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Effects of home-based exercises in comparison to facility-based supervised exercises for improving mobility after stroke: A systematic review update

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Roesner, K; Gross, C; Carvalho, GF, Saal, S.

Corresponding author:
Katrin Roesner

katrin.roesner@uni-luebeck.de

Author Affiliation:
Institut für Gesundheitswissenschaften, Studiengang Physiotherapie,Pain and Exercise Research Luebeck (P.E.R.L), Universität zu Lübeck, Lübeck, Deutschland.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 April 2025 and was last updated on 10 April 2025.

INTRODUCTION

Review question / Objective The systematic review aims to update the findings of Nascimento et. al (2022), which examined the effectiveness of home-based exercises compared to facility-based supervised exercises (FBSE) for improving mobility after stroke. Subgroup analysis will investigate stroke severity, phase, and setting.
Hypothesis: The effectiveness of home-based exercises compared to FBSE in people after stroke differs regarding mobility, even during the follow-up period.

Rationale Stroke remains a leading cause of death and disability worldwide, accounting for 11.6% of total deaths and representing 5.7% of total disability-adjusted life-years (DALYs) lost globally in 2019 [1]. The World Stroke Organization underscores the necessity of implementing primary and secondary prevention strategies alongside evidence-based acute care and rehabilitation services to mitigate this burden [2]. At the national level, organisations such as the UK's National Institute for Health and Care Excellence (NICE) have updated guidelines emphasising high-quality rehabilitation to minimise the multifaceted impacts of stroke on individuals and society [3]. Mobility is a key aspect of recovery in individuals following stroke to enhance participation in daily life and social activities [4], [5].
Different rehabilitation approaches exist to improve mobility after stroke. In this context, home-based exercise programs are gaining prominence as innovative interventions and are currently being proven in clinical studies. Nascimento et al. (2020) recently conducted a systematic literature review with meta-analysis on the effectiveness of home-based exercises in stroke patients; however, specific subgroup analyses regarding stroke phases, stroke severity and the setting were not carried out. Therefore, relevant information for individualising home-based stroke rehabilitation is still missing.
Home-based exercise interventions for stroke rehabilitation offer several key benefits [6]. They provide greater accessibility and convenience,

allowing patients to engage in rehabilitation without travelling and reducing time and transportation costs. The familiar environment fosters higher adherence and motivation, as patients experience greater comfort and can benefit from family support. Furthermore, these interventions promote long-term recovery and self-management, enabling patients to integrate exercises into their daily routine [7], [8].

Condition being studied People following stroke.

METHODS

Search strategy

Electronic databases will be searched using a predetermined search strategy:
MEDLINE, EMBASE, COCHRANE, PsycINFO, AMED
1. exp cerebrovascular disorders/ or brain injuries/ or brain injury/
2. (stroke$ or cva or poststroke or post-stroke).tw.
3. (cerebrovasc$ or cerebral vascular).tw.
4. (cerebral or cerebellar or brain$ or vertebrobasilar).tw.
5. (infarct$ or isch?emi$ or thrombo$ or emboli$ or apoplexy).tw.
6. 4 and 5
7. (cerebral or brain or subarachnoid).tw.
8. (haemorrhage or hemorrhage or haematoma or hematoma or bleed$).tw.
9. 7 and 8
10. exp hemiplegia/ or exp paresis/
11. (hempar$ or hemipleg$ or brain injur$).tw.
12. 1 or 2 or 3 or 6 or 9 or 10 or 11
13. community health services/ or community health nursing/ or community networks/ or home care services/ or home care services, hospital-based/ or home nursing/
14. homebound persons/ or home health aides/ or home care agencies/ or house calls/ or primary health care/ or aftercare/
15. residential facilities/ or assisted living facilities/ or group homes/ or halfway houses/ or homes for the aged/ or exp nursing homes/
16. housing for the elderly/ or long-term care/ or institutionalization/
17. (home$ or house$ or domicile or domiciliary or community or institution$ or outreach or sheltered accomm$).tw.
18. ((resident$ or long-term) adj5 (care or facilit$)).tw.
19. 13 or 14 or 15 or 16 or 17 or 18
20. Randomized Controlled Trials as Topic/
21. Controlled Clinical Trials as Topic/
22. Clinical Trials as Topic/
23. (random$ or RCT or RCTs).tw.
24. (controlled adj5 (trial$ or stud$)).mp.
25. ("random allocation" or "control group*" or "experimental group*").mp.
26. 20 or 21 or 22 or 23 or 24 or 25
27. exp exercise/ or movement/ or exp locomotion/ or physical exertion/ or exp exercise therapy/ or physical endurance/ or physical fitness/ or sports/ or exercise movement techniques/ or fitness centers/ or physical therapy modalities/ or rehabilitation/ or gymnastics/
28. 12 and 19 and 26 and 27
29. limit 28 to human

PEDro
Abstract and Title:
Search 1: Home-based and stroke
When Searching: Match all search terms (AND)
Method: Clinical Trial.

Participant or population Participants aged ≥18 years with stroke.

Intervention Any home-based exercise will be considered, regardless of whether it was carried out with or without supervision and offered remotely or in person. Only dose-matched trials will be included comparing home-based and FBSE. Home-based will be defined as two-thirds of the exercise being conducted at home. A minimum dose of four sessions over ≥2 weeks, prescribed by a physiotherapist or health professional with a qualification in movement exercises [9], will be considered.

Comparator Dose-matched FBSE, being provided at a centre, such as a hospital, outpatient department, private practice, medical centre, or community centre. Session duration, session frequency, and program duration will be recorded to assess the similarity of the included studies.

Study designs to be included Randomised controlled trials (RCTs), which are considered the gold standard for demonstrating efficacy in clinical trials, will be included. Individually randomised, cluster randomised controlled, randomised crossover, or multicentre randomised studies will be of interest.

Eligibility criteria

Design: Randomised controlled trials.
Participants: Adults (≥18 years), stroke
Intervention: Home-based exercise/FBSE (four sessions over two weeks, two-thirds of exercises are performed at home, prescribed by a physiotherapist or health professional
Outcome measures: Measures of balance, walking ability, walking speed, walking distance, risk of falling, activities of daily living and participation.

Comparison: Home-based exercises versus dose-matched FBSE.
The search will be limited to human studies only.

Information sources The following databases will be searched: Medical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica Database (Embase), the Physiotherapy Evidence Database (PEDro), the Cochrane Central Register of Controlled Trials (CENTRAL), and PSYChology INFOrmation (PsychINFO). The search will cover the period from April 2022 to April 2025. This review will also serve as an update to the systematic review by Nascimento et al. (2022). The selected time frame directly corresponds to the search by Nascimento et al. (2022). The International Trials Registry Platform (ICTRP) will assist in identifying ongoing trials from April 2022 to April 2025. Additionally, the reference lists of eligible studies will be examined to uncover potential studies not identified during the initial search process. A forward citation search will be performed for references of the included studies in Web of Science and Scopus.

Main outcome(s) The review will focus on the following primary outcomes: balance, walking ability, walking speed, and walking distance.
Balance assessment should reflect the individual's ability to sustain a stable body position during activities, which can be evaluated using questionnaires, stabilometric data or objective measures like the Mini-BESTest. Walking speed should be measured using a timed walk test, expressed as a distance-to-time ratio. Walking distance will be measured in meters or equivalent. Walking ability will be measured, for example, by the Functional ambulatory categories (FAC). Measures concerning the risk of falling, such as the Timed Up and Go test, will be of interest.

Additional outcome(s) The following additional outcomes will be of interest: activities of daily living and participation.
Activities of daily living and participation should be assessed through questionnaires that evaluate an individual's capacity to engage in real-life activities using instruments such as the Stroke Impact Scale.

Data management This systematic review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)- Statement [10].

Two reviewers will screen titles and abstracts of the publications retrieved during the searches independently using predetermined criteria. Any disagreement regarding the inclusion or exclusion of publications will be resolved by discussion, and in case of no consensus, a third author will be consulted. The full text of the remaining studies will then be retrieved. Two reviewers will screen the full texts of studies identified as potentially eligible for inclusion. The studies' authors may be contacted to request missing data or to clarify study details to ensure appropriate inclusion. If a disagreement occurs, it will be resolved by discussion. A third author will be consulted in case of no consensus. Different reports based on the same study population will be linked to ensure that the data from that population is only included once in the review and analysis.

Two reviewers using a predetermined data collection form will then extract relevant data. A standardised data extraction form will be developed based on the Cochrane Handbook for Systematic Review of Interventions, the CONSORT statement for reporting randomised trials and the TiDieR template for intervention description and replication. It will be pilot tested. The form will focus on the following information: study design, participants, intervention, clinical outcome measure, results, and missing and miscellaneous data significant to this review; if discrepancies or queries regarding data extraction occur, these will be resolved and discussed between the two reviewers. If not resolved, a third reviewer not involved in the initial data extraction process will be asked to extract the data. If no consensus is reached, all reviewers will discuss the article, and if no consensus is achieved, this will be documented in the review. In case of incomplete or missing data, KR will contact the authors of the primary studies by e-mail to request additional data.

Quality assessment / Risk of bias analysis Two reviewers will independently complete a risk of bias assessment. Any difference in opinion will be resolved by discussion, or a third reviewer will be consulted. Two independent authors will use the RoB-2 assessment RCT: Cochrane Risk of bias tool II (see Chapter 8, Cochrane Handbook, with a focus on sequence generation, allocation concealment, blinding, incomplete outcome data and selective outcome reporting). If disagreements persist, they will be resolved by consensus discussion or by a third author. The risk of bias will be presented in either a summary plot or a “traffic light” plot. Studies with a high risk of bias will be removed from the sensitivity analyses.

Strategy of data synthesis Two reviewers will independently complete a risk of bias assessment. Any difference in opinion will be resolved by

discussion, or a third reviewer will be consulted. Two independent authors will use the RoB-2 assessment RCT: Cochrane Risk of bias tool II (see Chapter 8, Cochrane Handbook, with a focus on sequence generation, allocation concealment, blinding, incomplete outcome data and selective outcome reporting). If disagreements persist, they will be resolved by consensus discussion or by a third author. The risk of bias will be presented in either a summary plot or a "traffic light" plot. Studies with a high risk of bias will be removed from the sensitivity analyses.

Subgroup analysis The following subgroups will be analyzed:
1. Stroke phases will be analysed according to the definitions of the Stroke Rehabilitation and Recovery Roundtable (Bernhardt et al., 2017):
– hyperacute (≤ 24 h post-stroke)
– acute (> 24 h but ≤ 7 days post-stroke)
– early subacute (> 7 days but ≤ 3 months (≤ 90 days) post-stroke)
– late subacute (> 3 months but ≤ 6 months (≤ 180 days) post-stroke)
– chronic (> 6 months)
2. Stroke severity will be measured by NIHSS following the Stroke Rehabilitation and Recovery Roundtable recommendations [11].
3. Stroke setting will be divided into (1.) clinical or (2.) rehabilitative setting and (3.) no clinical nor rehabilitative setting.
4. FBSE vs. home-based therapy: if possible, further subgroups (supervised (personally supervised compared to other digital forms) vs. unsupervised exercises) will be analysed within both groups.

The data will be synthesized (narratively or quantitatively, if possible) according to the categories defined by the methods outlined above. The nature of the included studies will determine the feasibility of subgroup analysis.

Sensitivity analysis Sensitivity analysis will be based on the risk of bias and heterogeneity levels. Heterogeneity will be assessed first by visual inspection of the forest plots and χ^2 test (i.e., Q statistic), where a statistically significant test indicates the presence of heterogeneity between studies. Then, it will be explored using univariable meta-regression analyses with three covariates: time post-stroke, age, and sex.

Language restriction No language restrictions.

Country(ies) involved Germany.

Keywords stroke, home-based interventions, randomized trials.

Dissemination plans Inclusion of results in clinical guideline recommendations.

Contributions of each author
Author 1 - Katrin Roesner - Institut für Gesundheitswissenschaften, Studiengang Physiotherapie,Pain and Exercise Research Luebeck (P.E.R.L), Universität zu Lübeck, Lübeck, Deutschland, International Graduate Academy (InGrA), Institute of Health and Nursing Sciences, Medical Faculty of Martin Luther University Halle-Wittenberg, University Medicine Halle.
Author 2 - Catharina Gross - Ernst-Abbe-Hochschule Jena, University of Applied Sciences.
Author 3 - Gabriela F. Carvalho - Department of Physiotherapy, Faculty of Health, Medical & Life Sciences, Furtwangen University, Furtwangen, Germany.
Author 4 - Susanne Saal - Ernst-Abbe-Hochschule Jena, University of Applied Sciences, Institute of Health and Nursing Science; Medical Faculty of Martin Luther University Halle-Wittenberg University Medicine Halle.

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