Non-pharmacological therapies for postpartum analgesia: a systematic review

Terapias não farmacológicas para analgesia no pós-parto: uma revisão sistemática

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ABSTRACT

BACKGROUND AND OBJECTIVES: Abdominal and pelvic pain is a prevalent condition among women in the immediate postpartum period. Non-pharmacological therapies are of great importance for the treatment of this condition since they do not cause systemic side effects, such as drowsiness, irritability, and changes in the composition of breast milk. This article aims to identify and evaluate the efficacy of non-pharmacological analgesic therapies used in the immediate puerperium in abdominal-pelvic pain.

CONTENTS: Searches were carried out in the main databases from September to October 2017 using the following descriptors "treatment" AND "pain" AND "postpartum"; "Treatment" AND "pain" AND "postpartum" AND "analgesics" AND "non-pharmacological". Controlled and randomized clinical trials published between January 2007 and August 2017, in Portuguese, English, and Spanish were included. Of the 1737 studies found in the databases, 42 were selected by the title. According to the eligibility criteria, 13 studies were included. The total sample size of the studies ranged from 21 to 266. In the intervention groups, the sample ranged from 11 to 126 women who underwent cryotherapy, transcutaneous electrical stimulation, LASER, acupuncture and ear acupressure.

CONCLUSION: Interventional practices such as transcutaneous electrical nervous stimulation and cryotherapy presented significant data relevant to the reduction of abdominal and pelvic pain. The techniques of acupuncture and ear acupressure still present inconclusive data. Despite the relief of perineal pain, laser therapy showed no statistically significant effect on pain relief when compared to the placebo group.

Keywords: Analgesics, Cesarean section, Pain, Physiotherapy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Dor abdominal e pélvica são condições prevalentes entre as puérperas no período pós-parto. As terapias não farmacológicas nesses casos são de grande importância, tendo em vista a ausência de efeitos adversos sistêmicos, tais como sonolência, irritabilidade e modificações no leite materno. O objetivo deste estudo foi identificar e avaliar a eficácia das terapias analgésicas não farmacológicas utilizadas no puerpério imediato na dor abdominal e pélvica.

CONTEÚDO: Realizou-se buscas nas principais bases de dados, no período de setembro a outubro de 2017, utilizando-se as combinações: "treatment" AND "pain" AND "postpartum"; "treatment" AND "pain" AND "postpartum" AND "analgesics" AND "non-pharmacological". Foram incluídos ensaios clínicos controlados e randomizados, publicados no período de janeiro de 2007 a agosto de 2017, nos idiomas português, inglês e espanhol. Dos 1.737 estudos encontrados nas bases de dados, 42 foram selecionados pelo título. De acordo com os critérios de elegibilidade, incluiu-se 13 estudos. O tamanho total das amostras dos estudos variou entre 21 e 266. Nos grupos com intervenção, a amostra variou entre 11 e 126 mulheres que foram submetidas a crioterapia, eletroestimulação elétrica nervosa transcutânea, LASER, acupuntura e auriculoterapia.

CONCLUSÃO: As práticas intervencionistas como a eletroestimulação elétrica nervosa transcutânea e a crioterapia apresentaram dados significativos relevantes na redução da dor abdominal e pélvica. As técnicas de acupuntura e auriculoterapia ainda apresentam dados inconclusivos. Apesar de provocar alívio da dor perineal, a laserterapia não mostrou efeito estatisticamente significativo para alívio da dor quando comparada com o grupo placebo.

Descritores: Analgesia, Cesariana, Dor, Fisioterapia.

INTRODUCTION

In the immediate puerperium, abdominal and pelvic pain are prevalent conditions among women[1,2]. A cohort study of 1,288 women who underwent cesarean section and vaginal birth[2], identified a prevalence of pain of 10.9% in the first 36 hours after birth. The literature shows that women who underwent cesarean section reported 2.4 more complaints of pain compared to women undergoing vaginal birth[3]. Other research conducted in Brazil showed that women who had vaginal birth were 82% less likely to experience intense pain in the immediate puerperium[4]. Another study reveals that postpartum pain may persist for up to one year and is more common after cesarean section[5].

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In the postpartum after a vaginal birth, perineal pain was observed due to an episiotomy or spontaneous perineal trauma that trigger a local inflammatory process with the presence of acute pain[6]. In the cesarean section, surgical wound pain is considered the main complaint in women[7], which impedes functionality in the immediate puerperium. Regardless of the mode of birth and local tissue trauma, abdominal pain may also be present in most women as a result of uterine contractions[1].

The discomfort caused by painful condition relieves the quality of life, mobility, self-care, breastfeeding and eliminatory functions of puerperium[7,8]. Pharmacological treatment is often prescribed for analgesia, favoring patient recovery, reducing maternal distress and increasing the mother's interactions with the newborn[8,9].

Despite advances in the knowledge of pathophysiology, treatment for pain and the availability of new drug systems, it is still possible to find patients who are unable to use drugs, making this therapy unfeasible[1]. In addition, Steen et al.[10] reported that the use of drug alone has not been enough to promote analgesia in these women. It is possible to identify in the literature several non-pharmacological analgesic therapies used in acute processes of tissue trauma, discussing the low cost for application and the wide possibility of indications.

In view of the painful symptoms in distinct regions such as the abdomen and pelvis due to the parturition process, whether by vaginal birth or cesarean section, present in the first days of the puerperium, it is necessary to identify and assess the effectiveness of the non-pharmacological analgesic therapies used in this period, to better guide the clinical and scientific practice of health professionals working directly in obstetric care.

CONTENTS

This study was characterized as a systematic review, carried out in the main databases Pubmed; LILACS, Ovid EMBASE, Scielo, CAPES, IBECS, SCOPUS, SCIENCE DIRECT and CAPES thesis bank. The searches were carried out from September to October 2017, using the following combinations: "treatment" AND "pain" AND "postpartum"; "treatment" AND "pain" AND "postpartum" AND "analgesics" AND "non-pharmacological".

Inclusion criteria were complete articles published between January 2007 and August 2017 in the Portuguese, English and Spanish languages; studies with the methodological design of randomized controlled clinical trial presenting a quantitative analysis of the outcome pain; articles that presented in the title and abstract approach of a non-pharmacological intervention for analgesia in the immediate puerperium. In cases where the title and the abstract were not enlightening, the search for the article was carried out in full to avoid the inclusion of important studies.

The articles identified by the initial search strategy were independently assessed and covered by two authors, strictly adhering to the eligibility criteria defined in the research protocol and assessed methodologically based on the PEDro[11] scale. Duplication studies were excluded from the databases.

The systematic review was performed according to the guidelines of the Cochrane Reviewer's Handbook and the PRISMA guidelines[12] (Preferred Reporting Items for Systematic Reviews and Meta-Analysis). The steps of the research are demonstrated in the flowchart (Figure 1), according to the methodological procedure proposed in the study.

Selection of studies

The results of the research are shown in figure 1. Initially, 1,737 studies were found in the databases, 13 of which were selected according to the eligibility criteria.

Characteristics of the studies

The total sample size of the studies ranged from 21 to 266 with the size of the intervention group ranging from 11 to 126 women[13,14]. In the assessment of the methodological quality, an average score of 7 (range of 5 to 10) was verified, as shown in table 1. The resources found were cryotherapy[15-18], TENS[13,19-22], laser therapy[23,24], auriculotherapy[14] and acupuncture[25] and are described in table 2.

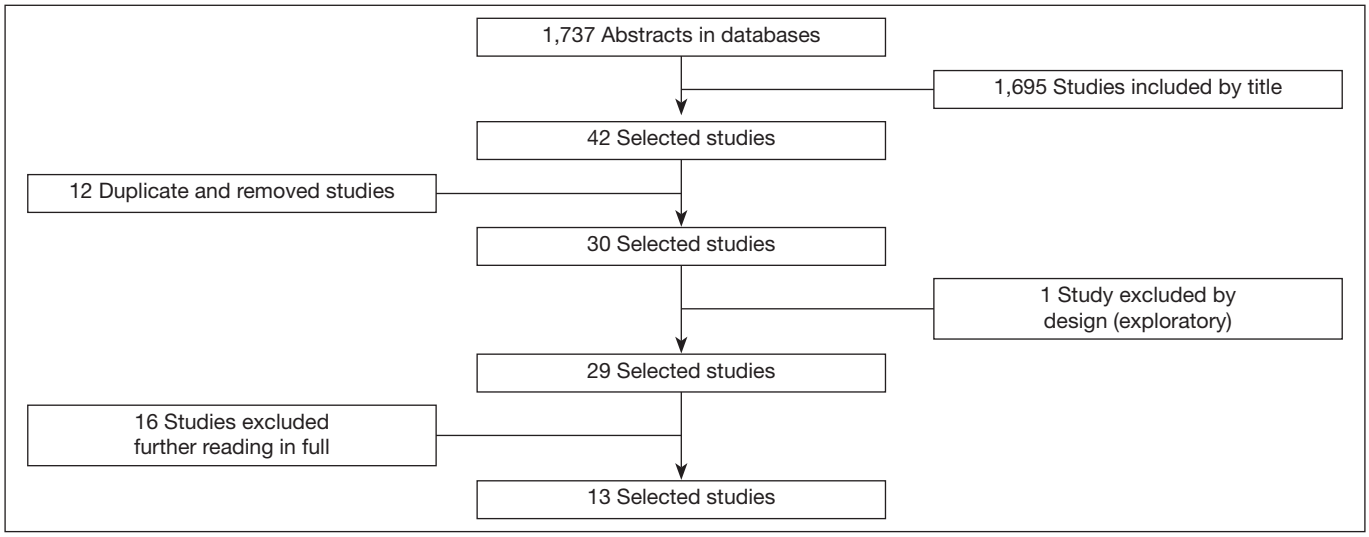

Figure 1. Flowchart of the systematic review steps recommended by PRISMA

Table 1. Characteristics of included articles

Authors	Methodological/blind design	Non-pharmacological resource used	Methodological quality (PEDro scale)
Lu et al.[15]	Quasi-randomized controlled experimental/unblinded trial	Cryotherapy	5
Oliveira et al.[16]	Randomized controlled/unblinded clinical trial	Cryotherapy	5
Kayman-Kose et al.[19]	Randomized controlled/single-blind clinical trial (patient)	TENS	8
Pitangui et al.[20]	Randomized double-blind clinical trial	TENS	8
Olsen et al.[13]	Randomized controlled/single-blind clinical trial (patient)	TENS	6
Pitangui et al.[21]	Controlled randomized/unblinded clinical trial	TENS	8
Santos et al.[24]	Randomized double-blind clinical trial	Low-level laser therapy	9
Santos et al.[23]	Pilot, randomized clinical trial	Low-level laser therapy	9
Kwan and Li[14]	Randomized controlled/double-blind trial	Auriculotherapy	10
Leventhal et al.[17]	Randomized, controlled, parallel-group/single-blind trial (evaluator)	Cryotherapy	8
Marra et al.[25]	Pilot placebo trial	Acupuncture	5
Lima et al.[22]	Randomized, placebo-controlled/single-blind clinical trial	TENS	10
Morais et al.[18]	Randomized controlled/double-blind clinical trial	Cryotherapy	9

TENS = transcutaneous electrical nerve stimulation.

Table 2. Non-pharmacological analgesic resources for abdominal-pelvic pain relief in the immediate puerperium

Authors	Objective of the study / n = sample	Intervention groups	Intervention	Assessment tools	Effectiveness of the intervention (p<0.05) *
Cryotherapy					
Lu et al.[15]	To assess the effect of a cold compress on episiotomy pain reduction/ n=70.	The study was performed with two groups containing 35 women in each.	The IG underwent the application of ice pack in the perineal region with temperature ranging from 12 to 15°C, lasting from 15 to 20 minutes and encouraged to perform ice pack as many times as possible in the first 4 hours postpartum. For the next three days, they should use at least 3 times a day. All IG and CG participants received routine care, consisting of nonsteroidal anti-inflammatory and hot-seat baths after 24 hours postpartum.	For both groups, the pain was measured in 4 moments through BPI: 4h (immediately before the intervention), 12, 24 and 48h after birth. It was also assessed the interference of pain in the ADL, through a questionnaire developed for the research.	BPI: significant reduction of pain 48 h after birth in the intervention group (p=0.002). DA questionnaire: significant reduction of pain interference on daily activities (p=0.001).
Oliveira et al.[16]	To compare the effect of applying ice pack for 10, 15 and 20 minutes in the perineal region in pain reduction/ n=114.	The research was done with three groups containing 38 patients each: Group underwent 10 min intervention with ice packs; Group underwent 15 min intervention with ice packs. Control group underwent 20 min of ice.	Single application of ice pack in the perineal region at -10°C between 2 and 56 hours postpartum after vaginal birth, in women with pain ≥3 assessed by visual analog scale (VAS).	The pain was measured in 4 moments through the VAS: before, immediately after, 20 minutes and 40 minutes after the intervention.	The three groups presented significant pain reduction (p=0.001), with no statistical difference between them (p=0.066). Application of 10 minutes and 15 minutes of ice pack has the same benefits in reducing pain like that of 20 minutes.

Continue...

Table 2. Non-pharmacological analgesic resources for abdominal-pelvic pain relief in the immediate puerperium – continuation

Authors	Objective of the study / n = sample	Intervention groups	Intervention	Assessment tools	Effectiveness of the intervention (p<0.05) *
Cryotherapy					
Leventhal et al.[17]	To assess the effectiveness of an ice pack applied for 20 minutes to relieve perineal pain after spontaneous vaginal birth/ n=114.	Participants included nulliparous women divided into 3 groups (n = 38 per group): Experimental group underwent intervention with ice pack in the perineum; Placebo group underwent intervention with water packs at room temperature; Control group without intervention.	The packages were applied in a single instance for 20 minutes in the perineal region, between 2 and 48 hours postpartum. The package consisted of a plastic bag 8cm wide by 16cm long, filled with 250mL of water. For the experimental group, the pack was placed in the freezer and removed as ice for the intervention. The ice and water packs were wrapped in 20×20 cm fine cotton fabric to avoid direct contact with the perineum.	The data were collected daily by 4 evaluators between 11:00 and 15:00. They were collected in the following sequence: interview, initial assessment of perineal pain, randomization, body temperature measurement, and perineal trauma length measured by the use of Perirule™. A numerical scale (zero to 10) was used for the assessment of pain.	The use of an ice pack in the perineum is useful in the treatment of perineal pain after vaginal birth. A comparison of mean pain at baseline and after 20 minutes showed significant pain reduction (p<0.001) in the 3 groups and the experimental group had a lower average pain score compared to the control group (p=0.032)
Morais et al.[18]	To assess the clinical effectiveness of cryotherapy to control pain and perineal edema after humanized vaginal birth / n=80	The volunteers were divided into 2 groups containing 40 volunteers in each: Experimental group underwent cryotherapy; Group without cryotherapy.	The experimental group underwent 6 applications of ice pack crushed in the perineum region, for 20 minutes, reducing the temperature between 10 and 15 ° C, with 60 minutes between the applications. The group without cryotherapy received a water pack, which did not reduce the temperature at that level, respecting the same protocol of application of the experimental group.	They were assessed: perineal pain and perineal edema with assessments performed immediately before and at the end of each application in each group to determine the immediate effects of the therapy and were reassessed at 24 hours postpartum to verify the late effects of cryotherapy. The combined pain assessment scale (CSAP) was used to assess pain level.	There was no significant difference for perineal pain and edema scores between groups with or without cryotherapy up to 24 hours after birth. There was no difference between groups when repeated measures were analyzed in all assessments, considering the median pain scores (p=0.3) and perineal edema (p=0.9). Perineal cryotherapy did not influence the amount of analgesics used (p=0.07) and no adverse effects were recorded.
TENS					
Kayman-Kose et al.[19]	To assess the efficiency and reliability of TENS in the treatment of uterine pain and surgical incision after birth/n = 200.	Participants were randomized into four groups: Cesarean section group underwent intervention with TENS switched off; Cesarean section group underwent intervention; Vaginal birth group underwent intervention with TENS switched off; Group of vaginal birth underwent intervention.	All participants in the intervention groups received the application of TENS immediately after birth. A frequency of 100Hz and intensity according to the patient's sensitivity were used for the intervention groups. No pulse width and time of application were reported. For vaginal birth patients, the electrodes were positioned in the region of the lower abdomen corresponding to the fundus of the uterus. For those who underwent a cesarean section, the electrodes were positioned above and below the OW.	Pain was assessed before and immediately after application through VAS and VNS.	TENS is effective for uterine pain relief and operative wound. Pain reduction was significant for the groups that underwent TENS intervention. For cesarean section: VAS and visual numerical scale (VNS) (p<0.001). For vaginal birth: VAS (p=0.022) and VNS (p=0.005).

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Table 2. Non-pharmacological analgesic resources for abdominal-pelvic pain relief in the immediate puerperium – continuation

Authors	Objective of the study / n = sample	Intervention groups	Intervention	Assessment tools	Effectiveness of the intervention (p<0.05) *
TENS					
Pitangui et al.[20]	To assess the effectiveness of low-intensity TENS and high-intensity TENS in episiotomy pain reduction / n = 33.	The volunteers were randomized into three groups: Group underwent intervention with TENS of 5Hz; Group underwent intervention with TENS of 100Hz; Placebo group on intervention with the device switched off.	The intervention was performed for all groups between 6 and 24 hours postpartum with the electrodes in parallel, close to the episiotomy, following a pudendal and femoral nerve region. The intensity of the device was programmed according to the sensitivity of the patient, and the pulse width was 100μs. The intervention lasted 30 minutes.	The pain was assessed through the NRS before the intervention, post-intervention, 30 minutes post-intervention and 60 minutes post-intervention.	TENS of low and high intensity are effective in reducing perineal pain after episiotomy in the first 24 hours postpartum. Significant reduction of pain between intervention and placebo groups immediately after resting (p=0.046) and sitting (0.008). Significant reduction in pain between intervention and placebo groups at rest after 30 '(p=0.001) and after 60' (p=0.001).
Olsen et al.[13]	To compare the effects of low and high-intensity high-frequency TENS in reducing abdominal pain caused by uterine contractions during breastfeeding/n = 21.	Participants were randomized into two groups: Group underwent intervention with TENS using intensity less than 50mA performed in 13 volunteers; Group underwent intervention with TENS using intensity of 10 to 15mA in eight volunteers.	The intervention was performed in all groups 24 hours after vaginal birth without complications. The device has been programmed for a frequency of 70 to 100Hz and a pulse width of 0.2ms. For the high-intensity group, the application was performed for 1 'and repeated if there was still a report of pain. For the low-intensity group, the time of therapy was not reported.	The assessment of the pain was done through VAS before and after the application of TENS.	High-intensity high-frequency TENS had a better outcome in reducing pain. The high-intensity group presented a pain decline of 49 (CI = 66.5 - 33.2), and the low-intensity group had a decline of 21 (CI = 39.0 - 20.0)
Pitangui et al.[21]	To assess the effectiveness of high-frequency TENS as a pain relief resource for postpartum women with episiotomy/ n=40.	The volunteers were randomized into two groups with 20 participants each: Group underwent intervention with TENS with high frequency; The group without intervention.	All were between 6 and 24 hours after a vaginal birth and had a mediolateral episiotomy.	The pain was assessed through NRS before initiating the intervention, 60 minutes post-intervention and 120 minutes post-intervention. MPQ and PRI were also used at baseline and 60 minutes after the current.	The high-frequency TENS showed good results in the reduction of perineal pain in the postpartum period with episiotomy. For MPQ, PRI and NRS assessment, a significant decrease (p <0.001) in the scores in the intervention group.
Lima et al. [22]	To assess the analgesic effect of TENS modulation in high (100Hz) and low (4Hz) frequency in post-cesarean section pain / n = 34.	The patients were randomly assigned, in three treatment groups: G100: underwent TENS of 100Hz; G4: underwent TENS of 4Hz; GP: placebo group underwent TENS switched off.	The participants were placed in dorsal decubitus position and remained in rest throughout the experiment so that there were no intercurrences that interfered In the results. TENS was applied by medium of two channels with 4 siliconized rubber electrodes (5x3 cm) for individual use located 1 cm above and below the surgical incision, a pulse duration of 100 μs and intensity according to the sensorial threshold of each patient. The total TENS application time was 30 minutes and performed in a single session.	Pain intensity was assessed by NRS before, immediately after and at 20-minute intervals (20, 40 and 60') after the electrostimulation period. The initial assessment was performed respecting a minimum interval of 8 hours postpartum to avoid acute interferences of postanesthetic recovery.	The results demonstrated a significant decrease of the NRS in the G100 only in relation to the pre-treatment condition (p<0.05). In the post-treatment intervals, the G100 presented a significant decrease in pain during all the intervals (p<0.05). G4 showed a significant decrease only in the 40 'and 60' intervals; and GP, only in the range of 60 '(p<0.05). TENS modulation at a high pulse rate had a greater analgesic effect than low-frequency TENS in post-cesarean section, postpartum women.

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Table 2. Non-pharmacological analgesic resources for abdominal-pelvic pain relief in the immediate puerperium – continuation

Authors	Objective of the study / n = sample	Intervention groups	Intervention	Assessment tools	Effectiveness of the intervention (p<0.05) *
LASER					
Santos et al.[24]	To assess the efficiency of Low-intensity laser in the treatment of perineal pain after episiotomy (n=114).	Participants were randomized into three groups with 38 participants each: Group underwent intervention with LASER of 780nm of wavelength; Group undergoing laser intervention with 660nm of wavelength; Group underwent intervention with LASER switched off.	All volunteers were in the range of 6 to 56 hours after vaginal birth with mediolateral episiotomy and had pain greater than 3 on VAS. The device used in the volunteers underwent the intervention was programmed at a dose of 8.8J/cm2, a spot of 0.04 cm2, power of 35mW, energy per point of 0.35 and applied punctually in the upper, the middle and lower point of the episiotomy for 10 seconds per application point.	The pain was assessed before, immediately after 3 and 30 minutes after the application through VAS.	The low-intensity laser was not efficient in mediolateral episiotomy pain reduction. There was a reduction in pain in the intervention groups 30 and 60 minutes after LASER application, but when compared to placebo, no difference was observed (p=0.234 and p=0.111, respectively).
Santos et al.[23]	To assess the effects of Low-intensity laser therapy for perineal pain and healing after episiotomy / n=52.	Participants were randomized into two groups with 26 participants each: LASER intervention group with 660nm wavelength; Group underwent intervention with LASER switched off;	All underwent vaginal birth with mediolateral episiotomy. The LASER application was performed in three moments: up to 2 hours after birth, between 20 and 24 hours after birth and between 40 and 48 hours postpartum. The device used in the volunteers underwent the intervention was programmed for a dose of 3.8J/cm2, a spot of 0.04mW, a spot of 0,04 cm2, the power of 15mW energy per point of 0.15 and applied punctually in the episiotomy for 10 seconds per application point.	The pain assessment was done through VAS before and after each session.	LASER did not reduce pain in the episiotomy. Up to 2 h after birth: p=0.999 Between 20 and 24 hours postpartum: p=0.758 Between 40 and 48 hours postpartum: p=0.662.
Auriculotherapy and Acupuncture					
Kwan and Li[14]	To assess the effects of auricle pressure in reducing acute perineal pain in the first 48 hours postpartum / n=266.	Participants were randomized into two groups: Intervention group with 126 women; Group without intervention with 130 women.	Participants could take pain medication (500mg paracetamol/4 hours) if necessary. In the two groups, the following stimulation points were chosen: “Apex of the auricle, Anus, external genital organs, Shenmen.” The volunteers should press the points for 30”, 1x / 4h. In the intervention group, a seed adhesive was used while in the control group a seedless adhesive was used.	The pain was assessed through VDPS and VAS: 12, 24 and 36 h after birth. Also, the average consumption of paracetamol was analyzed.	Apparently, there are no positive results regarding the use of auricle pressure. No difference in pain was observed through AVA in the first two assessments (p=0.11, p=0.30, respectively). In the third assessment, there was pain difference between the groups (p=0.02). In the analysis of pain through VDPS no difference was observed between the groups at any time (p=0.49, p= 0.27, p=0.06). As for paracetamol consumption (p=0.13, p=0.42, p=0.37).

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Table 2. Non-pharmacological analgesic resources for abdominal-pelvic pain relief in the immediate puerperium – continuation

Authors	Objective of the study / n = sample	Intervention groups	Intervention	Assessment tools	Effectiveness of the intervention (p<0.05) *
Auriculotherapy and Acupuncture					
Marra et al.[25]	To assess the effectiveness of acupuncture in relieving perineal pain after mediolateral episiotomy during birth/ n=42	The patients were divided into 2 equal groups with 21 volunteers each: Intervention group underwent acupuncture treatment; Group without intervention that was not treated with acupuncture.	The intervention consisted of wrist-ankle acupuncture by inserting a needle in the right ankle. The needles were inserted within 2 hours after birth by an acupuncturist physician in 21 patients. The group without intervention was monitored during the hospitalization and oral analgesic request. For additional pain relief, volunteers could request oral medication at any time during hospitalization.	Acupuncture was considered ineffective when women treated with needles required one or more oral analgesics during hospitalization (data were extracted from the medical records by the acupuncturist).	Wrist-ankle acupuncture is a simple and effective method to reduce pain referred by episiotomy after birth. Requests for oral analgesics were significantly more frequent in the control group (p<0.01).

* p<0.05 accepted as significant. IG = Intervention Group; CG = Control Group. BPI = Brief Pain Inventory; ADL: activities of daily living; VAS = visual analog scale; CSAP = combined scale to assess pain that integrates VAS, face pain scale, categorical scale and numerical scale, and ranges from zero to 10, with zero indicating total absence of pain and 10 indicating extreme pain that can be felt. OW = operative wound; VNS = verbal numeric scale of pain; NRS = numeric rating scale; MPQ = McGill Pain Questionnaire; PRI = Pain Rating Index; VDPS = Verbal Descriptive Pain Scale (no pain, mild pain, moderate pain, severe pain). CI = confidence interval.

Non-pharmacological resource

1) Transcutaneous electrical nerve stimulation - TENS

Of the studies found, five (38.4%) treated TENS as an effective therapy for the abdominal and pelvic pain relief in postpartum women[13,19-22]. Of these, three analyzed abdominal pain, and post-cesarean section wound[13,19,22] and two in an episiotomy region[20,21].

Two of these studies assessed the effectiveness of TENS at high frequency[19,21]. One[13] also assessed the high frequency comparing different intensities. The other two studies[20,22] compared the effectiveness of high and low frequency for pain reduction. Table 2 shows the protocols used in each study. From these studies it is evidenced that the TENS presents a satisfactory result in the control of the pain in postpartum women, being the two intensities able to produce benefits in the reduction of the painful condition.

It is possible to find described in the literature different types of TENS, for example conventional, burst, acupuncture, and brief-intense. According to the frequency, high (10 to 200Hz), or low (2 to 4Hz), its application is indicated for acute and chronic pain, respectively[26].

The use of high-frequency TENS is based on the pain gate theory proposed by Melzack and Wall in 1965[27]. This theory explains that the electrical stimulus emitted by the device causes excitation of the Aβ-afferent nerve fibers in the posterior horn of the spinal cord and it rapidly inhibits the transmissions of painful impulses by the nerve conductors of pain through the spinal cord. Therefore, its indication for the management of acute and postoperative pain may be justified, as the higher the intensity of the TENS current, the more units of receptor fibers will be recruited. In turn, the use of low-frequency TENS acts on the stimulation of the release of endogenous opioids by the brain to promote the analgesic effect. In this case, it is more recommended for chronic painful condition[28].

In the literature can be found a study comparing the application of TENS in the immediate postoperative period of gynecological surgery with the use of opioids. In this study[29], women were randomly divided into two groups, in which they underwent pain reduction intervention after surgery. One group received high-frequency TENS and the other group, opioids. Both groups presented satisfactory pain relief results (p<0.001), indicating that non-pharmacological therapy is an excellent alternative for these patients, minimizing the adverse and systemic effects of pharmacological resources.

2) Laser therapy

Two studies (15.5%) investigated low-level laser therapy (LLLT) for analgesia in an episiotomy region in postpartum women. In the intragroup assessment, a statistical difference was found before and after the intervention. However, no difference was found in the comparison between the intervention group and placebo[23,24].

It is possible that this difference in results occurred due to the protocols used in the studies in question. The first published study[24] was a pilot used as the basis for the second article[23]. Santos et al.[24] presented results that did not provide accurate information on the effect of LLLT on episiotomy using parameters with a wavelength of 660nm, a dose of 3.8J/cm^2 in three sessions with a range of 20 to 24 hours between them. The authors concluded that the effect might not have occurred due to the application of laser therapy since the control group also presented significant results. Subsequently, one more group was added to the study using a dosage of 8.8J/cm^2; the groups with different wavelengths (660nm and 780nm) were compared to the placebo

group[21]. The authors identified that regardless of wavelength applied the primary outcome was not different between the groups. It is believed that the result can be justified by the natural process of tissue recovery favoring the improvement of phlogistic signs/pain, as well as by the Hawthorne phenomenon, in which there is a change in the patient's perception due to the special attention given by the team at the time of research[23,24].

Despite the statistically insignificant results of laser therapy in the reduction of pain in perineal trauma of postpartum women presented by the studies[23,24], there is an article[29] that already shows promising results, indicating the effectiveness of laser therapy in perineal recovery and reduction of acute pain. An experimental study[30] demonstrated the analgesic effect after the application of laser therapy. The application of LLLT is expected to promote changes in cell membrane permeability, wound healing, muscle relaxation, immune system modulation, and nerve regeneration. In addition, it is also expected that in the intracellular environment a state of cellular hyperpolarization occurs that may inhibit the transmission of painful stimuli to the central nervous system[31]. As a consequence of the change of polarity added to the release of histamine, serotonin, bradykinin and prostaglandins, there will be a reduction of the inflammatory process and pain relief[32]. For such effects to occur, wavelengths between 600 and 1000nm have been suggested and powers of 1mW to 5W/cm^2. The authors also emphasize that very low (2.5 W/cm^2) or very high (25 W/cm^2) potencies can cause inverse effects[33].

Few studies address LLLT in the immediate puerperium phase with the aim of analgesia. Thus, it is prudent to suggest new studies with different wavelengths, time and duration of application, dose and potency, before establishing any guidelines on the effectiveness of LASER in the treatment of pain in the region of episiotomy in postpartum women.

3) Cryotherapy

Of the studies on analgesic resources for postpartum women, four (30.7%) investigated the use of cryotherapy for the perineal pain relief after vaginal birth. Of these, three[15-18] presented statistically significant results of the analgesic effect whereas only one showed the non-effectiveness of the use of ice for the pain relief in postpartum women[18].

The divergence of the result found by Morais et al.18 in relation to the other studies is explained throughout the study. The authors emphasized that initially, the patients presented very low levels of pain due to the absence of tissue injury, which may have interfered in the final statistical result. The other studies[15-17] assessed patients who presented some degree of perineal lesion and, consequently, developed an inflammatory picture, generating initially greater pain scores.

The application of cryotherapy varied among the studies. Three used ice pack[16-18,] and one applied ice packs with temperature ranging between 12ºC and 15ºC[15]. All articles applied cryotherapy in the perineal region. Regarding the time of therapy, three[15,17,18] studies used 20 minutes of application and one[16] compared different times: 10', 15' and 20'. Oliveira et al.[16] identified that there was no difference in the effects caused by cryotherapy with the time of application of 10', 15' and 20', that is, from the 10' of application, the effect was the same for the three groups. However, it is understood that the 20' time is well established in the literature, bringing the expected benefits of cryotherapy over perineal pain[15,17,18].

Regarding the frequency of application, in the studies by Lu et al.[15] and Morais et al.[18] participants were encouraged to apply compresses at least 3 times a day. The objective of these studies was to investigate the long-term effect, and there are divergences between the results, unlike the studies by Leventhal et al.[17] and Oliveira et al.[16] that investigated the immediate effect and found significant results for pain relief after the achievement of a single application. Similar to the study by Morais et al.[18], Lu et al.[15] also assessed the patient 24 hours after birth and found no significant reduction of pain at that time, however, they demonstrated a good result 48h after birth. It is known that in the first hours after the tissue injury the inflammatory process is higher, causing an increase in local metabolism, the release of inflammatory factors and a greater painful condition[16]. In this context, despite decreasing the local metabolism, it is believed that the single application of cryotherapy, is not able to decrease the pain after 24 hours of birth. However, the use of several compresses in the first few hours postpartum[15,18] may lead to an increase in the patient's pain threshold due to a decrease in metabolism and a decrease in the sensitivity of nerve endings[34], a fact that justifies long-term analgesia (48 hours).

According to the review performed by Malanga, Yan and Stark[35], cryotherapy acts in the reduction of pain after injury by several mechanisms of action. Initially, it promotes a decrease in the local temperature, provokes the sympathetic reflex of vasoconstriction with consequent diminution of the local circulation that culminates with the reduction of the inflammatory agents and reduction of the secondary hypoxia. The local temperature reduction also causes localized anesthesia through a neuropraxia induced by a decrease in the activation threshold of the nociceptors and a decrease in the conduction velocity of the pain signal; a good result of cryotherapy for postoperative.

Based on the data described, it is evident that cryotherapy provides good results in the momentary relief of perineal pain in the immediate postpartum period and is, therefore, a good resource to be used in the treatment of puerperal pain. It is still important to note that the compresses should be made for approximately 20 minutes and repeated times throughout the day, given their local physiological effect.

4) Acupuncture and Auriculotherapy

Two studies (15.3%) analyzed the effects of Chinese medicine techniques, acupuncture[23,] and auriculotherapy[12] on reducing pain in postpartum women.

According to the review by Murakami, Fox and Dijkers[36] auriculotherapy has shown good immediate results in reducing pain, has few adverse effects, is quick and easy to apply, and is a low-cost therapy that must, therefore, be stimulated for use and research by health professionals.

In the study of Kwan and Li[14], after an adjusted analysis of the data, a significant result of auriculotherapy was observed in the reduction of pain 36h postpartum, but there was no reduction after 12 and 24h. The study data are not conclusive about the effectiveness of auriculotherapy in the treatment of pain. No

statistical difference was found regarding paracetamol consumption and pain analysis through the Verbal Descriptive Pain Scale (VPDS) in the placebo and intervention groups. Thus, more studies on the application of auriculotherapy to postpartum women are recommended.

Auriculotherapy is a method of treatment of physical and psychosomatic dysfunctions that acts by stimulating specific points in the ear, promoting repercussions on neurological reflexes, neurotransmitters, cytokines, immune system, and inflammatory processes[37]. According to a review[37], the technique has good results in pain control in different situations; however, analgesia after operative procedures still has a controversial effect. This data corroborates the study by Kwan and Li[14] that argues that vaginal birth with episiotomy can be considered a type of surgical intervention.

Regarding acupuncture, one study[25] used the wrist-ankle region to treat perineal pain after vaginal birth with episiotomy, and the results were significant. The stimuli were performed in region 1 of the right ankle, local to pain located in the lower part of the body. The study presented a significant result in the reduction of perineal pain assessed through the reduction of oral analgesic use. Despite the positive result, the study did not present quantitative data on pain in the perineal region, the primary outcome of the study. The use of analgesic during the puerperal period may be associated with other complaints such as uterine or breast pain. Thus, although the study presents good results, it is prudent to perform further studies analyzing the effect of the technique on perineal pain.

CONCLUSION

Several non-pharmacological analgesic resources/methods used in postpartum woman care in the immediate postpartum period were assessed in this systematic review. Of these, only TENS and cryotherapy presented well-established data regarding the significant effect on the reduction of abdominal/pelvic pain in postpartum women.

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