



## Therapeutic exercise for pregnancy low back and pelvic pain: a systematic review

### *Exercícios terapêuticos para dor lombar e pélvica gestacional: uma revisão sistemática*

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#### Abstract

**Introduction:** During pregnancy, a woman's body goes through many changes, and lower back and pelvic pain are common and may persist after pregnancy. Although the literature point physical therapy as an effective therapeutic tool, there are few studies on the effects of physical therapy intervention through exercises for this purpose. **Objective:** To perform a systematic review on the use of Physiotherapy, through therapeutic exercises, for the prevention and treatment of pregnancy low back and pelvic pain. **Methods:** A systematic search for randomized trials (RCTs) was conducted on the databases PubMed, PEDro, Cochrane, EMBASE, LILACS and Periódicos Capes. There was no date or language restriction. The terms included in the search were: "pregnancy", "low back pain", "pelvic pain", "exercise therapy" and their descriptors in Portuguese. Methodological quality was assessed using the PEDro scale and a descriptive analysis of the studies was performed. **Results:** Eight studies, including 1781 pregnant women, were selected. Among them, one study addressed the issue of low back pain, two focused on pelvic pain and five on low back and/or pelvic pain. Seven studies presented high methodological quality, and only one study had low methodological quality. Limited evidence on low back pain was found, and conflicting evidence on pelvic pain, and low and/or pelvic pain. **Conclusion:** RCTs on the subject are scarce and heterogeneous, making it impossible to reach a consensus

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or any conclusions about which protocol of therapeutic exercise is more effective in the use of physiotherapy for pregnancy low back and pelvic pain.

**Keywords:** Physical Therapy Specialty. Pregnancy. Exercise Therapy.

## Resumo

**Introdução:** Na gravidez o organismo materno passa por muitas transformações e a dor lombar e a dor pélvica são frequentes, podendo persistir após a gestação. Embora a literatura venha apontando a Fisioterapia como recurso terapêutico efetivo, existem poucos estudos sobre os efeitos da intervenção fisioterapêutica por meio de exercícios para esse fim. **Objetivo:** Desenvolver uma revisão sistemática sobre a abordagem da Fisioterapia, por meio de exercícios terapêuticos, na prevenção e no tratamento da dor lombar e pélvica gestacional. **Métodos:** Realizou-se uma busca sistemática por ensaios clínicos randomizados (ECRs) nas bases de dados PubMed, PEDro, Cochrane, EMBASE, LILACS e Periódicos Capes. Não houve restrição de data e de idioma. Os termos compreendidos na busca foram: "pregnancy", "low back pain", "pelvic pain", "exercise therapy" e seus descritores em português. A qualidade metodológica foi avaliada por meio da escala PEDro, e uma análise descritiva dos estudos foi realizada. **Resultados:** Oito estudos, incluindo 1781 gestantes, foram selecionados. Dentre eles, um estudo aborda a temática da dor lombar, dois sobre dor pélvica e cinco sobre dor lombar e/ou pélvica. Sete estudos apresentaram alta qualidade metodológica, e somente um estudo apresentou qualidade metodológica baixa. Foram encontradas evidências limitadas para dor lombar e evidências conflitivas para dor pélvica e para dor lombar e/ou pélvica. **Conclusão:** Os ECRs sobre o tema ainda são escassos e heterogêneos, impossibilitando estabelecer consenso e conclusões sobre qual protocolo de exercícios terapêuticos é mais eficaz no manejo fisioterapêutico da dor lombar e pélvica gestacional.

**Palavras-chave:** Fisioterapia. Gravidez. Terapia por exercício.

## Introduction

Pregnancy is a period in which a woman's body goes through several changes, and may include soft tissue edema, ligamentous laxity, postural adjustments, weight gain, center of gravity shift, among others, which cause a predisposition to musculoskeletal disorders. The presence of low back and pelvic pain is quite frequent during pregnancy and, although their etiologies are clearly defined, some authors suggest that they are due to the physical alterations that happen in this period (1, 2).

The prevalence of low back and pelvic pain during pregnancy is significant. The literature points that they occur on at least 50% of pregnancies, and are limiting problems that interfere on the quality of life and on everyday activities (EDAs) (3, 4). Besides that, these discomforts may persist after pregnancy, according to Norén et al. (5). The study by these authors found that about 20% of women who had back pains during pregnancy, still had them three years after giving birth.

Physical therapy has been pointed in the literature as a therapeutic resource for resolving this problem. Among various techniques used for this purpose are therapeutic exercises, including aerobic ones, and ones for muscle strengthening, breathing, stretching and flexibility. Therapeutic exercises provide muscle strength, positive psychological effects and improvement in body posture, while also helping to develop the ability to concentrate and relax (2, 6-11).

Recent systematic review studies assessed the effects of pre-natal interventions on obese or overweight pregnant women (12, 13). Other reviews focused on the outcome of low back and pelvic pain, but did not restrict their approach to therapeutic exercises, guided or supervised by physical therapists, and/or included other types of treatment (14-18). But there are still few studies on the effects of physical therapy intervention with exercises on pregnancy low back and pelvic pain.

In this sense, it seems relevant to conduct studies that seek to elucidate the effects resulting from

the practice of therapeutic exercises for the prevention and treatment of pregnancy low back and pelvic pain. The results from these studies may assist in the clinical practice of physical therapists, based on the scientific evidence found. Thus, this study is a systematic review on the use of physical therapy for the prevention and treatment of pregnancy low back and pelvic pain through therapeutic exercises.

## Methods

This study was carried out in accordance with PRISMA (Preferred Reporting Items for Systematic Review and Meta-analyses) (19).

### Research strategy

The research was conducted on the databases PubMed, Physiotherapy Evidence Database (PEDro), Register of Controlled Trials (Cochrane CENTRAL), EMBASE, LILACS and *Periódicos Capes*. The search was done in May, 2014, and updated in June, 2016, without restriction of date or language.

The English keywords used in the research were “pregnancy”, “low back pain”, “pelvic pain”, “exercise therapy”; and the equivalent in Portuguese. The Boolean

operators “OR” and “AND” were used for the combinations between the keywords. The research on PubMed was carried out using MeSHs terms and entry-terms, associated to a sensitive list of terms for the research of RCTs, by Robinson e Dickersin (20). Table 1 brings the complete research strategy used on PubMed.

### Eligibility criteria

We only included Randomized Controlled Trials (RCTs) conducted with healthy pregnant women, and which used as an intervention strategy exercises conducted on the mat, guided or supervised by physical therapists, and compared the results with a control group or with any other type of intervention. The outcomes included in this review were low back pain, pelvic pain and lumbopelvic pain. The following exclusion criteria were adopted: studies with other methodological designs (not RCTs); unpublished literature (theses and dissertations); studies with incomplete data and/or without a control group or a comparison group; studies in which the participants presented comorbidities or were overweight; and studies that used manual therapy techniques or electro-thermal-phototherapy associated to the therapy with exercises. In cases in which the RCT was published several times, it was only included once.

**Table 1** - Research strategy used on PubMed

#7	#1 AND #5 AND #6
#6	#2 OR #3 OR #4
#5	Search ((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized controlled trials[mh] OR random allocation[mh] OR double-blind method[mh] OR single-blind method[mh] OR clinical trial[pt] OR clinical trials[mh] OR ("clinical trial"[tw]) OR ((singl*[tw] OR doubl*[tw] OR trebl*[tw] OR tripl*[tw]) AND (mask*[tw] OR blind*[tw])) OR ("latinsquare"[tw]) OR placebos[mh] OR placebo*[tw] OR random*[tw] OR research design[mh:noexp] OR follow-up studies[mh] OR prospective studies[mh] OR cross-over studies[mh] OR control*[tw] OR prospectiv*[tw] OR volunteer*[tw]) NOT (animal[mh] NOT human[mh]))
#4	Search ("Exercise Movement Techniques"[Mesh] OR "Movement Techniques, Exercise" OR "Exercise Movement Technics" OR "Pilates-Based Exercises" OR "Exercises, Pilates-Based" OR "Pilates Based Exercises" OR "Pilates Training" OR "Training, Pilates")
#3	Search ("Exercise"[Mesh] OR "Exercises" OR "Exercise, Physical" OR "Exercises, Physical" OR "Physical Exercise" OR "Physical Exercises" OR "Exercise, Isometric" OR "Exercises, Isometric" OR "Isometric Exercises" OR "Isometric Exercise" OR "Exercise, Aerobic" OR "Aerobic Exercises" OR "Exercises, Aerobic" OR "Aerobic Exercise")
#2	Search ("Exercise Therapy"[Mesh] OR "Therapy, Exercise" OR "Exercise Therapies" OR "Therapies, Exercise")
#1	Search ("Pregnancy"[Mesh] OR "Pregnancies" OR "Gestation" OR "Pregnant Women"[Mesh] OR "Women, Pregnant" OR "Pregnant Woman" OR "Woman, Pregnant" OR "Prenatal Care"[Mesh] OR "Care, Prenatal")

## Study selection and data extraction

To revisers independently checked the titles and abstracts of all articles identified by the research strategy. The abstracts that did not have enough information about the inclusion and exclusion criteria were selected for later reading of the whole article. On the second phase, the same revisers independently assessed the complete articles and made their selection, based on the previously explained eligibility criteria. The main outcomes extracted from the studies were pain intensity and functionality. The secondary outcomes we considered were self-reported symptoms and medical leaves (medically approved time-off from work). Studies that related at least one of these outcomes were included in the systematic review. Standardized tables were used for data extraction referring to the samples, interventions, role of the physical therapist and main results from each study included in the review.

## Methodological quality assessment

The methodological quality of the studies was assessed using a scale developed by the database PEDro. Based on the Delphi concept, it's the reliability of its total score is enough for being used on systematic reviews of Physical Therapy RCTs (21). In this scale, which has 11 items, each item that is met (except for the first one) contributes a point for the final score, which is obtained by adding up all positive answers (22). Maher (21) states that in intervention studies the impossibility of blinding the therapists or the participants, and other conditions, causes the maximum possible score in the PEDro scale to be 8/10. According to Moseley et al. (23), studies with scores equal to or higher than five have high methodological quality. Thus, in this systematic review, the studies were classified as having high methodological quality when five or more of the criteria were positive, and low methodological quality when the score was lower than five.

## Data analysis

The heterogeneity of the result measures and the sample numbers of the studies prevented us from

carrying out the meta-analysis. Thus, a descriptive analysis of the studies included in the systematic review will be presented.

## Results

### Identified studies

The initial research found 3434 articles, from which 36 were excluded because they appeared more than once in the different researched databases. After assessing the titles and abstracts, 3353 articles were excluded because they did not meet the inclusion criteria and 45 articles were selected for detailed analysis. Among them, 25 were considered to be potentially relevant. After assessing the complete articles, 16 were excluded because they did not report interventions that were supervised or guided by physical therapists (9-11, 24-28); because they associated the exercises to manual therapy (29, 30); because they were unpublished (theses and dissertations) (31-33); for lack of data (34); or because they did not relate the outcomes or interventions of interest (8, 35). Thus, eight studies (36-43), published between the years of 2005 and 2014, were included in this systematic review (Tables 2, 3 and 4). The selection process of the studies is shown the flowchart below (Figure 1).

Eight RCT (36 - 43) were included; one about low back pain (36), two about pelvic pain (37, 38) and five about low back and/or pelvic pain (39 - 43). The size of the sample of the studies included in the review varied from 34 to 855 participants, with a total of 1781 pregnant women.

### Study quality assessment

As to the methodological quality of the studies, assessed with the *PEDro* Scale, seven studies (36-39, 41-43) were considered to have high quality, with scores varying from six to eight points. Only one study (40) had low methodological quality. The average score of all studies was 6.375 points. The scores of each included study are shown in the last columns of Tables 2, 3 and 4.

Even though most studies had high methodological quality, the samples, in general, are small; only two studies (41, 42) had samples with more than 300 participants.

**Table 2** - Characteristics and scores in the *PEDro* Scale of the study about low back pain

Author/Year	Sample	Age (average (SD)) / Gestational age when included (median)	Intervention	Role of the Physical Therapist	Main Results	<i>PEDro</i> Score
<b>Gil et al., 2011 (32)</b>	<b>N: 34;</b> EG: 17; CG: 17.	EG: 29 (5.2); / 22; CG: 23.7 (3.9); / 22.	EG: stretching the posterior chain with two active postures from the GPR method. F: 40 min/week; D: eight weeks. GC: pre-natal routine and guidance. F: two follow-up encounters.	Assessment; pain-confirmation tests.	Pain intensity: significant decrease in the EG throughout the study and in comparison with the CG. Functional limitations: significant decrease after the end of the interventions. Lower results in the EG.	7

Note: N: sample number; EG: experimental group; GC: control group; SD: standard deviation; GPR: Global Postural Re-education; F: frequency; D: duration.

**Table 3** - Characteristics and scores in the *PEDro* Scale of the studies about pelvic pain

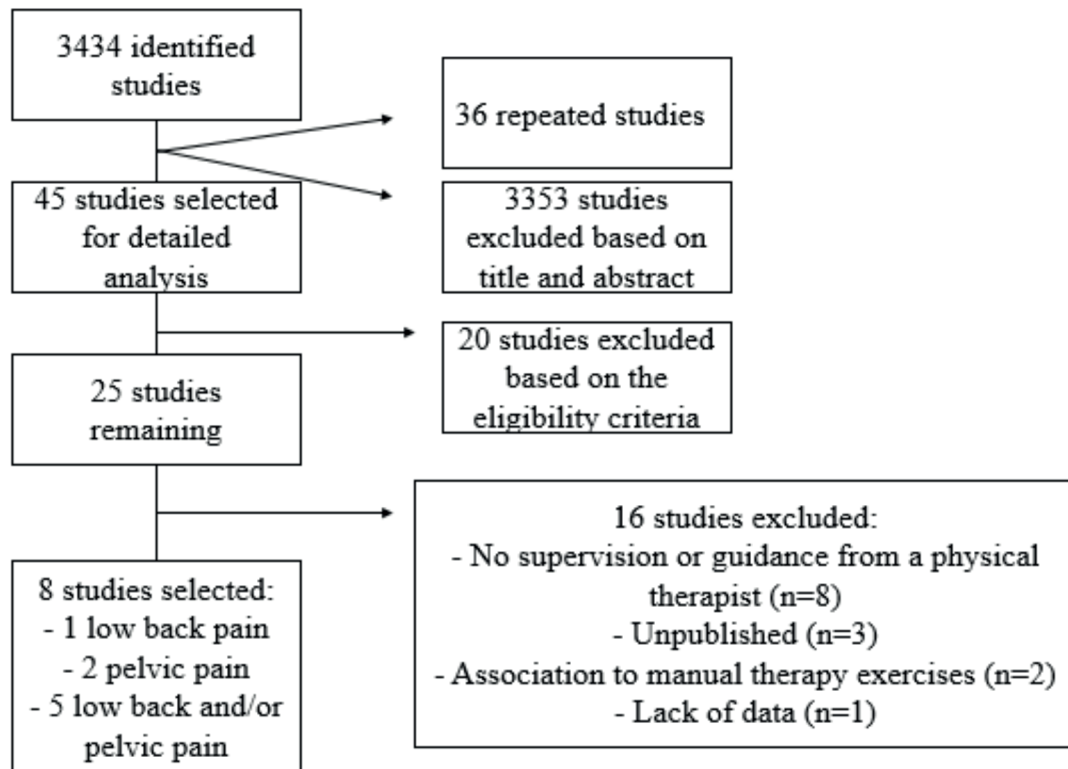
Author/Year	Sample	Age (average (SD)) / Gestational age when included (median)	Intervention	Role of the Physical Therapist	Main Results	<i>PEDro</i> Score
<b>Depledge et al., 2005 (33)</b>	<b>N: 87;</b> EG1: 30; EG2: 28; EG3: 29.	EG1: 30.7 (4.0); / 32.2 (5.2); EG2: 29.8 (4.6); / 30.5 (5.2); EG3: 28.7 (6.3); / 31.1 (5.4).	EG1 – Specific muscle strengthening exercises to be performed at home, information and guidance; EG2 – Same intervention as EG1 + rigid pelvic belt; EG3 – Same intervention as EG1 + non-rigid pelvic belt; F: 3x/day (at home); D: one week.	Performed the initial examination, demonstrated the exercises and verified if the execution was correct.	Pain intensity and functional limitations: significant decrease for all groups. No difference between groups.	6
<b>Nilsson-Wikmar et al., 2005 (34)</b>	<b>N: 118;</b> EG1: 40; EG2: 41 EG3: 37.	EG1: 28.4 (3.9); / 25 (7); EG2: 29.5 (3.3); / 22 (7); EG3: 29.7 (5.4); / 21 (6).	EG1 - Information (anatomy, posture, ergonomics) + elastic pelvic belt; D: 10 weeks (median); EG2 – Same intervention as EG1 + at home exercises: pelvic stabilization and stretching; Instructions: once a week; Follow-up: once after receiving the program; F: 2x/week; D: 14 weeks (median); EG3 – Same intervention as EG1 + exercises at the clinic: strengthening, stabilization, stationary bicycle and stretching. D: 16 weeks (median).	Performed the physical examination, was responsible for the exercise programs, and assessed the questionnaires. On the EG2, explained the initial instructions as needed.	Pain intensity, pain design and functional capacity: no difference between groups during pregnancy and after-birth. Reduction in the results of all groups between the 38th gestational week and 12 months after birth.	7

Note: N: sample number; EG1: experimental group one; EG2: experimental group two; EG3: experimental group three; F: frequency; D: duration; SD: standard deviation.

**Table 4 - Characteristics and scores in the PEDro Scale of the selected studies about low back and/or pelvic pain**

Author/ Year	Sample	Age / Gestational Age (Average (SD))	Intervention	Role of the Physical Therapist	Main Results	PEDro Score
<b>Eggen et al., 2012 (35)</b>	<b>N: 257;</b> EG: 129; CG: 128.	EG: 30.6 (4.8); / 16.3 (1.8); CG: 30.0 (4.8); / 16.4 (2.0).	EG: in group; aerobic and strengthening exercises, stretching, body awareness, posture and guidance for EDAs. F: 60 min/week; D: 16 to 20 weeks. CG: cares with the routine and information (midwife). F: every four weeks.	Individual guidance and exercise adjustments	Prevalence of pelvic and low back pain and secondary outcomes (pain intensity in the morning, pain intensity at night, disablement and SF-8): no significant difference.	7
<b>Martins et al., 2005 (36)</b>	<b>N: 69;</b> EG: 33; CG: 36.	NI	EG: in group; eccentric stretches using the SGA method; F: 60 min/week; D: eight weeks. GC: medical guidance and return after eight weeks.	Pain-provoking tests, data collection, recommending compensations and guidance.	Pain intensity: decrease in the EG. Decrease not verified in the CG. Pain-provoking tests: decrease in low back pain. No significant difference regarding posterior pelvic pain. Self-report: pain decreased or stopped after the exercises; the exercises caused positive feelings.	< 5
<b>Martins e Silva, 2015</b>	<b>N: 60;</b> EG: 30; CG: 30.	CG: 26 (median); EG: 23 (median). (inclusion between the 12th and 32nd weeks).	GE: in group; yoga-type exercises (warm-up, breathing, postures, relaxation and meditation). F: 60 min/week; D: 10 weeks. GC: postural guidance through leaflets. D: 10 weeks.	Pain-provoking tests, administering the session/instructing about the method.	Pain intensity: Lower in the EG in comparison with the CG. Low back pain provoking tests: lower responses in relation to the pelvic pain provoking test.	5
<b>Morkved et al., 2007 (37)</b>	<b>N: 301;</b> EG: 148; CG: 153.	EG: 28.0 (5.3); / Average NI (inclusion at 20 weeks); CG: 26.9 (3.9); / Average NI (inclusion at 20 weeks).	EG: in group; aerobic and strengthening exercises, stretching, body awareness, breathing and relaxation, information. Daily at home training of the PFM. F: 60 min/week; D: 12 weeks. CG: information from the obstetrician	Conducted the groups, encouraged the performance of the exercises at home and reported group participation.	Self-report: EG was less prone to lumbopelvic pain after the intervention. Medical leaves: no significant difference; Functional state: EG had higher scores after the intervention.	8
<b>Stafne et al., 2012 (38)</b>	<b>N: 855;</b> EG: 429; CG: 426.	EG: 30.5 (4.4); / NI; CG: 30.4 (4.3); / NI	EG: in group. Aerobic and strengthening exercises, stretching, body awareness, breathing and relaxation, information. F: 60 min/week; D: 12 weeks; At home exercise program: resistance, strength and balance. F: 45 min 2x/week; CG: standard pre-natal and information.	Conducted the weekly group session and collected reports about the at home exercises.	Self-reports about lumbopelvic pain: no significant difference between the groups; Self-reports about medical leaves: proportion was lower in the G1; Deficiency index and pain intensity: no significant difference between groups.	7

Note: N: sample number; EG: experimental group; CG: control group; NI: not informed; EDAs: Everyday Activities; SGA: Global Active Stretching; F: frequency; D: duration; PFM: pelvic floor muscles



**Figure 1** - Flowchart of the research and selection of the studies included in this review

Note: n: number of studies.

### Assessed outcomes

Pain intensity was assessed by most studies (36-40, 42, 43), and the Visual Analogue Scale (VAS) was the most commonly used instrument for the assessment (36, 38, 40, 42, 43). Another outcome that was highly emphasized in the assessments was functionality (36-39, 41, 42), especially using the Roland-Morris Questionnaire (36, 37, 39) and the Disability Rating Index (DRI) (38, 41, 42). Two studies (41, 42) assessed medical leaves for time off work and three studies (38, 41, 42) used self-reports and pain design.

### Low back pain

Only the study by Gil et al. (36) assessed the efficacy of therapeutic exercises for pregnancy low back pain (Table 2). A total of 34 pregnant women was randomized and divided into an intervention and a control group. The intervention group was treated using the Global Postural Re-education (GPR) method, during

eight weeks. The control group received routine prenatal guidance in two follow-up encounters. The pain intensity averages, which were similar in both groups before the study (intervention group: 5.2 (standard deviation (SD): 1.5); control group: 5.8 (SD: 1.2)), were significantly reduced after eight weeks, and the intervention group presented lower intensity (0.9 (SD: 1.3) versus 7.0 (SD: 1.4)). The score averages regarding functional limitations also presented significant differences, going from 7.1 (SD: 5.0) to 2.3 (SD: 2.9) in the intervention group, and from 9.5 (SD: 4.5) to 13.8 (SD: 3.8) in the control group. Based on these results, the author concluded that the GPR method may contribute for the treatment of pregnancy low back pain, reducing pain intensity and functional limitations.

### Pelvic pain

The studies by Depledge et al. (37) and Nilsson-Wilkmär et al. (38) focused their interventions on the treatment of pregnancy pelvic pain (Table 3).

Depledge et al. (37) investigated the effects of exercises, guidance and pelvic belts on the symphysis pubis dysfunction of 87 pregnant women, who were divided into three groups. They all received guidance from a physical therapist and performed at home exercises to strengthen specific muscles for increasing pelvic stability, during one week. One of the groups just received the guidance and performed the at home exercises. The other two groups used pelvic belts also — one used the rigid kind and the other the non-rigid kind. After the interventions, which lasted a week, the authors found a reduction in the score from the *Patient-Specific Functional Scale* (38.6% in the exercise group, 25.4% in the exercise and non-rigid belt group and 30.4% in the exercise and rigid belt group); in the score from the *Roland-Morris Questionnaire* (22.7% in the exercise group, 15.9% in the exercise and non-rigid belt group and 17% in the exercise and rigid belt group); and in the numeric scale of pain (31.8% in the exercise group, 13.9% in the exercise and rigid belt group and 29.2% in the exercise and non-rigid belt group), which indicates significant results on the functional limitation and pain intensity for all groups. However, there was no significant difference between the groups, which suggests that the use of pelvic belts did not add positive effects to the program of muscle strengthening and guidance performed by the participants.

Nilsson-Wilmar et al. (38) compared the effects of three different physical therapy treatments given until the 38th week of pregnancy to 118 pregnant women with pelvic pain. Besides, the authors followed-up with investigations three, six and 12 months after birth. The participants were randomly divided into three groups and they all received information and wore pelvic belts. One of the groups also performed at home exercises, and the other performed exercises at the clinic. The median of the duration of the interventions was of 10 weeks for the information group, 14 for the group that performed exercises at home and 16 weeks for the group that performed exercises at the clinic. In all groups, the authors found a decrease in intensity of the areas of pelvic pain and an increase in functional capacity between the 38th gestational week and at 12 months after the birth ( $P: 0.00$  for the three groups). However, there was no significant difference between the three groups during pregnancy or after birth, suggesting that performing the exercises did not add positive effects to the information and use of a sacroiliac inelastic belt.

## Pelvic and/or low back pain

In order to assess the treatment and prevention of low back and/or pelvic pain, five studies were found, by Eggen et al. (39), Martins et al. (40), Morkved et al. (41), Stafne et al. (42) and Martins e Silva (43), which assessed group interventions (Table 4).

Eggen et al. (39) investigated if a program of group exercises could reduce the prevalence of low back and pelvic pain during pregnancy. The 257 pregnant women who participated in the study were randomly divided into an intervention group, which performed weekly supervised exercises for 16 to 20 weeks, and a control group, which received routine care. The assessments were carried out on the 20th and 36th gestational weeks. The exercise program did not have significant effects on functionality, and on the prevalence and intensity of pelvic or low back pain in pregnancy. The study by Martins et al. (40) randomly divided 69 pregnant women into two groups to verify the effectiveness of the *Global Active Stretching (SGA)* method, through eccentric stretches in group during eight weeks, comparing to a control group, which only received medical guidance. After the intervention, 61% of the pregnant women who performed the treatment with the SGA method did not complain of pain in the low back and pelvic areas, a result that was not observed in the participants from the control group, in which only 11% of women presented improvement. The women who participated in the intervention group reported feelings of relief, and the pain intensity decreased significantly. A decrease in low back pain, but not in pelvic pain, was found with the pain-provoking tests.

Morkved et al. (41) and Stafne et al. (42) assessed the effects of a group exercise program involving aerobic and strengthening exercises, body awareness, breathing, relaxation and information, for a period of 12 weeks during pregnancy. The first study proved the efficacy of the program for the prevention of lumbopelvic pain. A total of 301 participants were assessed, randomly divided into an intervention group (group exercises) and a control group (information from the obstetrician). The women in the intervention group had higher scores for the functional state and presented themselves, through self-reports, as less prone to having lumbopelvic pain after the intervention (44% versus 56%). This study did not find differences regarding medical leaves. The study by Stafne et al. (42), which randomly divided a total of 855 groups into an intervention group (group



exercises) and a control group (standard pre-natal and information), did not find significant differences between the groups regarding lumbopelvic pain, neither pain intensity or functional capacity, after the intervention. However, the proportion of women on medical leave because of lumbopelvic pain was lower in the intervention group (22% versus 31%). Martins and Silva (43) assessed the efficacy of Hatha yoga on the reduction of low back and pelvic pain in 60 pregnant women, and found that the method was more efficient for postural guidance (control group) than for the reduction of pain intensity.

## Discussion

The results from this systematic review showed that the studies about the use of Physical Therapy for pregnancy low back and pelvic pain through therapeutic exercises are relatively recent and have, in their majority, high methodological quality. However, the number of indexed studies on the subject is still small. Besides, the studies were very heterogeneous, which complicated the comparison between the assessed variables and outcomes. Systematic reviews by Stuge et al. (14), Richards et al. (15) and Pennick e Liddle (16), which were not limited to studies that were supervised by a physical therapist and/or were not restricted to exercises, but assessed the same outcomes, also found a problem with heterogeneity among the studies.

### Duration and frequency of the interventions

One of the aspects observed in the assessed RCTs was the use of very different protocols as to the duration of treatment, which varied from one to 20 weeks, and as to the weekly frequency, which varied from once a week to three times a day. The fact that there is no consensus about the duration and frequency of the interventions was also found by other studies that assessed the effects of the exercises on pregnant women. The studies by Elden et al. (8) and Kordi et al. (11) showed that exercises performed during six weeks reduced pelvic pain, and according to Kluge et al. (10) an exercise program that lasted 10 weeks reduced the intensity of pregnancy low back pain and increased the functional capacity of the participants. The studies by Garashabi et al. (9) and Schim et al. (26) found a reduction in the intensity of low back and

pelvic pain after the 12th week of intervention. In this sense, despite the fact that practicing exercises during pregnancy is considered to be safe, the indication of intensity, duration and frequency of the exercises is not well established yet. We suggest that they be defined according to the needs of each pregnant woman (44).

### Group and individual protocols, with or without supervision

We found that the types of exercises were different among the RCTs. There was predominance of protocols that associated aerobic, strengthening, stretching, body awareness, breathing and relaxation exercises (38, 39, 41, 42). Besides, the exercises were different regarding how they must be performed. Two studies (37, 38) included in this systematic review used protocols with at home exercises — which had different results, and two others (41, 42) associated at home exercises with exercises done at the clinic, and also had conflictive results. In the same sense, other studies (11, 26, 30) that used at home exercises in their interventions showed there was no consensus about the effects on pregnancy low back and pelvic pain. The study by Schim et al. (26) found positive results regarding pain intensity, but did not find significant differences regarding functional limitations. The study by Kordi et al. (11) found significant results as to the improvement of functional capacity and reduction in pain intensity. Finally, the study by Miquelutti et al. (30) did not find significant effects on the lumbopelvic pain of pregnant women.

Even though some studies (37, 38, 41, 42) used guided interventions for at home exercises, without continuous supervision, all the RCTs included in this review had interventions that were guided or supervised by Physical Therapists at one moment. As to the exercises that were supervised by different therapists, previous studies found that these strategies were efficient for pregnancy low back and pelvic pain (8-10). The importance of supervision during the exercises for the treatment and prevention of low back pain is also emphasized in studies that did not focus solely on pregnant women (45, 46).

Five of the RCTs (39-43) included in this systematic review used group intervention protocols. As to the treatment for the pregnant women being individual or in group, European guidelines recommend that they be individual (47). However, group activities,

even with different focuses and supervised by health professionals, are described as an importance resource for ensuring assistance during pregnancy, as it is also a space for sharing experiences, feelings and affects that are common to the period (48-50).

### Assessment methods

The assessment methods of the outcomes were also heterogeneous among the RCTs, corroborating data from the literature which show controversies related to the clinical assessment of pregnancy low back pain (51). There is no consensus as to what method would be more adequate for the assessment of low back and/or pelvic pain in pregnant women, which represents a challenge for researchers of the subject. Since the evidences and alternatives are scarce, self-reports and designs are recommended (47, 52).

### Low back pain

Referring specifically to low back pain, only one RCT in accordance with the inclusion criteria was found in this systematic review, with a relatively small sample size, limited to eight weeks of intervention and only using the GPR (36) method. Although this study demonstrated a significant reduction in pain intensity and functional limitations in the group that received the intervention, another study with the same design that could confirm and generalize this evidence was not found.

Other published RCTs have shown benefits from interventions with exercises that were not specifically conducted by physical therapists (9, 10). A systematic review conducted by Pennick and Liddle (16) included a total of 23 studies, and seven specifically assessed exercises for pregnancy low back pain, comprising mat or aquatic exercises, not limited to exercises supervised by physical therapists. The authors found, specifically in these seven studies, evidence of poor quality of the effectiveness of the exercises for the management of pregnancy low back pain.

### Pelvic pain

The studies by Depledge et al. (37) and Nilsson-Wilmar et al. (38), included in this review, found

conflicting evidence, because they differed as to the duration of the interventions, the effects on pain intensity and on functional limitations; on the study that found positive results (37), the duration of the intervention was only a week. Other studies (8, 11) indicate that specific stabilization exercises for strengthening the muscles of the pelvic girdle can be effective in the treatment of pregnancy pelvic pain, with relatively short interventions (six weeks).

Exercises for the treatment of pelvic pain during pregnancy are recommended by European guidelines (47), which corroborate our findings with regard to the heterogeneity of the duration of the protocols used in the literature, which means that there is no consensus on the appropriate treatment period.

### Low back and/or pelvic pain

The included studies that assessed low back and/or pelvic pain showed conflicting evidence in reducing pain intensity, improving functional capacity and reducing the number of medical leaves (39-43). All articles presented interventions in small groups, not in accordance with the European guidelines (47), which recommend individualized treatments during pregnancy.

The fact that the assessment and treatment of low back and pelvic pain were performed concomitantly in these studies must also be considered. It is known that the differential and accurate diagnosis of these pains is essential, since these are different conditions and have different treatments and prognoses (8, 40). Thus, the used intervention protocols, which did not treat these pains differently, could have influenced the results of the research.

Pennick and Liddle (16), in a recent systematic review, included 23 studies with 4093 pregnant women, and found evidence that the practice of specific exercises was able to relieve lumbopelvic pain during pregnancy. Richards et al. (15) and Gutke et al. (17) — although having found some evidence that physical therapy through exercises, acupuncture and pelvic support belts, among others, could have positive effects on pregnancy low back and pelvic pain — could not perform a meta-analysis due to the heterogeneity of the studies included in their systematic review. Gutke et al. (17) found in a recent systematic review, a weak level of evidence of the effect of specific exercises guided by physical therapists

on pregnancy lumbopelvic pain. In contrast, the systematic review by Van Benten et al. (18) recommends the use of exercises for the treatment of lumbopelvic pain during pregnancy, based on studies showing a positive effect of the technique on pain, disability and/or medical leaves.

### Limitations of the study

The low number of indexed articles on the subject that met the inclusion criteria stipulated for this systematic review limited the number of selected studies. This factor, along with the methodological differences, heterogeneity in relation to samples, interventions, follow-up periods and outcome measures, made it impossible to conduct a meta-analysis and, therefore, there is considerable uncertainty about the estimate of the effects of this type of treatment.

### Conclusion

This systematic review found that the RCTs published on the subject and included in this investigation, although mostly with high methodological quality, are scarce and use heterogeneous methodologies and protocols, limiting the possible conclusions. Thus, it is not possible to establish a consensus on the duration, frequency and more effective type of therapeutic exercise for the management of pregnancy low back and pelvic pain. Therefore, we suggest that new RCTs be conducted, with a higher number of participants, describing their activities in more detail, and demonstrating more clearly which therapeutic intervention was more effective, so their results can guide the clinical practice of Physical Therapists, based on the scientific evidence found.

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