

Non-pharmacological methods for pain relief during mammography: integrative review

Métodos não farmacológicos para o alívio da dor durante mamografia: revisão integrativa

Katherine Olga Correia Alves Santos¹, Clarissa Lima Franco², Caique Jordan Nunes Ribeiro^{2,3}, Mariangela da Silva Nunes¹, Maria do Carmo de Oliveira^{1,2}

DOI 10.5935/2595-0118.20220029-en

ABSTRACT

BACKGROUND AND OBJECTIVES: Mammography is an examination of images of the breasts, obtained through radiography with compression of the breast tissue. Pain is a factor constantly reported by patients undergoing the procedure and, for this reason, there is a need to establish alternative non-pharmacological strategies that reduce the sensation of pain. The aim of this study was to carry out an integrative review on non-pharmacological methods used for pain relief during mammography examination.

CONTENTS: The search was carried out in April 2021 in four databases (Pubmed, Medline, Scopus and CINAHL) using the descriptors “pain”, “pain management”, “mammography”, “music therapy” and “complementary therapies “. After reading and final analysis, four articles met the pre-established criteria, addressing the non-pharmacological management of pain during mammography. The studies showed different methods to reduce pain, such as the use of pads and changes in the compression protocol, as well as the intervention with music.

CONCLUSION: Evidence on the non-pharmacological management of mammography-related pain is still scarce. Among the strategies found, the customized compression protocol and the use of compressible pads showed analgesic efficacy, while the use of music did not result in a significant reduction in procedural pain. However, as this is an integrative review, there is a need to carry out evidence syntheses with greater methodological rigor to estimate the size of the analgesic effect of these interventions.

Keywords: Complementary therapies Mammography, Pain, Pain management.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A mamografia é um exame de imagens das mamas, obtidas por meio de radiografia com realização da compressão do tecido mamário. A dor é um fator constantemente relatado pelas pacientes submetidas ao procedimento e, por esse motivo, evidencia-se a necessidade de estabelecer estratégias alternativas não farmacológicas que reduzam a sensação dolorosa. O objetivo deste estudo foi realizar uma revisão integrativa sobre os métodos não farmacológicos utilizados para o alívio da dor durante o exame mamográfico.

CONTEÚDO: A busca foi realizada no mês de abril de 2021 em quatro bases de dados (Pubmed, Medline, Scopus e CINAHL) utilizando os descritores “dor”, “manejo da dor”, “mamografia”, “musicoterapia” e “terapias complementares”. Após a leitura e análise final, quatro artigos atenderam aos critérios preestabelecidos, abordando o manejo não farmacológico da dor durante a mamografia. Os estudos evidenciaram diferentes métodos para redução da dor, como a utilização de almofada e a alteração no protocolo de compressão, bem como a intervenção com música.

CONCLUSÃO: Evidências sobre o manejo não farmacológico da dor relacionada à mamografia ainda são escassas. Entre as estratégias encontradas, o protocolo personalizado de compressão e o uso de almofadas compressíveis apresentaram eficácia analgésica, enquanto o uso da música não resultou em redução significativa da dor procedimental. No entanto, por se tratar de uma revisão integrativa, destaca-se a necessidade da realização de sínteses de evidências com maior rigor metodológico para estimar o tamanho do efeito analgésico dessas intervenções.

Descritores: Dor, Mamografia, Manejo da dor, Terapias complementares.

INTRODUCTION

Mammography is the most effective and low-cost procedure for early identification of breast alterations¹. Among these is breast cancer, whose occurrence in women is the leading cause of cancer mortality in the world, as well as in Brazil, where there is an estimation of 66280 new cases for the period of 2020-2022^{2,3}. The compression performed by the mammography unit reduces breast thickness in order to separate the overlapping structures and minimize the absorbed radiation⁴. Despite its importance in the identification of these changes in the breast tissue, the literature contains reports claiming that the receptivity to mammography is negatively influenced by procedural pain, discouraging

Katherine Olga Correia Alves Santos – <https://orcid.org/0000-0002-3819-0917>;

Clarissa Lima Franco – <https://orcid.org/0000-0002-4462-3408>;

Caique Jordan Nunes Ribeiro – <https://orcid.org/0000-0001-9767-3938>;

Mariangela da Silva Nunes – <https://orcid.org/0000-0003-0693-5790>;

Maria do Carmo de Oliveira – <https://orcid.org/0000-0003-4719-3893>.

1. Federal University of Sergipe, Nursing Department, Aracaju, SE, Brazil.

2. Federal University of Sergipe, Postgraduate Program in Nursing, São Cristóvão, SE, Brazil.

3. Federal University of Sergipe, Nursing Department, Lagarto, SE, Brasil.

Submitted on July 14, 2021.

Accepted for publication on 19 May, 2022.

Conflict of interests: none – Sponsoring sources: none.

Correspondence to:

Katherine Olga Correia Alves Santos

E-mail: kathebale_i9@hotmail.com

ging the return of patients, which results in impairment of early detection and worse prognosis⁵.

Pain is defined as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage”⁶. In addition, it is known that pain is subjective and, therefore, complex to measure precisely. Therefore, during mammography, the feeling of fear and anxiety can influence the experience of each woman undergoing the procedure in different ways⁵.

Two previous reviews reported the use of different interventions, pharmacological and non-pharmacological, to assess pain intensity before and after the mammography procedure. These studies found that verbal and written information before the procedure, as well as compression control by the patient, obtained positive results, thus showing the relevance of previous guidance^{7,8}.

In order to provide more comfort during some painful procedures, integrative techniques have been used, such as music and aromatherapy, which have shown good response in relieving acute procedural pain and in the acceptance of procedures when associated with common practices^{9,10}. Nevertheless, the lack of knowledge about the applicability of these methods must be mentioned as an important gap⁹.

Therefore, the present study’s objective was to carry out an integrative literature review on the use of non-pharmacological strategies for pain management during mammography with the purpose of contributing to the knowledge on the subject.

CONTENTS

An integrative review aimed at identifying studies on non-pharmacological management of pain during mammography. Thus, Whittemore and Knaff’s methodological framework was adopted, consisting of five stages: problem identification, search, data evaluation, analysis and presentation of results¹¹. First, the research guiding question was defined: what are the non-pharmacological methods used for pain relief in women during the mammography exam?

The searches were then conducted during the month of April 2021 in the Pubmed, CINAHL, Scopus and Medline databases, accessed through the EBSCO platform using the DeCS/Mesh controlled descriptors in English, Portuguese and Spanish: mammography (*mamografia, mamografía*), pain management (*manejo da dor, manejo del dolor*), pain (*dor, dolor*), complementary therapies (*terapias complementares, terapias complementarias*) and music therapy (*musicoterapia, musicoterapia*) added to the Boolean operators AND and OR.

Studies included were: original primary studies; published between 2011 and 2021; with full text available in English, Portuguese and/or Spanish; that investigated the non-pharmacological management of mammography-related pain in women. The following were excluded: animal models, reviews (systematic, integrative, narrative and scoping), editorials, letters to the editor, commentaries and experience reports. Duplicate manuscripts were computed only once.

The next step was to screen the articles according to titles and abstracts. Studies considered relevant were read and selected according to the eligibility criteria (Figure 1).

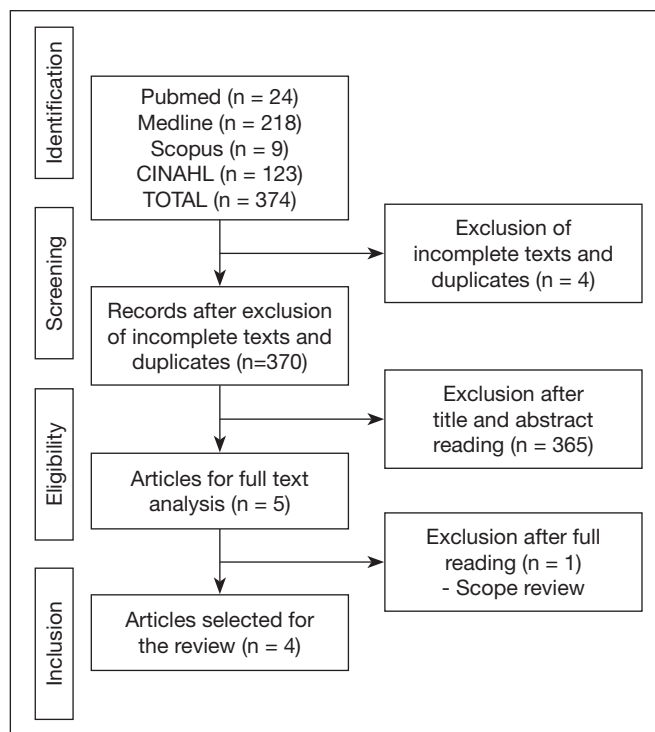


Figure 1. Article identification and selection flowchart

Data extraction and cataloging of the studies included in the final sample was performed in a standardized spreadsheet according to title, author, journal, year of publication, country of origin, and categorized by level of scientific evidence using the Oxford Center for Evidence-Based Medicine 2011 (OCEBM) tool, which classifies studies into five levels (1 to 5) according to the research question and study design.

Inconsistency between studies, imprecision, mismatch between the type of question and design, or cases where the absolute effect size is too small, can result in the level of evidence being lowered. However, if a large effect size is observed, the level can be raised¹².

Next, a qualitative synthesis of the data was performed, from which the characteristics of the studies selected in the final analysis were presented in table 1.

The final sample was composed of four articles from research conducted in the United States, the Netherlands, China, and Germany, published between 2014 and 2017 in the English language. Of these, two were classified as 3B (case-control study) and two were classified as 2B (cohort study or lower quality clinical trial), according to the OCEBM levels of evidence.

The articles selected for the review were classified as studies of lower scientific quality, highlighting the need for studies with greater scientific rigor, such as randomized clinical trials with large samples and greater statistical power, approving the use of different non-pharmacological methods for pain relief during the mammography exam. The main results of the studies are presented in table 2.

Two studies dealt with personalized compression, which consists of adjusting the pressure exerted on the breast according to the contact

Table 1. Description of studies included in the review.

Authors	Country of Origin	Design and Level of Evidence	Sample Size	Objectives
Zavotsky et al. ¹³	United States of America	Prospective quasi-experimental study 2B	100 women	Examine the relationship between screening mammography and music intervention.
de Groot et al. ¹⁴	Netherlands	Observational Study 3B	117 women	Gain insight into existing and potential mammography pain prevention strategies by simultaneously recording breast mechanics and pain throughout the breast compression cycle.
Chan, Lo and Cheung ¹⁵	China	Cohort Study 2B	100 women	Evaluate the effectiveness of a radiotransparent pad (MammoPad; Hologic Inc, Bedford [MA], US) during screening mammography to reduce pain in Chinese patients and the possibility of glandular dose reduction.
Ferder and Grunert ¹⁶	Germany	Prospective observational study 3B	199 women	Determine how to reduce the presence of pain during mammographic compression. In doing so, the authors evaluated its association with compression force, compressed breast surface area, breast density (ACR), and previous operations.

ACR = American College of Radiology.

Table 2. Results of evaluated studies

Authors	Results
Zavotsky et al. ¹³	The mean unadjusted pain scores (X) were lower for the music therapy group ($X = 4.38 \pm 2.58$) compared to the control group ($X = 4.44 \pm 2.93$), which received no music. A statistical calculation was performed to evaluate the association between anxiety and pain scores. A significant, moderate, positive relationship was found between participants' anxiety and pain scores ($r = 0.54$; $p < 0.01$). These results support an association between anxiety and pain in this population that may influence pain perception in both groups.
de Groot et al. ¹⁴	Breast compressions consisted of a deformation phase for flattening and a clamping phase for immobilization. The clamping phase lasted 12.8 ± 3.6 seconds (mean \pm standard deviation), 1.7 times longer than the deformation phase of 7.5 ± 2.6 seconds. During the clamping phase, the mean pain intensity increased from 4.75 to 5.88 (24%) on the numerical rating scale (NRS) from 0 to 10, and the proportion of women presenting severe pain ($NRS \geq 7$) increased from 23% to 50%. Moderate pain ($NRS \geq 4$) was reported up to four days after mammography. Multivariate analysis showed that pain memory from the previous mammogram and pain in the breast prior to compression are significant predictors of pain. Women with smaller breasts experienced more pain.
Chan, Lo and Cheung ¹⁵	Of the 100 patients, 66.3% of women reported at least a 10% reduction in the level of discomfort with the use of the MammoPad. No statistical differences were found for age, breast size, and discomfort level. The mean pain score was 5.7 ± 2.5 without the MammoPad vs 4.2 ± 1.8 with the use of the device.
Ferder and Grunert ¹⁶	The thickness of the compressed breast was 65.2% of the uncompressed breast at a force of 10 daN (57.8% at 15 daN). When the force was increased from 10 daN to 15 daN, the average glandular dose (AGD) decreased by 17%. Compression tolerance was associated with breast size. More than 50% of mammograms with compression less than 9 daN were associated with higher pain levels. In the oblique projection, 60% of the women specified the axilla as the area of most pain.

NRS = Numerical Rating Scale; AGD = average glandular dose.

area, i.e., its size^{14,16}. This is an important factor to be evaluated, since in many places the compression force is the same in all procedures, regardless of the size and density of the examined breast. When comparing the standard compression protocol with the customized one, authors found that pain scores were reduced. The compression time resulted in an increase from 23% to 50% in the number of women who had severe pain in the clamping or immobilization phase of compression, showing that prolonged compression also interferes with the perception of pain¹⁴. Furthermore, another study addressed the fact that 60% of women reported pain in the axilla and not in the compression site¹⁶. These studies pointed out the customization of the compression protocol as the best method for pain relief during mammography, since both reported more intense pain for women with less voluminous breasts, a problem that was solved by customizing compression. The use of a radiotransparent, compressible pad (MammoPad, Hologic Inc, Bedford MA, USA) was tested in one of the studies. The use of this device as support for the breasts during compression presented good results for pain reduction as well as for

image quality, 92% of which were similar to the group that did not use the device. However, unlike the other studies, this one did not present an association between the incidence of pain and breast size¹⁵.

The use of integrative and complementary therapies was one of the least investigated topics. Only one of the studies evaluated the efficacy of musical intervention in the management of pain during mammography. Although the group that received music therapy presented lower pain intensity initially, music did not reduce pain after adjustments for analgesic use and clinical conditions of the patients. Nevertheless, a significant relationship between pain and anxiety was identified, alerting to the need for more specific studies about integrative practices and pain perception during mammography¹³.

CONCLUSION

The analysis of the results of this review revealed some non-pharmacological strategies for pain management during

mammography, such as customization of the compression protocol, use of a radiopaque compressible pad and music. Both customization of compression and use of the compressible pad showed satisfactory results for reducing procedural pain in the original studies. On the other hand, music was not effective for analgesia. The results of this review show that robust scientific evidence that can support the non-pharmacological management of pain during mammography is scarce, highlighting the need for additional studies with greater methodological rigor.

AUTHORS' CONTRIBUTION

Katherine Olga Correia Alves Santos

Data Collection, Conceptualization, Project Management, Research, Methodology, Writing - Preparation of the original, Writing - Review and Editing, Visualization

Clarissa Lima Franco

Methodology, Writing - Review and Editing

Caique Jordan Nunes Ribeiro

Conceptualization, Methodology, Writing - Review and Editing, Supervision

Mariangela da Silva Nunes

Conceptualization, Methodology, Writing - Review and Editing, Supervision

Maria do Carmo de Oliveira

Conceptualization, Methodology, Writing - Review and Editing, Supervision

REFERENCES

1. Serwan E, Matthews D, Davies J, Chau M. Mammographic compression practices of force- and pressure-standardisation protocol: A scoping review. *J Med Radiat Sci.* 2020; 67(3):233-42.
2. GLOBOCAN - Cancer Incidence and Mortality Worldwide: IARC Cancer. Lyon, France: International Agency for Research on Cancer. 2020. Disponível em: <http://globocan.iarc.fr>. Acesso em: 26/05/2021.
3. INCA - Instituto Nacional do Câncer José Alencar Gomes da Silva. Estimativa 2020. Incidência do Câncer no Brasil. Rio de Janeiro: INCA, 2019.
4. INCA - Instituto Nacional do Câncer José de Alencar Gomes da Silva. Ministério da Saúde. Atualização em mamografia para técnicos em radiologia. 2ª ed. rev. atual. Rio de Janeiro: INCA, 2019.
5. Gomes EA, Jesus MCP, Silva MH, Merighi MAB, Campos SEM. Motivos da não realização da mamografia por mulheres com idades entre 60 e 69 anos. *Revista APS*, 2018;21:2.
6. DeSantana JM, Perissinotti DM, Oliveira Junior JO, Correia LM, de Oliveira CM, Fonseca PR para a língua portuguesa da definição revisada de dor pela Sociedade Brasileira para o Estudo da Dor. *BrJP*. 2020;3(3):197-8.
7. Ribeiro NFP, Ribeiro CJN, Oliveira ALC, Dias EMF, Silva Santos, M, Santos AD et. al. Efeito analgésico da música durante a fotocoagulação retinal a laser em diabéticos: Um estudo cruzado, randomizado e controlado por placebo. *Res Soc Develop.* 2021;10(6):1-12.
8. Lakhan SE, Sheaffer H, Tepper D. The effectiveness of aromatherapy in reducing pain: a systematic review and meta-analysis. *Pain Res Treat.* 2016;2016:8158693.
9. Whittemore R, Knaff K. The integrative review: Updated methodology. *J Adv Nurs.* 2005;52(5):546-53.
10. CEBM. The Centre for Evidence-Based Medicine develops. *OCEBM Levels of Evidence.* 2011;287-95.
11. Zavotsky KE, Banavage A, James P, Easter K, Pontieri-Lewis V, Lutwin L. The effects of music on pain and anxiety during screening mammography. *Clin J Oncol Nurs.* 2014;18(3):E45-9.
12. de Groot JE, Broeders MJM, Grimbergem CA, den Heeten GJ. Pain-preventing strategies in mammography: an observational study of simultaneously recorded pain and breast mechanics throughout the entire breast compression cycle. *BCM Womens Health.* 2015;15:26.
13. Chan HH, Lo G, Cheung PS. Is pain from mammography reduced by the use of a radiolucent MammoPad? Local experience in Hong Kong. *Hong Kong Med J.* 2016;22(3):210-5.
14. Ferder K, Grunert JH. Is individualizing breast compression during mammography useful? investigations of pain indications during mammography relating to compression force and surface area of the compressed breast. *Rofo.* 2017;189(1):39-48.

