Non-pharmacological measures for pain relief in childbirth: a systematic review

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Abstract

Objectives: to evaluate the effectiveness of non-pharmacological measures used by obstetric nurses to relieve pain during labor.

Methods: this is a systematic review of the databases carried out in the United States National Library of Medicine, Cumulative Index to Nursing and Allied Heal Literature, Scopus, Web of Science and Latin American and Caribbean Literature in Health Sciences, the descriptors were: labor pain, labor, obstetric and obstetric nursing. The search and selection followed the PRISMA recommendations, were carried out from August to September 2020, and randomized clinical trials were eligible and analyzed using descriptive statistics.

Results: 17 clinical trials made up the final sample, which highlight the use of non-pharmacological measures with diversified benefits for labor, namely: thermal therapy (20%); massage/sacral massage (15%); Swiss ball exercises (15%); acupressure (15%); auriculotherapy (10%); music therapy (10%); aromatherapy (5%); acupuncture (5%); and dance (5%).

Conclusion: the non-pharmacological measures found in this review are efficient to promote pain reduction during labor, associated with a decrease in the use of drug interventions.

Key words *Labor pain, Labor obstetric, Obstetric nursing, Systematic review*

Introduction

The pain caused by labor is associated with the physiological process of uterine contractions and dilation and factors such as stress and tension, can intensify the moment, making it even more painful. Moreover, cultural aspects, family history, anxiety, fear, and the experiences of previous childbirths and pregnancies can generate concern in pregnant women and their families.[1-4]

With the publication on the classification of vaginal birth care practices by the World Health Organization (WHO) in 1996,[5] the importance of the insertion of good practices for childbirth was emphasized, such as freedom of position, ambulation, showering, immersion, massage, and the use of a ball, which was then implemented by health professionals working in obstetric care. Measures such as enema, trichotomy, episiotomy, among others, are no longer recommended by the competente officials because they have been shown to be ineffective due to scientific evidence that points them as harmful practices in labor.[1,6,7]

To ensure a qualified assistance during labor, WHO has recommended pain relief measures as a way to provide a satisfactory birth experience. Thus, it is up to the obstetric nurse and other nursing professionals who work in normal childbirth centers to encourage vaginal birth with the fewest possible interventions, being responsible in offering care based on strategies capable of reducing stress factors that influence pain.[8,9]

The practice of an obstetric nursing includes care that aims to mitigate the pain of childbirth without interfering in the natural process of the birth; therefore, the countries that have the best indicators in maternal and child care are similar because of the qualified performance of this professional category. Thus, this care is linked to the increase in the number of vaginal births, reduction of unnecessary interventions, complications, and maternal-infant mortality, which result in satisfied mothers with their childbirths.[8,10]

Thus, the nursing professionals' participation, especially obstetric nurses, according to WHO/Ministry of Health (MOH) guidelines, promoting the qualification of childbirth care and reduction of interventionist practices.[9]

Hence, the present study has the following guiding question: what are the non-pharmacological measures used by obstetric nurses that are effective for pain relief during labor? And it aims to evaluate the effectiveness of non-pharmacological measures used by obstetric nurses for pain relief during labor.

Methods

This is a systematic review (SR),[10] elaborated on the base of the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA)[11] and with a review protocol registered in the International Prospective Register of Ongoing Systematic Reviews (PROSPERO) database, identification number CRD 42020205945, on the effectiveness of non-pharmacological measures for pain relief during labor, in which the data were analyzed using descriptive statistics.

The PICO strategy was used to elaborate the question: P (Population) - parturients; I (Intervention) - non-pharmacological measures; C (Control) - Placebo; O (outcome) - pain relief. It should be noted that placebo refers to the approach used for the control group that is presented in Table 1. The review question was: what are the effective non-pharmacological measures used by obstetric nurses for pain relief during labor?

The survey of the articles in the databases took place throughout the months of August and September, 2020. The search and selection were carried out from these databases: United States National Library of Medicine (PubMed), Cumulative Index to Nursing and Allied Heal Literature (CINAHL), SCOPUS, Web of Science, and Latin American and Caribbean Literature on Health Sciences (LILACS), carried out by peer reviewers independently with access through the virtual library of the *Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES), (Periodical Portal of the Coordination for the Improvement of Higher Level Personnel) via the *Comunidade Acadêmica Federada* (CAFe) (Federated Academic Community) protocol.

Before starting the searches in the referred databases, descriptors represented the study object of the research and would retrieve the largest number of relevant articles and select through the Medical Subject Headings (MeSH), for the international databases, and in the *Descritores em Ciências da Saúde* (DeCS), (Health Sciences Descriptors), for Latin American database. The descriptors defined: labor pain, labor, and nursing, obstetric.

The search strategies were adapted according to the specificities of each database, namely: PubMed: ((Pain, labor OR pains, labor) AND (obstetric labor) AND (nursing, obstetric)); CINAHL: pain, labor OR (pains, labor) AND obstetric labor AND nursing, obstetric; Scopus: ((pain, labor) OR (pains, labor) AND (obstetric labor) AND (nursing, obstetric)); Web of Science: TS=(pain, labor OR pains, labor) AND TS=(obstetric labor) AND TS=(nursing, obstetric) and LILACS: labor pain AND labor AND labor AND obstetric nursing.

The eligibility criteria were: randomized clinical trials published in full, available electronically via CAFe protocol and addressing the effectiveness of non-pharmacological measures used by obstetric nurses, in combination or not, to relieve the pain during labor in de parturients with gestational age superior to 37 weeks. Studies that did not answer the research question were excluded, as well as studies that combined pharmacological

Table 1

Characterization of the randomized clinical trials as to year, country, sample, gestational age, and methodological quality assessment according to Jadad's scale.[13] Natal, RN, Brazil, 2020 (N=17).

Code	Author/ Year*/ Country	Sample	Measure		Intervention Data
			Experiment	**Control**	
E1	Chang et al.,[14] 2006*/ China	60 primiparous women	Massage	Standard nursing care	The measures were applied in three phases, at dilations of 3 to 4 cm, 5 to 7 cm and 8 to 10 cm.
E2	Taghinejad et al.,[15] 2010*/ Iran	101 primiparous women	Massage / Music therapy	Own group	When the cervix was dilated up to 3 to 4 cm, women in the massage therapy group were asked to close their eyes and breathe deeply. Women in music therapy group were asked to listen to soft traditional music, using headphones for 30 min, starting at the beginning of the active phase of labor.
E3	Fahami et al.,[16] 2011*/ Iran	64 nulliparous women	Thermal therapy	Standard nursing care	A thermal bag was applied in the first and second phase of labor, considering a minimum of 80 min on the first occasion, where the lumbar region was targeted, and at least 5 min on the second, which focused on the perineal region. .
E4	Barbieri et al.,[17] 2013*/ Brazil	15 **	Hot bath/ Perineal exercise / Combined intervention	Own group	The bath was performed at a temperature of 37° C, where a jet of water was directed to the sacral region for 30 minutes. Regarding perineal exercise, a Swiss ball was used, and the parturient woman sat with her legs flexed at 90°, performing propulsion and rotation movements for 30 minutes. In the group in which the measures were combined, the same steps were followed as when they were applied alone.
E5	Abdolahian et al.,[18] 2014*/ Iran	60 primiparous women	Dance	Standard nursing care	In the dance work group, women were instructed to stand with pelvic tilt and sway their hips back and forth or in a circle while their partner-who was instructed to stand in front of them, massaged their back and sacrum for at least 30 minutes. In the control group, the participants were allowed to choose their own position and receive the usual care during physiological labor, without ambulation or any intervention. In both groups the same environmental conditions were offered.
E6	Calik e Komurcu[19] 2014*/Turkey	100 primiparous women	Acupressure SP6	Standard nursing care	Acupressure SP6 was applied by placing the thumbs on both legs at the same time from the beginning to the end of the contraction, with the average pressure around 3-5 kg, being 35 times during uterine contractions, 15 times at 2-3 cm of cervical dilation, and 10 times at 5-6 cm and 8-9 cm of cervical dilation.
E7	Namazi et al.,[20] 2014*/ Iran	126 primiparous women	Aromatherapy	Placebo	In the aromatherapy group, gauze squares were soaked in 4 mL of C. aurantium distilled water. In the control group, gauze squares were soaked in 4 mL of saline and attached to necklaces on the participants.
E8	Akbarzadeh et al.,[21] 2014*/Iran	150 primiparous and multiparous women	Acupressure at point BL32	Standard nursing care	In the control (support)-group the midwife accompanies the woman until the end of the second stage of labor. In the acupressure group the BL32 point was located and pressed.
E9	Asadi et al.,[22] 2015*/ Iran	63 nulliparous women	Acupuncture	Placebo	At the beginning of the active phase acupuncture was performed for the study group and sham acupuncture for the control group.
E10	Taavoni et al.,[23] 2016*/ Iran	90 primiparous women	Delivery ball/ Thermal therapy	No intervention	At the first stage of the active phase with dilation between 4 to 8 cm were allocated to two intervention (thermal therapy and delivery ball) and control groups, while pregnant women in the latent phase were observed until the beginning of the active phase. .

E11	Mafetoni and Shimo[24] 2016*/ Brazil	156 nulliparous and multiparous women	Acupressure in SP6	Placebo / No intervention	The parturients in the BP6 acupressure group received deep pressure (± 5kg), with sudden and rapid decompression with the thumb, without causing discomfort. In the touch group they received a superficial, very low intensity touch (± 100g). In both groups the contact was on the bilateral BP6 point, during contractions, in a single 20-minute period. The control group received only routine care.
E12	Abedi *et al.*,[25] 2017*/ Iran	80 nulliparous women	Auriculotherapy	Standard nursing care	Specific ear points were stimulated between intervals of uterine contractions when the uterus reaches dilations of 4, 6 and 8 cm.
E13	Karkal *et al.*,[26] 2017*/ India	60 primiparous women	Music therapy	No intervention	Music therapy was applied with primigravidae during the active phase of the first stage of labor and pain was measured by applying the visual analog pain scale.
E14	Yazdkhasti *et al.*,[27] 2018*/ Iran	120 primiparous women	Heat and cold therapies	Standard nursing care	Heat thermotherapy was applied to the lumbar and abdominal regions for at least 60 minutes during the first stage of labor, whereas in the second stage the focus was on the perineal region, in which the heated source acted for at least 4 minutes. In the intervention that used cold, an ice pack was applied for 10 minutes with half hour intervals during the first stage, and on the perineum for 5 minutes every 15 minutes during the second stage. The control group received only routine care.
E15	Valiani *et al.*,[28] 2018*/ Iran	84 primiparous women	Auriculotherapy	Standard nursing care	Auriculotherapy was applied in the course of uterine dilations for 1 minute. .
E16	Wang *et al.*,[29] 2020*/ China	110 primiparous women	Free-position delivery ball	Standard nursing care	The parturients used the free-position delivery ball, in which they could choose to perform the exercises in the standing, sitting, squatting, kneeling, or prone position.
E17	Çevik e Karaduma[30] 2020*/Turkey	60 primiparous women	Sacral massage	Standard nursing care	Women in the experimental group received a sacral region massage for 30 min. While the other women received only routine care. .

* in years ; ** Information not found; SP6: point located four fingers of the receiver above the medial malleolus (ankle); BL32: point used in acupressure, located on the second hole of the sacral bone.

and non-pharmacological methods for pain relief. There was no temporal or language delimitation, and duplicate studies were considered only once. The studies selected for the final sample were classified according to the Critical Appraisal Skills Programme (CASP) checklist.[12]

There were 2 phases to select the studies, first was the reading of titles and abstracts, which were carefully read to provide sensitivity to the guiding question and to apply the adopted inclusion and exclusion criteria. In the second step, to ensure specificity on the researched subject, the articles were fully read by two reviewers to exclude unrelevant articles to the study. The reviewers were experienced and were previously trained for the criteria defined in this study. In case of disagreement among the reviewers, a third party was invited to discuss and evaluate the study regarding to the eligibility criteria.

The randomized clinical trials selected underwent an evaluation of the methodological quality proposed by Jadad, which consists of a scale ranging from zero to five points. When the score is lower than three, it indicates low methodological quality.[13]

From the selected articles, the following variables were extracted: author, year of publication, country of origin of the study, sample of research participants, type of non-pharmacological intervention used by the obstetric nurse, and the data of the intervention.

The data collected were organized in Microsoft Excel 2016 spreadsheets, analyzed using descriptive statistics, and presented in tables and figures to compose the results and discussions of this study. Since this is a research that used public domain materials and did not involve studies with human beings, there was no need for assessment by the research ethics committee.

Results

The database search initially retrieved a total of 7,097 articles. After the selection process of the studies described in Figure 1, 17 clinical trials were obtained to compose the final sample.

Thus, when characterizing the studies that comprised this review as to year, country, research sample, non-

Figure 1

Flowchart of the article selection process. Natal, RN, Brazil, 2020.
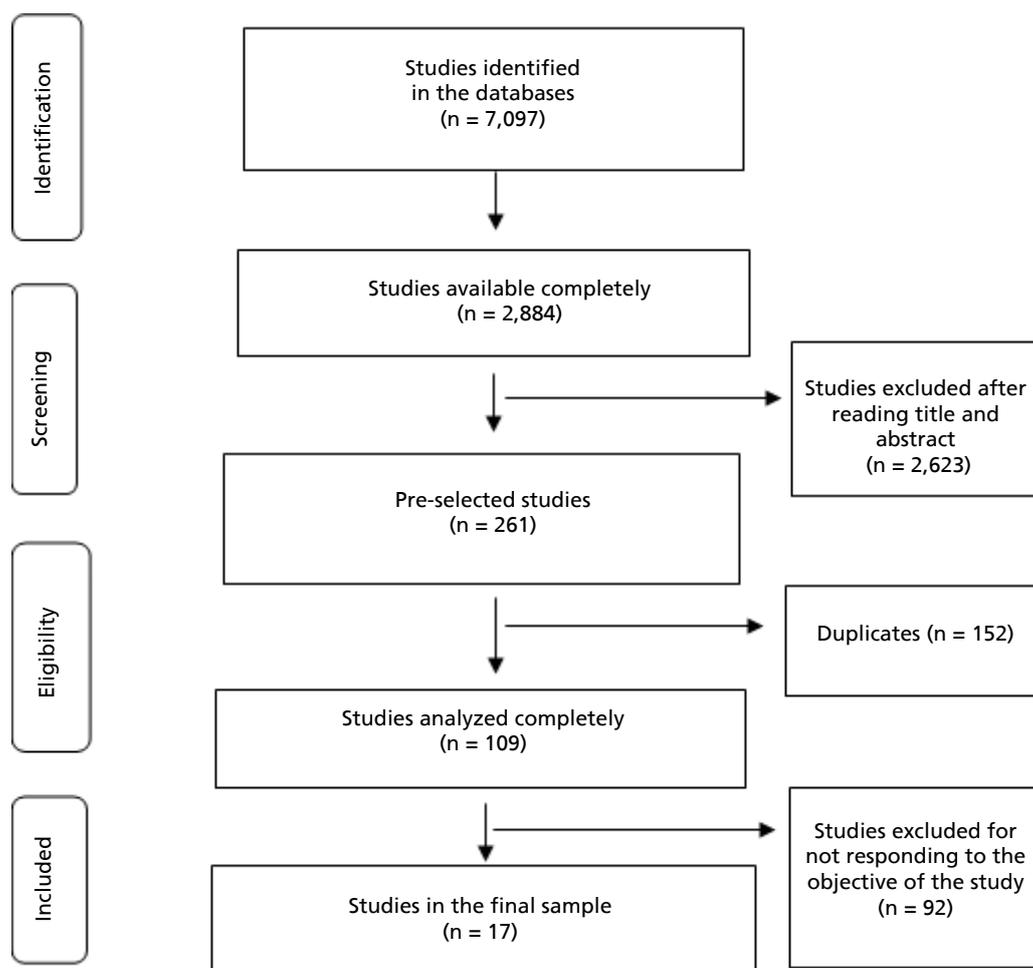
pharmacological measures (being two groups: the experiment and the control) and intervention data are presented in Table 1. It is noted the predominance of publications in 2014, as well as studies published in Iran and Turkey, with primiparous pregnant participants in labor, which remained constant from 2016 to 2020.

Regarding the evaluation of methodological quality performed by applying the Jadad scale, nine (53%) articles with score 3 stood out, followed by five articles with score 2 (29%), while two obtained score 2 (23%) and one reached score 5 (6%), regarding the final sum, it exceeded 100% due to the fact that two articles were counted twice for contemplating two or more interventions.

The main findings of the 17 (100%) studies that comprised the final sample emerged with nine non-pharmacological measures, of which four used heat therapy (20%), three used massage/sacral massage (15%), three used Swiss ball exercises (15%), three used acupressure in SP6/on point BL32 (15%), two used auriculotherapy (10%) two used music therapy (10%), one used aromatherapy (5%), one with acupuncture (5%) and

one danced (5%), indicating that the measures are positive for pain reduction and guarantee efficacy in reducing labor time, the sum of all is greater than the number of articles, because two studies addressed a combination.

In relation to the control measures, it was found that the standard nursing care, own group, placebo and no intervention, and the measures used in the control group, did not present any harm to the pregnant woman or the newborn, as well as did not interfere in any labor stage, thus being a way in comparing the two study groups.

In addition to the care with the binomial during labor, it is noteworthy that in the groups in which the standard nursing care was applied, there was a direct care practice linked to the care of the puerperal woman and the NB during the immediate postpartum period, with guidance being offered at that moment, as well as encouragement of comfort techniques, changing position, ambulation, assistance in bathing, teaching of breathing techniques, administration of medication, and among others.[16,19,21]

While in other studies that used placebo, there was only the formation of two groups, in which in one group some of

the non-pharmacological measures were applied and in the other group only routine care for labor was performed.[15,17] Whereas in other studies of the sample, placebo was used, which are substances or interventions used in controlled studies to generate comparison with another group.[20,22,24]

Discussion

The rise in publications on the subject is concentrated after the year 2000s, a fact congruent with the publication and advancement of the *Objetivos do Milênio* (Millennium Development Goals), which include improving maternal health and reducing infant mortality.[31]

The *Programa de Humanização no Pré-Natal e Nascimento* (PHPN)[32] (Humanization Program for Prenatal Care and Birth) was launched by the Ministry of Health, with the objective of improving access, coverage, and quality of prenatal care, as well as childbirth and puerperium care for pregnant women and their newborns.

Based on these milestones, the aim is to foster clinical decision-making, taking into account the patient's individuality and demonstrating care of evidence-based practice (EBP)[33] that aims to encourage the promotion of quality health services. Interest in this field has increased in recent years, following WHO recommendations to reduce medical interventions in childbirth and the encouragement of non-pharmacological measures.[5]

The production on the theme of parturition care reveal the benefits of keeping the birth process as physiological as possible, especially regarding pain relief, since some pharmacological methods with analgesic purposes, such as the use of opioids can cause numerous side effects for both the mother and the newborn, such as drowsiness and respiratory depression.[5,6]

It is also noteworthy that, among the studies that comprised this review, the most used pain assessment tool was the *Escala Visual Analógica* (Visual Analog Scale), which refers to a one-dimensional method of measuring pain intensity; in this category there is the advantage of easy and fast application and low cost. In contrast, the McGill Pain Questionnaire is a multidimensional instrument that has the prerogative of covering other aspects of pain besides intensity, such as location, affective and sensory qualities.[34]

It is worth noting that non-pharmacological measures can and should be used at different times during labor, because they are able to produce good sensations in pregnant women and relieve the pain. The application of non-pharmacological measures is observed in several places, whether within the hospital environment or not, leaving the role of adjuvant to professionals, in order to support and offer care that encourages the physiological development of labor, with the fewest possible interventions.[5,9]

It is worth emphasizing that the studies that used thermal therapies with heat or cold, which can be either a spray bath or the application of hot or cold compresses, were efficient in reducing the mean scores of pain felt by pregnant women in labor, especially in the first and second stages of vaginal delivery. However, it was noticed that this type of measure was more effective when the cervix reached five centimeters of cervical dilation and when the application occurred in the region of the perineum and sacrum.[16,23]

Regarding the use of thermal therapies, they are seen as a noninvasive, low-cost method that brings good results in labor, since the woman actively participates throughout the process, as stated by Silveira *et al.*[34] in their study that measures such as bath, water birth, soaking tub and massage are able to replace analgesia during labor and help women in labor deal with their pain complaints.[23,27]

Whereas studies conducted in countries such as China, Iran and Turkey presented massage as a non-pharmacological, safe, non-invasive, accessible and easily applicable measure.[14,15,30] Furthermore, this method is related to a significant decrease in labor pain intensity, especially in stages one and two of cervical dilation, improvement of blood flow and tissue oxygenation, in addition to promoting physical contact with the patient. Similarly, Araújo *et al.*,[35] stated in their study that this measure can increase blood flow, tissue oxygenation, and promote physical contact with the patient.

The Swiss ball, when used as a non-pharmacological measure, proposes to reduce pain during labor, and is therefore able to substantially reduce the pain felt by the mother when compared to the control groups determined by the studies in which no measure was applied. It is noteworthy that the use of this measure, in addition to being effective in reducing pain, has proven effective for relaxation, as well as being responsible for reducing anxiety in women, mainly due to their free choice of position and active participation in the birth process.[24,29,36]

Thus, the use of non-pharmacological measures such as thermal therapy, massage, and the use of the Swiss ball bring excellent results for pain relief in pregnant women in labor, as stated by Mascarenha *et al.*,[7] Araújo *et al.*,[35] and Santos *et al.*[36]

The use of thermal therapy was combined with the Swiss ball and although there were no differences in pain perception between the two when applied separately, it was possible to observe a significant reduction in pain and stress felt by pregnant women since they acted synergistically.[23,29]

Acupressure is another non-pharmacological measure capable of maintaining balance during labor, reducing pain, improving the labor process and the quality of care for the parturient, as stated by França *et al.*,[37] and capable of increasing uterine contractions. In a study conducted with patients in Iran using acupressure technique on

point BL-32, located on the second orifice of the sacral bone, it was possible to observe a decrease in pain in the intervention group, compared to the control group, which was applied only routine care.[21]

In pregnant women in whom acupressure was used in the SP-6 region, which is the point located four fingers of the receptor above the medial malleolus (ankle), being applied in pregnant women from Turkey and Brazil, it was seen that it is an effective means of pain relief, capable of shortening the duration of labor without causing harm to the mother and baby.[19] Therefore, acupressure has been shown to be more effective where there is cervical dilatation of up to eight centimeters and there is cephalic presentation.[24] Corroborating this finding, Turkmenh and Turfaneç[38] state that acupressure reduces and promotes comfort for the parturient woman.

The studies that approached auriculotherapy showed favorable results regarding the relief of pain in labor. Data showed that the levels of pain in women who used auricular therapy were lower during the active phase of vaginal delivery.[25,28] Another study that corroborates this finding also points to a significant decrease in the time of the first and second stages of labor when associated with sacral massage.[30] It is considered an efficient and low-cost measure that, in addition to reducing the painful sensation in women in labor, also reduces the time of the active phase and the rate of episiotomy in nulliparous women.[25]

The studies developed by Taghinejad et al.[15] and Karkal et al.[26] approached the use of music therapy as a low-cost strategy that contributes to the reduction of pain in pregnant women in labor, as an indirect action that promotes relaxation and reduces tension, especially in the first hours of the active phase.

Another measure presented to pregnant women during labor was music therapy together with dancing, as a low-cost measure[15] that, by means of pelvic movement from one side to the other, aims to reduce the intensity of pain and provide satisfaction to pregnant women during the active phase of labor.[14,15,18,30]

With the purpose of reducing labor pain, a hospital in Iran used aromatherapy with the essence C. aurantium, through environmental diffusion, with reports of satisfaction of the pregnant women in the sense of promoting tranquility, since its action mobilizes the limbic system.[20] Cruz et al.,[39] considered aromatherapy as a low cost, non-invasive, easy to apply and without side effects for the mother and newborn.

Although acupuncture on LI-4, a point on the hand between the base of the thumb and the index finger, and SP-6, which is located above the tip of the medial malleolus on the posterior border of the medial aspect of the tibia, is a practice used as a non-pharmacological measure to relieve pain during labor, the only sample of this study on the subject did not show changes in the reduction of pain levels in the intervention group when compared to the control group, but the method was shown to be effective in reducing the labor time.[22]

Finally, the limitations of this study are due to the fact that sensations and perceptions about pain are extremely subjective and vary according to each individual, which relativizes the findings of increased or decreased pain in pregnant women when comparing labor pain in at least two different women; however, despite the facts mentioned, the effects recorded and presented in this study are valid and of great relevance.[16,29,30]

There is still a limited number of articles on the subject, despite this, it is important to stress the lack of uniformity among the clinical trials selected, especially regarding the methodological aspects, a fact that made it difficult to combine results that were similar, which would make it possible to develop a meta-analysis.

Conclusion

It is concluded that the main measures used for pain relief were thermal therapy, massage, aromatherapy, acupressure, dance and swiss ball exercises, which proved to be effective in reducing pain during labor, presenting other benefits, such as promoting relaxation, comfort, reducing anxiety, besides being associated with lower use of medication interventions for analgesic purposes.

This research contributes to provide scientific support for evidence-based health care, supporting the practice of obstetric nursing, especially in the care of vaginal delivery, in order to guide the clinical practice of professionals, as well as to direct future scientific production about the gaps found, which are the small number of materials on the subject from the perspective of obstetric nursing.

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Authors' contribution

Azevedo IC and Martins QCS: conception and design or data analysis and interpretation. Cabral BTV, Rocha MCS, Almeida VRM, Cunha YA and Petrônio CCAD: writing of the article or relevant critical review of the intellectual content. All authors approved the final version of the article and declare no conflict of interest.

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