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Investigation of -Assisted Rehabilitation and Its Effect on Patient-Dog Relationships in Young adults Alzheimer's disease

Ramkumar Krishnamoorthy[1]*, Swati Singh[2], Rahul Bhatt[3]

*[1]Assistant Professor, Department of Computer Sceince and Information Technology, Jain (Deemed to be University), Bangalore, India, Email Id- ramkumar.k@jainuniversity.ac.in, Orcid Id- 0000-0003-1164-6504

[2]Assistant Professor, Maharishi School of Engineering & Technology, Maharishi University of Information Technology, Uttar Pradesh, India, Email Id- swatisingh5444@gmail.com, Orcid Id- 0009-0007-3888-3258

[3]Assistant Professor, School of Engineering and Computer, Dev Bhoomi Uttarakhand University, Dehradun, Uttarakhand, India, Email Id- socse.rahul@dbuu.ac.in, Orcid Id- 0009-0004-0486-9413

Abstract

Alzheimer's disease (AD) affects cognitive abilities and general well-being, and it presents substantial obstacles, particularly for young individuals. Making use of the special relationship that exists between humans and dogs, canine-assisted rehabilitation has gained attention as a possible therapeutic intervention. A nonpharmacological strategy called dog-assisted treatment (DAT), which focuses on patient-dog contact, has been suggested as a benefit for adult Alzheimer's disease. Thus, we intend to analyze the reliability of the data from the randomized controlled trials (RCTs) estimations as well as the impacts of DAT on this population. A detailed examination of the literature produced 1500 studies from three different sources. Twenty papers made into the final analysis after extensive screening and qualifying requirements. We incorporated Research that is quasi-experimental (QE) controlled and randomized controlled trials (RCTs) that assessed the advantages and disadvantages of DAT in Alzheimer -affected individuals. The study employed random effects systematic reviews and produced scaled mean differences (SMD) or mean differences (MD) along with their respective 95 %confidence intervals (95 % CI). RCTs with very low confidence data show that DAT did not affect sadness, anxiety, daily living activities, poor quality of life, or cognitive impairment those with Alzheimer's; nevertheless, tiny Research reported a favorable effect on indifference. The extensive Research provides attention to the possible advantages of canine-assisted therapy for young persons with Alzheimer's disease. The importance of including therapy dogs in rehabilitation programs for this population is highlighted by the favorable results shown in the cognitive and emotional domains, as well as the growth of significant patient-dog interactions.

Keywords: Canine-Assisted Rehabilitation, Young Adults, Alzheimer's Disease, Patient-Dog Relationships

INTRODUCTION

Alzheimer's disease (AD) is a progressive neurological illness that predominantly affects memory and cognitive abilities very difficult for those who are diagnosed with as well as those who care for patients (1). It is anticipated that the number of people 65 and older will almost quadruple to 72.1 million by 2030 from an estimated 39.6 million in 2009 (2). It is expected that the amount of canine-assisted rehabilitation, especially because of its possible effects on the living quality of young individuals with AD (3). It is essential to investigate alternative therapy techniques since this population presents particular obstacles in the cognitive and emotional domains (4). Stress's effects on human health and potential stress-reduction strategies have received a lot of Research in recent decades (5). Child and adolescent mental health centers and primary care providers handle mental health issues that children and adolescents come there, when a patient with a severe mental illness (SMD) needs more intensive outpatient partial hospitalization care (6). In-depth and restorative care is provided at DHs, with individualized treatment plans that are tailored to each patient's unique need. It is carried out by a group employing thorough, multidisciplinary methodology (7). When it comes to entrance requirements, they are less stringent in an inpatient mental health unit.Inactivity has well-documented complications (8). Figure (1)

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shows the symptoms of AD (9). There is a wealth of evidence, albeit at a low level, that supports the significance of ambulation during cardiac-related hospital stays (10).

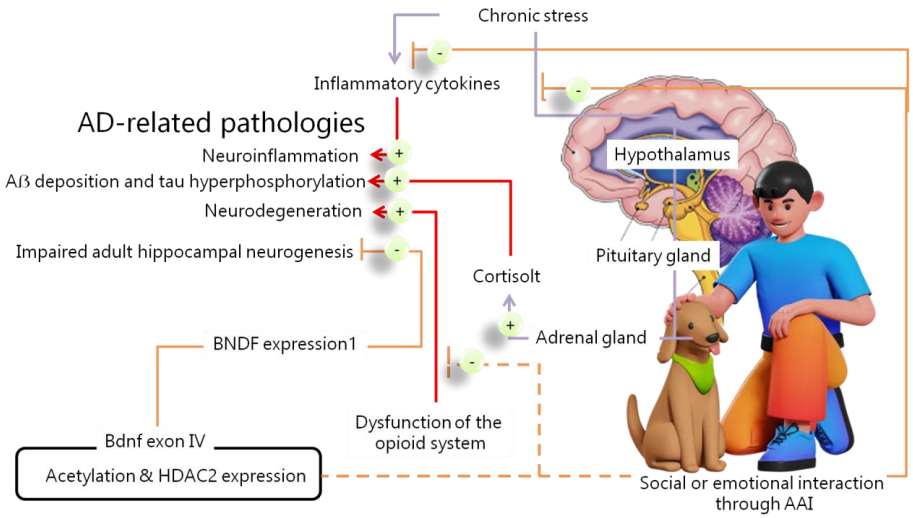

Figure (1). Relieving the symptoms of Alzheimer's disease

(**Source:** https://www.frontiersin.org/files/Articles/682308/fnagi-13-682308-HTML-r1/image_m/fnagi-13-682308-g001.jpg**)**

It's anticipated that, this population grows more health issues and disabilities will be documented. The risk of morbidity is increased when aging-related physiological changes are combined with a sedentary lifestyle. The financial burden of disability justifies the investigation of low-cost, readily available, nonpharmacological strategies to enhance social support, reduce feelings of sadness and loneliness, and extend the practical autonomy of older persons(10). It evaluates the impact of including dog companions in early-onset Alzheimer's patients' rehabilitation programs, emphasizing social, emotional, and cognitive effectstherapy against conventional rehabilitation techniques in terms of increases in social engagement, emotional stability, and cognitive performance.

The study (11) describeda summary of the suggested neurobiological processes behind the advantages of transcranial magnetic stimulation (TMS) for AD is provided in this article, with a focus on the excitatory/inhibitory equilibrium's modulatory effects that TMS therapy protocols created for young adults have unintended detrimental effects on elderly individuals or on the brain affected by dementia based on accumulating data from several domains.The study (12) provided the brains of young urbanites. Iron-rich carbon-based as well as friction-derived nanoparticles (CFDNPs), which are commonly seen in airborne particle contamination, have been found in large quantities. One potential mechanism between air pollution exposure and brain illnesses is epigenetic gene regulation.The author (13) suggested the majority of MMC pollutant emissions come from mobile sources, especially unregulated diesel cars, which expose people to quantities higher than EPA and WHO guidelines. Every MMC resident has their brains tested for magnetic, rich in iron, and very oxidative CFDNP.The study (14) described an ultrasensitive blood immunoassay that we created and verified, its performance was assessed in four prospective cohorts based in clinics. Age-matched controls and ADpatients made up the discovery cohort. Two validation cohorts comprised elderly persons without cognitive impairment. The author (15) suggested that the ability of each network's grey matter volume to the receiver operating characteristic analysis, along with logistic regressions, used to evaluate the whole-brain pattern to differentiate between AD and aging. In aging and AD, they also evaluated interindividual variation in morphometric networks and throughout the whole brain architecture because it is frequently said that increasing heterogeneity is one of the primary characteristics defining brain aging.

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METHODS

Criteria for diagnosing Alzheimer's disease

All randomized controlled trial studies using Quasi-experimental (QE) controls and RCTs that specifically evaluated the advantages of DAT for dementia patients in adulthood were included in this systematic review (16). We eliminated the studies for not possible to get the entire text. When AD is suspected, a patient should have a number of tests performed, such as a brain magnetic resonance imaging (MRI), neurological testing, and laboratory testing for vitamin B12, and other procedures not related to the customer's illness and background. Beta-amyloid protein (Aβ) extrinsic contributions, known as Figure (2), show the brain's structure with AD senile plaques can take on several structural forms, such as neuritic, dispersed, dense-cored, classic, or compact type plaques (17). Enzymes that undergo proteolytic cleavage, such β- and γ-secretase, are in charge of synthesizing Aβ deposits from the transmembrane amyloid precursor protein (APP).

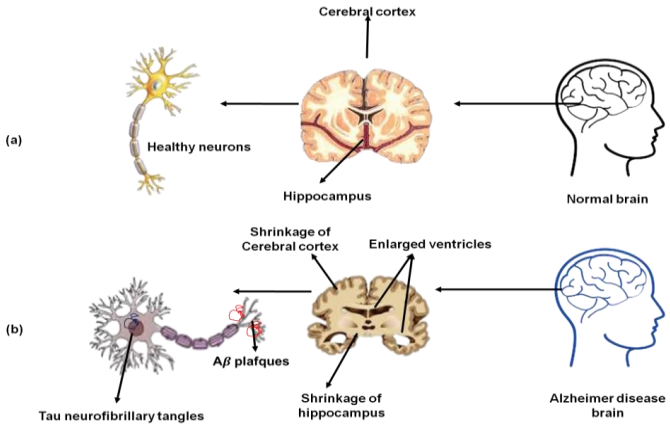

Figure (2). The brain's structure with Alzheimer's disease (Source: Author)

Analytical statistics

To compile Research that has assessed comparable results, we conducted metaanalysesmeta-analyses. We computed when comparing and meta-analyzing these papers standardized mean differences (SMD) were used to determine which assessed using various scales between studies. Since no meta-analysis was done, we give the mean difference (MD) for outcomes that were assessed in a single research (18). The last evaluation of each result was provided for examines that were repeated measures or pre- and post-intervention measurements, and the metaanalyses meta-analyses were conducted using this metric for the studies that were measured at the conclusion of the prevention. Being that there are disparities in the confidence of evidence between these two types of Research and because the approach was used for RCTs, we chose to publish the results according to the study design separately (19). Because of the overall evaluation of variability (in the community, assistance, and comparators), we believe it is reasonable to utilize random-effects models. The statistical has few studies included in each meta-analysis, meta-analysis publication bias was not assessed.

RESULT

Examines attributes

We located a total of 1500 titles in the three sources we reviewed and examined a total of 1000 titles; 200 papers underwent full-text evaluation; eight of them were included.Five studies were carried out in assisted living facilities, four in childcare centers, and five in nursing homes. However, the intervention setting was different,

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with areas designed specifically for the research, unique assisted living facilities, or nursing homes. Five studies evaluated inclusion criteria pertaining to dementia diagnosis using the Mini-Mental State Exam (MMSE). Those who possess a dementia diagnosis from the clinical history were included, whereas three other studies employed other cut-off points (20). Additionally, the investigations covered a range of dementia severity degrees. In reference to the treatment, it included DAT sessions, which took place one to three times a week for fifteen to ninety minutes each time. These sessions might be individual or group meetings, and they take place between three weeks and seven months. In regard to the treatment,

Outcome measurements

Six studies evaluated activities of daily living; three employed the Barthel index, whereas another employed the N-ADL (activities of daily living) score. An improved rating on either scale indicates more autonomy. A higher score indicates a greater likelihood of anxiety. Mood Inspection Scale for Dementia (DMAS), Multidimensional Observation Scale for Elderly Subjects (MOSES), and Cornell Scale for Anxiety in Dementia (ASDD) were utilized in five researches. A higher score on all measures indicates a greater likelihood of anxiety. Largernumber of points on all five measures indicates greater agitation. Two researchers utilized the full three studies: employed two short CMAIs to measure agitation (21). Quality of Life (QoL) was measured in four studies: three employed using the AD scale and the assessment, in order. Since a greater quality of life is indicated by more points on the QOL-AD scale than the QUALID scale, the findings of The QOL-AD scale were used in several studies. Mental abilities were assessed in three different ways: two utilized the Michigan Multiple Scale Examination (MMSE), where higher scores correspond to higher the Alzheimer Disease Assessment Scale (ADAS) results associated with improved memory. Scores correspond to worse cognitive function (22). Figure (3) shows the PRISMA flow to reverse the ADAS scale so that greater cognitive function scores correspond to better function. Anxiety, irritation, withdrawal, and other MOSES self-care aspects were assessed in one Research; a higher score corresponds to worse results.

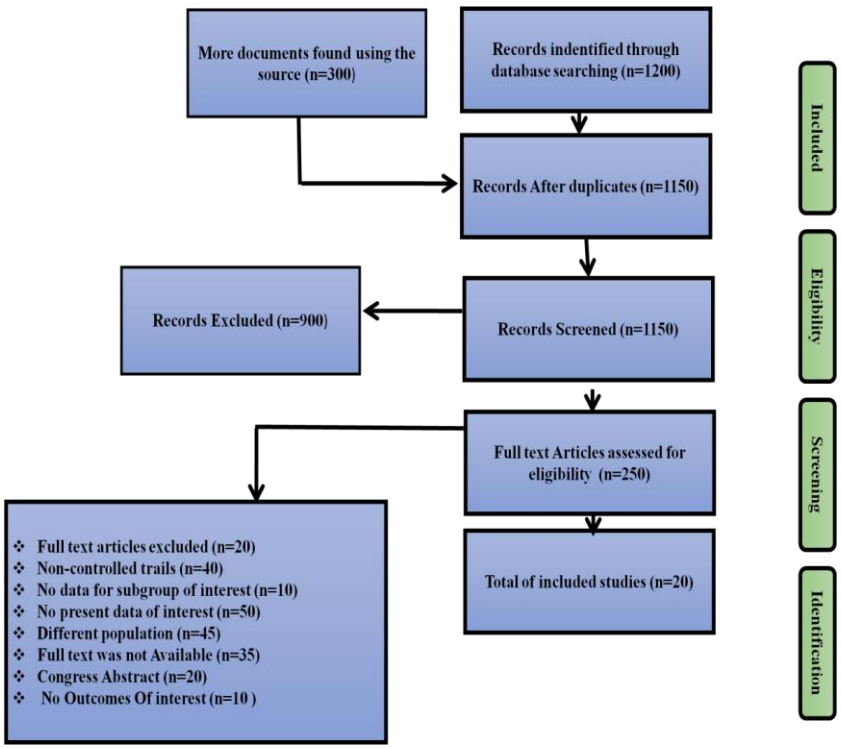

Figure (3). PRISMA flow diagram (**Source**: Author)

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Possibility of biases

The Cochrane method was used to evaluate the risk of bias for six RCTs. Each RCT experienced issues with reporting allocation concealment, personnel blinding, and data analyst blinding; five RCTs experienced issues with outcome assessment blinding (23). Figure (4) (a) and Figure 4 (b) represent the bias risk in BCTs and bias in risk QE technique, which was used to evaluate the bias risk for four QE-controlled experiments. The reporting of the studies included the inclusion of consecutive patients, the purpose assessment of the study outcome, and the computation of sample sizes (24).

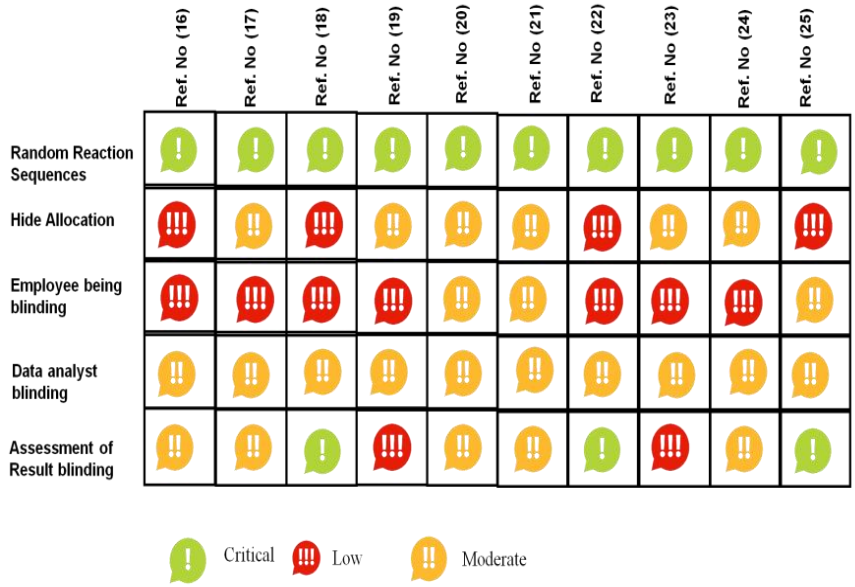

Figure (4a). Bias risk in BCTs (**Source:** Author)

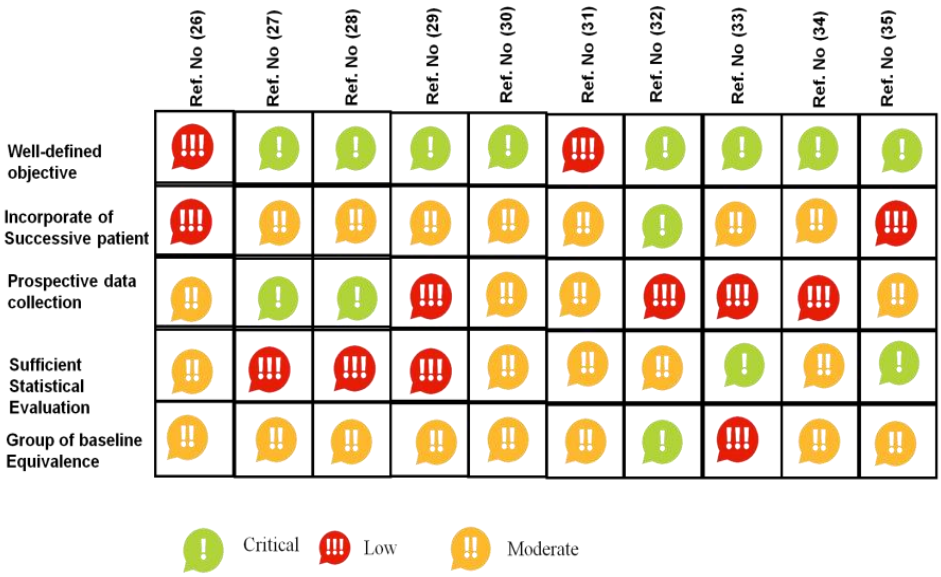

Figure (4b). Bias risk in QE (**Source:** Author)

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Result Summary

Twenty studies that assessed the impact of DAT on individuals with dementia were included in the analysis Figure (5) shows canine therapy that enhances day-to-day living(10 RCTs and 10 QE-controlled studies). These studies had a poor sample size, were highly biased, and were diverse (25). Pooled RCTs indicated no improvements in depression, agitation, daily living activities, or quality of life, but the one RCT that measured disinterest discovered a possible benefit. RCTs have very little data to be certain about in daily living actions, anxiety, quality of life, cognitive impairment, self-care, disorientation, irritation, or departure; pooled QE-controlled trials did not reveal improvements. However, a possible positive impact on depression was discovered (26). DAT had no influence on our usual routines. Figure (6) shows improvement in anxiety SMD: 0.18 for 2 RCTs; 95% CI range: 1.14 to -0.90. Anxiety (4 RCTs, 95% CI: -1.95 to 0.99; SMD: -0.50)QoL (5 RCTs, 95% CI: -0.43 to 0.75; SDM: 0.18).Figure (7) and (8) represents the reduce in anxiety and improvement in anxiety RCTs, SDM: -1.14; 95% Confidence Interval:-2.53 to 0.34, as well as cognitive decline

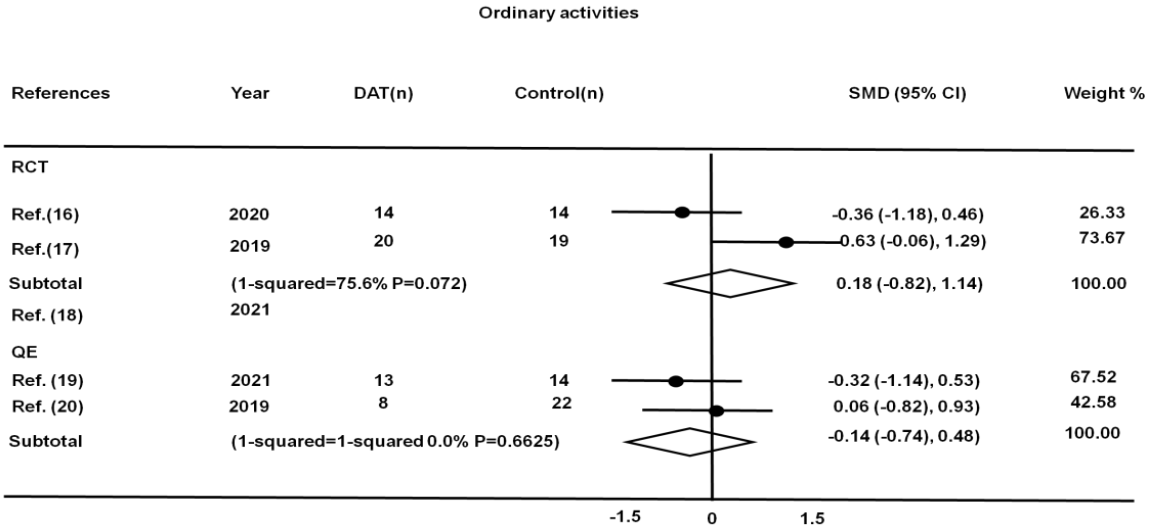

Figure (5). Canine therapy that enhances day-to-day living (**Source:** Author)

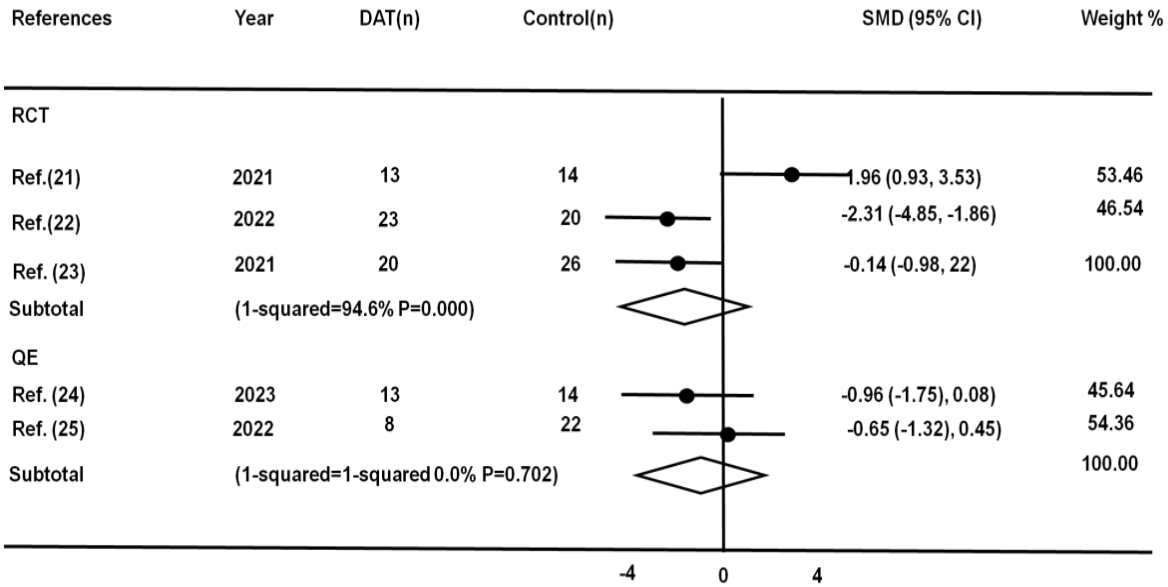

Figure (6). Improvement in Anxiety **(Source:** Author)

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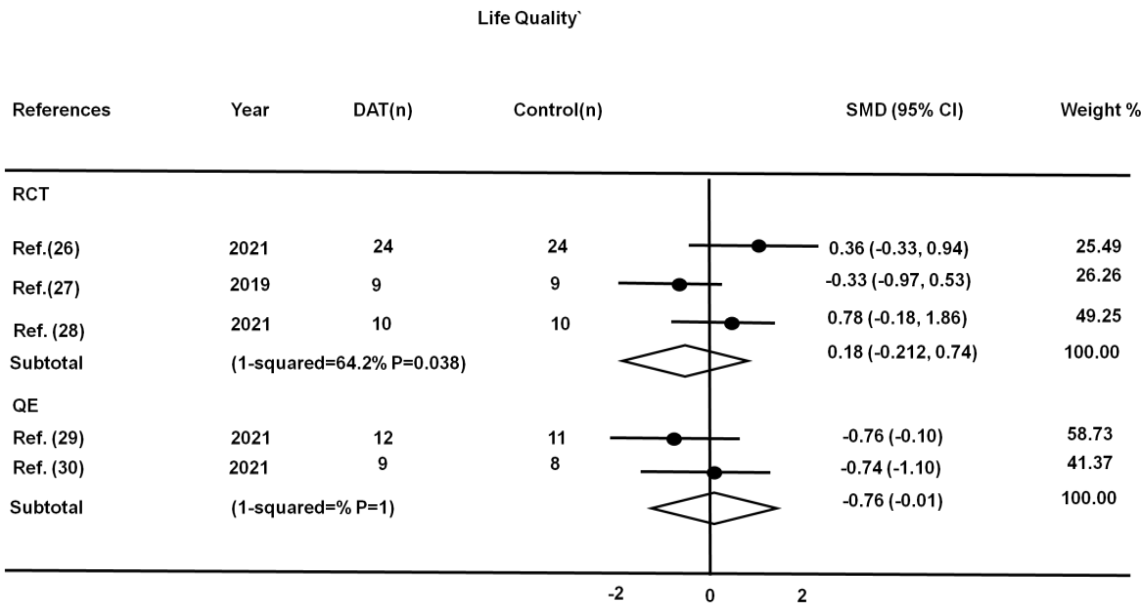

Figure (7). Dog contributed to the reduction in anxiety **(Source:** Author)

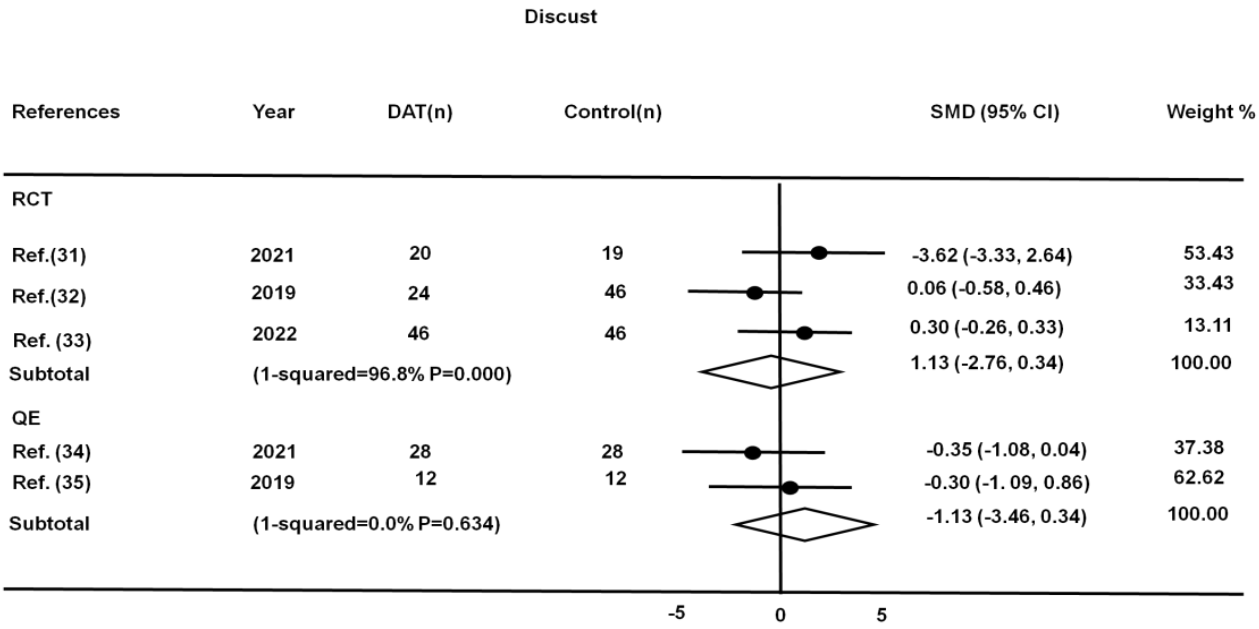

Figure (8). Increase in life quality **(Source:** Author)

Comparison with More Research

When RCTs do not demonstrate such an impact, the methodological constraints of QE research in adjusting significant founding factors necessitate that the results of these studies interpreted (27). Metaanalysis Comparison between three QE-controlled trials revealed slightly effect, while meta-analysis of four RCTs showed no advantage of DAT for depression; considering the methodological shortcomings of QE research in terms of regulating significant confounding factors when RCTs do not show an impact, the results of this Research need to be interpreted very carefully. Additionally, due to imprecision, the statistical restrictions QE

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adversely influenced when RCTs do not demonstrate such an impact, and the findings of these researches need to be interpreted. Table 1 shows theevidence level of confidence, limited size of the sample, variable control group treatment, and outcome measure, among other technical constraints of these RCTs; imprecision also had an impact on the RCTs (28). When combining QE studies with RCTs, we found that AAT had a beneficial effect on memory sufferers' anxiety (Two RCTs and two non-controlled QE investigations were present; evaluation focused on the two RCTs).

Table (1). Overview of the results to assess the evidence's level of confidence (Source: Author)

Results	Ordinary activity	Anxiety	Life Quality	Discussion
Absolute effect anticipated	SMD 0.18 SD more	SMD 0.50 SD lower	SMD 1.14 SD lower	SMD 0.18 SD higher
Participants' numbers and investigations	J32D32 (3 RCTs)	J82 D 82 (4 RCTs)	J89D85 (3 RCTs)	J67D 75 (4 RCTs)
Confidence in the evidence	Very low	Very low	Very low	Very low
Observations	Regarding if DAT affects everyday life activities	Regarding DAT's impact on anxiety	Regarding DAT's impact on agitation	Knowledge of DAT's impact on quality of life is limited.

DISCUSSION

There is a claim that meta-analyses do not compare comparable research, as there were insufficient diverse trials to evaluate. Luckily, we discovered that metaanalyses meta-analyses were helpful in providing thorough overview of the data, as decision-making requires summary impact estimations (29). The main studies' acknowledged shortcomings are evident in this meta-analysis as well, including a lack of information on the procedure, criteria for inclusion, outcome evaluation, and treatment given to the control group. Significant advantages of this systematic review include the following: It was etched with the PRISMA declaration (30). We discovered every article found in prior analyses by executing a searching technique using many databases, language-neutral, and across publications mentioning each study we located. Because of these benefits, we are able to present the most recent information on RCTs and QE-controlled studies in DAT, implications of applying the confidence of the results obtained(31). Evidence from significant positive impact on the exception of a tiny RCT that suggested DAT useful for apathy the included studies did not provide clear information about the risks associated with DAT, which included musculoskeletal illnesses, bites, falls, infections, anxiety and dread (32). In terms of evidentiary certainty, there is a significant chance of bias in the included Research (33). It is concerning that there is a moderate to severe risk of bias in all RCTs for both personnel and outcome assessment blinding, even if these blinding techniques are doable. In terms of patient preferences, some families and patients want to work with dogs because they are terrified of them (34). However, as the DAT intervention is typically contracted out to outside organizations, the tolerance of health center employees is sufficient. In terms of facilities, DAT has to happen in suitable locations big, open areas. Both human and non-human resources are required, including humans with experience handling dogs and a well-trained dog (35).

CONCLUSION

The ten effects of DAT on dementia were evaluated in ten QE-controlled trials and RCTs. Patients were found. We discovered evidence to support the claim that DAT has no effect on anxiety, sadness, quality of life, or daily activities despite the fact RCT examined apathy had an apparent positive impact. No RCT evaluated this

intervention's negative effects. Dogs encourage social interaction among AD patients, which lessens their feelings of social isolation and loneliness. when a patient interacts with an animal use of animal-assisted intervention in AD patients completely justified. Dogs of any size or breed can participate in this kind of exercise with AD patients. Considering the limited sample size, substantial bias risk, and other limitations of these trials, more RCTs are required to assess the advantages and disadvantages of DAT in Alzheimer sufferers with a very low degree of confidence in the data. Adequate reporting, minimizing bias risk, describing adverse effects, and providing an explanation of the treatments in the DAT control areas are necessary components of this Research.

REFERENCES

[1] Guillen Guzmán, E., Sastre Rodríguez, L., Santamarina-Perez, P., Hermida Barros, L., García Giralt, M., Domenec Elizalde, E., ...& Morer Liñan, A. (2022). The Benefits of Dog-Assisted Therapy as Complementary Treatment in a Children's Mental Health Day Hospital. Animals, 12(20), 2841.Doi: https://doi.org/10.3390/ani12202841

[2] Quintavalla, F., Cao, S., Spinelli, D., Caffarra, P., Rossi, F. M., Basini, G., & Sabbioni, A. (2021). Effects of dog-assisted therapies on cognitive mnemonic capabilities in people affected by Alzheimer's disease. Animals, 11(5), 1366.Doi: https://doi.org/10.3390/ani11051366

[3] Santaniello, A., Garzillo, S., Cristiano, S., Fioretti, A., &Menna, L. F. (2021). The research of standardized protocols for dog involvement in animal-assisted therapy: a systematic review. Animals, 11(9), 2576. Doi: https://doi.org/10.3390/ani11092576

[4] Koukourikos, K., Georgopoulou, A., Kourkouta, L., &Tsaloglidou, A. (2019). Benefits of animal assisted therapy in mental health. International journal of caring sciences, 12(3), 1898-1905.

[5] Feng, Y., Lin, Y., Zhang, N., Jiang, X., & Zhang, L. (2021). Effects of animal-assisted therapy on hospitalized children and teenagers: A systematic review and meta-analysis. Journal of Pediatric Nursing, 60, 11-23. Doi: https://doi.org/10.1016/j.pedn.2021.01.020

[6] Rabbito, A., Dulewicz, M., Kulczyńska-Przybik, A., & Mroczko, B. (2020). Biochemical markers in Alzheimer's disease. International journal of molecular sciences, 21(6), 1989.Doi: https://doi.org/10.3390/ijms21061989

[7] Lavín-Pérez, A. M., Martín-Sánchez, C., Martínez-Núñez, B., Lobato-Rincón, L. L., Villafaina, S., González-García, I., ...& Collado-Mateo, D. (2021). Effects of dog-assisted therapy in adolescents with eating disorders: A study protocol for a pilot controlled trial. Animals, 11(10), 2784.Doi: https://doi.org/10.3390/ani11102784

[8] Abraham, P. A., Kazman, J. B., Bonner, J. A., Olmert, M. D., Yount, R. A., & Deuster, P. A. (2022). Effects of training service dogs on service members with PTSD: A pilot-feasibility randomized study with mixed methods. Military psychology, 34(2), 187-196.Doi: https://doi.org/10.1080/08995605.2021.1984126

[9] Patto, M. V. (2020). Neurological perspectives on pets and the elderly: The truth about cats, dogs, and grandparents. Pets as Sentinels, Forecasters, and Promoters of Human Health, 269-293.Doi:https://doi.org/10.1007/978-3-030-30734-9_12

[10] Kuschel, R. M. (2022). A Comparison of Animal Assisted Therapy with Talk Therapy for Treating Anxiety among University Students (Doctoral dissertation, Regent University).Doi:https://doi.org/10.1523/ENEURO.0523-19.2022

[11] Weiler, M., Stieger, K. C., Long, J. M., & Rapp, P. R. (2020). Transcranial magnetic stimulation in Alzheimer's disease: are we ready?.Eneuro, 7(1).Doi: https://doi.org/10.1523/ENEURO.0235-19.2019

[12] Calderón-Garcidueñas, L., Herrera-Soto, A., Jury, N., Maher, B. A., González-Maciel, A., Reynoso-Robles, R., ...& Varela-Nallar, L. (2020). Reduced repressive epigenetic marks, increased DNA damage, and Alzheimer's disease hallmarks in the brains of humans and mice exposed to particulate urban air pollution. Environmental Research, 183, 109226.Doi: https://doi.org/10.1016/j.envres.2020.109226

[13] Calderón-Garcidueñas, L., Torres-Jardón, R., Kulesza, R. J., Mansour, Y., González-González, L. O., Gónzalez-Maciel, A., ...& Mukherjee, P. S. (2020). Alzheimer's disease starts in childhood in polluted Metropolitan Mexico City. A major health crisis is in progress. Environmental Research, 183, 109137.Doi:https://doi.org/10.1016/j.envres.2020.109137

[14] Karikari, T. K., Pascoal, T. A., Ashton, N. J., Janelidze, S., Benedet, A. L., Rodriguez, J. L., ...& Blennow, K. (2020). Blood phosphorylated tau 181 as a biomarker for Alzheimer's disease: a diagnostic performance and prediction modeling study using data from four prospective cohorts. The Lancet Neurology, 19(5), 422-433.Doi:https://doi.org/10.1016/S1474-4422(20)30071-5

[15] Pichet Binette, A., Gonneaud, J., Vogel, J. W., La Joie, R., Rosa-Neto, P., Collins, D. L., ... & PREVENT-AD Research Group. (2020). Morphometric network differences in aging versus Alzheimer's disease dementia. Brain, 143(2), 635-649.Doi: https://doi.org/10.1093/brain/awz414

[16] Bierbrauer, A., Kunz, L., Gomes, C. A., Luhmann, M., Deuker, L., Getzmann, S., ...& Axmacher, N. (2020). Unmasking selective path integration deficits in Alzheimer's disease risk carriers. Science advances, 6(35), eaba1394.Doi: https://doi.org/10.1126/sciadv.aba1394

[17] Maass, A., Barron, D., Harrison, T. M., Adams, J. N., La Joie, R., Baker, S., ...& Jagust, W. J. (2019). Alzheimer's pathology targets distinct memory networks in the ageing brain. brain, 142(8), 2492-2509.Doi:https://doi.org/10.1093/brain/awz154

[18] Gaitán, J. M., Moon, H. Y., Stremlau, M., Dubal, D. B., Cook, D. B., Okonkwo, O. C., & Van Praag, H. (2021). Effects of aerobic exercise training on systemic biomarkers and cognition in late middle-aged adults at risk for Alzheimer's disease. Frontiers in Endocrinology, 12, 660181.Doi: https://doi.org/10.3389/fendo.2021.660181

[19] Zhang, X. X., Tian, Y., Wang, Z. T., Ma, Y. H., Tan, L., & Yu, J. T. (2021). The epidemiology of Alzheimer's disease modifiable risk factors and prevention. The journal of prevention of Alzheimer's disease, 8, 313-321.Doi: https://doi.org/10.14283/jpad.2021.15

[20] Machová, K., Součková, M., Procházková, R., Vaníčková, Z., & Mezian, K. (2019). Canine-assisted therapy improves well-being in nurses. International journal of environmental Research and public health, 16(19), 3670.Doi: https://doi.org/10.3390/ijerph16193670

[21] Figueiredo, M. D. O., Alegretti, A. L., &Magalhães, L. (2021). Canine-assisted occupational therapy: a scoping review of the Brazilian literature. CadernosBrasileiros de TerapiaOcupacional, 29.Doi:https://doi.org/10.1590/2526-8910.ctoAR2087

[22] Narvekar, H. N., & Narvekar, H. N. (2022). Canine-assisted therapy in neurodevelopmental disorders: A scoping review. European Journal of Integrative Medicine, 50, 102112.Doi: https://doi.org/10.1016/j.eujim.2022.102112

[23] Olmert, M. D. (2021). The comfort dog project of Northern Uganda: An innovative canine-assisted psychosocial trauma recovery programme.

[24] Hill, J., Mensforth, S., Waldby, L., Fleming, J., Quinlan, T., & Driscoll, C. (2023). Canine-Assisted Occupational Therapy for Children within a Student-Led University Clinic: The Influence on Child Engagement from the Perspectives of Student and Parent Participants. Physical & Occupational Therapy InPediatrics, 1-16.Doi:https://doi.org/10.1080/01942638.2023.2273281

[25] Kosteniuk, B., Dell, C. A., Cruz, M., & Chalmers, D. (2022). An Experiential Approach to Canine-Assisted Learning in Corrections for Prisoners Who Use Substances. Journal of forensic nursing, 10-1097.Doi:https://doi.org/10.1080/01942638.2022.2273532

[26] Dawoud, M. (2021). The Effects of Canine-Assisted Therapy in Speech Therapy.Doi: https://doi.org/10.35988/sm-hs.2021.52481

[27] Nedzinskaitė, U., Mažeikaitė, J., Paleckaitis, M., & Stankevičius, R. (2019). Canine-assisted therapy and the improvement of physical characteristics in disabled children: a pilot study. SveikMoksl, 29(6), 88-94.Doi: https://doi.org/10.35988/sm-hs.2019.106

[28] Brosig, C. (2021). Nurse-Led Canine-Assisted Intervention Practice. In Career Paths in Human-Animal Interaction for Social and Behavioral Scientists (pp. 93-95). Routledge.Doi: https://doi.org/10.3389/ 2021.785241

[29] HU, J. J., BAI, Z. R., MIAO, S. Y., WANG, Y., WANG, M., & GAO, H. X. (2021). Effect of Canine-assisted Therapy on Family Function of Autism Spectrum Disorder. Chinese Journal of Rehabilitation Theory and Practice, 1199-1204. Doi: https://doi.org/10.3389/fvets.2021.573201

[30] Barker, S. B., & Gee, N. R. (2021). Canine-assisted interventions in hospitals: best practices for maximizing human and canine safety. Frontiers in Veterinary Science, 8, 615730.Doi: https://doi.org/10.3389/fvets.2021.615730

[31] Leng, K., Li, E., Eser, R., Piergies, A., Sit, R., Tan, M., ...& Kampmann, M. (2021). Molecular characterization of selectively vulnerable neurons in Alzheimer's disease. Nature neuroscience, 24(2), 276-287.Doi: https://doi.org/10.1038/s41593-020-00764-7

[32] Wesenberg, S., Mueller, C., Nestmann, F., & Holthoff-Detto, V. (2019). Effects of an animal-assisted intervention on social behaviour, emotions, and behavioural and psychological symptoms in nursing home residents with dementia. Psychogeriatrics, 19(3), 219-227.Doi:https://doi.org/10.1111/psyg.12385

[33] Sherrill, M., & Hengst, J. A. (2022). Exploring animal-assisted therapy for creating rich communicative environments and targeting communication goals in subacute rehabilitation. American journal of speech-language pathology, 31(1), 113-132.Doi:https://doi.org/10.1044/2021_AJSLP-20-00284

[34] An, H. J., & Park, S. J. (2021). Effects of animal-assisted therapy on gait performance, respiratory function, and psychological variables in patients post-stroke. International journal of environmental Research and public health, 18(11), 5818.Doi: https://doi.org/10.3390/ijerph18115818

[35] Joe, E., & Ringman, J. M. (2019). Cognitive symptoms of Alzheimer's disease: clinical management and prevention. bmj, 367.Doi: https://doi.org/10.1136/bmj.l6217