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Protocol of a systematic review and meta-analysis: blood pressure effects of chronic physical exercise in pre and post menopause women

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We use this protocol and it's working

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Abstract

Changes in menopause affect women's lives and there are physiological differences during this period. Blood pressure (BP) is affected and may increase the risk of developing cardiovascular diseases. The practice of physical exercise causes a reducing effect of BP after its performance, but the effect of physical exercise on BP responses is still poorly understood when comparing women in pre and post menopause. Thus, the objective of the scientific review proposed here is to answer the following question: Is there a difference in BP responses in pre- and post-menopausal women submitted to the same exercise training protocol? For this we will conduct a systematic review with meta-analysis in digital bases (MEDLINE, LILACS, EMBASE, Sportdiscus) of controlled studies that are performed with women in pre and post menopause and that indicate BP values after performing chronic physical exercises.

Guidelines

This protocol was written following the recommendations of PRISMA-P.

Before start

Authors' contributions: JCS, ACRC, ALA, IMM, GMP; participated in the idealization, planning, original manuscript, and approval of the final version.

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Background

- 1 The climacteric represents the transition from the reproductive to the non-reproductive phase of a woman's life. The marked changes in the climacteric phase include physical, hormonal, psychosocial aspects, and may affect body composition and bring cardiovascular risks, such as increased blood pressure, these symptoms are a consequence of the progressive decrease in estrogen production by the ovaries (POMPEI et al., 2018; WARD, 2018).

Studies show that physical exercise promotes benefits in physical, psychological aspects, reduction of abdominal fat mass, improvement of physical capacity, change in body composition; in addition to cardiovascular and neuromuscular adaptations (NGUYEN et al, 2020; DUPUIT et al, 2022; KARATRANTOU et al, 2023). In pre- and post-menopausal women, it was demonstrated that there are mitochondrial and vascular adaptations in skeletal muscle, reduction of blood pressure, improvement in autonomic tone, oxidative stress, lipid profile, cardiovascular function and cardiorespiratory fitness (LIN et al, 2018; NYBERG et al, 2017; XI et al, 2021). Thus, the objective of the study is to answer the following question: Is there a difference in blood pressure responses in pre- and post-menopausal women submitted to the same chronic exercise training protocol?

Methods

2 **Methods**

This systematic review with meta-analysis will follow the PRISMA guidelines and will be registered on the "PROSPERO" platform.

3 **Eligibility criteria**

Studies with the following categories will be eligible: 1) Population: Women in pre and post menopause; 2) Intervention: Any category of chronic physical exercise in postmenopausal women.; 3) Control: Any category of chronic physical exercise in pre-menopausal women. 4) Outcome of interest: values of blood pressure (Systolic Blood Pressure, Diastolic Blood Pressure and/or Mean Blood Pressure); 5) Languages: English, Portuguese, and Spanish; 6) Study designs: randomized, non-randomized clinical trials and cross-sectional studies; 7) Publication dates: No time limit.

Excluded: literature reviews, meta-analysis, letters to the editor, observational studies, animal studies, studies in children, studies in men, studies written in other languages.

4 **Search strategy**

Searches will be carried out in the following digital databases: MEDLINE, LILACS, EMBASE and SPORTDiscus, in the references of the main articles and through manual search. If necessary, the authors of the studies will be contacted to request data.

The search will be divided into three categories of terms: Exercise, Menopause, and Blood pressure. Within each category, terms will be separated by union operators (i.e. “OR”) and categories will be separated by parentheses and intersection operators (i.e. “AND”). All terms that will be added to the search are shown in table 1.

Table 1. Categorized search terms.

Exercise	Menopause	Blood pressure
(Exercise OR “Exercise Therapy” OR “Physical activity” OR “Physical training” OR Aerobic OR Cycling OR Treadmill OR Ergometer OR Swimming OR Swim OR Running OR Run OR “Hand grip” OR “Hand-grip” OR Walking OR Walk OR “Weight training” OR “Resistance exercise” OR “Resistance training” OR Pilates OR Yoga OR Taichi OR “Tai chi” OR “Tai-chi” OR Isometric OR Hiit OR “High intensity” OR “Moderate intensity” OR “Low intensity” OR “Combined training” OR “Combined exercise” OR “Concurrent training” OR “Concurrent exercise”)Deep water	(Menopause OR Menopausal OR Premenopausal OR Postmenopausal OR “Post-menopause” OR “Pre-menopause” OR Premenopause OR Postmenopause OR “Post-menopausal” OR “Pre-menopausal”)	(“Arterial pressure” OR “Blood pressure” OR Diastolic OR Systolic)

5

Study records

During the screening, eligibility, inclusion, and data extraction phases, studies will be evaluated in duplicate by independent reviewers. After verifying the reviewers' responses, disagreements will be resolved by a third reviewer. These studies will be organized in the reference manager Rayyan (<https://www.rayyan.ai/>) and later recorded in a spreadsheet for data extraction and organization. If there are studies in which the data are represented only in graphs or figures without numerical representation, the data will be extracted by the software WebPlotDigitizer (<https://automeris.io/WebPlotDigitizer/>).

Data extraction will include: 1) General description (identification code, author, year of publication, language, study design, sample size); 2) Exercise description (modality, intensity, volume, frequency, progression); 3) Participants description (age, sex, health status, menopausal status, blood pressure); 4) Other characteristics (conflicts of interest, other cardiovascular results, and idiosyncrasies of the exercise and the study population).

6 Risk of bias in individual studies

The evaluation of the quality methodology of the included studies will be performed according to the criteria proposed by Testex. The tool is a 15-point scale (5 points for study quality and 10 points for reporting) and addresses previously unmentioned quality assessment criteria specific to exercise training studies. Quality assessment will be independently performed by 2 blinded reviewers and disagreements will be resolved by consensus or by a 3th reviewer.

7 Data synthesis and quantitative approaches

The pooled effect estimates will be computed from the change scores between baseline and end of intervention, their standard deviations (SD) and the number of participants. Data from intention-to-treat analyses will be entered whenever available in included studies. Authors will be contacted through emails for unreported data. Missing SD, not provided through email, will be imputed based on Cochrane's Handbook recommendations. Results will be presented as mean differences and calculations will be performed using fixed effects models, except when heterogeneity was greater than 50% (by i^2), when the random effects models will be adopted.

Statistical heterogeneity of treatment effects among studies was evaluated by Cochran's Q test and I^2 inconsistency test; it will be considered that values over 50% indicated high heterogeneity (Higgins, 2011). Forest plots will be generated to present the pooled effect and the mean difference with 95% confidence interval will be calculated. Values of $\alpha \leq 0.05$ will be considered statistically significant.

References

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