TELEREHABILITATION FOR DEMENTIA PATIENTS DURING PANDEMIC CORONAVIRUS DISEASE (COVID-19): A LITERATURE REVIEW

Andi Salsabilah[1)], Ratna D Krismondani[2)], Rizka D Aulia[3)]

Correspondent Email: andisalsabilah16@gmail

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ABSTRACT

Introduction: Dementia is a chronic and progressive intellectual function syndrome in the elderly. According to WHO, the prevalence of dementia in the world in 2018 reached 50 million people and is estimated to reach 152 million in 2050. Rehabilitation is an effort to minimize disturbances in the life quality of dementia patients. However, The COVID-19 pandemic has emerged as a new obstacle in providing rehabilitation services for dementia patients. Telerehabilitation is very useful in helping rehabilitate dementia patients in the era of the COVID-19 pandemic.
Purpose: The technology use of telerehabilitation in geriatrics dementia is potentially improving medical access to deliver rehabilitation therapy of pandemic COVID-19.
Method: This study was conducted by literature review from Science Direct, PubMed, and The American Journal of Geriatric Psychiatry library database, with search terms: "Telemedicine," "Telerehabilitation," "Dementia," "Geriatric" by Boolean search operators. There are 226 records identified and screened by title and abstract. Their studies are finally fulfilled our criteria and will be reviewed.
Result: We examined three studies and presented qualitative and quantitative scores for two telerehabilitation methods. Two methods are commonly used for video conference and virtual reality. Video conferences are still the most capable method for dementia telerehabilitation.
Conclusion: The technology use of telerehabilitation in geriatrics dementia is potentially improving medical access to deliver rehabilitation therapy to patients and caregivers at a distance during this pandemic.

Keyword: Dementia, Geriatric, Telemedicine, Telerehabilitation

[1)] *Faculty of medicine, UPN veteran Jakarta*
E-mail: andisalsabilah16@gmail.com
[2)] *Faculty of medicine, UPN veteran Jakarta*
E-mail: dwi801607@gmail.com
[3)] *Faculty of medicine, UPN veteran Jakarta*
E-mail: rizkadwiaulia@gmail.com

INTRODUCTION

Dementia is a chronic and progressive intellectual function syndrome in the elderly (1). The decline in intellectual function causes dementia patients to experience disturbances in social and professional activities that interfere with their daily life (2). According to WHO, the prevalence of dementia worldwide in 2018 reached 50 million people and is estimated to reach 152 million in 2050. This shows an increase in the prevalence of dementia to 204% in the next 30 years (3). Meanwhile, according to statistical data in Indonesia, there will be an estimated 1 million people with dementia in 2020 and an estimated 3 million patients in 2050.

The symptoms of dementia can be classified into two groups, cognitive and non-cognitive disorders. Cognitive disorders impair memory, learning, and disturbances of the new environment or the home, making it difficult for patients. Meanwhile, non-cognition disorders are neuropsychiatric complaints such as agitation, depression, sleep disorders, delusions, hallucinations, aggression, disinhibit, sundown syndrome, and motor disorders. Dementia is classified into six subtypes, namely Alzheimer's, vascular, Lewy body, Parkinson's disease, frontotemporal and mixed dementia. Alzheimer's dementia is a common subtype in 60-80% of cases (4). Risk factors of dementia such as alcohol consumption, atherosclerosis, diabetes mellitus, Down syndrome, genetics, hypertension, depression, and smoking. However, the initial diagnosis of dementia is quite difficult to do (4). This has increased the economic burden that the family and the government must bear. Based on statistical data worldwide in 2016, dementia is estimated to have a cost of USD 818 billion per year. It is predicted to increase to USD 1 trillion in 2018 and USD 2 trillion in 2030 (5). This increase in costs is due to pharmacological and non-pharmacological dementia therapies.

Rehabilitation is an effort to minimize disturbances in the life quality in dementia patients. Rehabilitation can help restore the function and ability of dementia patients to increase the patient's independence to carry out daily activities without depending on other people (6).

However, the COVID-19 pandemic that has emerged since 2020 has become a new obstacle in providing rehabilitation services for dementia patients (7). The majority of dementia patients are elderly aged > 65 years. In the elderly, the immune system has begun to weaken, and comorbid diseases are more common. Mobilization of patients to hospitals can increase risk factors for contracting COVID-19 infection. Therefore, telemedicine application as telerehabilitation is an appropriate strategy to reduce the risk of dementia patients exposed to the COVID-19 virus.

Telerehabilitation is the provision of rehabilitation services through a telecommunications network that allows patients to interact with doctors remotely and monitor patients and provide rehabilitation therapy. The fields of treatment that utilize telerehabilitation include speech therapy, psychology, motor exercise, robotic therapy, occupational therapy, physical therapy, and others (8). Therapy can be given individually or in a community. Telerehabilitation is very useful in helping rehabilitate dementia patients in the era of the COVID-19 pandemic (7). So, the purpose of this literature review is to synthesize the effectiveness of telerehabilitation as a strategy to manage dementia patients in the COVID-19 pandemic.

METHOD

This study method is a literature review, with qualitative and quantitative data sourced from the scientific literature. Literature searching is applied from 29 March to 3 April 2021, published on Science Direct, PubMed, and The American Journal of Geriatric Psychiatry library

databases, with search terms: "Telemedicine," "Telerehabilitation," "Dementia," "Geriatric" by Boolean search operators. We retrieved journals published from the last three years between 2019 – 2021, written in English**.** There are 226 records identified and screened by title and abstract. Study selection was eligible with the following inclusion criteria; (1) Major topic of the studies is telerehabilitation (2) Population are geriatrics (3) Dementia patients (4) The design studies were observational and experimental. The exclusion criteria are the studies that did not fulfill in inclusion criteria with the following exclusion criteria; (1) A review articles, (2) Studies without focused on telerehabilitation in dementia, (3) Population are not geriatrics.
Finally, three studies are fulfilled our inclusion criteria for this review.

RESULTS

The pathophysiology of dementia is not fully understood. Some studies show that vascular remodeling and pathologic changes lead to brain damage by hypoperfusion with neuronal injury and brain damage. Another structure in the microvasculature brain is thickening; therefore, it disrupts blood-brain barrier (BBB) permeability (9). The molecular mechanism includes hypoxia, oxidative stress, mitochondrial bioenergetics, neuroinflammation, and neurodegeneration (9). All pathological processes except VaD involve the accumulation of native protein contains; AD plaque of amyloid in extracellular and intracellular tangles of tau; DLB alpha-synuclein; FTLD TDP-43 and hallmarks protein of AD and DLB (10), tangles and plaques causes neuro damaging that affect to neurotransmitter may trigger neurotoxicity to disrupt cognitive function in learning and remembering (11). The neuropathological pathway shows hypoperfusion, metabolic dysfunction, and cerebrovascular disease lead to neuroinflammation causes dementia (12).

Dementia causes disability and dependency in geriatric; therefore, rehabilitation as a non-pharmacology approach in dementia intervention is needed. Dementia rehabilitation targets modifying routines in patients to engage in daily living situations (13). Cognitive therapy as a rehabilitation was adapted for dementia patients. Cognitive therapy is a non-pharmacological intervention using cognitive assessment tools that focus on specific cognitive aspects such as attention, problem-solving, or memory to maintain functional disability and improve the quality of life between patients and their families. Cognitive therapy is usually given to individual therapy; therefore, the role of family or caregiver is important to this therapy to achieve a set goal (13). Cognitive therapy involves restorative mechanisms by revisited and revised as cognition declines (14). Cognitive therapy methods commonly use electronic cognitive training-based apps or computerized training 19%; learning compensatory strategies 16%; speech and language therapy 100%; sensory-motor skill training are indeed. (15). However, cognitive therapy as rehabilitation in dementia is a complex process. Furthermore, studies report cognitive therapy provides repetitive exercise and memory strategy training (16). This mechanism can lead to a neuroplasticity process that induces neural structure in geriatric reveals in MRI (17).

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The pandemic of COVID-19 has disrupted healthcare services due to decreasing risk of infection worldwide has committed to social distancing. The geriatric population is vulnerable to being affected since it's restricted all social activities and support services for dementia patients (18). Therefore, telerehabilitation as a subfield of telemedicine is a possible solution to improve medical services is acceptable during this pandemic. Telemedicine is a health-related service using information communication and technologies allowing virtually connection face to face in-person approaches in a medical condition such as monitoring, diagnostic, rehabilitation, and therapeutic (19).

Telerehabilitation is a technology-enabled communication between patients and healthcare at a distance by providers. Telerehabilitation is defined as delivering rehabilitation services virtually via telecommunication (20). Technically, high-speed internet connection and patient or caregiver's ability in technology access are required in telerehabilitation (18). Studies show telerehabilitation has a positive impact and greater improvement of clinical outcomes in physical, functional, and physiological aspects and satisfaction between healthcare and patients (21). Even though telerehabilitation is accessible, some limitations are the family or caregiver's ability to operate the system. Provider connection may be unable; nevertheless, benefits of telerehabilitation are cost-effective access (22), improve patient care, reducing the mobility of patients to go hospital due to Pandemic COVID-19 telerehabilitation may help to deliver rehabilitation to optimal functioning in dementia. Here we are extracted data as shown in Table 1.

Authors	Title	Design Study	Sample	Method	Outcome
Varela Aldás, J. *et al.* (2021)	A Virtual Reality-Based Cognitive Telerehabilitation System for Use in the COVID-19 Pandemic	Quasiexperim ental and controlled design	Participants range in age 18-65 years old in both genders and have experience managing computer applications.	The participants are divided into two groups the control and experimental group. The experimental group completed the assessment using the VR program. In contrast, the control group completed the assessment using written materials in a face-to-face format, as is typical in conventional therapies. The suitability Assessment Questionnaire (SEQ) test was used to assess the usability of the application	The SEQ test overall result is 59.65/65 (91.77%) with a remarkably low standard deviation (SD) which means great usability of this method

Di Lorito, C. *et al.* (2021)	Telerehabilitation for People with Dementia During the Covid-19 Pandemic: A CaseStudy from England	Qualitati ve CaseStudy	Participants are five patients with dementia (aged 65 years or over) and their caregiver and also five therapists of the Lincolnshire Partnership NHS Foundation Trust.	Semi-structured qualitative interviews have been conducted for the patients and their caregivers by the therapist. The main researcher briefed the therapist themselves about the interview protocols.	Video conferencing was much more impactful when caregivers and therapists assisted patients, expressed enthusiasm, and established relationships with the patients.
Lai, F. H. yin *et al.* (2020)	The Protective Impact of Telemedicine on Persons with Dementia and Their Caregivers During the COVID-19 Pandemic	True Experim ental Research	Neurocognitive disorder patients (Aged 65-80 years old) and their caregivers.	The Control group has showed a excellent MoCA score more than the by phone weekly. control group. (ηp2= Experimental = 0.50) The group was also given care by phone but has also revealed an additional significantly better approach by the quality of life in the video conference. Experimental group. (ηp^2= = 0.23)) Several aspects were assessed Also, Zarit Burden Interview Scale which, presented an Neurocognitive improvement of functioning, physical and mental behavioural, health problems in mental health participants. issues and quality of life using Lastly, the Revised Caregiving Self- Montreal Efficacy Scale for Cognitive Assessment (MoCa), the Revised Memory and Behavior Problem Checklist (RMBPC), and the Quality of Life in Alzheimer's Disease (QoL-AD) assessment.	The experimental group was given a telerehabilitation the caregivers in the experimental group found an indication of self-efficacy that was absent in the control group. (η_{p2}=0.23−0.51)

Table 1. Study About Telerehabilitation for Dementia Patients During Pandemic COVID-19

Based on the table results above, the application of telerehabilitation in geriatric patients with dementia is possible. Three studies reviewed above present satisfactory scores, qualitatively and quantitatively. The possibilities of applying telerehabilitation in dementia care will be a bright spot for the therapists and the caregiver to continue providing services in this pandemic.

Modalities	Benefits	Challenges
Virtual Reality (Varela-Aldás, J. *et al.* 2021)	- The system provided simple - application and Senior-friendly technologies - The low band with requirement and resource-saving lead to cost-effectiveness - The suggested models provided automatically recording of patient response time, which is essential for their cognitive assessment - This system could be used to extend the health system's service area more efficiently and effectively -	The model proposed does not support full immersion. The patient's focus during therapy could be fragmented.
Video Conference (Di Lorito, C. *et al.* motoric 2021 and Lai, F. H. yin *et al.* 2020)	- The proposed program may involve real-time, visually dependent cognitive and tasks. - The interactive feedback also enabled clinicians to make more precise assessments of participants' progress and to give a motivation for both parties, the - patients and the clinicians - This system could be used to extend the health system's service area more efficiently and effectively	- Older dementia patients might be difficult to comprehend the system in one time familiarization The inability to advance patients with targets that demanded the physical appearance Different from an actual home visit. The proposed program might have a less meaningful human connection between the clinicians and the patients

Table 2. Benefit and Challenges

DISCUSSION

The two most current methods of telerehabilitation in dementia patients have their benefits and challenges. According to the three works of literature cited above, the two methods have the same benefits: they can effectively and efficiently broaden the coverage of health care areas, especially in geographically isolated areas where resources are scarce, and access to physical therapy rehabilitation services is limited. (23)(24). Furthermore, during the COVID-19 pandemic, patients are not required to travel to health facilities. This will minimize the risk of COVID-19 spread and transmission, especially in vulnerable patients such as the elderly, and reduce travel expenses that patients and their caregivers typically incur to access health care facilities (25).

Compared with virtual reality, video conferencing in cognitive therapy is more widely used. According to Gosse, P. J. et al. (2021), video conferencing is still the most

promising instrument for assessing dementia patients. This may occur because video conferencing can still develop connections among people more favorably than virtual reality (24). This seems meaningful because the social connection is essential to people's health and well-being, particularly in the present COVID-19 pandemic. The emergence of policy protection has been restricting social contacts, which might lead to social isolation (26). The medical community does not identify social isolation as a health condition, but instead, growing evidence indicates that it has a profound negative effect on our physical and mental health. Unfortunately, this negative effect has a stronger impact on elderly patients (27). However, we cannot turn a blind eye to the fact that virtual reality could be the future of telerehabilitation. Virtual reality has offered many benefits in telerehabilitation. Non-immersive virtual reality proposed by VarelaAldás, J. et al. (2021) can automatically document some therapy details, such as patient response time. Furthermore, the proposed system may be tested for different types of dementia and can be enhanced with supplementary tasks that require more concentration and cognitive effort. The main challenge in implementing telerehabilitation is introducing the unusual technology to older patients (24).

CONCLUSIONS

The technology use of telerehabilitation in geriatrics dementia is potentially improving medical access to deliver rehabilitation therapy to patients and caregivers at a distance during this pandemic. According to our study, there are two methods of telerehabilitation therapy consist of virtual reality and video conference. Virtual reality promotes playful therapy, whereas video conference promotes interactive therapy between patient and therapist. However, both have benefits and challenges; therefore, family or caregiver involvement is critical, and the therapist should choose therapy methods carefully. In addition, further studies about telerehabilitation in dementia are needed to evaluate its use. Therefore, in the future, we should be concerned about creating a very easy and safe system for older patients. Also, cooperation from various parties, including families, caregivers, and health workers, is to guide geriatric patients to get used to and achieve the goals of telerehabilitation made.

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