

## Intervention of aerobic exercise on pneumonia or COVID 19 in elderly: A system review

INPLASY202360067

doi: 10.37766/inplasy2023.6.0067

Received: 21 June 2023

Published: 22 June 2023

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**Support** - This research was funded by Zhejiang Province Science Fund for Distinguished Young Scholars (R22A021199); Key R&D Program of Zhejiang Province, China (2021C03130); Ningbo Natural Science Foundation (20221JCGY010532; 20221JCGY010607) and Key R&D Program of Ningbo, China (2022Z196).

**Review Stage at time of this submission** - Completed but not published.

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY202360067

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 June 2023 and was last updated on 22 June 2023.

**INTRODUCTION**

**Review question / Objective** Participants who are in elderly or elder survivors over 59 years old with pneumonia or COVID -19 and have been in trials or case studies on aerobic exercise intervention were included in this review. Participants were excluded: below 59 years old, trails or case studies in elderly were not related to pneumonia or COVID-19. Interventions Aerobic exercises were limited to a few common ones, hence, Aerobic Exercise, Aerobic Exercise Combined with Strengthening exercise; Aerobic Exercise Combined with Resistance exercises or on prevention and rehabilitation were considered. Interventions excluded the exercise on health education or physiological exercise, or routine lifestyle Comparison

There was no restriction regarding the control group and case studies (e.g., oral training, physiological exercise, blank controls, and routine lifestyle were all treated as a no-intervention group).

Studies compared the Aerobic Exercise interventions with other exercise modalities, such as Explosive Force Training, Endurance Training or Blood Flow Restriction Training were excluded. Trials or case studies not related to aerobic exercise intervention or pneumonia or COVID-19 were excluded.

**Outcome**

The primary outcomes collected and analyzed from the included studies was Aerobic Exercise based on different types of scales. Aerobic exercise would enhance the immune responses to pneumonia vaccination and help recovery from lungs, heart, kidneys, or other organs, keep physical activity positively to control the risk of

infecting pneumonia in elderly and preventing serious pneumonia episodes among elderly through lifestyle promotion. Seniors can benefit from moderate-intensity aerobic training program combined with self-management techniques made contributions to interventions. COVID-19-related dyspepsia was relieved considerably, and the coughing ability in senior patient was strengthened; meanwhile, strength, balance, walking speed and daily living in elderly patient improved significantly. Rehabilitation program offered a safe and efficacy prescription when initiate rehabilitation therapy for elderly patients with severe COVID-19.

Outcomes were excluded if: did not include any impact or the results on intervention or rehabilitation.

#### Study Design

Randomized controlled trials (RCTs) and case studies investigated the effects of aerobic exercise intervention on pneumonia or COVID 19 prevention in elderly or rehabilitation in elder survivors were considered; cross-sectional studies, observational studies, conference papers, etc., were not included. Both Chinese and English papers published on peer-reviewed journals were covered.

**Condition being studied** The review aimed to conclude the recent studies that demonstrated the effects of aerobic exercise intervention on pneumonia or COVID 19 prevention in elderly or rehabilitation in elder survivors. China made adjustments on lockdown policies to stem the spread of COVID-19 since December 5, 2022. As a vulnerable group who is under a higher risk of infection, the health issue on intervention of prevention and rehabilitation in elderly had attracted a great deal of attention. The studies of this special health issue have been few in this filed, so this review dedicated to offer preliminary suggestions in future clinical research. A literature search of electronic databases involving WEB OF SCIENCE, SCIENCE DIRECT, EBSCO and CNKI was conducted for using the following key-words, “exercise”, “physical activity” “sports” “aerobic exercise”, “elderly” (over 59 years old) “COVID-19” “post COVID-19” and “pneumonia.” (Year 2020 to Year 2023). The relevant randomized control trials and case studies were all concluded, there were twelve qualified studies included this review ultimately. It was suggested that moderate-intensity aerobic exercise was an essential form of intervention on prevention and rehabilitation in seniors on COVID-19. Moreover, dancing training at moderate intensity of thirty minutes per day, and three times a week was strongly recommended. Meanwhile, aerobic exercise combined with strengthening exercise and resistance exercise

were also regarded as a valuable intervention. Nevertheless, the senior citizens are advised to choose aerobic exercise programs with a proper intensity and type based on their individual physical conditions under the fitness report and professional prescriptions. Moreover, latest experimental and real case studies from year 2020 to 2023 on pneumonia had immense influence on clinical research in the future, further studies should be focused on long-term interventions on pneumonia, especially for elderly.

## METHODS

**Participant or population** Participants Participants who are in elderly or elder survivors over 59 years old with pneumonia or COVID -19 and have been in trials or case studies on aerobic exercise intervention were included in this review. Participants were excluded: below 59 years old, trials or case studies in elderly were not related to pneumonia or COVID-19. Interventions.

**Intervention** Interventions Aerobic exercises were limited to a few common ones, hence, Aerobic Exercise, Aerobic Exercise Combined with Strengthening exercise; Aerobic Exercise Combined with Resistance exercises or on prevention and rehabilitation were considered. Interventions excluded the exercise on health education or physiological exercise, or routine lifestyle.

**Comparator** There was no restriction regarding the control group and case studies (e.g., oral training, physiological exercise, blank controls, and routine lifestyle were all treated as a no-intervention group). Studies compared the Aerobic Exercise interventions with other exercise modalities, such as Explosive Force Training, Endurance Training or Blood Flow Restriction Training were excluded. Trials or case studies not related to aerobic exercise intervention or pneumonia or COVID-19 were excluded.

**Study designs to be included** Randomized controlled trials (RCTs) and case studies investigated the effects of aerobic exercise intervention on pneumonia or COVID 19 prevention in elderly or rehabilitation in elder survivors were considered; cross-sectional studies, observational studies, conference papers, etc., were not included. Both Chinese and English papers published on peer-reviewed journals were covered.

**Eligibility criteria** The exclusion criteria for the study were that the studies were excluded in

duplication among databases or relevant conditions but met the inclusion criteria.

**Information sources** A systematic literature search was performed in the following four online electronic data-bases to identify all the relevant studies from their inception until December 28, 2023: WEB OF SCIENCE, SCIENCE DIRECT, EBSCO and CNKI (China National Knowledge Infrastructure (available at <https://www.cnki.net/>)) were conducted from year 2020 to 2023. The following search terms were used in databases: (“exercise” AND “physical activity” AND “sports”) AND (“sports” OR “aerobic exercise” OR “elderly” (over 59 years old) OR “COVID-19” OR “post COVID-19” OR “pneumonia”), while their Chinese counterparts were used in the Chinese database. The search strategy was slightly modified in order to suit each database. A rigorous and thorough literature search was conducted, which including two authors independently screened and assessed all the retrieved articles from the databases based on the included criteria. Any disagreements regarding the inclusion would be discussed and resolved with the third author. Moreover, all reference lists from the included studies and the retrieved reviews were double checked using the citation snowballing method to ensure that all the potential relative articles were located.

**Main outcome(s)** The primary outcomes collected and analyzed from the included studies was Aerobic Exercise based on different types of scales. Aerobic exercise would enhance the immune responses to pneumonia vaccination and help recovery from lungs, heart, kidneys, or other organs, keep physical activity positively to control the risk of infecting pneumonia in elderly and preventing serious pneumonia episodes among elderly through lifestyle promotion. Seniors can benefit from moderate-intensity aerobic training program combined with self-management techniques made contributions to interventions. COVID-19-related dyspepsia was relieved considerably, and the coughing ability in senior patient was strengthened; meanwhile, strength, balance, walking speed and daily living in elderly patient improved significantly. Rehabilitation program offered a safe and efficacy prescription when initiate rehabilitation therapy for elderly patients with severe COVID-19. Outcomes were excluded if: did not include any impact or the results on intervention or rehabilitation.

**Quality assessment / Risk of bias analysis** Two authors independently assessed the risk of bias of all the included studies using the Cochrane Risk of

Bias Assessment Tool, which included the following seven domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other biases. There are three grades for each domain: low risk of bias, unclear risk of bias, and high risk of bias. Any disagreements regarding the risk of bias assessment would be discussed and resolved with the third author..

**Strategy of data synthesis** Two authors independently screened, extracted, and summarized the following relevant data from all the original articles. The final literature search was completed by December 28, 2023. English language and Chinese language were the search language and there was no limitation on regions and countries. (1) the basic characteristics of included studies (authors, country where the trial and case studies were performed, and publication year); (2) the basic characteristics of participants (authors, regions, and objectives ‘s sample size, age); (3) study intervention on prevention and rehabilitation (the forms of aerobic exercise, intensity, frequency, duration, and study design); and (4) outcome parameters and primary results [26]. Any differences regarding data extraction would be discussed and re-solved with the third author. (EndNote X9.3.3 Bld 13966, Clarivate Analytics, Philadelphia, PA, USA) was used to organize papers and generate citations.

**Subgroup analysis** i) intervention on prevention studies ii) intervention on rehabilitation studies iii) types of interventions. Discuss the results of the different types of intervention (Rehabilitation of Aerobic Exercise; Aerobic Exercise Combined with Strengthening exercise; Aerobic Exercise Combined with Resistance training; Other exercises).

**Sensitivity analysis** The interventions primarily involved in two parts from different periods: (1) The prevention effects of aerobic exercise on pneumonia or COVID 19 in elderly; (2) The effects of aerobic exercise on rehabilitation on COVID 19 in elderly COVID 19 survivors; (3) The effects of aerobic exercise combined with strength training and resistance training and other exercises on pneumonia or COVID 19 prevention and rehabilitation in elderly. By contrast, the exclusion criteria for the study were that the studies were excluded in duplication among databases or relevant conditions but met the inclusion criteria..

**Country(ies) involved** China.

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**Keywords** exercise; pneumonia; elderly; system review.

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