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Benefits of aerobic or resistance training during pregnancy on maternal health and perinatal outcomes: A systematic review

Maria Perales [a,*], Alejandro Santos-Lozano [a,b], Jonatan R. Ruiz [c], Alejandro Lucia [a,e], Ruben Barakat [d]

[a] Research Institute of Hospital 12 de Octubre ('i+12'), Avda. de Córdoba s/n, 28041 Madrid, Spain
[b] GIDFYS, Department of Health Sciences, European University Miguel de Cervantes, Valladolid, Spain
[c] PROFITH "Promoting Fitness and Health through physical activity" research group, Faculty of Sport Sciences, Department of Physical Education and Sports, University of Granada, Granada, Spain
[d] AFIPE Research Group, Technical University of Madrid, Spain
[e] European University, Madrid, Spain

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ABSTRACT

Objective: To understand what evidence exists with regard to maternal and offspring benefits of aerobic and/or resistance training during pregnancy.
Methods: Systematic review of RCTs (published until May 2015) with healthy pregnant women and focusing on the benefits of exercise interventions on maternal health or perinatal outcomes. Studies were ranked as high/low quality, and a level of evidence was established according to the number of high-quality studies and consistency of the results.
Results: 61 RCTs were analyzed. The evidence for a benefit of combined exercise [aerobic + resistance (muscle strength)] interventions on maternal cardiorespiratory fitness and prevention of urinary incontinence was strong. A weak or insufficient level of evidence was found for the rest of interventions and outcomes
Conclusion: The exercise modality that seems to induce a more favorable effect on maternal health is the combination of aerobic and resistance exercises during pregnancy.

Contents

* Corresponding author.
E-mail addresses: m.perales.santaella@gmail.com (M. Perales), asantos@uemc.es (A. Santos-Lozano), ruizj@ugr.es (J.R. Ruiz), alejandro.lucia@universidadeuropea.es (A. Lucia), barakatruben@gmail.com (R. Barakat).

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1. Introduction

Moderate-intensity physical exercise during pregnancy is considered to be overall safe, if not beneficial, for both mother and offspring [2,14,60]. Yet less than 20% of healthy pregnant women meet minimum exercise recommendations at mid-pregnancy, that is, at least 30 min/day of moderate–vigorous activities [1], with walking being the commonest exercise adopted by active gravidae [46]. A main reason reported by pregnant women for not exercising regularly is lack of knowledge or evidence-based information on this topic [70].

Several national/international guidelines recommend regular physical activity, particularly aerobic activities, for pregnant women in the absence of obstetric or medical contraindications as part of a healthy lifestyle. A few guidelines from Australia, Canada, Denmark, Norway, UK, and Andalusia (Southern Spain) include recommendations on muscle strength or 'resistance' (usually in the form of weightlifting) exercises [23,34]. In this regard, some studies showed the safety and benefits of resistance exercise during pregnancy for the mother or offspring [6,50] and several randomized controlled trials (RCTs) are available on the potential benefits of combining aerobic and resistance exercise during pregnancy [10,12,20,62,69,72]. However, it remains to be determined which are the specific maternal and fetal benefits attributable to aerobic, resistance, a combination of aerobic plus resistance exercise, as well as exercise counseling.

The aim of this systematic review of previous RCTs was to identify the benefits of each of aerobic, resistance or combined (aerobic + resistance) exercise modalities, as well as exercise counseling, on maternal health and on perinatal outcomes.

2. Methods

We conducted a MEDLINE (PubMed) search (with no restriction on initial date) until May 2015. Included studies were RCTs aiming to evaluate the benefits of exercise on maternal health and/or perinatal outcomes. Keywords were ("pregnancy" OR "pregnancy outcomes" OR "maternal health") and ("aerobic exercise" OR "resistance exercise" OR "strength exercise" OR "physical activity" OR "training" OR "active". Inclusion criteria were: RCT (excluding protocol/methodological papers); evaluating the effect of exercise performed only during pregnancy on maternal health and/or perinatal outcomes; conducted with healthy pregnant women; and written in English. Included studies were divided into three groups: aerobic, resistance, and combined (aerobic + resistance) interventions. A fourth group of studies was created and included those using exercise counseling, where pregnant women were given general advice without specifications on exercise type, duration, frequency or intensity. The data collected from each study included: participant's age and sample size/arm, intervention characteristics (type, duration, frequency, intensity of exercise and adherence to the program), nutritional control, dependent variables and main results.

The Cochrane Collaboration risk-of-bias tool was used for assessing the quality of RCTs. It includes 6 items: random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants, incomplete outcome data, selective outcome reporting (reporting bias), and other sources of bias. Items were scored as '1' (positive), '0' (negative) or '?' (unclear). A total quality-score was calculated for each RCT by adding the number of positive items, with a score ≥4 denoting 'high quality'. Three levels of evidence were defined for each outcome: strong, *ie*, ≥3 high-quality RCTs reporting on the outcome and ≥75% reporting a significant benefit (pre minus post intervention or between study arms); weak, *ie*, ≥3 high-quality RCTs, but ≤75% reporting a significant benefit; and insufficient, *ie*, ≤3 high-quality RCTs.

3. Results

A total of 1392 studies were identified, of which 1331 did not meet the inclusion criteria; 61 RCTs were included and evaluated, including aerobic ($n = 15$), resistance ($n = 6$) or combined (aerobic + resistance) exercise interventions ($n = 32$), or exercise counseling interventions ($n = 8$) (Fig. 1). Of them, 92% ($n = 56$) were of high quality (Supplementary file 1).

The control group consistently included healthy sedentary pregnant women who followed standard perinatal care except for two trials, where controls performed stretching exercise [82,83], and another study in which they were moderately active (<150 min/week of moderate–vigorous exercise) [40]. Two studies also included a third group (other than exercise/control), receiving lumbopelvic belt treatment [42] or exercise + diet [66].

3.1. Maternal health

Fifty-seven RCTs evaluated the benefits of exercise on maternal health using aerobic ($n = 15$), resistance ($n = 4$) or combined (aerobic + resistance) exercise interventions ($n = 30$), or exercise

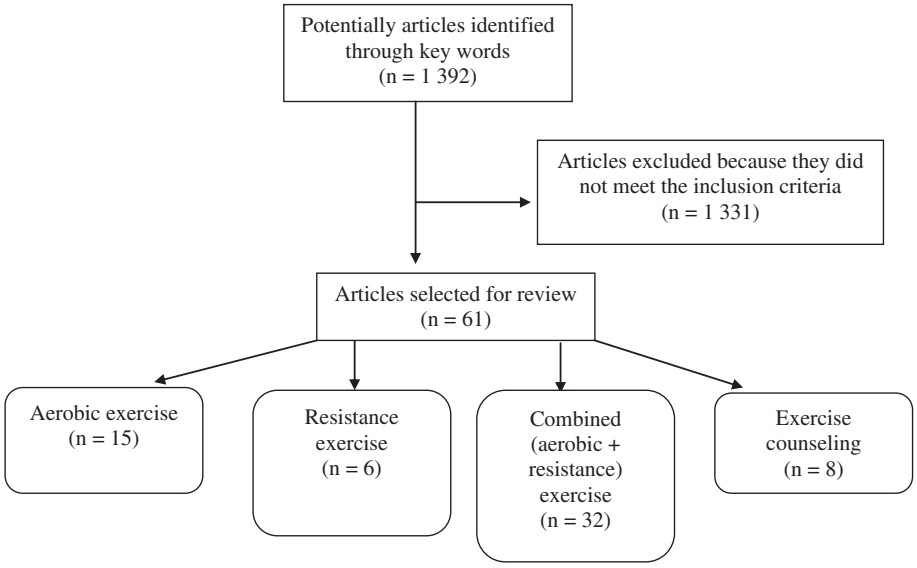

Fig. 1. Flow chart of data collection.