INPLASY PROTOCOL

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None declared.

Effects of Ten Different Exercise Interventions on Motor Function in Parkinson's Disease Patients—A Network Meta-Analysis of Randomized Controlled Trials

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Review question / Objective: **PICOS tool: (P) Population: people with Parkinson's disease; (I) Intervention: exercise; (C) Comparator: control group with only usual care and appropriate rehabilitation measures (including usual balance training); (O) Outcomes: motor tests for people with Parkinson's disease. (S) Study type: RCTs.**
Eligibility criteria: **2.2 Inclusion criteria(1) Experimental group with different exercise modalities as an intervention for Parkinson's disease (2) Control group with routine care and rehabilitation of patients only (3) Clinical randomised controlled trial (4) Outcome indicators including at least one of the following: Unified Parkinson's Disease Rating Scale (UPDRS) score [UPDRS or Movement Disorder Society-Unified Parkinson's disease rating scale scores (MDS-UPDRS)], Berg Balance Scale (BBS) score, Timed-Up-and-Go (TUG) score.2.3 Exclusion criteria(1) Studies with incomplete or unreported data (2) Studies from non-randomized controlled trials [including quasi-randomized controlled trials, animal studies, protocols, conference abstracts, case reports or correspondence].**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 May 2022 and was last updated on 23 May 2022 (registration number INPLASY202250136).

INTRODUCTION

Review question / Objective: **PICOS tool: (P) Population: people with Parkinson's disease; (I) Intervention: exercise; (C) Comparator: control group with only usual care and appropriate rehabilitation measures (including usual balance training); (O) Outcomes: motor tests for people with Parkinson's disease. (S) Study type: RCTs.**

Condition being studied: **Parkinson's disease has become the second most prevalent neurodegenerative dis-ease worldwide, affecting the quality of life and**

physical and mental health of more than 6 million people. Parkinson's disease can cause a number of motor dysfunctions that can seriously affect the lives of patients and place a significant burden on their families. There is no complete cure for Parkinson's disease, only a way to alleviate its symptoms to some extent. Medication is currently the primary option for Parkinson's disease relief, but the side effects and development of drug resistance or the cost of medication have limited the widespread use of medication in clinical practice and has become a long-term option for patients. Is there a treatment option that is less costly and has al-most no side effects? Physical exercise has made good progress in the treatment of other degenerative diseases due to its great ease of handling and almost side effects. As a result of research and studies, it has been noted in relevant Parkinson's disease rehabilitation studies that physical exercise can be of considerable help in improving motor function and slowing down the progression of Parkinson's disease in people with Parkinson's disease. Previous studies have consistently shown that physical activity has considerable benefits for maintaining brain health, improving motor performance and enhancing quality of life in people with Parkinson's disease. However, for physical activity, different exercise programs have different characteristics and may have different effects on people with Parkinson's disease, and previous me-ta-analysis has only compared the effects of a particular exercise type relative to a control group for people with Parkinson's disease[11–14]. There is still a lack of evidence-based recommendations as to which exercise programme is most suitable for improving motor function in people with Parkinson's disease. It is therefore particularly important to find an exercise modality within a complex exercise programme that is suitable for improving the symptoms associated with motor function in patients with Parkinson's disease, especially when physicians are considering the use of exercise prescriptions to treat patients with Parkinson's disease. Network meta-analysis is a recent evidence-based technique that uses direct or indirect comparisons to compare the effects of multiple interventions on a disease and to estimate the rank order of each treatment. Therefore, in this study we used network me-ta-analysis to compare different exercise programmes (aquatic training, cycling, walking exercises, treadmill exercises, yoga exercises, taijiquan qigong, baduanjin qigong, musical dance exercises, virtual reality exercises and resistance exercises) in order to assess the effect of these exercise programmes on the motor function of Parkinson's patients and to provide patients and clinicians with a better understanding of the effects of these pro-grammes. The aim is to evaluate the effects of these exercise programmes on motor function in Parkinson's patients and to provide evidence-based recommendations for patients and clinicians.

METHODS

Search strategy:

#1 "Parkinson disease”[MeSH]
#2 (((((Parkinson disease[Title/Abstract])OR Parkinson’s disease[Title/Abstract]) OR idiopathic Parkinson’s disease[Title/Abstract]) OR lewy body Parkinson’s disease[Title/Abstract]) OR primary Parkinsonism[Title/Abstract]) OR paralysis agitans[Title/Abstract]
#3 #1 OR #2
#4 “exercise"[MeSH]
#5 (((((((exercise[Title/Abstract]) OR exercise intervention[Title/Abstract]) OR exercise training[Title/Abstract]) OR training[Title/Abstract]) OR physical training[Title/Abstract]) OR physical exercise[Title/Abstract]) OR sports training[Title/Abstract]) OR nurse intervention[Title/Abstract]
#6 #4 OR #5
#7 randomzied controlled trials[Publication Type]
#8 #3 AND #6 AND #7

Participant or population: (1) Experimental group with different exercise modalities as an intervention for Parkinson's disease.
Intervention: The aim of this study was to evaluate ten exercise interventions (YOGA:

yoga training, RT: resistance training, AQU: aquatic training, TAI: Taiji Qigong training, TRD: treadmill training, VR: virtual reality training, DANCE: musical dance training, WKT: walking training, CYC: cycling training, BDJ: Baduanjin Qigong training) on motor function in Parkinson's disease (PD) patients.

Comparator: Usual care（no exercise）.

Study designs to be included: RCTs.

Eligibility criteria: 2.2 Inclusion criteria(1) Experimental group with different exercise modalities as an intervention for Parkinson's disease (2) Control group with routine care and rehabilitation of patients only (3) Clinical randomised controlled trial (4) Outcome indicators including at least one of the following: Unified Parkinson's Disease Rating Scale (UPDRS) score [UPDRS or Movement Disorder Society-Unified Parkinson's disease rating scale scores (MDS-UPDRS)], Berg Balance Scale (BBS) score, Timed-Up-and-Go (TUG) score.2.3 Exclusion criteria(1) Studies with incomplete or unreported data (2) Studies from non-randomized controlled trials [including quasi-randomized controlled trials, animal studies, protocols, conference abstracts, case reports or correspondence].

Information sources: The researchers in this paper searched five electronic databases (Pubmed, EMBASE, Cochrane Central Register of Controlled Trials, Web of Science and CNKI) from their creation to April 2022.

Main outcome(s): Outcome indicators including at least one of the following: Unified Parkinson's Disease Rating Scale (UPDRS) score [UPDRS or Movement Disorder Society-Unified Parkinson's disease rating scale scores (MDS-UPDRS)], Berg Balance Scale (BBS) score, Timed-Up-and-Go (TUG) score.

Quality assessment / Risk of bias analysis: Two researchers independently assessed the risk of bias (ROB), in accordance with the Cochrane Handbook version 5.1.0 tool for assessing ROB in RCTs. The following seven domains were considered: (1) randomized sequence generation, (2) treatment allocation concealment, blinding of (3) participants and (4) personnel, (5) incomplete outcome data, (6) selective reporting and (7) other sources of bias. Trials were categorized into three levels of ROB by the number of components for which high ROB potentially existed: high risk (five or more), moderate risk (three or four) and low risk (two or less)

Strategy of data synthesis: Data analysis In studies where exercise is the intervention, all variables are continuous variables and are expressed as means with standard deviation (SD). Continuous variables in the study will be reported as mean difference (MD = absolute difference between the means of two groups, defined as the difference in means between the treatment and control groups and calculated using the same scale) or standardised mean difference (SMD = mean difference in outcome between groups/standard deviation of outcome between subjects, used to combine data when trials with different scales) with 95% confidence intervals (CI) and analysis. As there are certainly potential differences across studies, we chose a random effects model for analysis rather than a fixed effects model. We used Stata software (version 15.1) and performed NMA aggregation and analysis using Markov chain Monte Carlo simulation chains in a Bayesian-based framework ac-cording to the PRISMA NMA instruction manual. We will use the nodal method to quantify and demonstrate the agreement between indirect and direct comparisons, calculated through the instructions in the Stata software, and if the P-value > 0.05. the consistency test passes. Stata software is used to present and describe network diagrams of different movement interventions. In the generated network diagrams, each node represents a different motor intervention and a different control condition, and the lines connecting the nodes represent direct head-to-head comparisons between interventions. The size of each node and the width of the

connecting lines are proportional to the number of studies. Intervention hierarchy was summarized and reported as a P score. The P score is considered as a frequentist analogue to surface under the cumulative ranking curve (SU-CRA) values and measures the extent of certainty that a treatment is better than another treatment, averaged over all competing treatments. The P score ranges from 0 to 1, where 1 indicates best treatment with no uncertainty and 0 indicates worst treatment with no un-certainty. While the P score or SUCRA can be usefully re-expressed as the percentage of effectiveness or acceptability of the exercise interventions, such scores should be interpreted cautiously unless there are actual clinically meaningful differences between interventions. To check for the presence of bias due to small-scale studies, which may lead to publication bias in NMA, a network funnel plot was generated and visually inspected using the criterion of symmetry.

Subgroup analysis: None.

Sensitivity analysis: We used Stata software (version 15.1) and performed NMA aggregation and analysis using Markov chain Monte Carlo simulation chains in a Bayesian-based framework ac-cording to the PRISMA NMA instruction manual. We will use the nodal method to quantify and demonstrate the agreement between indirect and direct comparisons, calculated through the instructions in the Stata software, and if the P-value > 0.05. the consistency test passes.

Language: None restriction.

Country(ies) involved: China.

Keywords: Keywords: exercise interventions; dance; Parkinson's disease; network meta-analysis.

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