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Effectiveness of tele rehabilitation in the management of adults with stroke: a mini review

Abstract

Background: Tele rehabilitation can deliver rehabilitation services with the use of technology to increase patient options, deliver services more efficiently and overcome geographical barriers to healthcare access. Despite its popularity, there is conflicting evidence for its effectiveness. Therefore, the aim of this systematic review was to update the current evidence base on the effectiveness of tele rehabilitation for stroke.

Objective: We aimed to provide an updated systematic review on the efficacy of tele-rehabilitation interventions for stroke survivors.

Method: PubMed, Google scholar, Physiotherapy Evidence Database (PEDro), Cochrane Library were searched, and the studies which were RCT, had tele-rehabilitation interventions, Published in English language, had moderate to high methodological quality (PEDro scoring 5 or more than 5).

Results: Out of 218 studies, 04 randomised controlled trials met the eligibility criteria and quality assessment and were selected for the present systematic review. A diverse range of interventions were delivered through a variety of tele rehabilitation systems. Summarized findings from the heterogeneous evidence base indicate that tele rehabilitation may have a positive impact on a range of primary and secondary outcomes.

Conclusion: Tele rehabilitation, as an alternate form of rehabilitation for people with stroke, shows potential. This updated systematic review provides evidence to suggest that tele-rehabilitation interventions have either better or equal salutary effects. However, due to methodological and practical concerns, an unequivocal recommendation cannot be made. Findings from this review may inform future policies and practices regarding the use of tele rehabilitation for stroke patients.

Keywords: stroke, tele rehabilitation, telemedicine, virtual reality, virtual rehabilitation

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Introduction

Stroke is one of the most widely recognized causes of death and incapacity worldwide.[1] A stroke is a rapid attack on brain function caused by a vascular cause that begins with signs and symptoms but lasts more than 24 hours. Stroke is the main cause of physical disability and the second-leading cause of death worldwide. Boehme, Esenwa, and Elkind[2] stated that stroke is the fourth leading cause of death worldwide, has a great impact in developing countries, and is the leading cause of long-term adult disability. Stroke kills 10% of the world's population each year, accounting for 55 million deaths, whereas 7 lac 80 thousand people in the United States suffer from stroke each year, with ischemic stroke accounting for 87% and hemorrhagic stroke accounting for 13%. An, Kim, and Yoon[3] stated that hemorrhagic stroke is more vulnerable to death in most cases, which is 10% to 20% approximately. Overcomes of stroke ordinarily experience a variety of indications influencing physical work, discourse, gulping, vision, sense, and perception, and recuperation can be moderate and inadequate.[4] These side effects frequently cause difficulties with everyday activities such as walking, showering, dressing, and attending social events. Numerous individuals need therapy after a stroke. This is normally given by healthcare experts in a medical clinic or facility setting.[5] According to Nichols-Larsen, Clark, Zeringue, Greenspan and Blanton[6] the stroke situation challenges overall social and wellbeing arrangements because of various reasons. In the first place, stroke shows high and expanding rate and pervasiveness rates. Secondly stroke patients regularly present utilitarian disabilities that can diminish their own self-sufficiency and personal satisfaction prompting a need of human services and restoration. And, the restoration procedure can be delay and keep going for quite a long time.[7] Johansson and Wild[8] stated that stroke restoration is a significant part of post-stroke care and is increasingly powerful the sooner it starts. Stroke recovery treatment plans to progress patients' physical, perceptual, mental, and social prosperity Effective recovery relies upon stroke seriousness, restoration group abilities, and the co-activity of the stroke survivor and their relatives, as well as additional companions. According to Yang et al.,[9] the annual cost of stroke-related long-term disability is nearly $33.9 billion.

Rehabilitation after stroke is the return of the patient's functional activities, family, social, and work environments to the original position that they held before the stroke. Physiotherapy plays an important role from the intensive care unit to patient discharge and at home. According to Appleby et al.,[10] because of advances in medicinal services and innovation, the endurance rates for stroke have increased significantly over the course of recent decades. As of now, stroke survivors can access medical and rehabilitation services through a multidisciplinary stroke program, leading to positive results. Be that as it may, regardless of this positive proof, and keeping in mind that 75% of stroke survivors have continuous recovery needs, just 46% of patients opted for restoration in 2017. It indicates that a lot of patients with strokes lack therapy that could enhance their physical status.[11]

Appleby et al.,[10] revealed that there remain various obstructions for stroke patients to get to normal eye-to-eye care, for example, time restrictions, asset impediments, land detachment, consistency with restoration, and an absence of mindfulness. One approach to approaching boundaries could be through mechanical development, such as telemedicine and, more explicitly, tele rehabilitation. Chumbler

et al.,[12] stated that Tele rehabilitation (TR) is characterized as use by a clinician of media transmission gadgets (eg, phone, videophone) to give assessment and separation backing of incapacitated people living at house. Then again telemedicine can be characterized as the "utilization of cutting edge media transmission advances to trade wellbeing data and give human services benefits crosswise over geographic, time, social and social obstructions".[10] Correspondence between the patient and the restoration expert may happen through an assortment of innovations, for example, the phone, Internet-based video conferencing and sensors, (for example, pedometers). Augmented reality projects may likewise be utilized as a vehicle for treatment; the patient finishes treatment errands inside a PC produced virtual condition, and information are transmitted to the specialist.[13] Russell[14] said that Tele rehabilitation counsels may incorporate appraisal, conclusion, objective setting, treatment, training and observing.

According to Kalra and Langhorne[15] multidisciplinary approach in stroke treatment diminishes the probability of hospital based rehabilitation and long haul incapacity and builds freedom in movements of day by day living. Enhancements in work after fruition of restoration programs have been ascribed to a blend of physiological recuperation, neuro plasticity and remuneration. One of the key favorable circumstances of tele rehabilitation is that it gives the chance to individuals who are disconnected to get to restoration administrations.[16] Moreover, the utilization of tele rehabilitation may bring about cost investment funds in different manners. Diminished travel time may imply that clinicians can fit more interviews into a solitary day.[5] In spite of its obvious points of interest, the difficulties related with tele rehabilitation are very much archived.[17] According to Russell[14] one of the vital matters confronting clinicians is the means by which to direct appraisals or give intercessions that are regularly "hands on", for instance, evaluation of muscle quality. The powerlessness to lead handson appraisal or treatment implies that advisors need to adjust current strategies, for instance, by using relatives or showing the patient approaches to play out the mediation freely.

Laver et al.,[17] distinguished inadequate proof to decide the adequacy of tele rehabilitation with respect to versatility, member fulfillment or wellbeing related personal satisfaction in stroke. Chen et al.,[18] distinguished constrained moderate proof supporting tele rehabilitation being similarly valuable to common consideration in improving engine capacity and capacities for exercises of day by day living (ADLs). Therefore, the purpose of this review was to update the literature on the effectiveness of tele rehabilitation for stroke which may be used to inform clinical practice and patient decision-making.

Methodology

We have conducted a systematic review to explore:

a) The feasibility, effectiveness, cost-effectiveness and quality of tele rehabilitation interventions in post-stroke care.

b) The effect of post-stroke tele rehabilitation initiatives on health outcomes, health-care processes, the use of health resources, and user/patient satisfaction and acceptance.

Design: review study

Search strategy

A literature search was conducted in December 2019. Electronic platforms and databases, including PubMed, Google Scholar, the Physiotherapy Evidence Database (PEDro), the Cochrane Library, and the Excerpta Medica Databank (EMBASE), were searched using a combination of search terms related to stroke, telemedicine, virtual reality, or rehabilitation, and tele rehabilitation. The studies, which were RCTs with physiotherapy interventions and published in the English language, had moderate to high methodological quality (PEDro scoring 5 or more than 5). The PRISMA guideline was used to diagram the study selection protocol.

Study selection

An initial analysis was performed based on the title and abstract. Titles and abstracts were displayed and identify the relevant studies. When the title and abstract were unclear, the full text was read. The full texts of articles considered possibly relevant were analyzed to determine whether the articles met the eligibility criteria.

The following criteria were used to include studies for the review:

a) published clinical trials that have an experimental group receiving tele rehabilitation interventions and a control group,

b) studies including a stroke population,

c) studies from 2015-2019

d) PEDro scale score 5 or more

e) studies in English.

Exclusion criteria

a) A pilot randomized control trial

b) A study protocol

c) Cross-over study

d) Clinical trials that do not have a control group.

Quality appraisal

The Physiotherapy Evidence Database (PEDro) scale which is one of the valid scales was used to appraise the studies. The studies were included which were scored 5 or above (Figure 1 & Table 1).

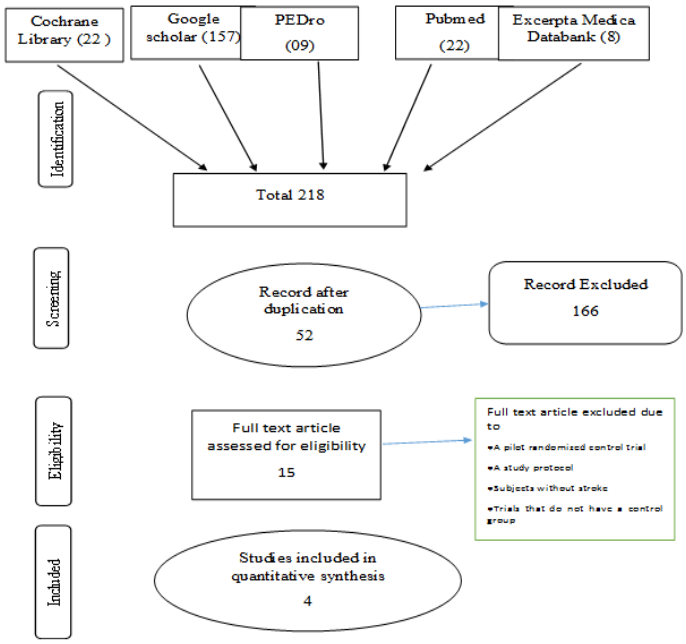

Figure 1 Preferred reporting item for systematic review (PRISMA Flowchart).

Discussion

The aim of this study was to review the evidence for the effectiveness of tele-rehabilitation for patients suffering from stroke. Finally, four studies out of 218 meet the inclusion criteria. From those studies, Lorens et al.,[7] found that tele-rehabilitation based on virtual reality (VR) can be as effective as in-clinic-based interventions in rehabilitating skills like locomotors' association with balance. They also found that both in-clinic intervention and tele-rehabilitation have the same effect on patient motivation. It was a single-blinded RCT. Thirty stroke patients were included as a sample in that study. Finally, they conclude that VR-based tele-rehabilitation can be extremely beneficial when cost savings are required. The study also suggested that tele-rehabilitation is effective for older people, as the mean age of the sample was over fifty. However, one scoping review suggested data on virtual reality is inappropriate; more data is required.[19] Adding to that, they also conclude that virtual reality-based treatment at home has the potential to become an effective tool for treating balance and gait deviation.

According to Cramer et al.,[20] tele-rehabilitation has significant potential to increase access to the field of therapeutic rehabilitation. The RCT was conducted on a large scale, with 124 samples. Where both the control and experimental groups receive stroke education and motor therapy with the same intensity, frequency, and dose. After 4 weeks of treatment, there was no significant difference between the two groups on a 95% level of significance (CI). The change in the FM score p value was 0.06 with a confidence interval of (-2.24 to 2.27). Another study suggested that tele-rehabilitation is an effective component of home-based rehabilitation to monitor and evaluate the secondary complications of stroke.[21] Tele-rehabilitation is a potential tool for flow-up evaluation. Chumbler et al.,[12] suggested that stroke tele-rehabilitation is more satisfactory among the people with stroke than hospital. In that study 43 patient was included. Both group compared with fall efficacy scale. There is satisfactory response found among the sample. A study suggested that tele-rehabilitation can increase the motivation of the client with stroke. Study also suggested that tele-rehabilitation has potentiality became an effective intervention with cost effect. Study also found effectiveness of virtual reality.[22] Chen et al.,[23] reported in a study that home-based tele-rehabilitation and inpatient-based rehabilitation have the same efficacy in improving function for stroke patients after completing initial intensive care at an institute-based rehabilitation. The study also suggested that tele-rehabilitation can potentially reduce the burden on caregivers. The study was assessor blinded, and both groups were measured by the Berg Balance Scale. Literature also suggests virtual reality with biofeedback can improve learning. Tele rehabilitation is a new concept in rehabilitation that can improve function.

Conclusion

Rehabilitation clinicians need to educate health care providers as well as patients, caregivers, and their families about the benefits of TR. There is a need to acknowledge biases about face-to-face therapy, encourage the use of TR, and develop and offer new evidence-based innovations focused on providing patient-centered care with their local medical and rehabilitation providers in their homes and community. With the advancement of technology, the rehabilitation team can provide accessible, cost-effective, and timely specialty care to persons with disability in the comfort of their home or community. Tele-rehabilitation is a promising tool in the field of rehabilitation that could help ease the burden of rehabilitation in the future. Potentially contribute to improving physical function and motor skills. Perhaps an important motivator for stroke patients.

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Both the authors have equal contribution to this study.

Conflicts of interest

The author declares that there are no conflicts of interest.

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