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TELE-REHABILITATION IN POST STROKE PATIENT – "A SCOPING REVIEW"

[1]Abhishek Thorat, [2]Dr.Ketaki Patani ,

[1]BPT, [2]BPT MPT PHD Scholar,

[1]Physiotherapy,

[1]Pravara Institute Of Medical Sciences, Loni, India

ABSTRACT

INTRODUCTION

Stroke was defined as rapid onset of a new neurological deficit attributed to obstruction or rupture in the cerebral arterial system. The defined deficit had to persist for at least 24 hours unless death supervened and had to include specific localizing findings confirmed by neurological exam and by CT scan brain, with lack of evidence of an underlying non-vascular cause. TIA (transient ischemic attack) was defined as rapid onset of focal neurological deficit lasting more than 30 seconds and less than 24 hours presumed to be due to cerebral ischemia and without evidence of underlying non- vascular cause.

Tele-rehabilitation is the delivery of rehabilitation services over telecommunication network and the internet .Tele-rehabilitation allows patient to interact with providers remotely and can be used both to assess patient and to deliver therapy .Field of medicine that utilize telerehabilitation include: physical therapy, occupational therapy speech-language pathology, audiology and psychology. Therapy session can be individual or community based. Rehabilitation after stroke requires the inputs of several skilled health personnel including physiatrists, physiotherapists, speech therapists and occupational therapists.

AIM –

To determine the outcome measures of Tele-rehabilitation in post stroke patient

Objective-

To investigate the effectiveness of Tele-rehabilitation in which is used for post stroke patient.

Methodology:-

Design- The design of this study is a scoping review. Scoping review have been described as a process of mapping the existing literature or evidence base.

DATABASE AND SEARCH STRATEGY-

The study includes Pubmed ,Embrase, ,Cochrane, CINHAL, PEDRO according to PRISMA guideline the search keywords used were "TR,VR and Stroke which is written in English and published between December 2015 to April 2024 non interventional studies such as cross sectional studies or duplicate studies, literature.

reviews and meta analysis were also excluded the study which is made for inclusion and were reviewed for outcome measures and selection which can be summarized according to flowchart.

Conclusion- In conclusion our study results demonstrate that tele-rehabilitation is more effective in post stroke patient .

Keywords : Tele-rehabilitation; post-stroke recovery; motor function; higher cortical Dysfunction.

1. INTRODUCTION

Stroke is defined as the sudden loss of focal cerebral function, lasting ≥24 hours, thought to be caused by an inadequate blood supply to part of the brain (ischemic stroke), or spontaneous hemorrhage into the brain substance (primary intra cerebral hemorrhagic), where brain imaging was normal or showed evidence of recent ischemia or hemorrhage.

There are three main kinds of stroke:

1)Ischemic stroke

2)Hemorrhagic stroke

3)Transient Ischemic stroke

ISCHEMIC STROKE

Ischemic stroke accounts for about 80 percent of all strokes and occurs when a blood vessel in the neck or brain is blocked. The blockage can be caused by "the formation of a clot within a blood vessel of the brain or neck, called thrombosis; the movement of a clot from another part of the body such as the heart to the brain, called embolism; or a severe narrowing of an artery in or leading to the brain, called stenosis". Deprived of blood's oxygen and vital nutrients, brain cells begin to die and the abilities controlled by that part of the brain, like muscular control or speech, are compromised.

HEMORRHAGIC STROKE

Hemorrhagic stroke is due to bleeding into the brain by the rupture of a blood vessel. Hemorrhagic stroke may be further subdivided into intra cerebral hemorrhage (ICH) and subarachnoid hemorrhage (SAH). ICH is bleeding into the brain parenchyma, and SAH is bleeding into the subarachnoid space. Hemorrhagic stroke is associated with severe morbidity and high mortality.

TRANSIENT ISCHEMIC ATTACK

Transient Ischemic Attack(TIA)—a clinical time based definition of symptoms lasting<24 hours. TIA was definite when a diagnosis of TIA was the only one considered for the symptoms and probable when a TIA was the most likely of several differential diagnoses.

The risk factors of stroke includes high blood pressure, high cholesterol, smoking, obesity, and diabetes. The five common signs and symptoms of stroke:

- Sudden **numbness** or weakness in the face, arm, or leg, especially on one side of the body.
- Sudden **confusion**, trouble speaking, or difficulty understanding speech.
- Sudden **trouble seeing** in one or both eyes.
- Sudden **trouble walking**, dizziness, loss of balance, or lack of coordination.
- Sudden **severe headache** with no known cause.

Sometimes the warning signs may last a short time and go away. These brief episodes, known as transient ischemic attacks or TIAs, are sometimes called “mini-strokes”. They indicate an underlying serious health condition. Immediate action is required to treat the individual and limit the disability caused by stroke.

Incidence and prevalence of stroke in world and in India:

After ischemic heart disease, stroke is globally the second cause of death. Stroke survivors have to undergo enormous burden, both in human and economic costs as they may suffer from disabilities, requiring temporary or lifelong assistance.11 Evidence suggests that stroke and its risk factors are associated with socio economic deprivation and also increase stroke severity and mortality and incidence of stroke at younger age. Almost 90% of cardiovascular disease, including stroke and myocardial infarction, is caused by potentially modifiable risk factors are documented in much literature.11 The global crude number of new stroke events

has increased by 76% from 6.8 million new events in 1990 to 11.9 million in 2017. The age-standardized global rate of new strokes became 150.5 per 100,000 in 2017.6 Ischemic strokes and intra cerebral hemorrhage seems to be more common in males than females. There is a

decrease of 6% from 1990 to 2017 in female to male ration. The age-standardized global rate of new strokes became 150.5 per 100,000 in 2017. The global rate of age Introduction 3 standardized stroke prevalence has increased by 3% from 1990 to 2017.

This increase in prevalence could be partly explained by improved healthcare (including screening, prevention, diagnosis, and treatment) and general awareness, which has extended the lifespan of stroke patients. 11 The incidence of ischemic stroke in young adults varies considerably between countries, ranging from 7–8 per 100 000 person-years in Europe to more than 100 per 100 000 person-years in sub-Saharan Africa. An increase of up to 40% in the incidence of stroke in young adults has been reported over the past decades.12 As per a study conducted in 2015, In India, crude prevalence of stroke ranged from 44.29 to 559/100,000 persons per year, and cumulative incidence of stroke ranged from 105 to 152/100,000 persons per year, in different parts of the country during past decade.

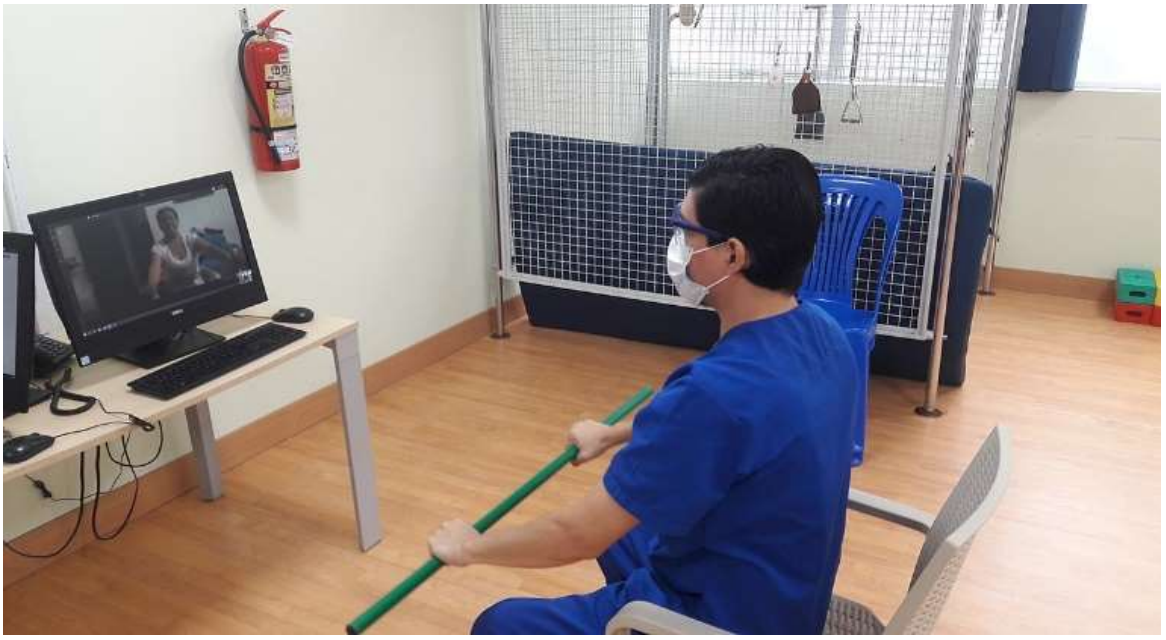
TELE-REHABILITATION:

Tele-rehabilitation is the delivery of rehabilitation services over telecommunication network and the internet .Tele-rehabilitation allows patient to interact with providers remotely and can be used both to assess patient and to deliver therapy .Field of medicine that utilize telerehabilitation include: physical therapy, occupational therapy speech-language pathology, audiology and psychology. Therapy session can be individual or community based. Rehabilitation after stroke requires the inputs of several skilled health personnel including physiatrists, physiotherapists, speech therapists and occupational therapists. These human resources are often unavailable engendering inadequate recovery from physical limitations among stroke survivors. Furthermore, supervised rehabilitation is often challenged by transportation restrictions of getting to hospitals and inconvenience. Home-based tele-rehabilitation- defined as the use of telecommunication devices (such as telephone, videophone) by a clinician to provide evaluation and distance support for disabled persons living at home- provide a viable avenue to meet the rehabilitation needs of stroke survivors in resource-limited rural settings in developed countries as well as Low-and-Middle Income countries where stroke burden is rapidly escalating.

Using technology to deliver rehabilitation services has many benefits for not only the clinician but also the patients themselves. It provides the patient with a sense of personal autonomy and empowerment, enabling them to take control in the management of their condition. In essence they are becoming an active partner rather than a passive participant in their care. It enables access to care for individuals in remote areas or for those who have mobility issues associated with physical impairment, access to transport and socioeconomic factors. In addition, it cuts down the associated travel costs and time spent travelling for both the healthcare provider and the patient. Research has found that the rehabilitation needs for individuals with long-term conditions such as stroke, TBI and other neurological disorders are often unmet in the patient's local community .

As telerehabilitation expands, patient continuity of care improves. It enables clinicians to remotely engage and deliver patient care outside of the medical setting, thus eliminating the issue of distance between clinician and patient. This opportunity to continue rehabilitation within the patient's own social and vocational environment should lead to greater functional outcomes.

The shift in the global demographics towards an increasing elderly population brings with it an associated increase in chronic health conditions. This highlights the need for changes to be made in the delivery of rehabilitation services with the incorporation of self-management strategies and technology.



2.NEED FOR STUDY

Up to 75% stroke patients suffer from disorders involving daily living activities Many tools have been developed to evaluate consequences of stroke and the effectiveness of intervention of post stroke .Telerehabilitation overcomes the barrier of distance and time and provides access to patients treatment.

2.AIM AND OBJECTIVES

1. AIM OF THE STUDY

The aim is to extract outcome measures and to find tele-rehabilitation is effective in post stroke patient.

.OBJECTIVE OF THE STUDY

To investigate the effectiveness of tele-rehabilitation in post stroke patient.

3.RESEARCH question

What is the efficacy of Tele-Rehabilitation in post stroke patient ?

2.REVIEW OF LITERATURE

1. **Kate E , Daniel et. Al** they included in the 10 trials involving a total of 933 participants. The studies were often small and reporting quality was often inadequate, particularly in relation to blinding of outcomes assessors and shading of allocation. selective outcome reporting was unveiled in several studies. study interventions and comparison varied, meaning that in most cases, it was inappropriate to pool studies. Intervention approaches included upper limb training, lower limb and mobility retraining, specimen management and caregiver support. Most studies were conducted with people in the chronic phase pursuit stroke. Primary outcome: no statistically significant result for independence in activities of daily living (based on two studies with 661 participant) where noted when a specimen management intervention was evaluated. secondary outcomes: no statistically significant result for upper limb function (based on two studies with 46 participant) were observed when a computer program was used to remotely retrain upper limb function. Evidence was insufficient to yank conclusion on the effects of the intervention on mobility, health-related quality of life or participant satisfaction with the intervention. No studies evaluated the cost-

effectiveness of tele-rehabilitation. No studies reported on the occurrence of adverse events within the studies. They found insufficient vestige to reach conclusions well-nigh the effectiveness of telerehabilitation without stroke. Moreover, we were unable to find any randomized trials that included an evaluation of cost-effectiveness. Which intervention approaches are most appropriately adapted to a telerehabilitation tideway remain unclear, as does the weightier way to utilize this approach.

2.Kate E , Daniel et. Al they included in the 10 trials involving a total of 933 participants. The studies were often small and reporting quality was often inadequate, particularly in relation to blinding of outcomes assessors and shading of allocation. selective outcome reporting was unveiled in several studies. study interventions and comparison varied, meaning that in most cases, it was inappropriate to pool studies. Intervention approaches included upper limb training, lower limb and mobility retraining, specimen management and caregiver support. Most studies were conducted with people in the chronic phase pursuit stroke. Primary outcome: no statistically significant result for independence in activities of daily living (based on two studies with 661 participant) where noted when a specimen management intervention was evaluated. secondary outcomes: no statistically significant result for upper limb function (based on two studies with 46 participant) were observed when a computer program was used to remotely retrain upper limb function. Evidence was insufficient to yank conclusion on the effects of the intervention on mobility, health-related quality of life or participant satisfaction with the intervention. No studies evaluated the cost-effectiveness of tele-rehabilitation. No studies reported on the occurrence of adverse events within the studies. They found insufficient vestige to reach conclusions well-nigh the effectiveness of telerehabilitation without stroke. Moreover, we were unable to find any randomized trials that included an evaluation of cost-effectiveness. Which intervention approaches are most appropriately adapted to a telerehabilitation tideway remain unclear, as does the weightier way to utilize this approach.

2. **Fred S. Sarfo Uladzislau Ulasavets et. Al** Two studies assessed tele-rehabilitation intervention for recovery from higher cortical dysfunction without stroke namely aphasia27 and visuo-special neglect using the Guttmann Neuro Personal Trainer cognitive telerehabilitation program24. Both studies demonstrated feasibility of the interventions with improvements in higher cortical deficits assessed albeit not significantly variegated from the comparator groups. Finally, the two studies assessing the effects of tele-rehabilitation on resolution of peepers among stroke survivors or superintendency givers demonstrated resurgence in both intervention and tenancy population but non-significant differences between the two populations.

3.Linzhang Li, MB and Yan Sun, MD et. Al Their first goal is to understand the research status

and popularity of telerehabilitation research for stroke survivors since 2012; the second goal is to unriddle the research trends and frontiers in this field, and provide a scientific understructure for the future application of telerehabilitation technology in patients with poststroke functional defects. We searched the Web of Science Core Collection (WoSCC) for literature on telerehabilitation for stroke survivors published from 2012 to 2022. The included wares were visually analyzed using CiteSpace6.1.6R (64-bit). In total, 968 eligible wares were included in this study. In the past 10 years, the number of papers published on telerehabilitation without stroke has been increasing annually, with the largest number of papers published in the United States and Australia, with 101 papers published by Chinese scholars. Some subsets of cooperative networks have been worked among major research institutions and their authors, but the scale remains small, and wonk exchanges and cooperation need to be strengthened further. Research on virtual reality (VR) technology and rehabilitation robot technology is popular, and the nomination of time and intensity of rehabilitation exercises, patients' participation in rehabilitation exercises, and care are moreover worth attention. In the last 10 years, research on telerehabilitation technology in the field of rehabilitation for stroke survivors has steadily developed, and is characterized by multidisciplinary joint development. Countries virtually the world can combine their own characteristics and advantages, strengthen wonk exchanges and cooperation with mature research institutions or authors, and explore suitable poststroke remote rehabilitation technologies and service models in variegated environments.

4.Huidi Tchero MD; Maturin Tabue Teguo MD et. Al They included 15 studies (1339 patients) in our systematic review, while only 12 were included in the pooled analysis. The combined effect estimate showed no significant differences between the telerehabilitation and tenancy groups in terms of the Barthel Index (SMD –0.05, 95% CI –0.18 to 0.08), Berg Balance Scale (SMD –0.04, 95% CI –0.34 to 0.26), Fugl-Meyer Upper Extremity (SMD 0.50, 95% CI –0.09 to 1.09), and Stroke Impact Scale (mobility subscale; SMD 0.18, 95% CI –0.13 to 0.48]) scores. Moreover, the majority of included studies showed that both groups were comparable in terms of health-related quality of life (of stroke survivors), Caregiver Strain Index, and patients' satisfaction with care. One study showed that the forfeit of telerehabilitation was lower than usual superintendency by US $867. Telerehabilitation can be a suitable volitional to usual rehabilitation superintendency in

poststroke patients, expressly in remote or underserved areas. Larger studies are needed to evaluate the health-related quality of life and cost-effectiveness with the ongoing improvements in telerehabilitation networks.

5.Steven Truijen · Auwal Abdullahi · Danique Bijsterbosch et. Al Objective In the last decade, there is a growing interest in the use of virtual reality for rehabilitation in clinical and home settings. The aim of this systematic review is to do a summary of the current vestige on the effect of home-based virtual

reality training and telerehabilitation on postural wastefulness in individuals with inside neurological disorders. Methods Literature was searched in PubMed, Web of Science, PEDro, ScienceDirect, and MEDLINE. Randomized controlled trials (RCTs) evaluating the effect of home-based virtual reality (VR) training and telerehabilitation (TR) on postural balance in patients with Parkinson's disease, Multiple sclerosis or stroke. Studies were imported to EndNote and Excel to perform two screening phases by four reviewers. Risk of bias was assessed using PEDro scale and Cochrane towage tool for risk of bias. Synthesis of the data on comparative outcomes was performed using Rev Man software. Results Seven RCTs were included, with all three pathologies represented. VR and TR consisted of a training device (e.g.Nintendo Wii or Xbox 360) and a monitoring device (e.g., Skype or Microsoft Kinect). Five studies used the Berg Balance Scale (BBS) for measuring postural balance. Across studies, there was an resurgence in BBS scores over time in both experimental and tenancy groups, and the effect remained at follow-up for both groups. However, there was no significant difference between groups post-intervention (MD = 0.74, p = 0.45).Conclusion Home-based VR and TR can be used as prolongation to conventional therapy.

6.Paulina Magdalena Ostrowska , Maciej ´ Sliwi ´ nski , Rafał Studnicki et. Al Due to the pandemic caused by the SARS-CoV-2 virus, rehabilitation centers have wilt less misogynist for neurological patients. This is the result of efforts to physically distance society, to try to slow the spread of the pathogen. Health superintendency facilities were mainly restricted to urgent cases, while most physiotherapy treatments, mainly for patients with chronic conditions, were suspended. Some countries have seen a reduction in vigilant stroke hospital admissions of from 50% to 80%. One solution to the whilom problem is the use of telerehabilitation in the home environment as an alternative to inpatient rehabilitation.

Their purpose of this review is to analyze the benefits and limitations of teletherapy in relation to the functional condition of post-stroke patients. Selected publications from 2019 to 2023 on the telerehabilitation of stroke patients were reviewed. The review was based on the Preferred Reporting Items for Systematic Reviews and Meta- Analysis (PRISMA) checklist. Studies have proven that teletherapy significantly improves the functional condition of post-stroke patients, resulting in improved quality of life and faster return to independence (while maintaining maximum possible precautions related to the SARS-CoV-2 virus pandemic). They concluded analysis of the study results showed comparable effectiveness of rehabilitation in the tele system to inpatient therapy. However, it should be emphasized that patients undergoing telerehabilitation must meet strict conditions to be eligible for this type of treatment program. However, the strength of the vestige itself supporting the effectiveness of this method ranks low due to the limited number of randomized tenancy trials (RCT), small number of participants, and heterogeneous trials.

7. **Ardalan Shariat 1, Mahboubeh Ghayour Najafabadi et. Al .** Outcome measures using telerehabilitation (TR) in the context of post-stroke rehabilitation are an zone of emerging research. The current review assesses the literature related to TR for patients requiring post-stroke rehabilitation. The purpose of this study is to survey the outcome measures used in TR studies and to pinpoint which parts of the International Organization of Functioning are measured in trials. Methods: TR studies were searched in Cochrane Central Register of Controlled Trials, PubMed, Embase, Scopus, Google Scholar, and Web of Science, The Cochrane Central Register of Controlled Trials (Cochrane Library), the Cumulative Index to Nursing and Allied Health Literature (CINAHL), and the Physiotherapy Evidence Database (PEDro) from 2016 to June 2023. Two reviewers individually assessed the full text. Discrepancies regarding inclusion or exclusion were resolved by an spare reviewer. Results: A total of 24 studies were included in the current review. The findings were synthesized and presented taking into worth their implications within clinical practice, areas of investigation, and strategic implementation. Conclusions: The scoping review has recognized a wholesale range of outcome measures utilized in TR studies, shedding light on gaps in the current literature. Furthermore, this review serves as a valuable resource for researchers and end users (such as clinicians and policymakers), providing insights into the most appropriate outcome measures for TR. There is a lack of studies examining the required follow-up after TR, emphasizing the need for future research in this area.

8.Mirella Veras1, Dahlia, Kairy et. Al - Despite the increased interest well-nigh tele-rehabilitation, virtual reality and outcome measures for stroke rehabilitation, surprisingly little research has been washed-up to map and summarize the most worldwide outcome measures used in tele-rehabilitation. For this review, we propose to self-mastery a systematic search of the literature that reports outcome measures used in tele-rehabilitation or virtual reality for stroke rehabilitation. Specific objectives include: 1) to identify the outcome measures used in tele-rehabilitation studies; 2) to describe the psychometric properties of the outcome measures in the included studies; 3) to describe which parts of the International Classification of Functioning are measured in the studies. Methods: we will self-mastery a comprehensive search of relevant electronic databases (e.g., PUBMED, CINAHL, EMBASE, PSYCOINFO, Cochrane Central Register of Controlled Trial and PEDRO). The scoping review will include all study design. Two reviewers will pilot-test the data extraction forms and will independently screen all the studies and extract the data. Disagreements well-nigh inclusion or exclusion will be resolved by consensus or by consulting a third reviewer. The results will be synthesized and reported considering the implications of the findings within the clinical practice and policy context. Dissemination: we visualize that this scoping review will contribute to inform researchers and end-users (ie, clinicians and policy-makers), regarding the most towardly outcome measures for tele-rehabilitation or virtual reality as well as help to identify gaps in current measures. Results will be disseminated through reports and unshut wangle journals, priming presentations, as well as newsletters, podcasts and meetings targeting all the relevant stakeholders.

9. Laver KE, Adey-Wakeling Z, Crotty M, Lannin NA, George S et. Al - They included 22 trials in the review involving a total of 1937 participants. The studies ranged in size from the inclusion of 10 participants to 536 participants, and reporting quality was o Men inadequate, particularly in relation to random sequence generation and allocation concealment. Selective outcome reporting and incomplete outcome data were unveiled in several studies. Study interventions and comparisons varied, meaning that, in many cases, it was inappropriate to pool studies. Intervention approaches included post-hospital discharge support programs, upper limb training, lower limb and mobility retraining and liaison therapy for people with poststroke language disorders. Studies were either conducted upon venting from hospital or with people in the subacute or chronic phases following stroke. Primary

outcome: they found moderate-quality vestige that there was no difference in activities of daily living between people who received a post-hospital venting telerehabilitation intervention and those who received usual superintendency (based on 2 studies with 661 participants (standardized midpoint difference (SMD) -0.00, 95% conviction interval (CI) -0.15 to 0.15)). We found low-quality vestige of no difference in effects on activities of daily living between telerehabilitation and in-person physical therapy programs (based on 2 studies with 75 participants: SMD 0.03, 95% CI -0.43 to 0.48). Secondary outcomes: we found a low quality of vestige that there was no difference between telerehabilitation and in-person rehabilitation for wastefulness outcomes (based on 3 studies with 106 participants: SMD 0.08, 95%CI -0.30 to 0.46). Pooling of three studies with 569 participants showed moderate-quality vestige that there was no difference between those who received post-discharge support interventions and those who received usual superintendency on health-related quality of life (SMD 0.03, 95% CI -0.14 to 0.20). Similarly, pooling of six studies (with 1145 participants) found moderate-quality vestige that there was no difference in depressive symptoms when comparing post-discharge tele-support programs with usual superintendency (SMD -0.04, 95% CI -0.19 to 0.11). We found no difference between groups for upper limb function (based on 3 studies with 170 participants: midpoint difference (MD) 1.23, 95% CI -2.17 to 4.64, low-quality evidence) when a computer program was used to remotely retrain upper limb function in comparison to in person therapy. Vestige was insufficient to yank conclusions on the effects of telerehabilitation on mobility or participant satisfaction with the intervention. No studies evaluated the cost-effectiveness of telerehabilitation; however, five of the studies reported health service utilization outcomes or financing of the interventions provided within the study. Two studies reported on wrongheaded events, although no serious trial-related wrongheaded events were reported.

10. Gabrielle Glenis, Regina Caecilia Setiawan et. Al Stroke rehabilitation is an essential component of post-stroke superintendency and is increasingly constructive if started sooner. Stroke rehabilitation therapy aims to modernize motor function, psychological well-being, cognitively, emotionally, and in terms of social well-being. Telerehabilitation allows communication between medical

staff and patients and can be a suitable volitional to usual rehabilitation superintendency in poststroke patients. This method may have potential implications for patients, expressly in remote or underserved areas. Future trials are needed on telerehabilitation's feasibility, efficacy, and cost-effectiveness in other low and middle-income countries where the stroke undersong is burgeoning.

3. MATERIALS AND METHODOLOGY

DESIGN- The design of this study is a scoping review. Scoping review have been described as a process of mapping the existing literature or evidence base.

DATABASE AND SEARCH STRATEGY-

The study includes Pubmed, Embrase, Cochrane, CINHAL,PED according to PRISMA guideline the search keywords used were "TR,VR and Stroke which is written in English and published between December 2015 to April 2024 non interventional studies such as cross sectional studies or duplicate studies ,literature reviews and meta analysis were also excluded the study which is made for inclusion and were reviewed for outcome measures and selection which can be summarized according to flowchart

SELECTION CRITERIA:

Inclusion criteria:-

- It includes involving stroke patient.
- Describing a rehabilitation intervention by using tele-communication.
- Articles which are written in English .
- The study which is published in Indexed Journal in last 10 years.
- The study includes search strategy all types of literature which includes pubmed , Embase, Cochrane, CINAHL, PEDro and MeSH of all types of articles in that outcome measures are used.

Exclusion criteria -

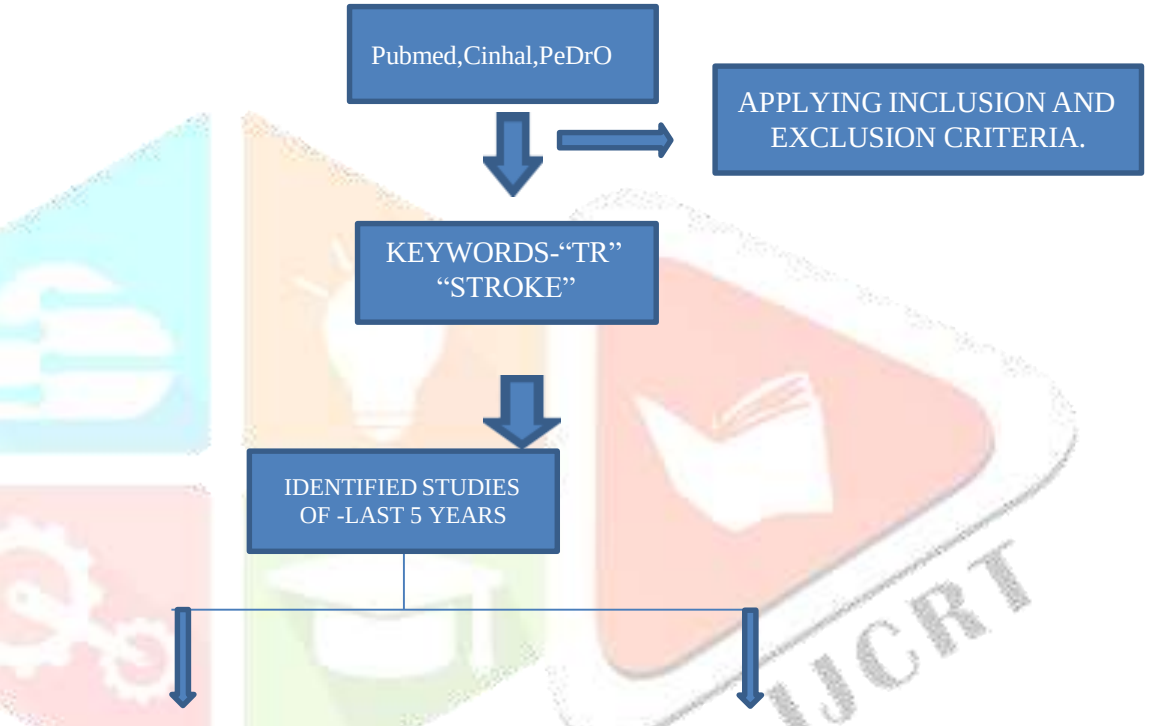
- The study or articles which are published more than last 5 years before more than 5 years.
- Articles published in other languages.
- Articles that do not report outcome measures.
- Discussion / position papers or comments.
- Poster presentation abstracts or articles without enough information about the intervention.
- Articles only reporting the development of technology .The search was not limited by study design or the date of publication.

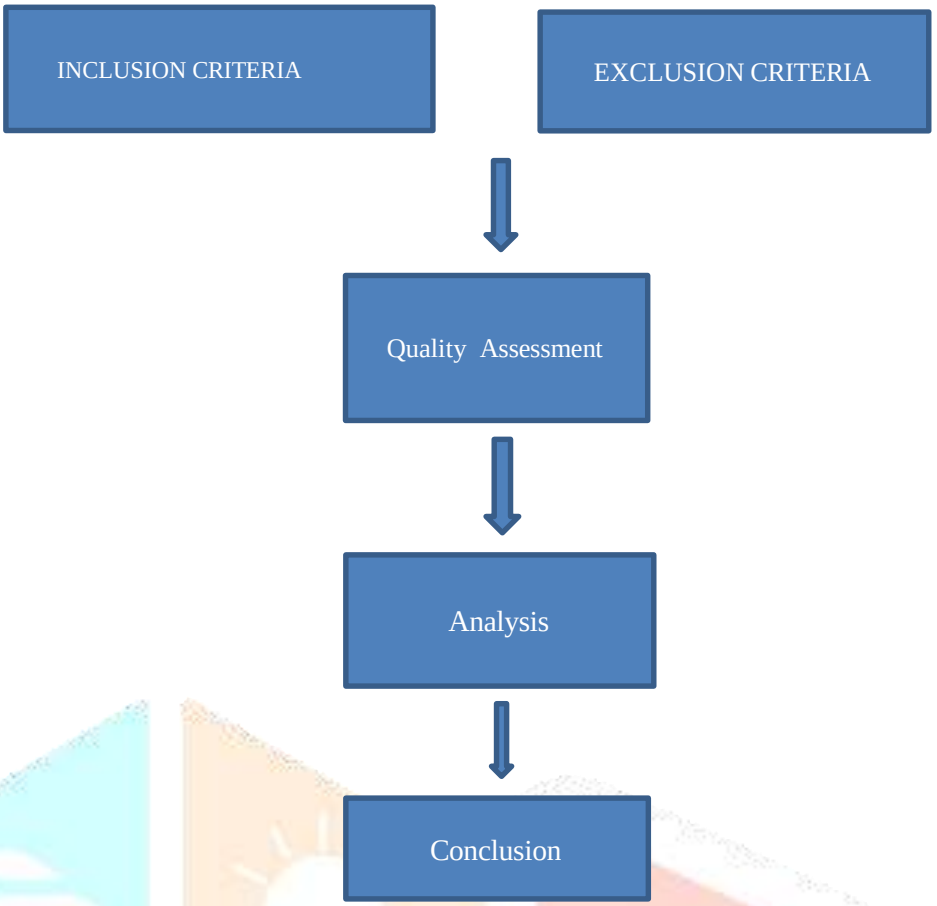
- Duplicate articles should be removed.

METHODLOGY :

The study includes Pubmed, Embrase, Cochrane, CINHAL, PEDro and MESH according to PRISMA guideline the search keywords used were “TR,VR and Stroke” which is written in English and published between December 2015 to April 2024 non interventional studies such as cross sectional studies or duplicate studies ,literature reviews and meta analysis were also excluded the study which is made for inclusion and were reviewed for outcome measures and selection which can be summarized according to flowchart.

PROCEDURE




INCLUSION CRITERIA
EXCLUSION CRITERIA
Quality Assessment
Analysis
Conclusion

Authors	Random allocation	Concealed allocation	Baseline Characteristics comparable	Subject blinded	Assessors blinded	Outcome for 85% of initial participants	Intention to treat analysis	Between group statistical comparison	Point and variability measures	Total score
Kate E ,2018	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7/10
Fred S. Sarfo 2018	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	7/10
Linzhang Li, 2023	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	7/10
Huidi Tchero 2018	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	6/10
Steven Truijen · 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	5/10
Ardalan Shariat 2023	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	6/10
Mirella Veras 2015	Yes	No	Yes	No	Yes	No	Yes	No	No	5/10
Laver KE 2020	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	5/10
Gabrie e Glen	Yes	Yes	Yes	Yes	Yes	No	No	No	No	6/10

2021										
Paulina Magd 2021	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	5/10

QUALITY ASSESSMENT

The pedro scale is a valid measure of methodological quality of clinical trials. It is valid to sum Pedro scale item scores to obtain a total score that can be treated as an interval level measurement and subjected to parametric statistical analysis.Pedro scale assesses a reasonable breadth of methological quantity (De Morton 2009).The total score for 5 studies were 7,for the rest of 5 studies were 7,9 respectively. The above table represents scores of all domains for all included studies.

ANALYSIS-

Data was extracted from tables along with the conclusion of the authors.

RESULT AND DISCUSSION

One of study result demonstrate that the role of telerehabilitation of post-stroke survivors. The telerehabilitation is feasible improving clinical outcomes of post-stroke patients. Apparently, technological and methodological improvements are seemed to result in a healthcare paradigm shift to implement cost-effective remote delivery of healthcare system, meeting the requirements of post-stroke individuals and granting access to rehabilitation services. Further research should be aimed at testing telerehabilitation systems for larger numbers of geriatric post-stroke patients and developing the most effective programs of rehabilitation under different conditions. Future intentions of researchers, healthcare professionals and stakeholders should be focused on implementing cutting edge solutions for sustainable improvements in health status and quality of life of post-stroke patients.

Within the next five years, a significant expansion in methods and devices of telerehabilitation is anticipated. Advanced methods and equipment, such as artificial intelligence, the internet of things, robotics and haptic devices will also be embedded in rehabilitation programs of post-stroke patients, reducing workload of therapists and clinicians and associated healthcare costs.

The routine implementation of telemedicine for post-stroke rehabilitation could be especially important for regions around the world with a paucity of socioeconomic resources, including under-resourced areas of high-income countries, where neuro-rehab experts and facilities are virtually non-existent. In particular, the findings of this updated systematic review may have important implications for Low-and-Middle Income countries in sub-Saharan Africa where tele-neurology has been proposed as a promising avenue to explore due to the severe shortage of skilled personnel in the midst of an enormous burden of stroke which is associated with high mortality, post-stroke depression, vascular cognitive impairment and stigma. Phone-based interventions have indeed demonstrated potential efficacy suggesting signals for blood pressure control among stroke survivors in Ghana as well as feasibility for post-stroke rehabilitation.

Future trials on the feasibility, efficacy and cost-effectiveness of tele-rehabilitation in SSA and indeed in other Low-and-Middle Income Countries where stroke burden is burgeoning are warranted. Larger, well-powered, longer-term studies are needed to establish the routine utility of tele-rehabilitation for stroke survivors globally.

No studies included in our original review reported information about the cost-effectiveness of telerehabilitation.

This review examines the efficacy results of teletherapy on various aspects of the

functional status of post-stroke patients. Research has shown that the tele system is a potential solution to the problem of increasing demand for rehabilitation services in a resource-constrained environment. Telerehabilitation provides continuity and an appropriate level of therapy intensity by using increased repetition of motor tasks
Clinical research indicates that hundreds of repetitions in a specific movement pattern are required to achieve an optimal range of motor cortex neuroplasticity after stroke. Cramer's study calculated 1031 repetitions of upper limb movements per day in the intervention trial, demonstrating the effect of teletherapy in maximising the plasticity phenomenon by intensifying the applied therapy (the number of repetitions of upper limb movements during conventional therapy averages 32 per session)

Telerehabilitation therefore contributes to a significant increase in function, regardless of whether therapy was initiated in the acute phase (<90 days from the stroke incident) or the chronic phase (>90 days after stroke).

At the same time, it alleviates the problem of patient transport, which is cited as a major limitation in access to inpatient therapy, and reduces the expenses incurred for post-stroke rehabilitation in the private sector. In turn, direct contact with a therapist, in the case of in-centre rehabilitation, plays an important role in the improvement process, increasing the patient's sense of security and support as well as the correctness of patients' motor tasks. Patients also often experience shrinkage of social networks after strokes. This is mainly due to loss of contact with friends, decreased participation in group events or avoidance of social activities. This phenomenon can contribute to worsening disability, as social isolation worsens indicators of functional status and increases the risk of depression.

A correlation was observed between the size and density of the network and the improvement in patients' gait time. Social network density was also associated with improvements in upper limb motor skills, while network size was associated with reductions in depressive symptoms. Furthermore, telerehabilitation using virtual reality (VR) is characterised by a large variety of goal-oriented motor tasks due to the availability of a wide range of interactive games with progressive levels of difficulty. The motor experiences offered by VR make traditional exercise unattractive to patients .In the Sheehy study, the tele technologies were proven to be easy to use and affordable for the stroke population eligible for this type of therapy.

Teletherapy has also had a tremendous impact on increasing the level of knowledge of strokes and secondary prevention, which are often inadequate among post-stroke patients. Through educational programmes that complement the teletherapeutic process, an optimisation of health is achieved, resulting in improved functional status and reducing the risk of secondary stroke. Thus, patient education is one of the key components of effective telerehabilitation.

9. CONCLUSION

Review provides evidence to suggest that tele-rehabilitation interventions have either better or equal salutary effects on higher cortical and mood disorders compared with conventional face-to-face therapy.

This home-based system was effective in providing telerehabilitation, education, and secondary stroke prevention to participants. Use of a computer-based interface offers many opportunities to monitor and improve the health of patients after stroke.
As telerehabilitation expands, patient continuity of care improves. It enables clinicians to remotely engage and deliver patient care outside of the medical setting, thus eliminating the issue of distance between clinician and patient.

Research has shown that the tele system is a potential solution to the problem of increasing demand for rehabilitation services in a resource-constrained environment.

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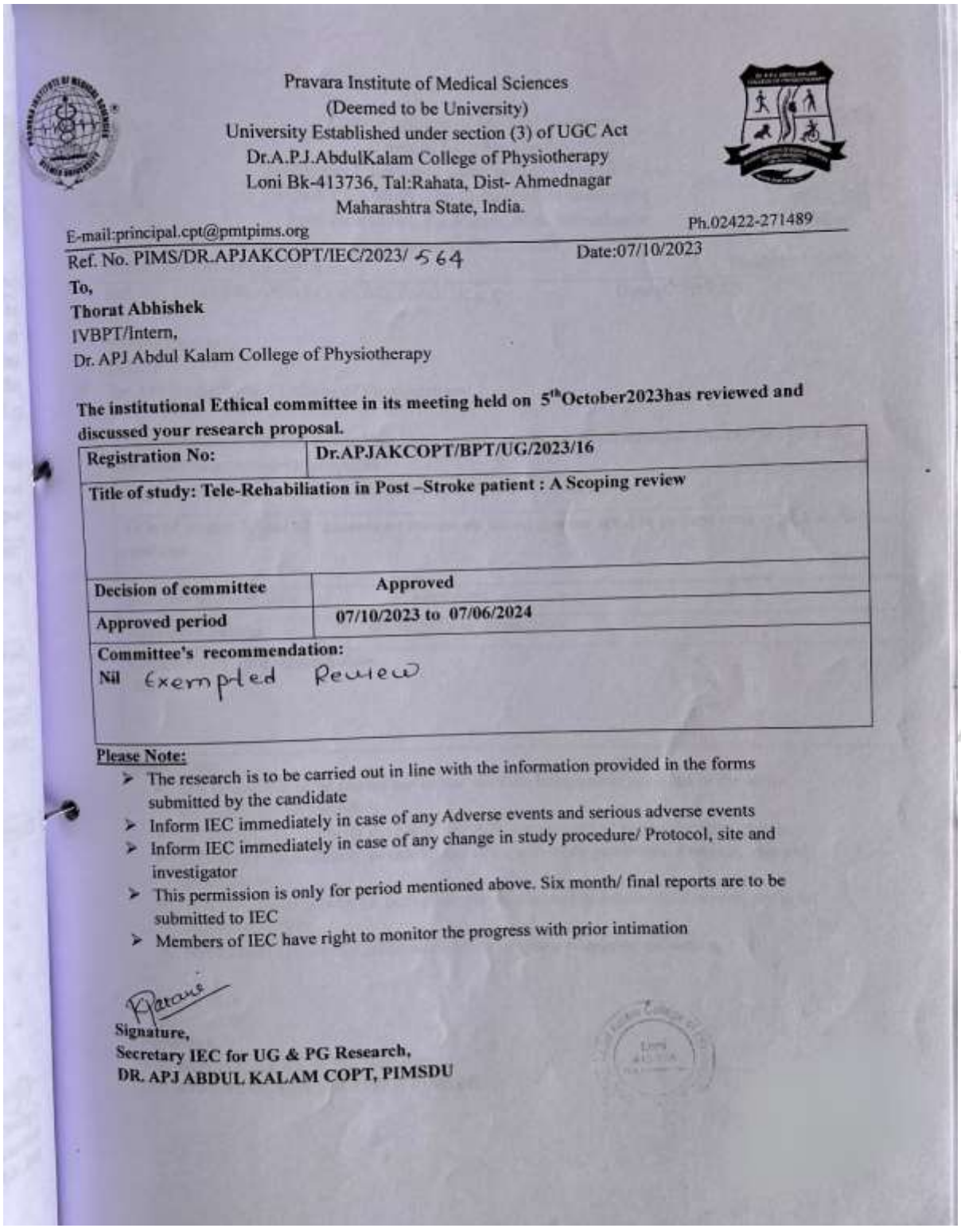
ANNEXURE

ETHICAL CLEARANCE FORM



Pravara Institute of Medical Sciences
(Deemed to be University)
University Established under section (3) of UGC Act
Dr.A.P.J.AbdulKalam College of Physiotherapy
Loni Bk-413736, Tal:Rahata, Dist- Ahmednagar
Maharashtra State, India.

E-mail:principal.cpt@pmtpims.org Ph.02422-271489

Ref. No. PIMS/DR.APJAKCOPT/IEC/2023/ 564 Date:07/10/2023

To,
Thorat Abhishek
IVBPT/Intern,
Dr. APJ Abdul Kalam College of Physiotherapy

The institutional Ethical committee in its meeting held on 5th October2023has reviewed and discussed your research proposal.

Registration No:	**Dr.APJAKCOPT/BPT/UG/2023/16**
Title of study: Tele-Rehabiliation in Post –Stroke patient : A Scoping review	
Decision of committee	**Approved**
Approved period	**07/10/2023 to 07/06/2024**
Committee's recommendation: Nil Exempted Review	

Please Note:

- The research is to be carried out in line with the information provided in the forms submitted by the candidate
- Inform IEC immediately in case of any Adverse events and serious adverse events
- Inform IEC immediately in case of any change in study procedure/ Protocol, site and investigator
- This permission is only for period mentioned above. Six month/ final reports are to be submitted to IEC
- Members of IEC have right to monitor the progress with prior intimation

Signature,
Secretary IEC for UG & PG Research,
DR. APJ ABDUL KALAM COPT, PIMSDU