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Systematic Review

Physical therapy assistance in labor: A systematic review and meta-analysis

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ABSTRACT

Background: Physical therapy assistance during labor may provide physical and emotional support to the expectant mother. Through specific techniques, physical therapists may help alleviate pain, improve mobility, and facilitate a safer and more comfortable delivery.
Objective: To perform a systematic review of the literature to assess the potential benefits and risks of physical therapy assistance during labor.
Methods: A search was conducted in the MEDLINE/PubMed, LILACS, PEDro, EMBASE, CINAHL, CENTRAL, Web of Science, and SCOPUS databases, with no restrictions on dates or language. The terms "Physical therapy assistance" and "Labor" were used. Randomized and quasi-randomized clinical trials comparing a group receiving physical therapy assistance during labor with a control group receiving standard care were included. The Cochrane tool (RoB 2.0) was used to assess the Risk of Bias, and the certainty of evidence was evaluated using the GRADE system. Quantitative analysis was performed through meta-analyses.
Results: Twelve studies involving 984 pregnant women were included. There was an increase frequency of vaginal deliveries (RR: 1.10, 95% CI 1.04, 1.17; 9 studies; I^2, 2%; T^2, 0.00; $p = 0.42$) and a reduction in cesarean sections (RR: 0.52, 95% CI 0.35, 0.76; 9 studies; I^2, 0%; T^2, 0.00; $p = 0.65$) for the physical therapy group, findings based on high-certainty evidence. There was also a reduction in the duration of the first stage of labor (MD: -99.01 min, 95% CI -153.35, -44.66; 7 studies; I^2, 88%; T^2, 4546.40; $p = 0.00001$), duration of the second stage (MD: – 11.29 min, 95% CI -18.94, -3.64; 6 studies; I^2, 53%; T^2, 45.01; $p = 0.06$) and frequence of perineal lacerations (RR: 0.49, 95% CI 0.25, 0.96; 4 studies; I^2, 0%; T^2, 0.00; $p = 0.70$) for the intervention group, findings based on moderate-certainty evidence. There was also a reduction in pain by 1.46 points on the Visual Analog Scale (MD: -1.46, 95% CI -2.52, -0.41; 7 studies; I^2, 100%; T^2, 1.90; $p < 0.00001$), findings based on low-certainty evidence, a decrease in analgesic use (RR: 0.90, 95% CI 0.83, 0.99; 2 studies; I^2, 0%; T^2, 0.00; $p = 0.44$), and maternal anxiety by 7.65 points on the State-Trait Anxiety Inventory (MD: -7.65, 95% CI -11.27, -4.03; 2 studies; I^2, 88%; T^2, 5.99; $p = 0.005$) for the intervention group. There was no difference in the other maternal and fetal outcomes.
Conclusion: Physical therapy assistance during labor provides a number of benefits to the mother.

Introduction

The primary guidelines on intrapartum care emphasize the importance of evidence-based assistance and interdisciplinary work to ensure a positive childbirth experience for women.[1,2] These guidelines highlight the need to provide pharmacological and non-pharmacological care for pain relief during labor and encourage the diversification of postures, ambulation, and practices that offer a positive risk-benefit balance for effective labor progression, maternal satisfaction, and favorable obstetric outcomes.[1,2] Within the multidisciplinary team, the role of a physical therapist is perceived to be of ultimate importance.[2]

In Brazil, several states have already introduced legislation mandating the presence of physical therapists around the clock in both public and private maternity hospitals.[3,4] It is advised that physical therapists who specialize in obstetrics possess a recognized women's health specialty title accredited by the Federal Council of Physiotherapy and Occupational Therapy (COFFITO), per Resolution No. 372/09.[5]

As per Article 3 of the resolution, specialized physical therapists are

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required to proficiently apply physical therapy techniques and resources for pain relief during labor. Utilizing methods and resources such as kinesiotherapy with or without balls, body mobility and positioning, mechanotherapy, thermotherapy, cryotherapy, phototherapy, electrotherapy, transcutaneous electrical nerve stimulation (TENS), respiratory techniques, and many options, either individually or combined to enhance the progression and quality of labor assistance.[5-10]

Physical therapists are the most specialized professionals, with the greatest expertise, to prescribe and apply these non-pharmacological methods in a safe and effective manner.[5-7] There is support for[8,9] and a high level of specificity in the training of physical therapists for the use of these techniques to provide pain relief resources, improvement of labor progression, and a positive and active role of women during labor.[10,11] Systematic reviews[2,6,10] have been published on the isolated use of these non-pharmacological methods. However, the studies included in these review had diverse teams applying the interventions, including partners and non-physical therapists health professionals.

It is therefore important to evaluate whether studies using isolated or combined physical therapy methods, provided by physical therapists, are effective to provide pain relief and to improve progression of labor. It is also essential to assess the levels of evidence and potential biases for these interventions when making recommendations for the clinical practice of physical therapy care during labor. This systematic review aimed to assess, using the best available evidence, the potential benefits of physical therapy assistance during labor on maternal and neonatal outcomes.

Methods

This review followed a protocol registered in PROSPERO (2023 CRD42023423213) and is reported according to PRISMA guidelines.[12]

Data sources and searches

Two independent reviewers (GM and FP) conducted the searches and selected eligible studies in MEDLINE/PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), LILACS, PEDro, EMBASE, CINAHL, Web of Science, and Scopus. No dates or language restrictions were applied, and tailored search strategies were employed for each database based on their specific descriptors (Supplementary material A).

Study selection

Types of studies: All published and unpublished randomized controlled trials (RCTs) or quasi-randomized trials were eligible for inclusion in this systematic review.

Population studies: Women who were nulliparous, primiparous, or multiparous; between 37 and 42 weeks of gestation; with a vertex or breech presentation; carrying a live fetus; with or without epidural analgesia; having a singleton pregnancy.

Types of interventions: Only studies on physical therapy assistance provided during labor using physical therapy interventions, performed by a physical therapist were included. The physical therapy interventions could include: TENS, kinesiotherapy with or without a ball (swiss, peanut, etc.…), pelvic mobility exercises with or without a support device, breathing exercises, thermotherapy with sprinkler and immersion baths, acupuncture, manual therapy, positioning, and others. The control group consisted of application of usual care. Studies using physical therapy type interventions, but performed by another professional, were not included.

The primary outcomes of the study were frequency of spontaneous vaginal delivery, frequency of cesarean delivery, and duration of the first stage of delivery for maternal outcomes and Apgar score (less than 5 at 5 min), admission to neonatal intensive care unit, and delivery room resuscitation for neonatal outcomes.

The secondary outcomes of the study were duration of the second stage of delivery, pain intensity and perineal lacerations (third or fourth degree), instrumental delivery, episiotomy, oxytocin use (after randomization), epidural analgesia use (after randomization), maternal anxiety, and fatigue and satisfaction with the childbirth experience for maternal outcomes; low umbilical cord blood pH (arterial less than 7.2 and venous less than 7.3) and fetal heart rate variability for neonatal outcomes.

Data collection and analysis

The study selection was done by two reviewers (GM and FP) who screened the studies by title and abstract, performing a pre-selection through eligibility criteria. Then, they read the full text of potentially eligible studies to confirm their inclusion. Any disagreements between the two reviewers was resolved by a third reviewer (AD). The reference lists of the included studies were also assessed to ensure that all potentially eligible trials that could not be found in the databases were included.

A data extraction form was developed for this purpose. For eligible studies, a minimum of two reviewers (GM and FP) were responsible for data extraction using the agreed-upon form. Any differences or discrepancies were resolved through discussion and, when necessary, by consulting a third reviewer (RSM). The data were inserted into the Review Manager software16 and checked for accuracy. When information was unclear, the authors attempted to contact the author of the original report to obtain further details.

The risk of bias (quality) assessment in each study was assessed using a recently developed revision of the Cochrane risk-of-bias tool (RoB 2.0: the revised Cochrane risk-of-bias tool for randomized trials).[13] This new risk of bias tool presents five domains of bias. For each domain there were questions with the following possible answers: “Yes”, “Probably yes”, “Probably no”, “No” and “No information” and the risk of bias was classified as “Low risk,” “Some concerns”, or “High risk” of bias.[13] The risk of bias was assessed for each outcome. Two reviewers (GM and FP) assessed the risk of bias for each outcome, and any discrepancies between them were resolved through discussion to reach a consensus. If required, a third reviewer (RSM) was consulted for decision-making.

Certainty of evidence assessment was conducted by two independent reviewers (GM and FP) using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system. It considers five factors that can decrease the quality of evidence for randomized trials: study limitation, inconsistency, indirectness, imprecision, and publication bias. Each factor is classified as high, moderate, low, and very low risk of bias.[14,15]

The certainty of evidence for outcomes such as spontaneous vaginal delivery, cesarean delivery, pain intensity, duration of the first and second stages of delivery, perineal laceration, and APGAR score were evaluated using the GRADE system. A review of the evidence for each factor followed the following classification: low risk of bias (no reduction in points), serious risk of bias (reduction of 1 point), and very serious risk of bias (reduction of 2 points).[14,15] Reviewers assigned points based on the identified biases in these items.

Data analysis was performed using RevMan 5.3 software.[16] The homogeneity of the studies was assessed using the test for heterogeneity. Studies were considered homogeneous when the p-value was greater than 0.05, and the heterogeneity index (I-squared) was categorized as low heterogeneity for values between 30% to 40%. In the first statistical analysis, a random effect meta-analysis was conducted because of the heterogeneity identified in the physical therapy assistance studies. When a meta-analysis could not be performed, the results were shown through a qualitative analysis.

We used the standardized mean difference (MD) to combine trials that measured the same outcomes using different methods. For studies reporting medians and ranges for continuous data, means and standard deviations were estimated using the method proposed by Hozo et al.[17]

Results

The search in the pre-established databases identified a total of 2169 studies. After the initial screening, duplicate articles were excluded, and the remaining articles underwent title and abstract analysis. Finally, 12 articles were considered eligible for full review (Supplementary material B).

In total, 984 pregnant women were included in the 12 studies. All primary researchers and professionals who executed the protocols were physical therapists or physical therapy students. The minimum and maximum ages of the parturients were 14 and 35 years, respectively. The majority of the included studies focused solely on primiparous women. All pregnant women who participated in the studies were at term gestational age and mostly had pregnancies with routine risk (Supplementary material C).

All studies were conducted in South America, specifically in Brazil.[18-29] Six of them were in the Northeast region[20,23,26,27-29] and six in the Southeast.[18,19,21,22,24,25] Different physical therapy interventions were identified. Three studies[18,24,28] used the Swiss Ball, with one of them using it to assist kinesiotherapy involving pelvic biomechanics.[28] Another study[24] performed exercises on the Swiss Ball, combined with sequential application of lumbosacral massage and hot baths. The third study[18] solely used the Swiss Ball as a physical therapy tool. One study[29] utilized the Peanut Ball as a physical therapy resource to aid in pelvic opening in various positions during the first and second stages of labor (Supplementary material C).

One study[23] conducted breathing exercises during the first stage of labor, employing a sequence of respiratory techniques (diaphragmatic, sigh, and timed expiration) at the peak of contractions. Two studies[20,27] provided physical therapy assistance during the second stage of labor, utilizing respiratory techniques for the expulsion period. The first study[20] performed pursed lip respiratory exercises, while the other[27] employed vocalization techniques with low-pitched sound emission during pushing (Supplementary material C).

Additionally, two studies[22,25] used TENS. One of them[22] applied the TENS technique along with a physical therapy protocol involving ambulation associated with free alternation of maternal postures and thermotherapy with a shower bath. The other study[25] used TENS alone for 35 min (Supplementary material C).

Physical therapy assistance also included guidance on body mobility associated with pelvic exercises and perineal relaxation.[19] Only one study[21] evaluated manual therapy techniques using massage in the lumbar region during uterine contractions. Lastly, one study[26] evaluated physical therapy assistance through a protocol consisting of breathing exercises, myofascial release, stretching, kinetic functional exercises, and massage (Supplementary material C).

In terms of the timing of physical therapy interventions, most of them[19,22,23,24,28,29] conducted the physical therapy techniques throughout the active phase of labor until complete cervical dilation. Four of them[22,24,28,29] continued physical therapy assistance until delivery. Another four studies[18,21,25,26] implemented the physical therapy protocol during the active phase of labor, but only in the initial phase, with durations of 30 min[21,25] and 45 min[26] from the onset of labor. One study[18] did not explicitly state the duration of the protocol execution time. Two studies[20,27] performed physical therapy interventions only during the second stage of labor, which includes the expulsion period (Supplementary material C).

Only 2 studies evaluated the dosage of physical therapy interventions.[28,29] Based on these studies, the average duration of kinesiotherapy required to achieve clinically significant results is two hours and 52 min,[28] while the average time for Peanut Ball use is 57 min.[29] The remaining studies[18-27] did not provide information on the duration of use of the physical therapy resource for research purposes or did not evaluate the dose-effect relationship.

Supplementary material D summarizes the risk of bias for all outcomes of the 12 articles included in the meta-analysis. The risk of bias varied among the studies, with most falling into the low and moderate risk categories. Only one study was at high risk of bias, and it only appears in the pain meta-analysis.

Maternal outcomes

Spontaneous vaginal delivery

Nine studies[18,20-25,27-29] assessed the prevalence of vaginal delivery, finding a 10% increased in risk ratio (RR) in favor of physical therapy assistance during labor compared to usual care (RR: 1.10, 95% confidence interval (CI) 1.04, 1.17; 9 studies, 694 women; random-effect: I^2 2%; T^2 0.00; $p = 0.42$; Fig. 1), findings based on high certainty of evidence (Table 1).

Caesarean delivery

There was a 48% reduction in the risk of cesarean section with physical therapy assistance during labor compared to usual care (RR: 0.52, 95% CI 0.35, 0.76; 9 studies,[8,20-25,27-29] 694 women; random-effect: I^2 0%; T^2 0.00; $p = 0.65$, Fig. 1), findings based on high certainty of evidence (Table 1).

Duration of the first period of labor (min)

Physical therapy assistance led to a reduction of 99.01 min (1 hour and 39 min) in the duration of the first stage of labor compared to usual care, based on seven clinical trials[19,21-24,28,29] (MD: −99.01 min, 95% CI −153.35, −44.66; 7 studies, 746 women; random-effect: I^2 88%; T^2 4546.40; $p < 0.00001$, Fig. 1), findings with a moderate certainty of evidence (Table 1).

Length of the second period of labor (min)

Six studies[20,22,24,27-29] evaluated the duration of the second stage of labor and found a reduction of 11.29 min for physical therapy assistance compared to usual care (MD: −11.29 min, 95% CI −18.94, −3.64; 6 studies, 562 women; random-effect: I^2 53%; T^2 45.01; $p = 0.06$, Fig. 2), findings based on moderate certainty of evidence (Table 1).

Pain intensity (VAS)

Seven clinical trials[21,23-26,28,29] evaluated pain intensity in the first stage of labor, all using the 0–10 Visual Analog Scale (VAS). Data from these studies showed a difference in pain intensity reduction with physical therapy assistance compared to usual care (MD: −1.46 points, 95% CI −2.52, −0.41; 7 studies, 658 women; random-effect: I^2 100%; T^2 1.90; $p < 0.00001$, Fig. 2), findings based on low certainty of evidence (Table 1).

One study[20] was not included in the meta-analysis because it evaluated pain during the second stage of labor.

The study that used kinesiotherapy involving pelvic biomechanics[28] assessed pain at three different time points: 30, 60, and 90 min after randomization. There was a reduction in pain intensity on the VAS in favor of physical therapy assistance: MD: −2.66 (95% CI −3.03, −2.29) at 30 min, −2.10 (95% CI −2.42, −1.78) at 60 min, and −1.96 (95% CI −2.30, −1.62) at 90 min.

Another study[24] also assessed pain intensity at three different time points using a series of different physical therapy interventions based on the progression of uterine dilation: Swiss Ball (4–5 cm dilation); lumbosacral massage (5–6 cm dilation); and thermotherapy with a shower bath (>7 cm dilation). The findings indicated a reduction in pain intensity at all three time points in favor of physical therapy assistance: −2.4 (95% CI −3.4, −1.5) on the VAS at 4–5 cm, −1.4 (95% CI −2.5, −0.4) at 5–6 cm, and −1.7 (95% CI −2.9, −0.5) at greater than 7 cm of uterine dilation.

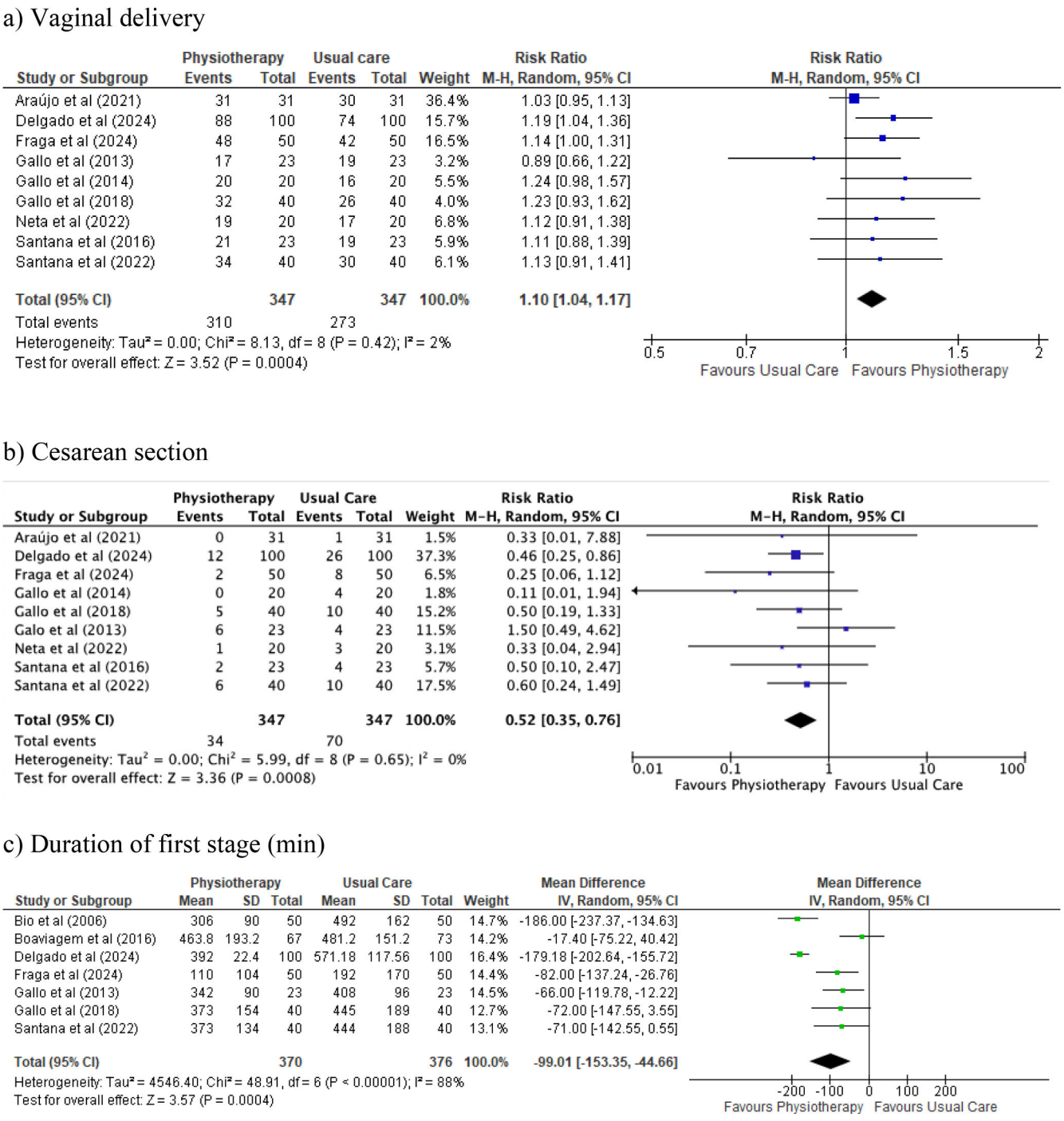


Fig. 1. Forest plot of Physical Therapy Assistance versus Usual Care for woman in labor for the outcomes: a) vaginal delivery, b) cesarean section and c) duration of first stage of delivery in minutes.

Perineal laceration (third or fourth degree)

Physical therapy assistance during labor reduced the risk of third and fourth-degree perineal laceration by 51% when compared to usual care (RR: 0.49, 95% CI 0.25, 0.96; 4 studies,[20,27-29] 400 women; random-effect: I^2 0%; T^2 0.00; $p = 0.70$, Fig. 2), based on moderate certainty of evidence (Table 1).

Oxytocin use (after randomization)

Four studies[22,24,28,29] assessed the use of oxytocin and found no difference between physical therapy assistance compared to usual care (RR: 1.01, 95% CI 0.79, 1.28; 4 studies, 460 women; random-effect: I^2 47%; T^2 0.03; $p = 0.13$, Fig. 3).

Epidural analgesia use (after randomization)

Physical therapy assistance during labor, when compared to usual care, reduced the risk of needing epidural analgesia by 10%, based on two clinical trials[19,22] (RR: 0.90, 95% CI 0.83, 0.99; 2 studies, 180 women; random-effect: I^2 0%; T^2 0.00; $p = 0.44$, Fig. 3).

In comparison to standard care, there was a delay in the use of pharmacological pain relief during labor when physical therapy assistance was provided. One study assessed physical therapy assistance with

Table 1
Assessment of the certainty of evidence using GRADE for maternal and neonatal outcomes.

Physical therapeutic assistance compared to usual care of the service for labor					
Patient or population: Women in labor					
Setting: Maternity					
Intervention: Physical therapy assistance					
Comparison: Usual care of the service					
Outcome Nº of participants (studies)	Relative effect (95% CI)	**Anticipated absolute effects (95% CI)**			Certainty
				Difference	
Spontaneous vaginal delivery Nº of participants: 694 (9 RCTs)	**RR 1.10** (1.04, 1.17)	78.7%	**86.5%** (81.8, 92)	**7.9% more** (3.1 more to 13.4 more)	⨁⨁⨁⨁ High
Caesarean delivery Nº of participants: 694 (9 RCTs)	**RR 0.52** (0.35, 0.76)	20.2%	**10.5%** (7.1, 15.3)	**9.7% fewer** (13.1 fewer to 4.8 fewer)	⨁⨁⨁⨁ High
Duration of the first period of labor (min) Nº of participants: 746 (7 RCTs)	–		–	MD **99.01 lower** (153.35 lower to 44.66 lower)	⨁⨁⨁◯ Moderate[a]
Duration of the second period of labor (min) Nº of participants: 562 (6 RCTs)	–		–	MD **11.29 lower** (18.94 lower to 3.64 lower)	⨁⨁⨁◯ Moderate[b]
Perineal laceration (third or fourth-degree) Nº of participants: 300 (4 RCTs)	**RR 0.49** (0.25, 0.96)	20.0%	**9.8%** (5.0, 19.2)	**10.2% fewer** (15 fewer to 0.8 fewer)	⨁⨁⨁◯ Moderate[c]
Pain intensity (VAS) Nº of participants: 658 (7 RCTs)	–		–	MD **1.46 lower** (2.52 lower to 0.41 lower)	⨁⨁◯◯ Low[c,d]
Apgar Score (less than five at seven minute) Nº of participants: 240 (2 RCTs)	**RR 0.68** (0.20, 2.37)	5.0%	**3.4%** (1.0, 11.9)	**1.6% fewer** (4 fewer to 6.9 more)	⨁⨁◯◯ Low[c,f]

*The risk in the intervention group (and its 95% CI) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).
CI, confidence interval; MD, mean difference; RR, risk ratio.
GRADE Working Group grades of evidence.
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.
Explanations.
a. There was high inconsistency (I2= 88%; $p = 0.00001$).
b. There was high inconsistency (I2= 53%; $p = 0.06$).
c. Wide confidence intervals.
d. There was high inconsistency (I2= 100%; $p = 0.00001$).
e. Insufficient number of subjects to evaluate the outcome studied.
f. Small number of studies.

a combination of therapeutic techniques, including the Swiss Ball, lumbosacral massage, and thermotherapy with a shower bath.[24] The study evaluated the timing of pharmacological pain relief use based on uterine dilation and found a difference of 1.9 cm (95% CI 1.5, 2.4) in favor of physical therapy assistance.

Another study[25] assessed physical therapy assistance with TENS and found a difference in the delayed use of pharmacological pain relief, with an average delay of 5.1 h (95% CI 4.1, 5.9) in favor of physical therapy assistance.

Maternal anxiety (STAI)

Two clinical trials[20,28] assessed the outcome of maternal anxiety using the State-Trait Anxiety Inventory (STAI) adapted for labor. There was a reduction in maternal anxiety during labor in favor of physical therapy assistance when compared to usual care (MD: −7.65 points on the STAI, 95% CI −11.27, −4.03; 2 studies, 232 women; random-effect: I^2 88%; T^2 5.99; $p = 0.005$, Fig. 3).

Maternal fatigue (MCFQ)

Four studies[20,23,28,29] assessed maternal fatigue during labor. Three of them[20,28,29] were included in the meta-analysis and used the Maternal Perception of Childbirth Fatigue Questionnaire (MCFQ), while one study[23] was excluded because it assessed maternal fatigue using the Modified Borg Scale.

There was no difference in the reduction of maternal fatigue with physical therapy assistance when compared to usual care (MD: −7.67 points on the MCFQ, 95% CI −21.01, 5.67; 3 studies, 362 women; random-effect: I^2 100%; T^2 138.08; $p < 0.00001$, Fig. 3). Additionally, there was no difference between the groups in the study[23] that assessed maternal fatigue using the Modified Borg Scale (MD: 0.5, 95% CI −1.4, 2.5).

Maternal satisfaction with the childbirth experience (VAS)

There was no difference in maternal satisfaction with the childbirth experience between the groups as assessed with the VAS (MD: 0.28 points, 95% CI −0.58, 1.09; 4 studies,[20,23,28,29] 512 women; random-effect: I^2 96%; T^2 0.64; $p < 0.00001$, Fig. 3).

Instrumental delivery

There was no difference in the need for instrumental delivery

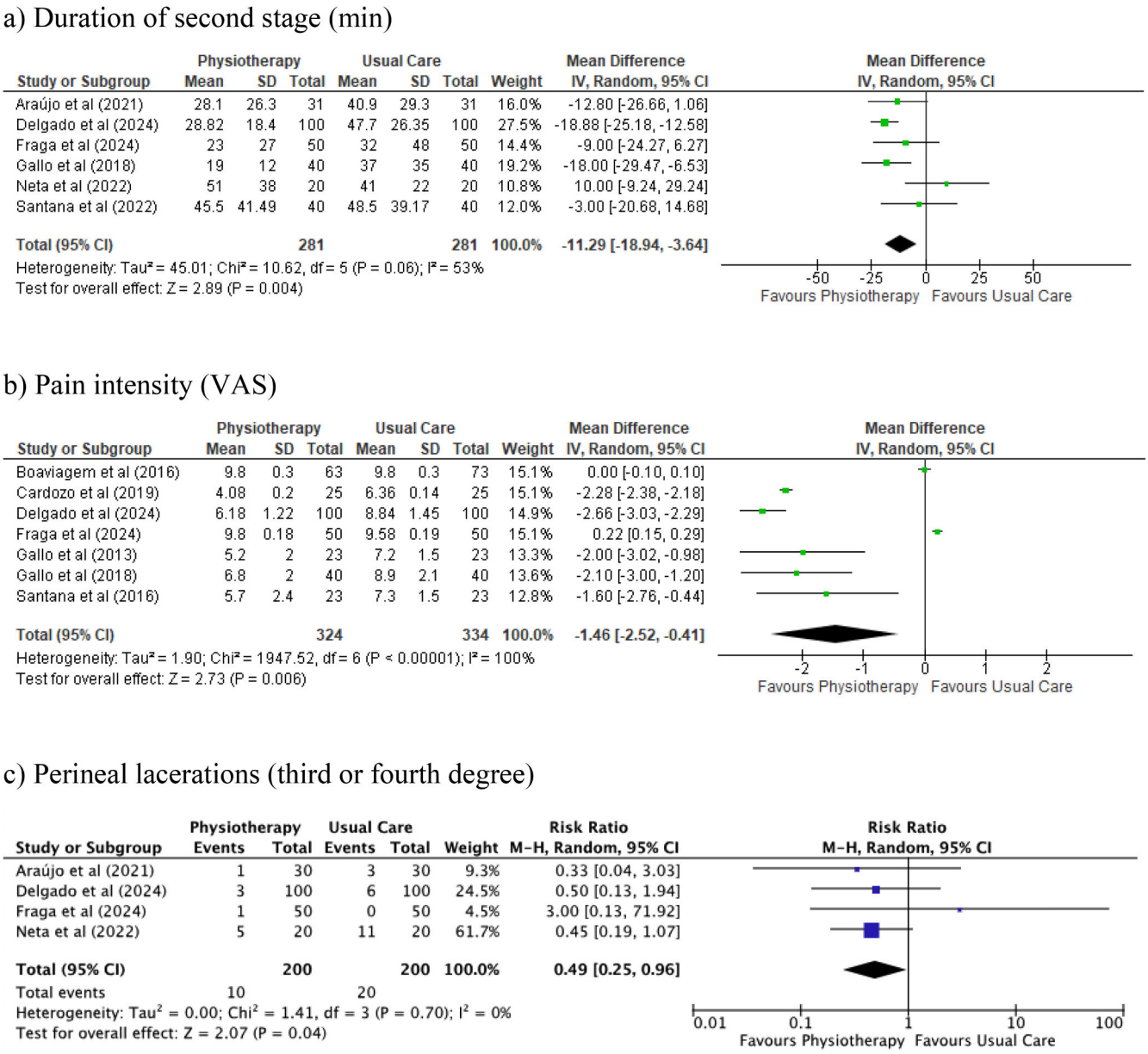


Fig. 2. Forest plot of Physical Therapy Assistance versus Usual Care for woman in labor for the outcomes: a) duration of second stage of delivery in minutes, b) pain intensity, and c) perineal lacerations (third or fourth degree).

between the groups (RR: 0.48, 95% CI 0.16, 1.47; 3 studies,[20,24,28] 342 women; random-effect: I^2 0%; T^2 0.00; $p = 0.55$, Fig. 4).

Episiotomy

No difference was found in the episiotomy rate between the groups (RR: 0.55, 95% CI 0.13, 2.34; 3 studies,[20,24,28] 2342 women; random-effect: I^2 41%; T^2 0.82; $p = 0.18$, Fig. 4).

Neonatal outcomes

Apgar score (less than seven at five minute)

There was no difference in Apgar score between the groups (RR: 0.68, 95% CI 0.20, 2.37; 2 studies,[18,28] 240 women; random-effect: I^2 0%; T^2 0.00; $p = 0.59$, Fig. 4), based on low certainty of evidence (Table 1).

Admission to neonatal intensive care unit

There was no difference in admission to the neonatal intensive care unit between physical therapy assistance during labor and usual care (RR: 0.50, 95% CI 0.09, 2.68; 2 studies,[22,28] 280 women; random-effect: I^2 0%; T^2 0.00; $p = 1.00$, Fig. 4).

Delivery room resuscitation

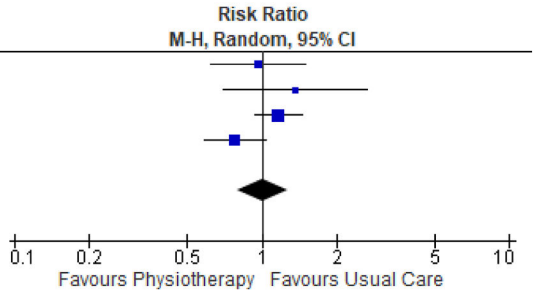
There was no difference in the need for neonatal resuscitation between the groups (RR: 0.50, 95% CI 0.09, 2.67; 1 study,[28] 200 women; random-effect, Fig. 4).

None of the included studies reported on low umbilical cord blood pH (arterial lower than 7.2 and venous lower than 7.3) and fetal heart rate variation.

a) Oxytocin use (after randomization)

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Delgado et al (2024)	28	100	29	100	19.5%	0.97 [0.62, 1.50]
Fraga et al (2024)	15	50	11	50	10.4%	1.36 [0.70, 2.67]
Gallo et al (2018)	35	40	30	40	38.8%	1.17 [0.94, 1.44]
Santana et al (2022)	25	40	32	40	31.3%	0.78 [0.59, 1.04]
Total (95% CI)		**230**		**230**	**100.0%**	**1.01 [0.79, 1.28]**
Total events	103		102			

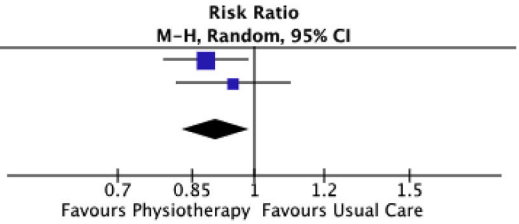
Heterogeneity: Tau² = 0.03; Chi² = 5.66, df = 3 (P = 0.13); I² = 47%
Test for overall effect: Z = 0.07 (P = 0.95)



b) Epidural analgesia use (after randomization)

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Bio et al (2006)	44	50	50	50	64.7%	0.88 [0.79, 0.98]
Santana et al (2022)	35	40	37	40	35.3%	0.95 [0.82, 1.10]
Total (95% CI)		**90**		**90**	**100.0%**	**0.90 [0.83, 0.99]**
Total events	79		87			

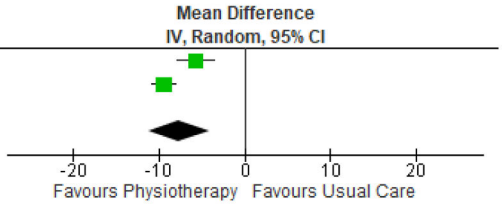
Heterogeneity: Tau² = 0.00; Chi² = 0.60, df = 1 (P = 0.44); I² = 0%
Test for overall effect: Z = 2.28 (P = 0.02)



c) Maternal anxiety (STAI)

Study or Subgroup	Physiotherapy Mean	SD	Total	Usual Care Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Araújo et al (2021)	44.79	4.96	31	50.5	3.48	31	47.6%	-5.71 [-7.84, -3.58]
Delgado et al (2024)	43.43	5.23	100	52.84	5.03	100	52.4%	-9.41 [-10.83, -7.99]
Total (95% CI)			**131**			**131**	**100.0%**	**-7.65 [-11.27, -4.03]**

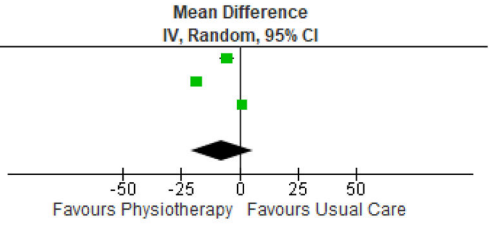
Heterogeneity: Tau² = 5.99; Chi² = 8.00, df = 1 (P = 0.005); I² = 88%
Test for overall effect: Z = 4.14 (P < 0.0001)



d) Maternal fatigue (MCFQ)

Study or Subgroup	Physiotherapy Mean	SD	Total	Usual Care Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Araújo et al (2021)	33.5	4.13	31	39	6.38	31	33.1%	-5.50 [-8.18, -2.82]
Delgado et al (2024)	36.76	6.76	100	55.4	6.43	100	33.3%	-18.64 [-20.47, -16.81]
Fraga et al (2024)	43.2	1.13	50	42.1	1.17	50	33.5%	1.10 [0.65, 1.55]
Total (95% CI)			**181**			**181**	**100.0%**	**-7.67 [-21.01, 5.67]**

Heterogeneity: Tau² = 138.08; Chi² = 437.65, df = 2 (P < 0.00001); I² = 100%
Test for overall effect: Z = 1.13 (P = 0.26)



e) Maternal satisfaction with the childbirth experience (VAS)

Study or Subgroup	Physiotherapy Mean	SD	Total	Usual Care Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Araújo et al (2021)	9	1.29	31	10	0.1	31	24.7%	-1.00 [-1.46, -0.54]
Boaviagem et al (2016)	7.9	0.3	67	7	0.4	73	26.6%	0.90 [0.78, 1.02]
Delgado et al (2024)	9.34	1.07	100	9.19	1.13	100	25.8%	0.15 [-0.16, 0.46]
Fraga et al (2024)	9.33	0.99	50	8.26	2.14	50	22.8%	1.07 [0.42, 1.72]
Total (95% CI)			**248**			**254**	**100.0%**	**0.28 [-0.54, 1.09]**

Heterogeneity: Tau² = 0.64; Chi² = 78.46, df = 3 (P < 0.00001); I² = 96%
Test for overall effect: Z = 0.67 (P = 0.51)

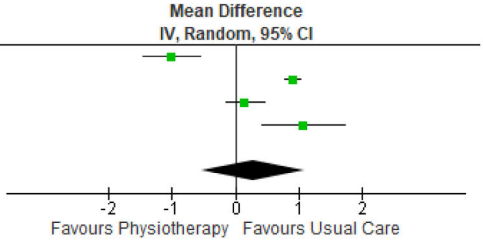


Fig. 3. Forest plot for a) oxytocin use, b) epidural analgesia use, c) maternal anxiety, d) fatigue, and e) satisfaction with the childbirth experience.

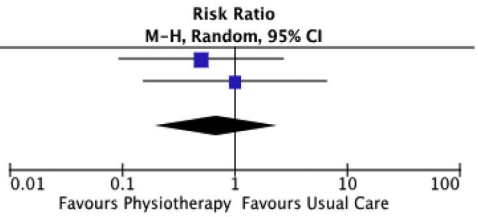
Discussion

The results of this systematic review indicate that receiving physical therapy assistance during labor, in contrast to standard care, increases the likelihood of vaginal delivery by 10% (high certainty evidence). It also reduces the risk of cesarean section by 48% (high certainty evidence); decreases the duration of the first stage of labor by 99 min and of the second stage by 11 min (moderate certainty evidence); reduces pain intensity by 1.46 on the VAS (low certainty evidence) and anxiety by 7.65 points on the STAI scale; decreases the risk of grade three and four

a) Apgar Score (less than five at seven minute)

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Delgado et al (2024)	2	100	4	100	55.2%	0.50 [0.09, 2.67]
Gallo et al (2014)	2	20	2	20	44.8%	1.00 [0.16, 6.42]
Total (95% CI)		**120**		**120**	**100.0%**	**0.68 [0.20, 2.37]**
Total events	4		6			

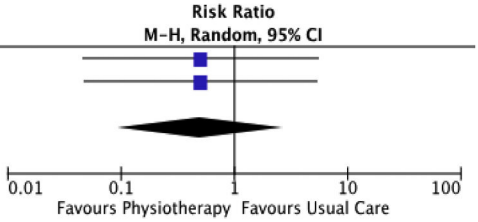
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.30$, df = 1 (P = 0.59); $I^2 = 0\%$
Test for overall effect: Z = 0.60 (P = 0.55)



b) Admission to neonatal intensive care unit

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Delgado et al (2024)	1	100	2	100	49.5%	0.50 [0.05, 5.43]
Santana et al (2022)	1	40	2	40	50.5%	0.50 [0.05, 5.30]
Total (95% CI)		**140**		**140**	**100.0%**	**0.50 [0.09, 2.68]**
Total events	2		4			

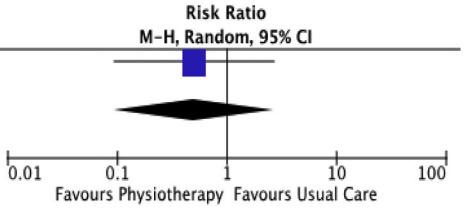
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.00$, df = 1 (P = 1.00); $I^2 = 0\%$
Test for overall effect: Z = 0.81 (P = 0.42)



c) Delivery room resuscitation

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Delgado et al (2024)	2	100	4	100	100.0%	0.50 [0.09, 2.67]
Total (95% CI)		**100**		**100**	**100.0%**	**0.50 [0.09, 2.67]**
Total events	2		4			

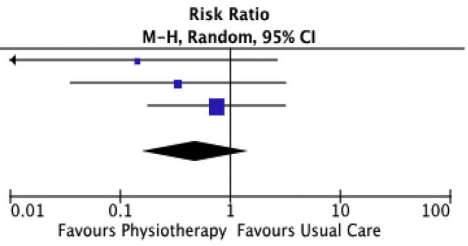
Heterogeneity: Not applicable
Test for overall effect: Z = 0.81 (P = 0.42)



d) Instrumental delivery

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Araújo et al (2021)	0	31	3	31	14.6%	0.14 [0.01, 2.66]
Delgado et al (2024)	1	100	3	100	24.7%	0.33 [0.04, 3.15]
Gallo et al (2018)	3	40	4	40	60.8%	0.75 [0.18, 3.14]
Total (95% CI)		**171**		**171**	**100.0%**	**0.48 [0.16, 1.47]**
Total events	4		10			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.18$, df = 2 (P = 0.55); $I^2 = 0\%$
Test for overall effect: Z = 1.28 (P = 0.20)



e) Episiotomy

Study or Subgroup	Physiotherapy Events	Total	Usual Care Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Araújo et al (2021)	0	31	3	31	18.1%	0.14 [0.01, 2.66]
Delgado et al (2024)	0	100	2	100	17.2%	0.20 [0.01, 4.11]
Gallo et al (2018)	24	40	23	40	64.7%	1.04 [0.72, 1.51]
Total (95% CI)		**171**		**171**	**100.0%**	**0.55 [0.13, 2.34]**
Total events	24		28			

Heterogeneity: $Tau^2 = 0.82$; $Chi^2 = 3.39$, df = 2 (P = 0.18); $I^2 = 41\%$
Test for overall effect: Z = 0.81 (P = 0.42)

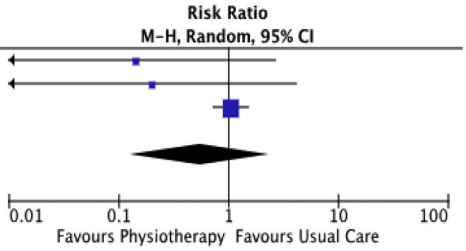


Fig. 4. Forest plots for a) Apgar Score, b) admission to neonatal intensive care unit, c) delivery room resuscitation, d) instrumental delivery, and e) episiotomy.

perineal lacerations by 51% (moderate certainty evidence) and the use of epidural analgesia by 10%. However, there is no difference in fetal outcomes (Apgar score, admission to the neonatal intensive care unit, and neonatal resuscitation) and in some maternal secondary outcomes (instrumental delivery, use of oxytocin, fatigue, and maternal satisfaction). No study evaluated umbilical cord pH and fetal heart rate variability.

The studies, conducted by physical therapists using various physical therapy interventions, were mostly randomized and blinded, enhancing confidence in the estimated effect found.[13,14] The selection of the physical therapy intervention based on the stage of labor, as well as a thorough physical therapy assessment, probably contributed to an increased frequency of vaginal deliveries and a reduced prevalence of cesarean sections.

The Cochrane Library has published a systematic review demonstrating a reduction in the duration of the first stage of labor by one hour and 22 min in the groups of women instructed to be in upright positions and walking, albeit based on evidence with low certainty.[2] Furthermore, in the second stage a reduction of six minutes in the duration of labor when the parturient was in positions like standing, crouching, using a birth stool, semi-recumbent with the birthing chair and birth cushion.[30] A reduction of one hour and nine minutes in the duration of labor was observed with continuous support,[31] based on very low and low certainty of evidence. Our results showed that physical therapy assistance reduced the duration of the first stage by one hour and 39 min and the second stage of labor by 11 min with moderate certainty of evidence.

One strong point of this systematic review is that the majority of studies included were compared to quality usual care endorsed by WHO guidelines. Notably, the aforementioned Cochrane reviews[2-31] compared a control group with women lying down, while the continuous support review includes a control group without a companion.

Concerning pain intensity, a reduction of 1.46 on the pain scale (VAS) was observed (low certainty of evidence). Pain and anxiety are maternal symptoms that tend to increase as labor progresses.[6,7,32] The results of pain intensity were inconsistent and therefore should be interpreted with caution. However, it was observed that pain continued to decrease with the progression of the use of physical therapy interventions after 30 to 90 min, ranging from −1.66 to −2.66 points on the VAS,[28] and with the use of interventions selected based on uterine dilation (4–5, 5–6, and 7 cm of dilation), ranging from −1.4 to −2.4 points on the VAS.[24]

Maternal anxiety decreased by 7.65 points on the STAI in favor of physical therapy assistance which is considered a clinically relevant result. The minimum clinically important difference for benefits from the STAI questionnaire adapted for labor is a reduction of 5 points.[33] We attribute this finding to the protocols applied by a physical therapist who guided the use of physical therapy resources throughout labor. However, we reiterate that the use of these resources were used respecting the choices and preferences of the women, and the principles of evidence-based care during childbirth.[1,2,5] These factors may have contributed also to the reduction in maternal anxiety.

Physical therapy assistance was also found to reduce the risk of third and fourth-degree lacerations by 51%. These types of lacerations have a prevalence ranging from 1 to 11% of births[34] and are associated with lithotomy positions[2] and poor quality labor assistance.[30] As a consequence, there is a risk of the woman developing urinary and fecal incontinence and increasing perineal pain intensity postpartum.[35,36] The reduction of this type of laceration with physical therapy assistance contributes to enhancing the woman's experience with labor and reduces the risk of pelvic floor dysfunctions in the future.[34]

There was also a 10% reduction in the risk of requiring an epidural with physical therapy assistance, and its use was postponed.[24,25] Epidural in labor is a resource that can be used to relieve pain and involves injecting a local anesthetic into the lower back, near pain-transmitting nerves.[1,37] However, some women are afraid of receiving an epidural injection due to possible pain and complications.[38] In this sense, using resources to postpone or avoid its use is important for women to have a positive labor experience.[1,37] The use of diverse physical therapy resources aimed at reducing pain intensity contributed to the diminished and deferred use of epidurals during labor.

Furthermore, the use of these interventions was showed to be safe as there was no difference in the primary neonatal outcomes (Apgar Score, admission to neonatal intensive unit, and delivery room resuscitation). No differences were observed in some maternal secondary outcomes as instrumental delivery, episiotomy, oxytocin use, maternal fatigue, and maternal satisfaction with the childbirth experience. While an expectation existed that physical therapy interventions would impact these outcomes because they care for and respect the physiological process of childbirth, the findings did not substantiate this assumption.

Low-certainty evidence in the literature suggests that upright positions and continuous support during labor yield improvements in neonatal outcomes.[2,31] It was expected that physical therapy assistance during labor would positively influence these neonatal outcomes, given that the physical therapy interventions investigated in the studies included in the meta-analysis are meant to facilitate the acquisition of vertical positioning by the parturients. However, this result was not found in this review, likely attributable to the limited number of studies assessing these outcomes. It is worth noting that this evidence is based on only three studies,[18,22,28] and therefore the estimation of the effects found may change with new larger studies.

There was also no difference in the episiotomy rate, which may be justified by the fact that most studies included in the meta-analysis were conducted in hospitals that do not routinely perform this procedure.[20,24,28] Additionally, there was no difference in instrumental delivery, oxytocin use, maternal fatigue, and maternal satisfaction with the childbirth experience. Nonetheless, these results may be attributed to some limitations, such as physical therapy assistance being provided only at certain moments during labor.[20,22,23] In addition the only two studies that evaluated these outcomes[20,23] investigated the use of only respiratory exercises, without associating any other physical therapy resources such as other exercised, changing positions, and pelvic movements. This may also explain the lack of statistical difference in the aforementioned outcomes.

The results of this meta-analyses highlight the clinical relevance of physical therapy care in maternity hospitals. These results are extremely important both for the clinical practice of physical therapists and for future research. The use of physical therapy interventions applied by a physical therapist reduces the duration of labor, the use of pharmacological analgesia, the risk of perineal lacerations, and the need for a cesarean section and increases the chance of vaginal delivery. These findings probably have a financial impact reducing costs and overcrowding in public hospitals, which should be specifically investigated in the future,

The development of this manuscript followed the latest Cochrane recommendations for systematic reviews and interventions,[13] aiming to minimize biases during the review process. It involved searching eight major international databases, although there is still a possibility that some studies outside of these databases were not included. It is worth mentioning that, to our knowledge, this is the first registered systematic review on the effectiveness of physical therapy assistance during labor. With the favorable outcomes found, this review supports the importance of the physical therapist's work in delivery rooms. Additionally, considering that all studies were conducted in Brazil, it is recommended to conduct new international clinical trials in other obstetric practice settings so that obstetric physical therapy assistance gains worldwide recognition, given the clinically relevant results.

Conclusion

Physical therapy assistance, compared to usual care, increased the likelihood of vaginal delivery and reduced the risk of cesarean section. It also reduced the duration of the first and second stages of labor and the

incidence of third and fourth-degree perineal laceration, based on moderate-certainty evidence. It also reduced the intensity of maternal pain and anxiety, as well as the use of epidural analgesia. However, there was no difference observed in fetal outcomes (Apgar score, admission to the neonatal intensive care unit, and neonatal resuscitation), and in some maternal secondary outcomes (instrumental delivery, oxytocin use, maternal fatigue, and maternal satisfaction). No study evaluated umbilical cord pH and fetal heart rate variability.

Declaration of competing interest

The authors declare no competing interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjpt.2024.101169.

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