

Cardiorespiratory influence of physical exercise in sarcopenic obesity: systematic review and meta-analysis

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Martinelli, B¹; Meira, GF²; Almeida, RAC³; Santiago Junior, JF⁴; Vettore, MV⁵; Sales Peres, SHC⁶.**ADMINISTRATIVE INFORMATION****Support** - None.**Review Stage at time of this submission** - The review has not yet started.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2023100090**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 October 2023 and was last updated on 27 October 2023.**INTRODUCTION**

Review question / Objective What are the cardiorespiratory repercussions that physical exercise causes in subjects with sarcopenic obesity?

Condition being studied With a multifactorial cause, sarcopenic obesity is characterized by a reduction in lean mass and accumulation of adipose tissue, which causes damage to health and can be treated in different ways. One of the forms of intervention to alleviate the consequences of sarcopenic obesity is through physical exercise. There are several modalities and forms of prescription of physical exercise as a therapeutic proposal for sarcopenic obesity, thus becoming a scientific investigative point on the possibilities of intervention and its repercussions, mainly cardiovascular and respiratory ones. In general, the focus of the studies is on the musculoskeletal aspect, since muscle changes and related ones become evident. On the other hand, sarcopenic

obesity and physical exercise can alter the cardiovascular and respiratory systems, so seeking updates on the cardiovascular and respiratory repercussions caused by physical exercise in sarcopenic obesity is the driving force of this study, which will provide new knowledge and new strategies to address this context.

METHODS

Search strategy Exercise: "exercise"[MeSH Terms] OR "exercise"[All Fields] OR "exercises"[All Fields] OR "exercise therapy"[MeSH Terms] OR ("exercise"[All Fields] AND "therapy"[All Fields]) OR "exercise therapy"[All Fields] OR "exercise's"[All Fields] OR "exercised"[All Fields] OR "exerciser"[All Fields] OR "exercisers"[All Fields] OR "exercising"[All Fields] Obesity: "obeses"[All Fields] OR "obesity"[MeSH Terms] OR "obesity"[All Fields] OR "obese"[All Fields] OR "obesities"[All Fields] OR "obesity's"[All Fields] Sarcopenia: "sarcopenia"[MeSH Terms] OR "sarcopenia"[All Fields] OR "sarcopenia's"[All Fields].

Registration for searches: ("exercise"[MeSH Terms] OR "exercise"[All Fields] OR "exercises"[All Fields] OR "exercise therapy"[MeSH Terms] OR ("exercise"[All Fields] AND "therapy"[All Fields]) OR "exercise therapy"[All Fields] OR "exercise s"[All Fields] OR "exercised"[All Fields] OR "exerciser"[All Fields] OR "exercisers"[All Fields] OR "exercising"[All Fields]) AND ("sarcopenic"[All Fields] AND ("obeses"[All Fields] OR "obesity"[MeSH Terms] OR "obesity"[All Fields] OR "obese"[All Fields] OR "obesities"[All Fields] OR "obesity s"[All Fields])) AND ("obeses"[All Fields] OR "obesity"[MeSH Terms] OR "obesity"[All Fields] OR "obese"[All Fields] OR "obesities"[All Fields] OR "obesity s"[All Fields]) AND ("sarcopenia"[MeSH Terms] OR "sarcopenia"[All Fields] OR "sarcopenia s"[All Fields])

The databases that will be considered: PubMed, SciELO, Scopus, BVSalud/LILACS, Web of Science, and EMBASE. The database of randomized studies - Clinical Trials will also be accessed for tracking and identification of studies. The determined period of publication will be from 2007 to 2023. The descriptors will be considered, in the English language: exercise, sarcopenic obesity, obesity, and sarcopenia. Inclusion criteria will be: 1) English language; 2) Clinical follow-up studies of the type: prospective and randomized-controlled clinical trials. The considered participants of each study will be adults with sarcopenic obesity. Studies related to in vitro methodology, animals, and with incomplete data that will not allow the collection of information will be disregarded and excluded.

Participant or population Obese and sarcopenic adults.

Intervention Exercises.

Comparator Diet/medication/control.

Study designs to be included Randomized-controlled clinical trials will be considered.

Eligibility criteria Inclusion criteria will be: 1) English language; 2) Clinical follow-up studies of the type: prospective and randomized-controlled clinical trials. The considered participants of each study will be adults with sarcopenic obesity. Exclusion Criteria Studies related to in vitro methodology, animals, and with incomplete data that will not allow the collection of information will be disregarded and excluded. Exclusion Criteria Studies related to in vitro methodology, animals, and with incomplete data that will not allow the collection of information will be disregarded and excluded.

Information sources The databases that will be considered: PubMed, SciELO, Scopus, BVSalud/LILACS, Web of Science, and EMBASE. The database of randomized studies - Clinical Trials will also be accessed for tracking and identification of studies. The determined period of publication will be from 2007 to 2023. The descriptors will be considered, in the English language: exercise, sarcopenic obesity, obesity, and sarcopenia. Inclusion criteria will be: 1) English language; 2) Clinical follow-up studies of the type: prospective and randomized-controlled clinical trials. The considered participants of each study will be adults with sarcopenic obesity. Studies related to in vitro methodology, animals, and with incomplete data that will not allow the collection of information will be disregarded and excluded.

Main outcome(s) Primary outcome - Change in systemic blood pressure from baseline to the last available follow-up, measured using the sphygmomanometer. Change in Forced Vital Capacity from baseline to the last available follow-up, measured using the spirometry. Change in Inspiratory muscle strength from baseline to the last available follow-up, measured using the inspiratory and expiratory pressure meter.

Measures of effect

The effect measures for main outcomes will be risk ratio and odds ratios.

Additional outcome(s) Secondary Outcome - Observe whether sarcopenic obese patients could be harmed in the following variables: Heart rate, Expiratory Volume in the first second, Peripheral oxygen saturation, respiratory rate, and expiratory muscle strength.

Measures of effect

The effect measures for main outcomes will be risk ratio and odds ratios.

Data management The researchers involved will search the aforementioned databases. The selection of articles and data collection will be carried out by two blind reviewers, previously trained and calibrated: a) Ricardo Abdala Almeida - a student in the last year of the medical course and b) Gabriela Figueiredo Meira - a graduate student FOB-USP, being assisted by a third reviewer (BM) in case of divergence or discrepancy. Consensus meetings will be held to evaluate the selected titles and abstracts, obtaining a concordance test value for the articles selected in both databases (Kappa Test), to reduce the possibility of bias in the selection of articles. The other authors will provide clinical and research support for data collection and discussion of the topics to be addressed. In addition, the references of eligible articles will be

consulted to identify possible potential studies related to the proposal. We will also add a gray literature search (<https://opengrey.eu/>) and Google Scholar (last six months). The data to be extracted from each study will be analyzed standardized and in order:

- 1) Author;
- 2) Year of publication;
- 3) Country of origin of the study;
- 4) Type of study: methodology and classification structure (NHMRC, 2000);
- 4) Number of patients (sample size);
- 5) Sample characteristics (gender, age, inclusion criteria);
- 6) Types of intervention – control (diet, medication, no intervention);
- 6) Type of exercise (training modality and volume: period, duration, intensity, series);
- 7) Cardiovascular responses (systemic blood pressure and heart rate);
- 8) Respiratory responses (Forced Vital Capacity, Expiratory Volume in the first second, Peripheral oxygen saturation, respiratory rate, respiratory muscle strength).

The form data collection will be done through a standardized form using the Excel spreadsheet for the final tabulation of the analyses.

Quality assessment / Risk of bias analysis Risk and bias analysis will be performed using the ROB scale (Cochrane) for RCTs studies.

Strategy of data synthesis For statistical analysis, the SPSS program (v.20) will be used with the construction of tables and calculation of crude agreement, agreement analysis - Kappa (80%). Risk and bias analysis will be performed using the ROB scale (Cochrane) for RCTs studies. The fixed effects model was used when there was no statistically significant difference, adopting the random effects model when there was a statistically significant difference (High Heterogeneity between trials). Heterogeneity is considered significant for $p < 0.1$. Heterogeneity will be evaluated using the Q (χ^2) method and the value of I^2 will be measured. The statistical value of I^2 will be used to analyze heterogeneity variations, and I^2 above 75 (0-100) will be considered to indicate relevant heterogeneity (NHMRC., 2000; HIGGINS; THOMPSON, 2002; ATIEH et al., 2010; HIGGINS; GREEN, 2011; ANNIBALI et al., 2012). The risk of bias will be assessed using the Risk of Bias (ROB) tool, version 2.0. Will be included in the Meta-analysis, studies that will have the primary or secondary outcome results expressed as odds ratio (OR) adjusted for confounding factors (eg age, sex, smoking, body mass index, among others). Data will be analyzed

using R statistical software (version 3.6.1).

Subgroup analysis In this study, won't be subgroups.

Sensitivity analysis For sensitivity analysis, two meta-analyses will be carried out.

Language restriction studies will only be considered in English.

Country(ies) involved Brazil.

Other relevant information None declared.

Keywords obesity; sarcopenia; exercise; Sarcopenic obesity.

Dissemination plans The publication this study is scheduled for the month of May.

Contributions of each author

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