

Massage for pain relief in newborns submitted to puncture: systematic review

Massagem para alívio da dor em recém-nascidos submetidos a punção: revisão sistemática

Masaje para el alivio del dolor en recién nacidos sometidos a punción: revisión sistemática



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How to cite this article:

Costa TMS, Oliveira ES, Silva BVS, Melo EBB, Carvalho FO, Duarte FHS, Dantas RAN, Dantas DV. Massage for pain relief in newborns submitted to puncture: systematic review. Rev Gaúcha Enferm. 2022;43(spe):e20220029. doi: <https://doi.org/10.1590/1983-1447.2022.20220029>

ABSTRACT

Objective: To analyze in the scientific literature the effects of massage on pain relief in newborns submitted to puncture.

Method: Systematic review with meta-analysis performed in October 2020, using PubMed, Web of Science, CINAHL, Scopus, Cochrane and Gale databases. Studies without time frame were included, which used massage as the main technique for relieving neonatal pain during puncture. Data were extracted using standardized forms and the synthesis of results occurred in a descriptive way.

Results: From the 12 studies included, massage was effective in pain relief in 83.3% of the studies. The comparative meta-analysis of massage versus routine care that assessed duration of crying obtained a statistically significant result ($p = 0.0002$; 95% CI -85.51 to -27.09). Conclusion: Massage contributes to neonatal pain relief by reducing pain score and reducing crying time in newborns submitted to puncture.

Keywords: Infant, newborn. Massage. Pain management. Punctures.

RESUMO

Objetivo: Analisar na literatura científica os efeitos da massagem no alívio da dor em recém-nascidos submetidos a punção.

Método: Revisão sistemática com meta-análise realizada em outubro de 2020, utilizando as bases PubMed, Web of Science, CINAHL, Scopus, Cochrane e Gale. Incluíram-se estudos sem delimitação de recorte temporal, que utilizaram massagem como principal técnica para o alívio da dor neonatal durante a punção. Os dados foram extraídos através de formulários padronizados e a síntese dos resultados ocorreram de forma descritiva.

Resultados: Dos 12 estudos incluídos, a massagem foi eficaz no alívio da dor em 83,3% dos estudos. A meta-análise comparativa da massagem versus cuidados de rotina que avaliou duração do choro obteve resultado estatisticamente significativo ($p = 0,0002$; IC 95% -85,51 a -27,09).

Conclusão: A massagem contribui para o alívio da dor neonatal através da redução do escore de dor e redução do tempo de choro em recém-nascidos submetidos a punção.

Palavras-chave: Recém-nascido. Massagem. Manejo da dor. Punções.

RESUMEN

Objetivo: Analizar en la literatura científica los efectos del masaje en el alivio del dolor en recién nacidos sometidos a punción.

Método: Revisión sistemática con metanálisis realizada en octubre de 2020, utilizando las bases de datos PubMed, Web of Science, CINAHL, Scopus, Cochrane y Gale. Se incluyeron estudios sin corte temporal, que utilizaron el masaje como técnica principal para el alivio del dolor neonatal durante la punción. Los datos fueron extraídos mediante formularios estandarizados y la síntesis de los resultados ocurrió de forma descriptiva.

Resultados: De los 12 estudios incluidos, el masaje fue efectivo para aliviar el dolor en el 83,3% de los estudios. El metanálisis comparativo de masaje versus atención de rutina que evaluó la duración del llanto obtuvo un resultado estadísticamente significativo ($p = 0,0002$; IC del 95%: -85,51 a -27,09).

Conclusión: El masaje contribuye al alivio del dolor neonatal al reducir el puntaje de dolor y reducir el tiempo de llanto en recién nacidos sometidos a punción.

Palabras clave: Recién nacido. Masaje. Manejo del dolor. Punciones.

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INTRODUCTION

Neonatal Intensive Care Units (NICU) are intended for newborns (NB) who are in critical situations due to prematurity, among other complications. Although the purpose of the NICU is quality recovery, this environment is responsible for several stressors related to painful invasive procedures, such as calcaneal puncture, venous puncture, arterial puncture, resulting in physiological and behavioral changes⁽¹⁻⁶⁾.

In this perspective, a current study in newborns shows a mean of 5.37 painful procedures performed per day, around 45.1% of which refer to punctures⁽⁷⁾. Thus, when untreated, pain has repercussions for the NB, in terms of physiological and metabolic changes, as directly influence the sympathetic nervous system and, consequently, affect systems such as the cardiovascular and respiratory. It is emphasized that this public has the ability to receive and process nociceptive stimuli, since from the 16th gestational week onwards, there is transmission of painful impulses through the cerebral cortex^(8,9).

Therefore, it is essential to observe physiological parameters such as Heart Rate (HR), Respiratory Rate (RR), Oxygen Saturation (SpO₂) and Blood Pressure (BP) in order to detect possible changes resulting from painful procedures. Furthermore, in addition to the physiological parameters, behavioral parameters are also highlighted, such as motor response to pain, facial mimicry, crying, sleep patterns and wakefulness⁽¹⁰⁾.

Thus, these matters are extremely important for the multidisciplinary team, especially nurses, as they generate sensitivity when observing changes that are considered, by many professionals, as a challenge during the assessment, treatment and pain relief in newborns, in order to enable humanized care^(8,11-14).

In order to complement the usual pharmacological treatments, non-pharmacological measures are characterized by alternatives that reduce painful stress, in order to slow down or remedy the patient's suffering, such as the newborn, in addition to reducing possible occurrences of certain complications from the procedures⁽¹⁵⁾.

Massage is included as a complementary therapy that provides pain relief properties to the individual by improving blood and lymphatic circulation, as well as oxygenation and nutrition of tissues, since pressure, rhythm and speed are directly linked with myofascial release, promoting muscle relaxation and, consequently, reducing painful sensations⁽¹⁶⁾. Therefore, this therapy is effective in the prevention, treatment and cure of certain pathophysiology, providing physical and psychic well-being, in addition to its easy application and low cost⁽¹⁵⁻¹⁹⁾.

In this perspective, this study is relevant due to the importance of the insertion of massage with the objective to reduce the pain felt by newborns during the performance of numerous painful procedures conducted daily in the NICU. In addition, they promote quality care and well-being to NBs, as well as practical and technical-scientific knowledge to professionals. Therefore, this study has great potential to assist nursing professionals in clinical decision making.

This review aims to analyze in the scientific literature the effects of massage on pain relief in newborns submitted to puncture. Therefore, it will be possible to identify whether this intervention is effective in the target audience in question, corroborating the insertion of massage in the NICU, in order to promote quality care for newborns, in addition to encouraging more studies on this theme.

METHOD

This is a systematic review with meta-analysis, conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)⁽²⁰⁾ strategy, registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42021226313. The method design was guided by the Cochrane Collaboration Handbook version 5.1.0⁽²¹⁾ which consists of the following steps: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and other sources of bias⁽²¹⁾.

For the construction of the guiding question, the PICO strategy was used (P - Population; I - Intervention; C - Control and comparison; O - Outcome), with P: newborns submitted to puncture; I: massage as a pain relief method; C: there was no comparison with other non-pharmacological measures; O: pain. Thus, the guiding question was defined: Is there a difference between reflexotherapy/massage and 25% glucose in pain relief in newborns submitted to puncture?

Primary quantitative studies were included, such as quasi-experimental and randomized clinical trials, which assessed pain in newborns submitted to puncture and massage in a hospital setting, without time frame and language restriction. Studies that aggregated patients older than one month of age and that applied methods other than massage for pain relief were excluded. Review articles, meta-analyses, abstracts, conference proceedings, editorials/letters and case reports were also excluded. There was a high level of agreement on inclusion/exclusion between the two investigators who screened the articles (Kappa index > 90%).

All electronic search titles, selected abstracts and full-text articles were independently reviewed by at least two reviewers (author 1 and author 2). Disagreements on whether the texts met the inclusion/exclusion criteria were resolved by consensus. There was no restriction regarding languages and time frame.

The searches in the databases occurred in October 2020, were conducted through the Portal of Journals of the Coordination for the Improvement of Higher Education Personnel (*Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES*), through the Federated Academic Community platform (*Comunidade Acadêmica Federada - CAFE*). Six data sources were used: National Library of Medicine (MEDLINE-PubMed), Web of Science,

Cumulative Index to Nursing and Allied Health (CINAHL), Elsevier SciVerse Scopus (SCOPUS), Cochrane Library and Gale Academic OneFile. Different combinations of the descriptors were used: “Infant, newborn”, “Massage”, “Reflexotherapy”, “Pain Measurement”, “Pain Management” and “Pain Assessment”. In turn, the keywords used were: “Premature”, “Baby” e “Pain Relief”.

The articles found were exported through the Mendeley reference manager. It was performed a manual search for citations. In case of disagreement about the inclusion of an article in the final list, the reviewers analyzed the complete version of the studies until reaching consensus. Chart 1 shows the search strategy adopted according to the data sources used.

Data Source	Search Strategy
MEDLINE-PubMed	((infant) OR (newborn) OR (premature) OR (baby)) AND ((Massage) OR (Reflexotherapy)) AND ((pain) OR (“Pain Measurement”) OR (“Pain Management”) OR (“Pain relief”) OR (“Pain assessment”) OR (Puncture))
Web of Science	(Infant, newborn OR premature OR baby) AND TÓPICO: (massage OR reflexotherapy) AND TÓPICO: (pain OR pain measurement OR pain management OR pain relief OR pain assessment OR puncture)
CINAHL	(Infant, newborn OR premature OR baby) AND (massage OR reflexotherapy) AND (pain OR pain measurement OR pain management OR pain relief OR pain assessment OR puncture)
SCOPUS	(ALL (infant AND newborn OR premature OR baby) AND ALL (massage OR reflexotherapy) AND ALL (pain OR pain AND measurement OR pain AND management OR pain AND relief OR pain AND assessment OR puncture))
Cochrane Library	(All Text (infant, newborn OR premature OR baby) AND All Text (massage OR reflexotherapy) AND All Text (pain OR pain AND measurement OR pain AND management OR pain AND relief OR pain AND assessment OR puncture))
Gale Academic OneFile	(infant, newborn) AND (massage OR reflexotherapy) AND (pain OR pain AND measurement OR pain AND management OR pain AND relief OR pain AND assessment OR puncture)

Chart 1 – Search strategies used in the data sources selected for the study. Natal, Rio Grande do Norte, Brazil, 2021
Source: research data.

Data were extracted by one reviewer using standardized forms and verified by a second reviewer. Next, it was performed a descriptive synthesis of the results, evidenced based on the selected primary studies. The following information was extracted from the studies: author, year of publication, country, study design, population, interventions, place of application, time of application, assessment instrument, outcomes, conclusions. Discrepancies between reviewers during data extraction were resolved by consensus by a third reviewer.

The risk of bias assessment was made by a pair of researchers (author 1 and author 2), independently and blinded by the first and second reviewers. It followed the risk of bias guidelines of the Cochrane Collaboration for Randomized Clinical Trials, version 5.1.0, Cochrane Handbook⁽²¹⁾ consisted by seven domains. Based on the analyzed domains, the studies were classified as: "low risk", if most of the information is from studies classified as low risk of bias; "unclear risk of bias", if most of the information is from low-risk and unclear-risk studies; and "high risk", if the proportion of high risk information is sufficient to affect the interpretation of results. In situations where there was insufficient information about the development of research, the studies were classified as "unclear risk".

All meta-analyses were conducted using the Review Manager 5.3⁽²²⁾. The treatment effects were defined as mean difference (MD) with 95% confidence intervals (CIs). Mean and standard deviation (SD) were obtained from each study group and used to calculate effect sizes. For the article that did not inform the SD, it was calculated using the 95% CI. The DerSimonian and Laird method was used to produce a random effects model to assume heterogeneity in the studies. A forest plot was used to plot the effect sizes and the 95% CI. A two-tailed $p < 0.05$ was used to determine significance. Statistical heterogeneity was assessed by the Cochran Q test and quantified by the I2 index⁽²³⁾.

RESULTS

The initial search resulted in 878 articles. After counting duplicate articles only once and excluding repeated articles, it was performed the reading of the remaining 448 titles and abstracts. Therefore, 70 articles were selected for full reading. After excluding articles not presented in full, duplicates, letters, case studies and those whose theme did not correspond to the criteria of this study, 12 articles remained in the final selection, as shown in Figure 1.

It is emphasized that most of the studies were published in English (75%), and three in Persian (25%). These studies were conducted in six countries, with the largest number of research produced being Iran, with six (50%) publications, followed by Turkey, with three (25%), China, Canada, Lebanon and India, with one (8.3%) publication each.

From the 12 records included in this review, 11 are randomized clinical trials^(24–25,27–35), and one is characterized as a non-randomized clinical trial⁽²⁶⁾, with a total of 981 participants and the age ranged between 24 hours of life and 42 weeks of Gestational age (GA). The characteristics of the study are summarized in Chart 2^(24–35).

As for the intervention technique, four (33.3%) studies reported the application of light to moderate pressure massage^(26–28,30) and eight (66.6%) did not specify the pressure used during the massage^(24–25,29,31–35). Regarding the application time, six (50%) studies performed the massage for 2 minutes; three (25%) for 3 minutes; one (8.3%) for 1 minute; one (8.3%) for 10 minutes; and one (8.3%) for 30 minutes.

Furthermore, other studies have also compared the effectiveness of massage application in relation to other techniques used to relieve neonatal pain, such as massage with non-nutritive suction and control⁽³⁰⁾; acupressure with the control group⁽³¹⁾; massage, non-nutritive suction, swinging, 20% sucrose, distilled water and breast milk⁽²⁹⁾; massage with breast milk⁽³⁴⁾; massage, maternal hug and control group⁽³³⁾; massage, breastfeeding and control group⁽³⁵⁾. The authors of this study identified the effectiveness of massage over other techniques (or control group) in 83.3% of the studies.

Therefore, three instruments were used by the researchers to assess the response to pain felt by newborns. Among them, the most dominant scale in the studies was the Neonatal Infant Pain Scale (NIPS), present in seven (58.3%) articles^(24,28,31–35). The Premature Infant Pain Profile (PIPP) scale was used in four (33.3%) studies^(25–27,30), and the *Douleur Aiguë du Nouveau-né* (DAN) scale was used in one (8.3%) study⁽²⁹⁾.

When performing the risk of bias analysis of the included studies, it was observed that the generation of random sequences (selection bias) was the only type of bias that was considered low in most (58.3%) of the articles.

For the allocation concealment assessment criteria, 75% (nine) of the studies obtained an unclear risk classification because they presented insufficient information about the process of generating the random sequence to allow the judgment. Regarding the topic of blinding participants and personnel (performance bias), seven studies had an unclear risk of bias for not reporting whether blinding was effective.

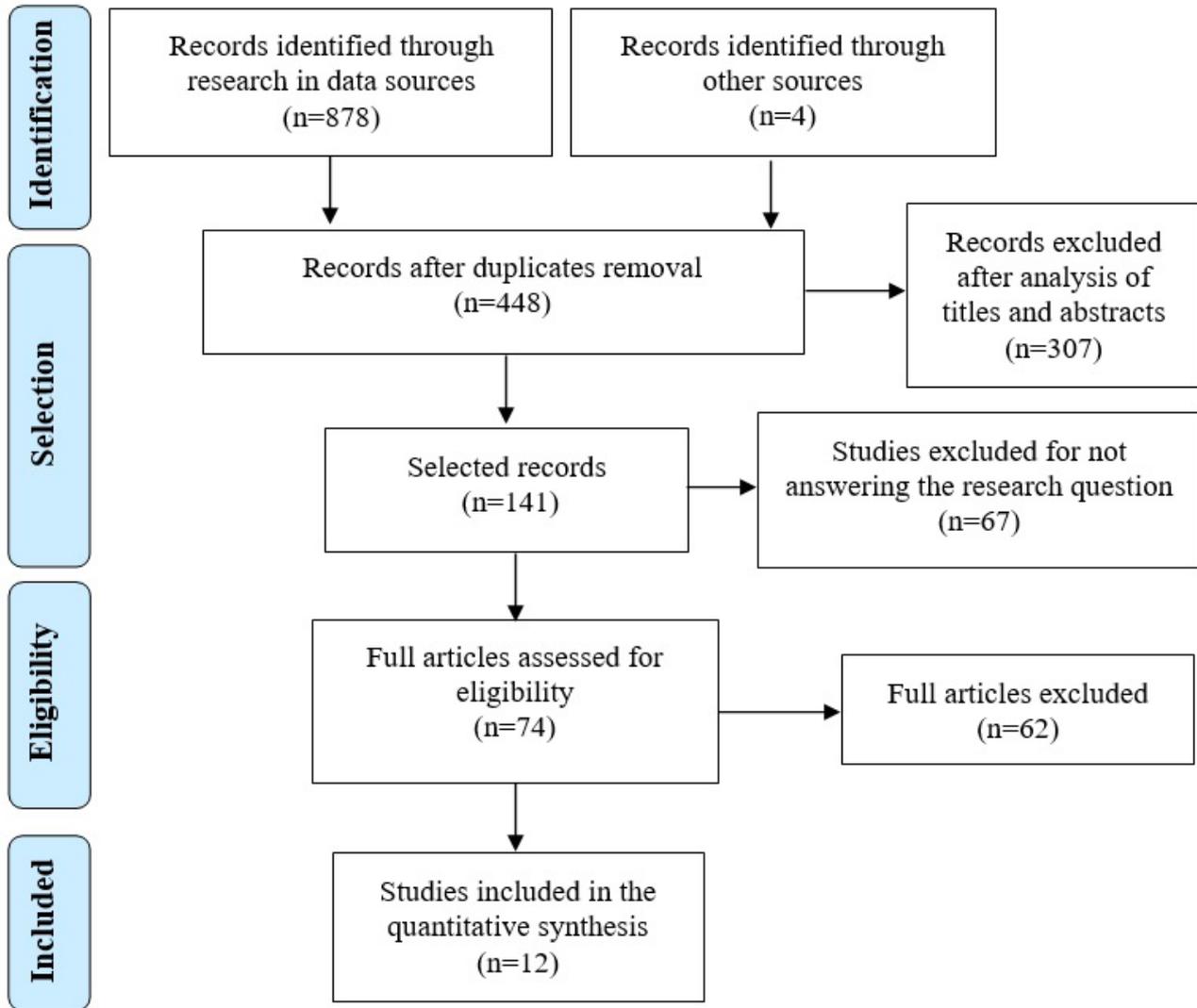


Figure 1 – PRISMA flowchart of the study selection process. Natal, Rio Grande do Norte, Brazil, 2021
Source: research data.

In blinding the outcome assessment (patient-reported outcome and objective outcome), four studies had a low risk of bias. On the topic of incomplete outcomes, seven studies had an unclear risk of bias, as they had insufficient reports of losses and exclusions to allow judgment. Five studies had a low risk of bias in relation to selective outcome reporting (reporting bias), in which most of them was not available the study protocol in the article but make it clear that the published study included all desired outcomes. All other biases were mostly unclear, justified by insufficient information to assess whether an important risk of bias exists. Figure 2 presents the analysis of the risk of bias of studies.

It was possible to perform two meta-analyses to assess the effects of massage compared with routine care regarding

pain score and duration of crying in the newborn, as shown in Figure 3. Among the 12 studies included in the systematic review, only four presented data that could be analyzed through meta-analyses^(25,27,32-33).

In the assessment of the pain scale score, the mean difference (MD) was -0.38 (95% CI -0.84 to 0.08), showing that massage, when compared to routine care, does not present a significant difference ($p = 0.10$), with $I^2 = 0\%$, indicating that there is no heterogeneity between the studies.

In the assessment of crying duration, the MD was -56.30 (95% CI -85.51 to -27.09), showing that massage, when compared to routine care, had a positive effect, showing a significant difference ($p = 0.0002$), with $I^2 = 73\%$, indicating a high level of heterogeneity between studies.

Author/ Country/Year	Study type/ Level of evidence	Population	Groups	Massage site	Massage time	Results
Abasi <i>et al.</i> ⁽²⁴⁾ / Iran/2011	Randomized clinical trial/1B	60 full-term newborns	IG*) Effleurage and petressage massage (30) CG†) No intervention (30)	Effleurage massage on the body and petressage on the extremities.	30 minutes	After 30 minutes of intervention, the mean pain intensity in the experimental group was lower than in the control group.
Abbasoğlu <i>et al.</i> ⁽²⁵⁾ / Turkey/ 2015	Randomized clinical trial/1B	32 newborns (GA‡ 28-36 weeks)	IG) Acupressure (16) CG) Usual care (16)	Acupressure applied to BL60 and K3.	3 minutes	The mean duration of the procedure and crying were lower in the acupressure group.
Abdallah <i>et al.</i> ⁽²⁶⁾ / Lebanon/2013	Quasi-experimental study/3A	50 newborns (GA 26-36 weeks)	IG) Moderate pressure massage (27) CG) No intervention (23)	Head, neck, back of neck, shoulders, arms, legs, buttocks, and hips	10 minutes	Reduction in PIPP [§] after massage, and at discharge, compared to the control group. And increased cognitive scores.
Chik <i>et al.</i> ⁽²⁷⁾ / China/2017	Randomized clinical trial/1B	80 newborns (GA 30 to 40 weeks)	IG) Light pressure massage (40) CG) Usual care (40)	Upper limbs	2 minutes	The mean difference between pain scores between receiving massage and control treatment was lower.
Jain <i>et al.</i> ⁽²⁸⁾ / Canada/ 2006	Randomized clinical trial/1B	23 newborns (GA 28-35 weeks)	IG) Light pressure massage (13) CG) No intervention (10)	In the punctured limb, toes and thigh.	2 minutes	HR , mean serum cortisol and NIPS [¶] were higher in the control group.

Chart 2 – Characterization of the systematic review studies. Natal, Rio Grande do Norte, Brazil, 2021

Source: research data.

Legend: †IG = Intervention Group; ‡CG = Control Group; §GA=Gestational Age; ¶PIPP = Premature Infant Pain Profile; ||HR= Heart Rate; ¶NIPS = Neonatal Infant Pain Scale; **NNS = Non-Nutritive Suction; ††SpO2 = Peripheral Oxygen Saturation; ††NB = Newborn; †††NICU = Neonatal Intensive Care Unit.

Author/ Country/Year	Study type/ Level of evidence	Population	Groups	Massage site	Massage time	Results
Mathai <i>et al.</i> ⁽²⁹⁾ / India/2006	Randomized clinical trial/1B	104 full-term newborns (> 24 hours of life)	IG) Extracted Breast Milk; sucrose; NNS**; Massage; and Swinging. CG) Absent	Massage the forehead, chest, arms and legs in a cyclic manner.	2 minutes	At 2 and 4 minutes pain scores were lower in the NNS and swing groups. The total duration of crying was also shorter in the NNS and swing groups.
Mirzarahimi <i>et al.</i> ⁽³⁰⁾ / Iran/2013	Randomized clinical trial/1B	90 newborns (IGI up to 37 weeks)	IG) Massage (30) and NNS (30) CG) No intervention (30)	Punctured limb, toes to thigh.	2 minutes	Lower variation in SpO ₂ ⁺ in the massage group. Changes in PIPP scores were lower in the massage group.
Özkan <i>et al.</i> ⁽³¹⁾ / Turkey/ 2019	Randomized clinical trial/1B	139 full-term NB ⁺⁺ (GA 38 to 40 weeks)	IG) Acupressure (46) and massage (47) CG) No intervention (46)	Acupressure at Kun Lun (UB60) and Taixi (K3) points and foot.	2 minutes	The acupressure, massage and control groups had means of 4.30 ± 2.25, 3.95 ± 2.63, 6.04 ± 1.26, respectively.
Rafati <i>et al.</i> ⁽³²⁾ / Iran/2015	Randomized clinical trial/1B	136 newborns admitted to the NICU ^{***}	IG) Eflourage massage (68) CG) Usual care (68)	Antecubital fossa	1 minute	Pain intensity mean in the experimental group was lower than in the control group and reduced crying time during procedure.

Chart 2 – Cont..

Author/ Country/Year	Study type/ Level of evidence	Population	Groups	Massage site	Massage time	Results
Roshanray <i>et al.</i> ⁽³³⁾ / Iran/2020	Randomized clinical trial/1B	135 newborns (GA 38-42 weeks)	IG) Massage (45) and maternal hug (45) CG) Usual care (45)	Foot massage, from fingertips to mid-leg	2 minutes	After 5 minutes, pain and HR decreased in the maternal hug group compared to the massage and control groups. The duration of crying in the maternal hug group was shorter than in the other groups.
Salimi <i>et al.</i> ⁽³⁴⁾ / Iran/2020	Randomized clinical trial/1B	30 newborns from the Neonatal Care Unit	IG) Breastfeeding and Massage (15) CG) Massage and Breastfeeding (15)	Massage performed on the lower limbs	3 minutes	There was a significant difference for the pain score during and after the intervention of each of the two groups.
Zargham-boroujeni <i>et al.</i> ⁽³⁵⁾ / Iran/2017	Randomized clinical trial/1B	75 newborns (GA > 34 weeks)	IG) Massage (25) and Breastfeeding (25) CG) No intervention (25)	Effleurage massage at the venous puncture site.	3 minutes	The lowest mean pain score was recorded in the massage group. The ANOVA test and post hoc statistics revealed that both interventions resulted in a significant reduction in pain scores.

Chart 2 – Cont.

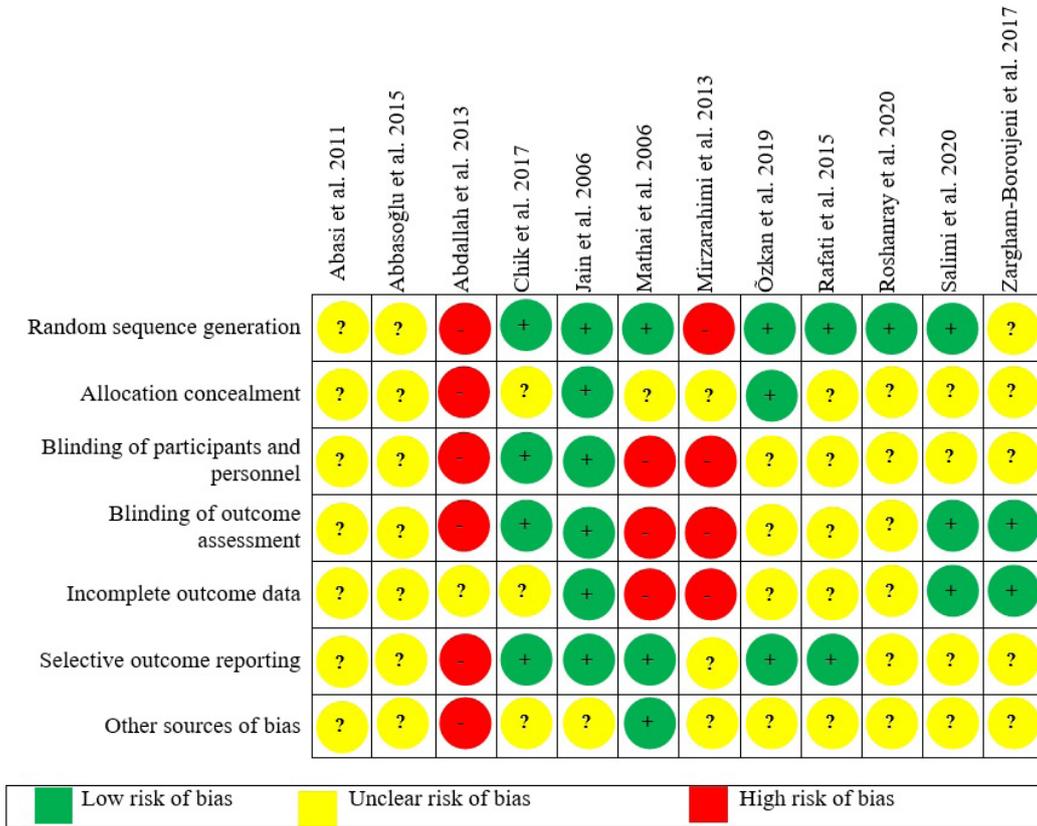
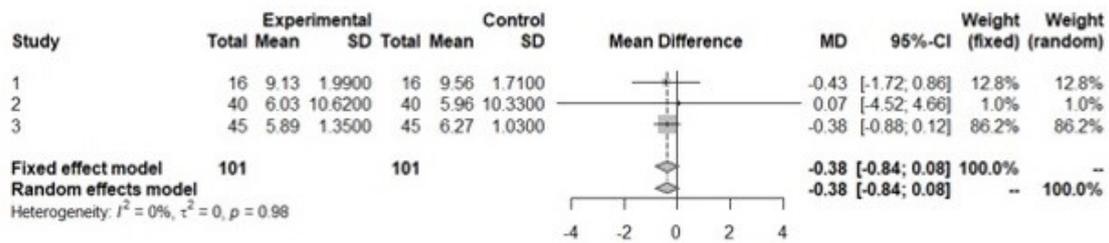


Figure 2 – Assessment of the risk of bias of studies. Natal, Rio Grande do Norte, Brazil, 2021
Source: research data.

Comparison Forest plot: Pain score – massage versus routine care



Comparison Forest plot: Duration of crying – massage versus routine care

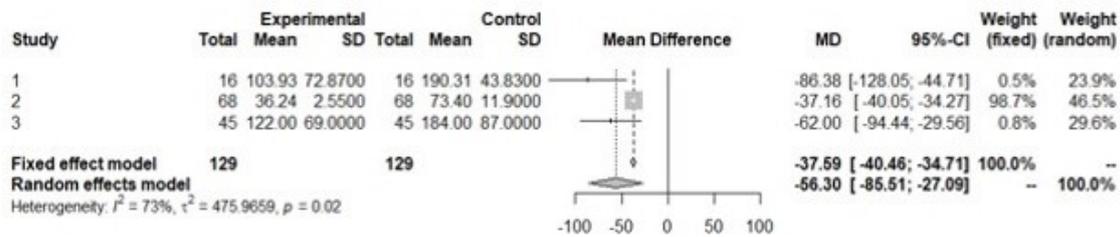


Figure 3 – Comparison Forest plot: Pain score – massage versus routine care and Comparison Forest plot: Duration of crying – massage versus routine care. Natal, Rio Grande do Norte, Brazil, 2021
Source: research data.

DISCUSSION

In general, the results identified the use of massage as a therapy due to its safety and easy applicability in pain relief, with analgesic efficacy evidenced in most interventions, in addition to being a safe technique, in which it can be performed by professionals or parents. In an experimental study with newborns, it corroborates the results by showing similarity with the findings, since the massage performed by the parents helped in pain relief and promotion of bond between them⁽³⁶⁾.

Also, according to an experimental study and a descriptive study, the effects of massage in reducing pain and crying time can be intensified with the presence of the mother, since contact with the presence of the mother promotes increase of bond, in addition to assist in non-pharmacological measures during the hospitalization period⁽³⁷⁻³⁸⁾. In addition, an experimental study also reinforces that massage ensures benefits in the physiological scope, ensuring less hospitalization time and the number of mortalities⁽³⁹⁾.

Therefore, it was observed a prevalence of positive results of massage regarding pain relief and reduction of crying time in newborns compared to certain non-pharmacological procedures applied when submitted to puncture, having significant results for the normality of vital signs and SpO₂, enabling consistency for clinical practice, promoting quality of life for patients^(24-28,30-32,34-35).

Thus, according to the results, in addition to massage being beneficial in pain relief, reducing crying time, normalizing vital signs, SpO₂ and behavioral patterns, randomized clinical trials have identified positive changes on improvement in the immune system⁽⁴⁰⁾ and function and parasympathetic development of the autonomic nervous system⁽⁴¹⁾, in addition to result in shorter hospital stays⁽⁴²⁾.

According to the results, the most common painful procedures were venous puncture, heel puncture and vaccination. Corroborating the shown data, a descriptive and exploratory study conducted in the NICU of a Brazilian hospital identified back puncture, chest drainage, phlebotomy, intramuscular and subcutaneous injection, venous and arterial puncture as the most common painful procedures⁽⁴³⁾. Another descriptive study identified that the first 14 days of hospitalization of the newborn, 42.9 painful procedures were performed by NB, the most frequent being calcaneal puncture⁽⁴⁴⁾.

Regarding pain assessment scales, the most observed among the studies was the Neonatal Infant Pain Scale, followed by the Premature Infant Pain Profile, and with only one study using the *Douleur Aiguë du Nouveau-né* scale. Corroborating this, a descriptive and comparative study stated a 60% preference among professionals for the use of

the Neonatal Infant Pain Scale, and its easy understanding, applicability, and effectiveness in quantification. In addition, it was considered more convenient when applied in the NICU⁽⁴⁵⁾.

It is emphasized that neonatal pain is considered a challenge regarding its identification, in which a cross-sectional study considered as necessary the implementation of pain assessment and treatment protocols⁽⁴⁶⁾. However, more recent studies, such as a cross-sectional study conducted with 55 nurses from a NICU, pointed out facial expression, crying and motor agitation as important and crucial aspects that identify the presence of pain in newborns⁽⁴⁷⁾.

Moreover, still justifying a good part of the use of the Premature Infant Pain Profile scale in the results, a pilot study corroborates by reporting that this scale is configured as very accurate and objective for the assessment of pain in newborns⁽⁴⁸⁾, which is also in agreement with a study cross-sectional study conducted with nurses from a NICU, in which the Premature Infant Pain Profile was reported as being the most applied among professionals⁽⁴⁹⁾. In turn, in a study assessing the scales, was highlighted that the *Douleur Aiguë du Nouveau-né* scale does not have reports of clinical utility, despite having psychometric properties⁽⁵⁰⁾, its use may be justified in only one result of the present study.

Furthermore, regarding the intensity, duration, application site and techniques used to perform the massage, it was observed the prevalence of the intervention being effective when performed with light and/or moderate pressure intensity, with soft massages. As for the application sites, they were more frequently observed in the upper and lower limbs, with a time ranging between two and 30 minutes, before or after the puncture. These results are repeated by an exploratory study with 186 newborns who underwent massage with light touches, kneading and stretching of the limbs, showing positive results in pain relief⁽⁵¹⁾. It is important to point out that, as it is a current theme in neonatology and in the literature, there is still no recommendation regarding the time of application.

These results are corroborated by a quasi-experimental study with significantly positive effects of massage, in which massage was applied softly, using the palms of the hands for a period of approximately five minutes, twice a day, following the cephalocaudal order⁽⁵²⁾.

The age group present in the results was between 28 and 38 weeks, with a prevalence of premature and male. Similar to these results, a randomized clinical trial with 112 newborns was also within this GA interval, between 32 and 34 weeks, showing the frequency of premature babies⁽⁵³⁾. As for gender, a cross-sectional study identified that from the 258 newborns admitted to the NICU, males had a higher risk factor for hospitalization⁽⁵⁴⁾, corroborating the findings of the review.

The results of the meta-analysis on the pain score show that there was no significant difference between massage versus routine care. However, although there was no statistically significant difference in the meta-analysis, the systematic review showed a reduction in pain assessment scales in newborns undergoing puncture who received massage.

The meta-analysis on the positive effects of massage versus routine care in reducing crying time showed statistically significant results, in order to show how much massage influences the relief and reduction of painful perceptions of newborns, directly influencing the crying time.

Thus, the study in question aims to corroborate future research on the theme, since the main limitation was related to the scarcity of literature. With this, it will be possible to promote scientific technical ground to health professionals, as well as students, aiming to advance in the quality treatment of newborns. The study contains articles referring to 11 clinical trials and a quasi-experimental study, presenting a high level of evidence for the results.

It is necessary to highlight the limitations in conducting the study, where the total number of articles included in the sample was 12, however, due to the availability and homogeneity of information, only four articles were compatible to perform the meta-analysis. Another limitation of the study was the lack of language restrictions and translation difficulties, as most of the selected articles were in English and Persian. Thus, it is evident the scarcity of scientific studies such as randomized clinical trials of high quality and level of evidence.

It is also emphasized that, due to the application of non-pharmacological interventions such as massage for neonatal pain relief being a scarce topic in the literature, it is necessary to conduct scientific studies on the effects and positive points of this method, since it gives to hospital practice of nurses, the development of skills and abilities aimed at quality care, since the number of painful invasive procedures in the NICU context is inevitable.

■ CONCLUSION

The main results of this study are the reduction of neonatal pain scores, reduction of procedure time, reduction of crying duration and stabilization of vital signs (less change in heart rate and oxygen saturation) in newborns submitted to puncture who received the intervention of massage. Thus, the outcomes found revealed that massage promotes pain relief by reducing the duration of crying in newborns submitted to puncture.

Newborns submitted to puncture are in a position of vulnerability, therefore, it is highlighted the need for singularized care by the multidisciplinary team, especially nursing professionals, who provide direct assistance to them. The present review presented relevant results regarding the use of massage to relieve pain in newborns during such procedure. In view of this, it is expected that the information in evidence can be used in the implementation of care protocols that are applied to improve the quality of care provided to newborns.

In addition, new randomized clinical trials and controlled must be performed with greater methodological rigor to reduce the risk of bias, and also with larger samples to increase the accuracy of clinical findings, since a certain scarcity has been identified in the literature.

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The authors declare that there is no conflict of interest.

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Received: 02.08.2022

Approved: 05.16.2022

Associate editor:

Carlise Rigon Dalla Nora

Editor-in-chief:

Maria da Graça Oliveira Crossetti