INPLASY PROTOCOL

To cite: Zhang et al. Exercise interventions for elderly people at risk of frailty. Inplasy protocol 202140083. doi: 10.37766/inplasy2021.4.0083

Received: 16 April 2021

Published: 16 April 2021

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Support: **West China Hospital.**

Review Stage at time of this submission: **Data analysis.**

Conflicts of interest:
None declared.

Exercise interventions for elderly people at risk of frailty

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Review question / Objective: **Frailty is a state of age-related reduced physiological reserve, characterized by an increased risk of adverse clinical outcomes. Studies have shown that exercise can improve frailty in older people.It remains to be seen which exercise will improve the fitness of older people. This protocol is aimed to examine whether physcical exercise can protect the elderly from frailty and which method is more effectively to reduce the level of frailty.**
Information sources: **PUBMED, EMBASE, Cochrane Library, Wanfang, China National Knowledge Infrastructure, Clinical Trials Database, and Science Network as data sources. The following search keywords will be used.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 April 2021 and was last updated on 16 April 2021 (registration number INPLASY202140083).

INTRODUCTION

Review question / Objective: **Frailty is a state of age-related reduced physiological reserve, characterized by an increased risk of adverse clinical outcomes. Studies have shown that exercise can improve frailty in older people.It remains to be seen which exercise will improve the fitness of older people. This protocol is aimed to examine whether physcical exercise can protect the elderly from frailty and which method is more effectively to reduce the level of frailty.**

Condition being studied: **The global trend of ageing has become a critical issue for public health, posing enormous challenges for a collective effort of older adults, health-care professionals, researchers, and**

policy makers.In 2019, the Chinese population constituted 18 % of the world population, with 164.5 million Chinese citizens aged 65 and above (65+), and 26 million aged 80 or above (80+). Frailty is a complex geriatric syndrome that increases vulnerability to stress frequently resulting in a decreased physiologic reserve in multiple organs that cause limited capacity to maintain homeostasis. At present, there are different degrees of frailty among the elderly in various countries around the world. The risk of frailty and frailty is higher in older patients with more health problems, a higher body mass index, and reduced strength in the limbs and legs. Frailness in the elderly is an important factor leading to various adverse outcomes in the elderly, such as waterfall reaction, disability, cognitive decline, hospitalization, rigid thinking, urinary incontinence, prolonged hospitalization, increased mortality, etc, which seriously affect the body function and quality of life of the elderly.In the existing literature, frail older adults have a higher risk of disability and death after normal conditions or surgery than non-frail older adults, and are associated with decreased quality of life. Physical infirmity, even physical infirmity, has a big impact on the risk of future disability. Certain components of physical frailty, such as slowness, frailty and weight loss, are strongly associated with accident disability among community-dwelling older adults. Frailty is related to many factors such as exercise, age and nutrition. Loss of muscle mass may reduce the independency of the individuals and when this process becomes chronic it may lead to frailty. Exercise can improve muscle oxygen content and tolerance, flexibility, prevent muscle atrophy and decrease, can increase muscle mass, enhance muscle strength, improve pace, to improve the quality of life and quality of confidence. Results of recent studies indicate positive effects of structured exercise programs during long-term care for physical functioning, cognition, and psychological well-being. At present, the therapy of the frail elderly mainly includes endurance training, resistance training and comprehensive functional training. A combination of strength training and high-intensity interval training (HIIT) improved frailty in 64% of subjects, SPPB scores increased by 3.2 points, and muscle strength increased by 47%. Lifestyle Interventions and the Independent Study of Older Persons (LIFE) showed that, compared with health education, physical activity programs reduced the risk of major outcomes in MMD, a major mobility disorder. Trombetti et al. showed that a structured, moderate-intensity physical activity program did not improve frailty for more than 2 years in sedentary, community-dwelling older adults. The question of whether physical exercise can improve frailty in the elderly remains to be studied. Exercise can improve frailty in elderly patients undergoing colorectal surgery, but there are few targeted studies on frailty in sick older adults. Some studies have shown that exercise can improve frailty in older people, but it doesn't provide the best exercise regimen. The best interventions to address frailty among older adults have not yet been fully defined, and the diversity of interventions and outcome measures makes this process challenging. More studies are also needed to determine which exercises are best suited, most effective, and safe (type, setting, duration, frequency, and intensity) for this population.

METHODS

Search strategy: The following search keywords will be used: 1#: “frailty” or “weak” 2#: “older people” or “aged” or “elder” or “elderly” 3#: “physical exercise” or “exercise” or “training” or “exercise training” or “Exercise prescription” or “Tai chi” or “yoga”.

Participant or population: Participants aged over 65 years who can walk without assistance will be included. The exclusion criteria are as follows: 1. Visual and hearing impairment interfering with communication or daily activities. 2. Cognitive impairment defined as 3-item recall ≤ 1. 3. Functional Impairment defined as not able to walk for 5 m without assistance. 4. Suicidal Ideation defined as Suicide Subscale of the Mini

International Neuropsychiatric Interview (M.I.N.I.) ≥ 6. 5. Alcohol abuse disorders active within the last year.(score ≥ 2 on the Chinese edition of Cut down, Annoyed,Guilty, and Eye-opener (CAGE) substance abuse screening tool). 6. Organic mental disorders (seizure, brain tumour, brain surgeries), history of schizophrenia or bipolar diagnosed from psychiatrist.

Intervention: The systematic review and meta-analysis that we will conduct are based on the application of one or more exercise interventions in the experimental group, including single forms of strength exercise.

Comparator: The Cochrane cooperative bias risk tool will be used to evaluate the methodological quality of the selected RCTs.

Study designs to be included: Randomized controlled trials (RCTs) of exercise interventions for frailty in the older adults published in Chinese or English will be included in our review. Studies that are not RCTs, but meet the criteria of RCTs will also be included.

Eligibility criteria: Participants aged over 65 years who can walk without assistance will be included. The exclusion criteria are as follows: 1. Visual and hearing impairment interfering with communication or daily activities. 2. Cognitive impairment defined as 3-item recall ≤ 1. 3. Functional Impairment defined as not able to walk for 5 m without assistance. 4. Suicidal Ideation defined as Suicide Subscale of the Mini International Neuropsychiatric Interview (M.I.N.I.) ≥ 6. 5. Alcohol abuse disorders active within the last year.(score ≥ 2 on the Chinese edition of Cut down, Annoyed, Guilty, and Eye-opener (CAGE) substance abuse screening tool). 6. Organic mental disorders (seizure, brain tumour, brain surgeries), history of schizophrenia or bipolar diagnosed from psychiatrist.

Information sources: PUBMED, EMBASE, Cochrane Library, Wanfang, China National Knowledge Infrastructure, Clinical Trials Database, and Science Network as data sources. The following search keywords will be used.

Main outcome(s): The main outcome in this study is the score of Fried's Frailty Phenotype Criteria, Frailty Trait Scale – short version, SHARE Frailty Instrument, FRAIL scale, the Gérontopôle Frailty Screening Tool (GFST) ,Clinical Frailty Scale (CSF), Rockwood and Mitnitski's Frailty Index (FI), the Study of Osteoporotic Fractures (SOF) Index, Edmonton Frailty Scale (EFS), the Fatigue, Resistance, Ambulation, Illness and Loss of weight (FRAIL) Index, the Multidimensional Prognostic Index (MPI), Tilburg Frailty Indicator (TFI), PRISMA-7, Groningen Frailty Indicator (GFI), Sherbrooke Postal Questionnaire (SPQ) and the Kihon Checklist (KCL).

Additional outcome(s): The secondary outcomes are muscle strength, gait velocity stair-climbing power, the level of spontaneous physical activity.

Data management: After finish of the study selection, we will conduct a standard data abstraction sheet using Microsoft Excel 2010 to collect data of interest. One reviewer will extract the following characteristics: the first author, year of publication, name of cohort if any, country in which cohort were conducted, sample size, mean age, median weight, proportion of female, body mass index (BMI), race, comorbidities, social function score, smoke status (yes or no), drinking status (yes or no), living status (living alone or living with others), work status (current work, retired, or never work), frailty criteria, the number and percentage of participants according to frailty categories (frailty, pre-frailty, and non-frailty).

Quality assessment / Risk of bias analysis: The I2 statistic and x2 test will be used to assess statistical heterogeneity, with P50% suggesting high statistical heterogeneity among the studies. If the included studies have existing heterogeneity, a random-effects model will be used. Otherwise, we

will use a fixed-effects model for calculation.

Strategy of data synthesis: Two researchers will independently select topics and abstracts to determine the literature that meets the criteria, and then read the full text to further screen the items and record the reasons for exclusions. Possible disagreements will be discussed and decided by consensus, with the intervention of the third researcher if necessary. The details of the study selection and identification process will be presented in a flow chart.

Subgroup analysis: Subgroup analyses will be performed on physical activity/exercise type (e.g., aerobic exercise, resistance exercise, motor skill training, or mixed training), intensity, frequency and/or duration, and so on. The purpose of subgroup analyses is to determine the best physical activity form of frailty people.

Sensitivity analysis: If it is possible to conduct a meta-analysis, the Review management software Revman 5.3 and Stata 12.0 will be used. The continuous outcomes will be expressed as mean difference (MD) with 95% confidence interval. When the MD of the outcomes is large or the unit is different, the standardized mean difference (SMD) will be used. The heterogeneity test between studies will be assessed with the Q statistic and the I2 statistic. Usually, if P >.05, I2<50%, it will be considered that heterogeneity is low enough and a meta-analysis can be conducted with a fixed-effect model. If P 50%, it will be considered as high level of heterogeneity, and a random effect model will be used.Sensitivity analysis will be used to further reducing heterogeneity by removing studies with high risk of bias or individually omitting each study to explore the sources of heterogeneity. Sources of heterogeneity will be investigated by meta-regression using age, gender, exercise intensity, and duration of exercise as covariates.

Country(ies) involved: China.

Keywords: elderly people, frailty, meta-analysis, exercises, protocol

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