

# INPLASY PROTOCOL

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**Review Stage at time of this  
submission:** Preliminary  
searches.

**Conflicts of interest:**  
None declared.

## INTRODUCTION

**Review question / Objective:** The purpose of this study was to explore the effects of physical activity (i.e., type of exercise, FITT criteria, control group, other interventions) on abdominal obesity and inflammatory

## Physical activity, abdominal obesity and inflammatory response in the elderly: a systematic review and meta-analysis of randomized-controlled trials

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**Review question / Objective:** The purpose of this study was to explore the effects of physical activity (i.e., type of exercise, FITT criteria, control group, other interventions) on abdominal obesity and inflammatory response in elderly? The study method was a randomized controlled trial.

**Condition being studied:** An increasing number of studies have demonstrated that chronic inflammation is closely associated with the initiation and progression of a broad range of age-related diseases, such as cardiovascular disease, cancer, diabetes, Alzheimer's disease, and other neurodegenerative diseases and is an independent risk factor for mortality in healthy adults. Moreover, there is strong evidence that the development of age-related diseases is linked to low-grade elevation of circulating inflammatory mediators. Therefore, future interventional researches should focus on preserving overall homeostatic balance and controlling inflammatory status in the aging patient.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 March 2023 and was last updated on 15 March 2023 (registration number INPLASY202330051).

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**Rationale:** Aging is a complex process that is compounded by a combination of environmental, genetic, and epigenetic factors. Aging is also characterized by an increase in abdominal adipose tissue (AT),

in particular visceral AT, and a decline in cardiorespiratory fitness (CRF), which are both associated with Metabolic diseases and inflammation. Chronic inflammation plays an increasingly significant role in health status by accelerating the aging process. It is well established that in older adults, chronic exercise is associated with improvement in Inflammatory factors and cardiorespiratory fitness as well as a reduction in abdominal obesity. However, it is unclear whether the effects of different types of exercise on health in elderly and improvements in abdominal obesity directly led to changes in sensitivity to inflammatory factors.

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## METHODS

**Search strategy:** The sources that will be searched include Medline (via PubMed), Embase, Scopus, Web of Science (WOS) and Cochrane databases. All databases will be searched on the same date. No language or publication date restrictions will be applied. In addition to database searching, citation mining will be performed to locate additional articles to ensure a comprehensive search. The search will be limited to published randomized controlled trials (RCT) written in English reporting data from human participants. Finally, the search data will be restricted to published RCT that has been published after 01.01.2000.

- 1、 aerobic exercise or exercise or fast walking or tai ji or yoga or brisk walking or jogging or taijiquan or tai chi or qigong or physical activity or physical exercise or physical endurance or treadmill or bicycling or dance or rope skipping or resistance training or strength training or weight training or resistance exercise or combined exercise
- 2、 older or elderly or aged or elder or geriatric or elderly people or old people or old people or senior
- 3、 Obesity or abdominal obesity or metabolic syndrome
- 4、 inflammation or cytokines or interleukin or Tumor Necrosis Factor or Transforming growth factor or C-Reactive protein or IL-1 or IL-6 or IL-8 or TNF- $\alpha$  or TGF- $\beta$  or CRP
- 5、 control or controlled trial or comparison.

**Participant or population:** The population of interest for this review is the obesity or abdominal obesity elderly, with or without disease and with an age restriction >60 years.

**Intervention:** Aerobic exercise, resistance exercise, high intensity interval training, aerobic combined resistance exercise.

**Comparator:** Maintain lifestyle without exercise intervention.

**Study designs to be included:** Randomized controlled trials.

**Eligibility criteria:** The population of interest for this review is the obesity or abdominal obesity elderly, with or without disease and with an age restriction >60 years.

**Information sources:** The sources that will be searched include Medline (via PubMed), Embase, Scopus, Web of Science (WOS) and Cochrane databases.

**Main outcome(s):** The included studies had to measure the effects of exercise training programs before, each time, or after under controlled or actual conditions on physical function, including:

- (1) Anthropometric Measurements  
Waist circumference (WC), abdominal adipose tissue (AT), Visceral fat
- (2) Inflammatory factors: adiponectin, leptin-reactive proteins (CRP), interleukin-6 (IL6), adiponectin, leptin and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ )

**Additional outcome(s):** Blood pressure, cognitive status, and quality of life, physical performance, Cardiopulmonary function, strength, balance, etc.

**Data management:** Two investigators will independently screen the studies, extract relevant data from the articles, and assess the risk of bias from the included studies. When the discrepancy noted, a third person was involved. If lacking available data from the manuscripts, we will contact the corresponding authors or co-authors to obtain the original data.

**Quality assessment / Risk of bias analysis:** The risk of bias described in the Cochrane risk of bias tool: namely, random sequence generation (selection bias), allocation concealment (selection bias), binding of participants and personnel (performance bias), binding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective reporting (reporting bias), and other bias will be assessed for included studies as well as for all studies as the overall risk of bias.

**Strategy of data synthesis:** The included studies were sequentially tested for publication bias using the software Review Manager 5.4. Data extraction is a continuous variable, and there are some differences in the measurement tools or units used in each single study, so the standardized mean difference (SMD) is used as the effect scale for statistics. The interpretation of effect size includes point estimate and 95% CI, with test level  $\alpha = 0.05$ , and  $p > 0.05$  being considered statistically insignificant. The specific steps of including between-study heterogeneity for interpretation are as follows: if  $I^2 \leq 50\%$  ( $p > 0.1$ ), there is no statistical heterogeneity or little heterogeneity among various studies, the heterogeneity can be

ignored, and the fixed-effect model can be used; otherwise, it indicates that the heterogeneity is high, and the random effect model can be used. Funnel plot and Egger test were used for publication bias. Whether there was publication bias was judged by whether its 95% CI included 0. If intercept a corresponded to  $P > 0.1$  or its 95% CI included 0, it indicated no publication bias.

**Subgroup analysis:** For evaluating the effects from potential confounding factors, we will select studies to perform subgroup analysis. For evaluating the outcomes objectively, we would divide the control groups to non-exercise and different exercise cohorts.

**Sensitivity analysis:** The sensitivity analysis would be performed when the pooling outcome with high risk of heterogeneity.

**Language restriction:** English.

**Country(ies) involved:** China.

**Other relevant information:** None.

**Keywords:** Physical activity; abdominal obesity; inflammation.

**Dissemination plans:** The results of the study will be submitted for peer review and published publicly.

**Contributions of each author:**

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