

## Benefits of Physical Exercise on Quality of life During Pregnancy: a Systematic Review

### Benefícios do Exercício Físico na Qualidade de Vida Durante o Período Gestacional: uma Revisão Sistemática

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#### Abstract

Pregnancy is a time of significant change in a woman's life, involving changes in both organic systems and psychological well-being. Physical exercise during pregnancy can play a critical role in alleviating musculoskeletal complaints and improving overall health. Despite this, many pregnant women remain sedentary due to myths and misinformation about the benefits of physical exercise. This study aimed to determine the benefits of physical activity on the quality of life of pregnant women. Therefore, a systematic review of databases was conducted: Medline (U.S. National Library of Medicine), accessed via PubMed, Lilacs (Latin American and Caribbean Literature in Health Sciences), Scielo (Scientific Electronic Library Online) and PEDro (Physiotherapy Evidence Database), from January to April 2023, using the combination of key words related to "pregnancy", "physical exercise", "quality of life" and "randomized controlled trial". Methodological quality was assessed using the PEDro scale. A total of 87 studies were initially identified, of which nine were comprehensively analyzed. Out of a maximum of 10, the methodological quality of the studies had a mean score of  $6 \pm 1$ . Of the nine studies analyzed, four showed a significant improvement in the quality of life of pregnant women who exercised, while the other studies showed no significant effects. Although exercise has been shown to enhance the quality of life for pregnant women, the evidence found is still insufficient to fully support the potential benefit of this intervention. This reflects the lack of robust evidence on the effects of exercise during pregnancy.

**Keywords:** Exercise. Pregnancy. Health.

#### Resumo

A gravidez é um período de mudanças significativas na vida de uma mulher, envolvendo alterações nos sistemas fisiológicos e no bem-estar psicológico. O exercício físico durante a gravidez pode desempenhar um papel fundamental na redução das queixas musculoesqueléticas e na melhoria da saúde geral. Apesar disso, muitas gestantes permanecem sedentárias devido a mitos e desinformação sobre os benefícios do exercício físico. Este estudo teve como objetivo identificar o benefício do exercício físico na qualidade de vida da gestante. Dessa forma, realizou-se uma revisão sistemática, que utilizou as seguintes bases de dados: Medline (U.S. National Library of Medicine), acessado via PubMed, Lilacs (Latin American and Caribbean Literature in Health Sciences), Scielo (Scientific Electronic Library Online) e PEDro (Physiotherapy Evidence Database); de janeiro a abril de 2023, com o uso da combinação de palavras-chave relacionadas a "Gravidez", "Exercício Físico", "Qualidade de vida", "Ensaios clínicos randomizados". A qualidade metodológica foi avaliada através da Escala PEDro. Foram identificados 87 estudos e nove foram analisados na íntegra. De um total de 10 pontos, a qualidade metodológica dos estudos, obteve pontuação média de  $6 \pm 1$ . Dos nove estudos analisados, quatro apresentaram melhora significativa da qualidade de vida em gestantes que realizaram exercícios físicos, os outros estudos não demonstraram efeitos significativos. Embora tenha sido demonstrado que o exercício físico melhora a qualidade de vida das mulheres grávidas, as evidências encontradas ainda são insuficientes para apoiar totalmente o potencial benefício dessa intervenção. Isso reflete uma carência de evidências sólidas sobre os efeitos do exercício físico durante a gestação.

**Palavras-chave:** Exercício Físico. Gestante. Saúde.

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## 1 Introduction

The gestational period is a phase of transformations in a woman's life. Throughout the three trimesters, several changes occur both in organic systems and in the psychological sphere. In this sense, the practice of physical exercise can positively contribute to alleviating musculoskeletal complaints arising from these changes<sup>1-4</sup>. Currently, many pregnant women are observed to be sedentary, either due to myths or misinformation about the benefits that a gestational exercise program can provide<sup>4,7</sup>. The practice of exercises aimed at gestational health can provide numerous benefits for both the woman

and the baby. This is because it is not only about performing joint or muscular movements but also about involving various systems of the human body that respond positively to the practice of physical exercise<sup>8-10</sup>.

The understanding of protocols or physical exercise programs for pregnant women is still scarce. A recently published systematic review study points out the need for a better understanding and deeper insight into exercise programs, types, and levels of conditioning for pregnant women. These variables are important as they can have positive effects on various maternal and fetal outcomes. Therefore, there is a need to deepen the evidence to identify which exercise

protocols or programs can contribute to the quality of life and health outcomes of pregnant women. This research aimed to conduct a bibliographic survey of randomized clinical trials in pregnant women to identify the benefits of physical exercise on quality of life.

## 2 Material and Method

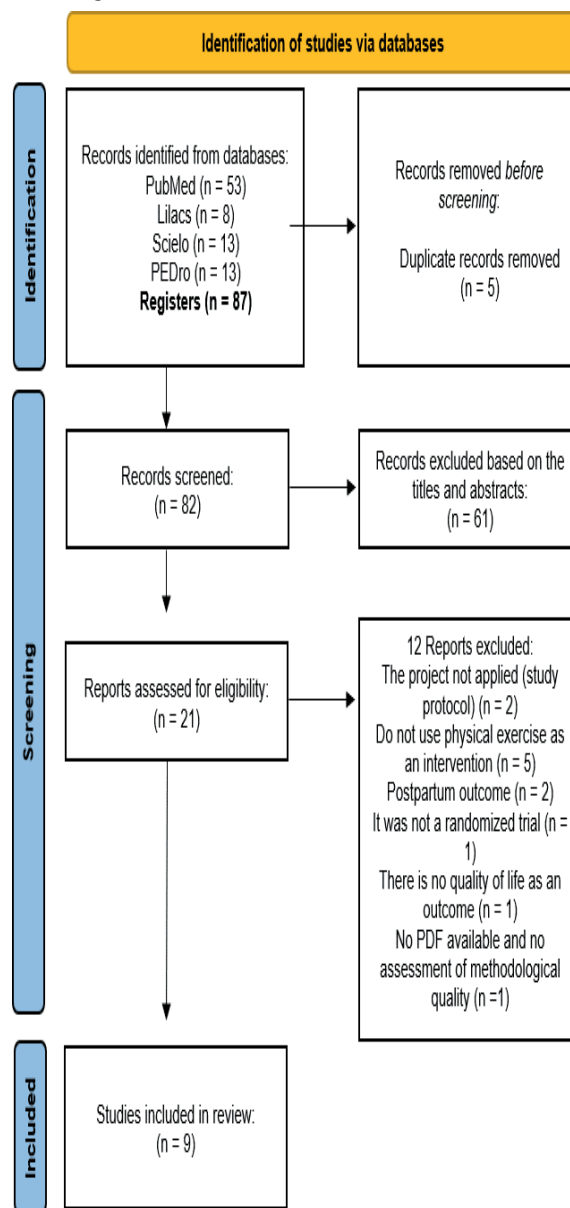
The study is a systematic review, following the recommendations proposed by the PRISMA checklist (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). This study aimed to include exercise protocols in pregnant women focusing on quality of life and well-being outcomes. Only randomized clinical trials were considered. Case series, case reports, systematic reviews, narratives, and prospective studies were excluded. Searches were conducted in the databases: Medline/PubMed, Lilacs, SciELO, and PEDro; using specific strategies for each database. The descriptors used in the search were “Pregnancy”; “Pregnant Women”; “Exercise”; “Physical Exercise”; “Quality of Life”; “Randomized Controlled Trial”; “Clinical Trial Protocol”. The Boolean operator “OR” was used to establish combinations among the descriptors, and the Boolean operator “AND” was used to combine the terms. The search strategy applied to the databases was the PICO method (Centre for Evidence-Based Medicine, 2012) used to structure literature search and data extraction: P (population) = Pregnant women; I (intervention) = Physical exercise; C (comparison) = no intervention or placebo; O (outcome) = Quality of life. All studies were checked according to specific inclusion criteria: a) studies published in Portuguese and English; b) published up to March 2023; c) with full text available; d) applied to women during any gestational period. The last search in the databases was conducted on April 6th, 2023. Methodological quality was assessed using the evaluation described in the PEDro database (Physiotherapy Evidence Database)<sup>11</sup>. After completing the search in the databases, duplicate manuscripts were excluded. Two independent authors examined the eligibility of the located articles. Initially, screening was based on title analysis, then abstracts were reviewed, and only potentially eligible manuscripts were selected for full-text reading. In cases of disagreement for inclusion, these were resolved through consensual discussion among the authors. Parte superior do formulário

## 3 Results and Discussion

Figure 1 presents the PRISMA flowchart describing the essential elements for retrieving the studies used in the present review. A total of 87 studies were initially identified through electronic search. After excluding duplicates, title, and abstract screening, 82 articles were considered potentially eligible and selected. Subsequently, only 21 articles remained

that fulfilled the initial eligibility criteria of the study. After full-text reading, 12 manuscripts were excluded for their respective reasons shown in the flowchart. Finally, nine manuscripts were included for qualitative synthesis.

**Figure 1** - Flowchart of the search conducted in the study according to PRISMA



Source: research data.

The general characteristics of the studies included in the systematic review can be observed in Table 1. Overall, the gestational period of the participants was quite diverse, ranging from 12 to 38 weeks of gestation. The most found type of physical exercise for intervention was Resistance Exercise, and the total number of participants across all selected studies was 1447 pregnant women. The methodological quality of the studies, assessed by the PEDro scale, averaged 5.5, with the lowest-rated study scoring 4 and the highest-rated study scoring 7.

**Table 1** - Qualitative synthesis of selected manuscripts

Author	Gestational Period	Type of Physical Exercise	N° Participants	Assessment Instrument	Result	PeDro
Sonmezer et al. <sup>12</sup>	22-24 to 30-32 weeks of gestation	Pilates, 2x a week for 8 weeks. The control group only received prenatal care.	40 women (20 to 35 years old) with low back pain with no history before pregnancy. Intervention group (n=20) and control group (n=20).	Instrument Turkish version of the Oswestry Low Back Disability. (which determines functional disability due to back pain) and the Health Profile (NHP) questionnaire to assess quality of life.	There was a reduction in pain and disability, improvement in mobility, and sleep-related disorders in the intervention group.	5
O'Connor et al. <sup>13</sup>	Between 21-25 weeks of gestation	resistance exercise of low to moderate intensity twice a day per week, individually or in small groups for 12 weeks.	134 pregnant women (17 to 38 years old), with pain or a previous history of back pain. Divided into 3 groups. Intervention Group (n=44), Pregnancy Education Group (n=45) and Control Group (n=45).	Short Form Health Survey (SF-36) questionnaire to assess quality of life. and the Profile of Mood States (POMS) to measure tension, depression, anger, vigor, fatigue, and confusion.	Resistance exercise had a significant benefit on quality of life compared to groups that did not perform the exercises.	6
Arizabalet <sup>14</sup>	From 16-20 to 28-32 weeks of gestation	Aerobic exercises, 3x a week, for 60 minutes, for 12 weeks. It included aerobic exercises, stretching, and relaxation. The control group did not perform any specific exercise.	64 nulliparous pregnant women (16 to 30 years old). Being (n=33) intervention group and (n=31) control group.	Colombian standard version of the Medical Outcome Questionnaire Study Short-Form Health Survey (SF-12 version 2) that assessed quality of life.	Significant improvement in quality of life in the intervention group when compared to the control.	5
Scott; Hellawell <sup>15</sup>	From 12 weeks of pregnancy	4 weekly sessions, lasting 4 weeks. Both programs focused on similar exercises and muscle groups.	23 pregnant women (over 18 years old). 2 groups of exercises, one in the aquatic environment (n=12) and the other on the ground (n=11).	Pelvic Girdle Pain Questionnaire (PGPQ) to measure pain in the pelvic girdle and Subjective Exercise Experience Scale (SEES) to measure quality of life.	Both protocols reduce pelvic girdle pain and improve quality of life. Water exercises may be most beneficial in the last trimester.	5
Gustafsson et al. <sup>16</sup>	Between 20 and 36 weeks of pregnancy	Aerobic and resistance exercise at least 3 times a week, lasting 12 weeks at moderate intensity. The control group received standard prenatal care.	855 pregnant women aged 18 and over. Intervention group (n=429) and control group (n=426).	Psychological General Wellbeing Index (PGWBI) questionnaire to assess psychological well-being and self-perception of general health.	There were no statistically significant differences in quality of life when compared to the control group.	7

Continuation...

Kahyaoglu et al. <sup>17</sup>	28 weeks of gestation. 3 assessment moments at the beginning of the intervention, between 36 and 38 weeks, and postpartum between 6-8 weeks	The intervention group performed strengthening exercises for the pelvic floor. 3x a day (morning, afternoon, and night). The control group did not receive any instructions.	60 pregnant women with a mean age of 27.2 years in the control group (n=30) and 30 years in the intervention group (n=30).	Urogenital Distress Inventory (UDI-6) questionnaires; Impact Questionnaire of Urinary Incontinence (IIQ-7); Overactive Bladder Questionnaire (OAB-q) and the Quality of Life (QoL). They assessed urinary symptoms and quality of life.	Pelvic floor strengthening exercises during pregnancy and postpartum contribute to reducing gestational urinary incontinence and strengthening the pelvic floor.	5
Szumilewicz et al. <sup>18</sup>	It started between week 19-21 of pregnancy. Termination between 25-27 weeks of gestation.	Intervention group warm-up exercises, aerobics with high and low impact choreography, strength training, stretching, and relaxation, 3x a week lasting 6 weeks. The Pelvic Floor Muscles (PFM) were instructed to contract during aerobic exercises. The control group underwent intervention.	97 nulliparous women, without complications, with a mean age of 29 years in the control group (n=27) and 30 years in the intervention group (n=70).	Incontinence Impact Questionnaire (IIQ), to assess the impact of urinary incontinence symptoms on the lives of participants in this study.	There was a trivial effect between groups on quality of life, however, PFM neuromuscular activity improved significantly in some motor tasks in the intervention group.	4
Nascimento et al. <sup>19</sup>	Start 14-24 weeks of gestation. With intervention lasting an average of 19 weeks.	Resistance exercises of light to moderate intensity and stretching, lasting for the duration of the exercise session 40 minutes. The control group underwent prenatal care.	82 pregnant women (over 18 years old), intervention group (n=41) and (n=41) control group.	WHOQOL-BREF questionnaire, which assessed the quality of life. The protocol with the recommendations of the American College of Gynecology and Obstetrics (ACOG-2002) was used to perform the physical exercise.	There was no significant effect on quality of life when compared to the control group.	7
Petrov et al. <sup>20</sup>	Between 14-25 weeks of gestation	Resistance exercises twice a week for 11 weeks with moderate to vigorous intensity, for 60 minutes. Including warm-up and cool-down. The control group received recommendations for home exercises and telephone follow-up.	92 First-time pregnant women, being the intervention group (n=51) and control group (n=41).	Questionnaires: Health-Related Quality of Life (HRQoL) and the Short Form-36 Health Survey, to assess quality of life.	There was functional worsening and increased pain in both groups, however, the study suggested that moderate/vigorous resistance exercises do not harm women's health status. Both groups had normal health-related quality of life.	6

Source: research data

Resistance exercise appeared as physical exercise with the potential to improve outcomes related to quality of life, well-being, and pain. It was applied through various forms in intervention programs, including exercises for the upper limbs, lower limbs, abdominal region, and specifically for the pelvic floor. However, other forms were also studied, such as Aerobic and Aquatic Exercise. Quality of life was assessed through questionnaires, with the Short Form Health Survey (SF-36) being the most used questionnaire among the studies. The study aimed to show randomized clinical trials that used physical exercise to improve the quality of life in pregnant. Among the nine studies analyzed, four were clear regarding the significant improvement in quality of life in pregnant women who performed physical exercises<sup>11-14</sup>; three studies reported some type of benefit, albeit not significant or explicit<sup>15-17</sup> and two studies did not show a significant effect on quality of life when compared to the control group<sup>18,19</sup>.

The four studies with significant results in quality of life (QoL) have different modalities in their prescription, with variations in type, including resistance, aerobic, aquatic, and Pilates exercises. In other words, the professional prescribing physical exercise could use four different types to improve the quality of life of pregnant women. These results may be attributed to the fact that physical exercise improves physical conditioning regardless of type, thus favoring the performance of daily life activities. For example, in pregnant women, there is evidence that regular practice helps control systemic arterial hypertension and gestational diabetes, factors that can negatively affect the quality of life<sup>11-14</sup>.

One of the benefits addressed by the three studies that did not find a significant result in QoL was that resistance exercise did not cause adverse effects in women. Of these three, two found one additional common benefit: increased muscular strength in the pelvic floor muscles, favoring the reduction of urinary incontinence episodes<sup>16-20</sup>.

Regarding the discrepancies related to physical exercise in improving the quality of life in pregnant women, one of the studies that did not find a significant effect on the variable had a considerable number of participants (855 women, Intervention Group=429 and Control Group=426) and demonstrated no substantial difference in general health perception and psychological well-being in the third trimester between the exercise group versus control. However, an explanation for the findings may lie in the indirect assessment of QoL; the authors used a general psychological well-being questionnaire to explain this outcome variable, and they also attribute this result to the lack of resources such as questionnaires to exclusively assess QoL in pregnant women<sup>15</sup>.

Regarding the two studies that did not show an effect on quality of life, they also used resistance exercises. However, one used self-reported moderate to vigorous intensity of resistance exercise, while the other included activities such as stretching and relaxation. Of these two studies, one showed functional deterioration according to the Disability

Rating Index (DRI) questionnaire and increased pain in both groups<sup>19</sup>. The other study used a protocol recommended by the American College of Obstetricians and Gynecologists, which involved stretching, and resistance exercises for upper and lower limbs with light to moderate intensity, if the heart rate did not exceed 140 beats. The authors attribute the lack of significant improvement in QoL during the study to typical discomforts resulting from weight gain, pain, and fatigue toward the end of pregnancy<sup>18</sup>.

Conducting a systematic review showing the domains that showed significant improvement in the group of pregnant women who practiced physical exercise can be a challenging task. Analyzing in which domains physical exercise may have some effect on pregnant women's QoL is complex, as this variable can be affected by multiple factors, making it difficult to determine individual effects. Thus, one of the strengths of the study is presenting evidence data with over 1400 participants and showing mostly that physical exercise during pregnancy may promote benefits in QoL. On the other hand, other reviews may need to be conducted, as well as a meta-analysis to quantify the effects of physical exercise practice when compared to the control.

Considering this review, it is necessary to describe some points of attention regarding the extracted findings, especially concerning the gestational period and whether pregnancy poses any risk. Additionally, we had a small number of included studies, although the sample size is satisfactory. On the other hand, the studies were heterogeneous among themselves due to the different modalities of physical exercises applied, and differences in dosages and duration, which made meta-analysis unfeasible in this study. Therefore, new clinical trials with good methodological quality must be conducted to reinforce the findings raised in the present study.

## 4 Conclusion

Despite seeing the positive effects of physical exercise on the quality of life of pregnant women, the available evidence is not sufficiently robust to allow for a definitive assessment of the potential benefit of this intervention. This gap highlights the need to develop future studies that adopt a more comprehensive and rigorous approach to the subject.

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