseases.* Public health organizations currently provide various services with dogs suitable for therapies. Samples for some application fields of AAT are given in Table 2 regarding human health improvement and development. [4], [52]

As Ballarini has mentioned, AAT is no longer a mysterious application, but currently it has become a treatment option, which is applied for supportive aims, and has resulted in positive outcomes in many diseases. In recent years, AAT has gained more attention all over the world, and it is being preferred as a complimentary and supportive method to improve life quality and health in some therapies, during which various problems have arisen. [45], [53], [54] Therefore, many studies have been performed to establish its scientific background, and different AAT models are being developed. Dolphin assisted therapy is one of these, and it is employed as an adjunctive method in various diseases (Table 3). [55], [56] During therapies,

For psychological training

In children with poor or underdeveloped socialization attitudes,
 In conduct disorders,
 In children with low academic success and low self-esteem

To decrease hostile behaviors

In jails
 In mental institutions with convicts
 In reformatory schools

Psychiatric conditions

Mild or moderate autism
 In treatment and prevention of depression symptoms in old people
 Anxiety
 Neuro-psychological tension

Medical interventions

In recovery periods of diseases
 Arterial hypertension
 Cardiopathies
 Chronic muscle-nervous system diseases
 Different motor disorder therapies and rehabilitation

Table 2. Application fields of AAT

it has been observed that dolphins have tried to communicate with ill subjects by increasing their sound levels. [57]

Autism
Down syndrome
Rett syndrome
Depression (non-endogenous type)
Neurotic disorder
Brain trauma (without cramp syndrome)
Brain paralysis (without cramp syndrome)
Cerebral palsy in children
Childhood neurosis like fobby, enuresis and asthenia
Environmental conduct disorders
Support for post-coma treatment
Severe psychological and complex trauma
Cephalgia
Chronic fatigue syndrome
Delayed speech development

Delayed psychological development

Chronic diseases

Table 3. Some medical and mental health problems for application of dolphin therapy

5. AAT use in some chronic diseases

Since Alzheimer's disease is generally observed in elderly people, it may be concomitant with some other chronic diseases. Among these diseases, cardiovascular diseases are the leading ones. Conducted studies have indicated that systolic blood pressure and plasma triglyceride levels are lower in pet owner subjects when compared with the non-owners. [38] In Odendaal's study, neurochemicals (β -endorphin, oxytocin, prolactin, phenylacetic acid, dopamine, cortisol) related to drop down of blood pressure were evaluated between 18 subjects and 18 dogs before and after the positive interactions. Statistically significant data ($p < 0.05$) have indicated that neurochemicals related to blood pressure are increased in both groups and attention behavior function is increased after AAT except cortisol (cortisol was low significantly in humans, but this decrease was not found to be significantly in dogs. [58] It has been reported in studies of another chronic disease, namely cancer, that AAT had positive effects both on patients and their relatives. [46], [59], [60] The positive effects are reported as decreased stress and anxiety; compliance with treatment and improvement in adaptation; relaxation; better nutrition; physical activity; socialization; participating in new activities; verbalization of fright and concerns; decreased nervousness; increased feeling of happiness; thus improvement in life quality. [46], [60]

Similar results have been obtained in studies performed on disabled subjects. [61]- [64] Especially achieved improvements were increased non-verbal interactions, physical activities, and daily life activities leading to increased life quality. Although these studies have been performed commonly in children with widespread developmental disorders, it should also be considered that Alzheimer patients may have various disabilities, which would lower their life quality, so their daily life activities may be limited according to the stage and severity of disease. When evaluated in this aspect, animal assisted therapies will provide significant benefits.

In a study performed on AIDS patients, it has been reported that cat assisted therapy has supported patients' communications with their families and friends, and has provided prevention from the feeling of loneliness.

6. Psychological and psychiatric diseases

Animal assisted therapies are especially employed in hospitalized children and Alzheimer patients to decrease stress. Animal companionship is employed in anxiety, refusal of therapy, refusal of eating and decreasing other agitated behaviors, treatments of various psychological

and psychiatric disorders o provide treatment compliance and to increase the life quality. Patients, who are hospitalized in rehabilitation centers are scheduled for weekly or monthly therapy programs with trained animals, so physical, emotional, social and cognitive benefit of AAT are used. It has been reported that blood pressure and cardiac rate are decreased, cortisol (stress hormone) is markedly decreased, and pain sensation is decreased.

Animal assisted therapy has been shown to be effective in patients with speech disorders like aphasia, schizophrenia and dementia (Table 4). [3], [7], [8], [12], [51]

Reference	Patients, study group	Pet therapy model	Results
<i>Macaulley BL, 2006</i> [3]	Three men with aphasia from left-hemisphere strokes and during AAT therapy with a 8 year old neutered male Newfoundland dog participated into the study.	Dog therapy	Dog may act as an excellent catalyst to motivate the client to talk and provide an atmosphere of unconditional acceptance for the speech disorders and brain injuries.
<i>LaFrance C et al, 2007</i> [7]	A 61-year old male with non-fluent aphasia and a left cerebral vascular accident. A therapy dog was 5 year old retriever.	Dog therapy	In condition with the dog and dog handler, it was found that both social verbal and non-verbal behaviors markedly increased in patient.
<i>Nathans-Barel I et al, 2005</i> [8]	Patients with hedonic tone of 10 chronic schizophrenia participated in 10 weekly sessions of AAT was compared to control group treated without animal.	Dog therapy	In AAT group, significant improvements of hedonic tone compared to control. It was observed that an increasing in use of leisure time and motivation.
<i>Richeson N, 2003</i> [12]	15 nursing home residents with dementia participated in a daily AAT for three weeks.	Dog therapy	Significant decrease in agitated behaviors and statistically significant increase in social interaction.
<i>Kovács Z, 2004</i> [51]	Seven schizophrenic patients living in a social institute participated into the study for 9 month treatment period. Each weekly therapeutic session was 50 min.	Dog therapy	AAT was found to be helpful in daily life activities and rehabilitation of schizophrenic patients. Significant improvement in domestic and health activities.

Table 4. Dog therapy models in aphasia, schizophrenia and dementia.

Nathan reported from his study that animal assisted therapy improved anhedonia in chronic schizophrenia patients. Anhedonia is one of the negative symptoms of dementia, and it is the main phenomenon related to poor social functionality and development of treatment resistance. In an active study performed with dogs, significant improvement has been observed in anhedonia in AAT group when compared with the controls. As a result of the study, it has been reported that animal assisted therapy might contribute in life quality and psychosocial rehabilitation of chronic schizophrenia patients.⁸

Antonioli and Reveley observed in their randomized, controlled study that depression symptoms were observed to be improved in the 2nd week of treatment in patients with mild-moderate depression. Antonioli responded the comment indicating that patient number was limited and study population was a specific group as this dolphin study has indicated that, according to "Biophilia" hypothesis, interaction between animals and humans could be beneficial in their natural environments. [65], [66] "Biophilia" term is first defined by psychologist Erich, and is based on "affection level, which is required for mental health and emotional well-being". [67] Kellert and Wilson improved biophilia concept, and stated that human health and well-being were related to interactions with the natural environments. [68]

7. How can a dog assisted therapy be beneficial for therapy in Alzheimer patients?

It may cause decreased agitation, improvement in the mood, and increased communication with the surrounding: Alzheimer patients may experience different clinical symptoms at different disease stages. Generally as the disease is progressed, they isolate themselves from their surroundings, family members, friends, healthcare personnel; they become quieter and less mobile. In this stage, an accompanying therapy dog may even become the only communication bridge to continue the interaction with their surroundings. Sometimes patients may end up the silence on a dog's touch or behaviors; they may smile, talk a few words, and even they may be involved more with their surroundings.

Indoor and outdoor safety problems are most commonly encountered problems in some patients. With the accompanying well-trained dog, the patient can feel more secure. Since the dog can estimate behaviors of the patient, it may warn the patient and his /her relatives and/or healthcare personnel before and/or during the behaviors. A guiding dog may prevent the patient, who would like to leave his/her surrounding (home or nursery home) without informing anybody, from many dangers he/she would be confronted with. When the patient come to the top of the ladder, the dog may inform the patient about his/her position, how he/she should act or what he/she should do next by barking or behaving differently non-verbally without agitating the patient. It may protect the patient while crossing the street. The dog guiding a patient, who will forget the way home or the address of his/her home, can lead the patient home safely and in good health.

Aquarium assisted therapy studies have revealed that eating habits of Alzheimer patients are improved by feeding fish. Moreover aquarium assisted activities improve hand skills as well

as they increase socialization of patients. Various mood disorders like nervousness, agitation, unhappiness, very quietness, and loneliness may be observed in subjects with dementia, who live in nursery homes. Aquariums at nursery homes may attract attention of subjects in these crowded environments, they may provide relaxation and happiness for them as well as they may help people live in more humane environments by decreasing work load and stress also for relatives of patients and healthcare personnel. Aquariums may help all individuals to share the same environment with the underwater creatures.

AAT is especially effective in elderly subjects with cognitive disorders like Alzheimer disease. Patients with dementia usually experience various degrees of agitation mainly in the evening. This situation, known as "sundowning", is not only stressful for patients, but can also be challenging for the healthcare personnel. Even touching an animal may decrease anxiety during challenging evening hours, and increase calmness/well-being feelings.

It has been observed that responses have been achieved in patients with advanced dementia by animal assisted therapies. Some patients with dementia may develop better and easier communications with animals when compared with humans. A pet can listen to a patient with dementia without judging. In guiding dog visits in AAT program, dogs may allow patients to come near to them and play with them. It has been reported that dog assisted therapies may help these exercises to be happier and more motivating experiences in patients, who are recommended to take a walk. These patients are also reported to have improved life quality, and socialization desires when compared with patients, who have not kept or lived with animals.

A therapy dog provides the Alzheimer patient a unique communication and love bonding, which can be re-shaped according to the target whichever animal assisted therapy is required, and various physical, mental and social health benefits can be achieved. Fish, cat, dog, horse or tortoise may present human benefits, which we cannot presume for Alzheimer patients, and by supporting patients' treatment compliances, they provide that patient relatives and healthcare personnel serve under more positive conditions. To provide the most benefit from AAT or AAA, in especially dog therapies, "resident" or "visiting" models can be used together for patients with dementia and Alzheimer's disease. [14], [15], [18] It is not clearly explored which therapy model more useful than the other one. [9] In another review written by Williams and Jenkins reported that animal visitings to nursing-care units can provide various benefits including relaxation, improving of apathy and decreasing in agitation, aggression behavior and blood pressure for both patients and their caregivers, relatives. [18] According to the Churchill et al., a therapy dog can reduce some agitation behaviors of Alzheimer patients with especially sundown syndrome, and also help increasing social behaviors and calm down. [16]

Studies shown that environmental factors or changes in Alzheimer's disease special care units can be effect on patients' behavioral health outcomes including aggression, resident agitation, social withdrawal, depression, psychotic problems. [69], [70] That is why, treatment procedures should be planned and managed considering a balanced combination of pharmacologic, behavioral and environmental options in order to improve health, behavior and quality of life of patients with Alzheimer's disease. [70] It is important that physicians who are playing a key role in recognizing problems and arranging suitable treatment for their patients should consider alternative treatment options based on social and recreational interventions including

meditation, validation therapy, reality orientation, reminiscence therapy, sensory interventions (therapeutic touch and massage therapy, aromatherapy, music therapy, dance therapy, light therapy, multisensory stimulation therapy), social contact (animal-assisted therapy, simulated presence therapy), exercise, art therapy and Montessori-based activities. [71], [72] In addition, most of the AAT studies have been focused on dog, cat and other small animal activities. It is not well-known that animal assisted therapies with farm animals may have positive effects on self-efficacy and coping ability among psychiatric patients. [73]

As displayed on Table 5, AAT especially dog therapies can be used successively as a preventive and interventional method in patients with Alzheimers' disease and dementia. Also, recent studies have shown that AAT may be beneficial to improve for various psychiatric diseases including Alzheimer, dementia, depression, anxiety, addiction, schizophrenia, autism spectrum disorder. [74]- [79]

Authors	Patients or study group	Pet therapy model	Results	Study design
<i>Moretti F, et al. 2011</i>	Over 84 age patients with dementia, depression and psychosis Pet group (n=10) Control group (n=11)	Dog therapy	Comparing to the control group, improvements as below was observed in the pet group: Decreasing of depression symptoms at 50% level and increasing 4.5 times in mini mental scores.	Methodological Study (6 weeks)
<i>McCabe BW, et al. 2002</i>	Patients with Alzheimer in a special care unit	Resident dog therapy in a special care unit	Significantly decreasing of problem behaviors at the end of the 4 weeks.	Methodological study (4 weeks)
<i>Edwards NE and Beck AM, et al. 2002</i>	62 patients with Alzheimer living a special care unit	Aquarium therapy used for improving nutrition intake behaviors	Since 2th weeks, nutritional intake behavior increased significantly and this increase kept on during 6 weeks. Over 16 week period, it was observed that patients had needed less nutritional supplements than baseline. Finally, authors indicated that dog therapy can provide health care cost savings (personal communication).	Methodological study (Follow-up) (6 weeks)
<i>Fritz CL, et al. 1996</i>	244 caregivers working with Alzheimer patients in Northern California.	Man and women contacted with pets regular (dog or cat)	It was observed that man who were attached to dogs scored better psychological health than men who had no pets. While, women less than 40 years old attached to cats were scored	Case-control study

Authors	Patients or study group	Pet therapy model	Results	Study design
	124 caregivers contact with pets. 120 caregivers didn't contact with pets included into the control group.		better some psychological health than women same aged and had no pets, women aged 40 to 59 years attached to dogs scored worse of life satisfaction and depression than women in the same age and had no pets.	
<i>Fritz CL, et al. 1995</i>	64 Alzheimer patients living in a private nursing home.	Pet-therapy group: 34 patients contact with pets Control group: 34 patients didn't contact with pets.	It was observed that, verbal aggression and anxiety was reported less in patients exposed to companion animals than patients didn't exposed to pets.	Methodological study
<i>Tribet J, et al. 2008</i>	2 female and one male patients in a nursing home diagnosed with severe dementia.	A dog therapy used 15 times over 9 months. A therapy performed in the same place for 30 min, once a week.	Psychological benefits obtained from the study as follows: <i>Calming effect</i> was observed on the patients, which is this effect provided that communication link would be needed during therapy sessions. With the dogs' unconditional acceptance <i>increased patients' self-esteem</i> need to patients felt themselves was in more secure environment. Addition, it was observed that their <i>social behaviours increased</i> by touching dog and its non-verbal communication.	Prospective-qualitative study
<i>Kanamori M, et al. 2001</i>	7 patients with senile dementia and 20 patients enrolled into the control group in an adult day care center.	AAT was used for 6 weeks. Before and after AAT was evaluated mini mental state, activities of daily living, behavioral pathology and salivary CgA.	The average mini mental state exam score was more higher than baseline, activities of daily living was more higher than baseline, behavioral pathology was more lower than baseline and finally salivary CgA was found to be decreasing tendency. Several methods can be used in order to show useful effects of AAT in patients with dementia as	Methodological study

Authors	Patients or study group	Pet therapy model	Results	Study design
			determined in this study by Kanamori M, et al.	

Table 5. Animal Assisted Therapy Studies in patients with Alzheimer’s disease and other dementia

According to the literature, number of studies recommending animal assisted therapies in clinical and social medicine practices in elderly people with dementia, Alzheimer’s disease, ability losses, mental health problems and conduct disorders, cognitive problems, physical and functional health problems have been increased rapidly. [1-3], [63] Targeted acquisitions in AAT applications can be classified under five headings as social, psychological, training, physical and motivational. Moreover, what we expect from all applications in a patient with Alzheimer’s disease are mainly physiological improvements, better focusing on environment, enabling physical contact, interaction with surroundings, improvements in nutritional behaviors, socialization, acceptance, motivation, increased physical activity, stress, decreased mood disorders like depression, and agitation, enjoying, and decreased feeling of loneliness.

8. Risks of AAT and Their managements

In USA, 60% of the population has at least one pet at home. Patients and animals participating in AAT require special care for prevention of zoonotic diseases, hypersensitivity reactions and injuries during visits. Therefore, the maximum benefit obtained from this therapy method depends on the multidisciplinary team work of a veterinarian specialist, a veterinarian public health specialist, a medical doctor, and an experienced therapist. [49], [80] Animal assisted therapy performed at treatment centers should always be performed following by a structured program, under the recommended guides, and targeted at the objectives of the program. [49] Hamsworth and Pizer reported after they investigated studies, which evaluated interactions with animals, and risk factors for zoonosis in immunocompromised children, and guidelines that information obtained from specialists were not adequately evidence-based. Keeping an animal is beneficial for prevention and development of emotional and physical health. However, guidelines are also required to conduct treatments. [81]

Minimization of risks in such applications depends upon a careful planning with multidisciplinary approaches, written protocols, personnel training, documentation, and investigations. Veterinarian public health practices, which will be performed in this field, are important sources to keep risks endangering human and animal health at minimum levels. Especially veterinarians should choose the appropriate animal for therapy of each patient group according to temperament and behaviors of animals, perform the care for each animal, work for prevention of zoonotic diseases, and suggest an appropriate interaction model for the therapy. [32] Infection controlling policies and regulations should be obeyed in treatment and prevention of zoonotic diseases, so that animal assisted therapies will be

more widespread. If measures for risk prevention are taken, then AAT applications can be performed safely. [82], [83]

In studies, where risk analyses have been performed, people interacting with pets have been observed to have benefits for their health. It has been reported from regions, where risks were not significantly high, controlled environmental conditions are provided especially in Europe and North America, potential benefits are reported in treatments with animals kept at home or at hospitals. Guidelines have been developed to limit infection risk during applications and to perform safe treatments. [84]- [86]

In addition to guidelines used during treatments, supportive units have also been established. Animal Assisted Crisis Response (AACR) unit is one of these. This unit provides services in how to struggle with the impending crises for assigned healthcare personnel, consultants and other trainers during animal assisted therapies. [87] Efficiency of these studies depends upon conductance of communication between the related units with a mutual language and a multidisciplinary approach. The most commonly encountered crises issues may be animal behavior, infection risk, and patient-trainer dispute.

Before starting animal assisted therapy and during its' all procedures, it is always remembered that AAT should be performed according to the guidelines in order to prevent risks including adverse reactions of patients, animals, physicians, caregivers, nurses, health personnels, and also relatives of patients, infectious diseases, bitings, etc. it is well clearly explained that AAT should be arranged, managed and performed by a specialist team including patients' physician, veterinary surgeon, psychologist, occupational therapist, expert caregivers, specialist nurses. Therefore, especially veterinary students should be trained about animal assisted therapies, activities and first of all human-animal bond during their undergraduate and postgraduate education. [88]- [91] At this point, according to the Timmins, a veterinary family practice conception can be helpful to understand and contribute human-animal bond from the theoretical framework into the practice for providing needs of patients. [92]

During applications, issues like increased work intensity of the personnel, zoonotic diseases, comfort and care of animals are considered. [93] These may be prevented by well-planned programming. [94] Disease risk can be easily prevented by regular animal health controls, and follow up of individuals. In developing countries like Turkey, animal assisted therapy is not practiced as a specialty filed, yet. Only limited services can be provided according to positive outcomes of human-animal interactions. But recently, an international project (Animals in Therapy Education) have been implemented for 2 years among different institutions from Turkey, Italy and France with financial supporting by European Union LLP Grundtvig Program for aged people. This project intends to design a collection of best practices related to implementation of pet therapy on aged people. As a result of this project will also ease the transfer of pet therapy practices through the comparison and the evaluation of different solutions adopted in the countries involved among partners from Italy, France and Turkey. [95]

9. Conclusion

In this present review, some information about what animal assisted therapies are, application fields, mechanism of action, sample applications for Alzheimer patients, and risk control in AAT, and some recommendations are suggested. It has been observed that this supportive therapeutic approach has been aimed at "complete well-being of individuals physically, socially and mentally as well as improvements of these well-being conditions", which is always emphasized in public health aspect. However, there are still some questions without clear answers, such as AAT is also effective in group therapies as it has been in individualized therapy; how temperament and other features of assisting animal should be. Whatever types the program is, temperaments of all animals should be tested; they should be examined by a veterinarian; and listening-learning training should be performed with patients.

When AAT is practiced according to guidelines, appropriate ethical principles, then it will be an effective supportive treatment option for improvement of human health, life quality, and especially preservation of health state of individuals. However, as it has been undertaken in this present review, it is believed that studies related to animal assisted therapies are required also in our country to evaluate its efficacies in different patient groups correctly.

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