

Foot reflexology in painful conditions: systematic review

Reflexologia podal em condições dolorosas: revisão sistemática

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ABSTRACT

BACKGROUND AND OBJECTIVES: Because foot reflexology is commonly associated with other interventions, its benefits are difficult to establish. In addition, systematic reviews have been carried out many years ago, analyzing unspecific parameters and with controversial results. Thus, the objectives of this study were: to analyze the results of randomized controlled trials with a control group in painful conditions, using foot reflexology as a single intervention; describe the proposed application and methodological quality of the studies (PEDro scale).

CONTENTS: The PEDro, Pubmed, Scielo and LILACS data bases were consulted, searching for clinical trials with the following keywords and Boolean index: Foot Reflexology AND pain; reflexology foot massage AND pain (English, Portuguese and Spanish). These keywords should have been present in the title or summary of the article for inclusion, directing to pain and moving away from other variables. 95 studies were found, 17 were selected and most of the results were favorable. The usual application varies from 2-30 minutes of stimulation on each foot, varying between massaging in general or using the somatotopic map stimulating the solar plexus, pain correspondence zone and accessory points related to the diagnosis. In short, the studies showed moderate to good methodological quality according to the PEDro scale.

CONCLUSION: Foot reflexology has shown promise for pain relief as an isolated therapy in neuromusculoskeletal cases in hospital and outpatient settings. The hope is that studies of excellent methodological quality can support this statement in the near future.

Keywords: Musculoskeletal manipulations, Pain, Physical therapy modalities.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os benefícios da reflexologia podal são difíceis de serem estabelecidos, pois revisões sistemáticas foram realizadas há muitos anos, analisando parâmetros inespecíficos com resultados controversos. Os objetivos deste estudo foram analisar os resultados de ensaios clínicos randomizados com grupo controle frente a quadros dolorosos, com a reflexologia podal como intervenção única; registrar sua aplicação e a qualidade metodológica dos estudos (escala PEDro).

CONTEÚDO: Foram consultadas as bases de dados PEDro, Pubmed, Scielo e LILACS, buscando por ensaios clínicos com as seguintes palavras chaves e índice booleano: *Foot Reflexology AND pain; reflexology foot massage AND pain* (inglês, português e espanhol). Essas palavras-chave deveriam estar presentes nos tópicos de título ou resumo do artigo para sua inclusão, direcionando para quadro algico e afastando-se de outras variáveis. Foram encontrados 95 estudos, 17 foram selecionados e em sua maioria os resultados foram favoráveis. A aplicação usual varia de 2-30 minutos de estimulação em cada pé, alterando massagear de maneira geral ou pelo mapa somatotópico estimulando o plexo solar, zona de correspondência de dor e pontos acessórios relacionados ao diagnóstico. Os estudos apresentaram qualidade metodológica de moderada a boa segundo a escala PEDro.

CONCLUSÃO: A reflexologia podal mostrou-se promissora para alívio da dor como terapia isolada em casos de dor neuromusculoesquelética em ambiente hospitalar e ambulatorial. Estudos de melhor qualidade metodológica devem ser realizados para comprovar a importância da reflexologia podal na dor neuromusculoesquelética.

Descritores: Dor, Manipulações musculoesqueléticas, Modalidades de fisioterapia.

INTRODUCTION

For not getting good results with the Western biomedical model, some patients seek alternative methods of pain treatment. The Integrative and Complementary Health Practices (IChP) are being implemented in Brazil's Serviço Único de Saúde (SUS – Unified Health System) 2006, and include massage, acupuncture, herbal medicine, Lian Gong, Yoga, Tai Chi, manipulative resources, music therapy, and reflexology^{1,2}.

In the last centuries, the nervous system's ability to detect information from the outside world and produce a response has caused researchers to question whether reflexes are an involuntary response to a stimulus, whether a diseased organ was perhaps receiving the wrong directions from the brain, and, if the organism were able to interrupt such erroneous stimulus, would it be able to return to its normal way of functioning or not³.

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Maps propose that the ears, hands, and feet have areas that correspond to body parts, and that by pressing specific points it's possible to treat organs, glands or systems from distant locations^{1,2,4,5}. Pressure receptors in these areas, once stimulated, would be able to send messages to the central nervous system (CNS), and from there the regulatory efference would reach the desired location⁵. Therefore, the reflex zones on the feet are used as the keyboard of a computer that communicates with the CPU (Central Process Unit), the CNS, and provokes a response emitted in the corresponding body part. In addition to this specific reflex effect, linked to a part of the body that needs to be treated, there are reports of reduction in tension and stress, a general relaxing effect, improvement of blood circulation, maintenance of good health, and promotion of well-being^{2,4,6}. Foot reflexology has shown promising results in cancer, chronic kidney disease, neuropathies, coronary artery disease, type 2 diabetes mellitus, multiple sclerosis, dementia, rheumatoid arthritis, dysmenorrhea, postoperative pain, and low back pain^{2,4,5,7,8}. An old systematic review and its update concluded that the scientific evidence of high methodological quality was insufficient to support positive effects of foot reflexology^{8,9}, but it doesn't analyze fatigue, sleep quality, stress, pain and anxiety, the association of other forms of auricular and hand reflexology, and the effects of foot reflexology as an isolated resource for the treatment of painful conditions. The purpose of this study was to analyze the results of randomized clinical trials with a control group of foot reflexology as a single intervention in the treatment of pain conditions.

Table 1. Search and selection of studies

Databases	Found	Repeated	Excluded	Final
PEDro	9	6	3	0
Pubmed	84	19	49	16
Scielo	1	0	0	1
LILACS	1	1	0	0
Total	95	26	52	17

Table 2. Characteristics of the analyzed clinical trials

Authors	Objectives	Counter Intervention	Population	Foot reflexology	Duration and sessions	PEDro scale	Results
Jones et al. ¹⁰	Compare the immediate effect of the application on the area of the foot corresponding to the heart (IG) to nonspecific areas (CG)	CG – placebo; unspecified zones of the foot	12 patients with chronic heart failure	IG - shoulder girdle region; CG - abdominal and pelvic region.	Bilateral and for 4.5 min; one intervention and one placebo session.	9	IG similar to CG (p>0.05). No improvement in pain.
Wyatt et al. ¹¹	Evaluate the safety and efficacy of reflexology in breast cancer	CG1 - random manipulation of the feet, superficial contact avoiding the IG areas; CG2 - conventional care.	286 women with breast cancer. IG - 95, CG1 - 95; CG2 - 96.	IG - stimulation on the nine essential breast cancer specific reflexes w/ firm pressure and thumbwalk ¹²	Weekly 30 min sessions for 4 weeks.	9	IG similar to CG1 (p>0.05). No improvement in pain.

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CONTENTS

The PEDro, Pubmed, Scielo and LILACS databases were searched. The following keywords were used for the search: Foot Reflexology, reflexology, foot massage and pain (English, Portuguese and Spanish). The Boolean index AND was used between the selected keyword and pain (Foot reflexology AND pain; reflexology AND pain), directed to pain and excluding other variables. These keywords had to be present in the title or abstract of the article for inclusion, and there were no restrictions as to the year of publication. In addition, “Clinical Trials” was one of the filters applied in order to eliminate other methodologies that did not mention comparative groups. Non-randomized studies were also disregarded. The studies needed to have pain as one of the analyzed variables and reflexology could not be associated with another form of treatment (such as analgesics or auriculotherapy). Other exclusion criteria were experiments with animals and results that were repeated in the databases. The studies that met the inclusion criteria were evaluated by the PEDro scale for clinical trials, applied by two professionals with experience in musculoskeletal physiotherapy, without eliminating the research according to the score obtained, i.e., only indicating the methodological quality of the study. Table 1 presents the quantitative data of the search.

Table 2 resumes the results of the selected clinical trials, and their arrangement is in descending order, that is, the higher the score indicated by the PEDro scale, the better the methodological quality of the study. The results described in the table refer to pain results only and not to other variables evaluated by the studies. Of the 17 analyzed studies, 14 (82%) showed superior results with foot reflexology compared to the control group regarding the analgesic effect of the intervention. However, in 3 of them, the classical foot massage, hand massage, and acupressure comparative groups were as effective as foot reflexology compared to the control group. The remaining three (18%) studies described insufficient results in the improvement of pain in heart patients (2 studies) and breast cancer (1 study). Nevertheless, heart patients (1 study) and cancer patients (3 studies - lymphoma, colorec-

Table 2. Characteristics of the analyzed clinical trials – continuation

Authors	Objectives	Counter Intervention	Population	Foot reflexology	Duration and sessions	PEDro scale	Results
Rambod, Pasyar and Shamsadini ⁵	Evaluate the effects of reflexology on fatigue, pain and sleep quality in patients with lymphoma	CG - conventional hospital care	72 patients with lymphoma, IG - 36 and CG 36.	IG - used almond oil and were pressed, using slidings, rotation, and stretching on the hallux, solar plexus (sleep), inner and outer edges of the forefoot, midfoot, and inner edge of the sole and heel (fatigue and lower back pain, shoulder girdle, hands, legs, and feet).	5 sessions on 5 consecutive days, 15 min on each foot	8	IG superior to CG (p<0.05)
Pasyar, Rambod and Kahkhaee ¹³	Evaluate the effects of reflexology on pain and anxiety after surgery for diaphyseal tibial fracture	CG - conventional hospital care	66 postoperative of diaphyseal fracture of the tibia. IG - 33; CG - 33.	IG - massage performed from the heel to the toes (dorsal and plantar surfaces), not selecting a specific area. Sliding movement using almond oil.	Single session, 10 min (5 on each foot)	8	IG superior to CG (p<0.001)
Medeiros, Sasso and Schindwein ⁷	Describe the relief of acute low back pain through foot reflexology in hospital nursing staff	CG - non-specific reflexotherapy, with gentle and superficial kneading	36 nurses w/ acute low back pain. IG - 17, CG - 19.	IG - reflex areas stimulated w/ strong kneading: spine (thoracic and lumbar), hip, pelvis. Area of lumbar musculature and sciatic nerve. 3 x 8 repetitions in each area.	Two sessions (72-hour interval) on both feet of 30 minutes (15 each)	8	IG superior to CG (p<0.01)
Saatsaz et al. ¹⁴	Determine the effect of massage in pain and anxiety after cesarean section	CG1 - Hand and foot massage CG2 - conventional hospital care.	156 participants after cesarean section IG - foot massage (52), CG1 - manual and foot massage (52), CG2 - (52)	IG - <i>Petrissage</i> , kneading and rubbing applied with vaseline and with no specification of the stimulated reflex zones	Single session, 5 min on each limb.	8	IG and CG1 superior to CG2 (p<0.001)
Imani et al. ⁶	Evaluate the effects of reflexology on nitroglycerin-induced migraine	CG1- placebo, unspecified site massage (heel); CG2 - control, no massage	75 patients admitted to the coronary unit. IG - 25, CG1 - 25, CG2 - 25	IG - massage applied to the upper portion of both hallux (head-brain reflex zone). Continuous and uniform pressure applied with the thumb.	Two 20 min sessions (10 min on each foot). Interval of 3h between sessions.	7	IG superior to CG1 and CG2 (p<0.001)
Wojciech, Pawel and Halina ¹⁵	Evaluate the effects of foot reflexology and segmental massage on migraines	CG - segmental massage, 3 times per week, 20 min, 15 total. Application in multiple locations: spine and back muscles, pectoralis major, neck, and head	40 women w/ migraine attacks (2-10 years). IG - 20, CG - 20.	IG - pressure applied w/ thumb on solar plexus, pituitary gland, heart and liver (reflex zones). The other parts of the plantar face of the foot were also massaged, and the solar plexus was the last.	2 sessions per week, 30 min (15 on each foot), 10 total.	7	IG superior to CG (p<0.05)
Koç and Gozen ¹⁶	Evaluate the effect of foot reflexology applied to infants on acute pain that may arise after vaccination.	CG - control, no massage.	60 infants (up to 12 months) pre-vaccine. IG - 30; CG - 30.	IG - applied sliding of the toes toward the heel	20-30 min of foot stimulation	7	IG superior to CG (p<0.001)
Koç Ozkan et al. ¹⁷	Determine the effects of foot massage and acupuncture on pain during heel puncture in newborns.	CG1 - acupuncture, 2 min, pressure for 60s on acupuncture points B60 and R3; CG2 - control, no intervention	139 newborns, pre-puncture on the heel, IG - 47; CG1 - 46; CG2 - 46	IG - general foot massage	Only 2 min	6	IG and CG1 superior to CG, with no intergroup difference (p<0.001)

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Table 2. Characteristics of the analyzed clinical trials – continuation

Authors	Objectives	Counter Intervention	Population	Foot reflexology	Duration and sessions	PEDro scale	Results
Hattan, King and Griffiths ¹⁸	Investigate the impact of foot massage and guided relaxation on patients undergoing coronary artery bypass grafting	CG1 - listened to a 20 min guided relaxation recording; CG2 - conventional hospital care	25 subjects post coronary artery bypass graft surgery. IG - 9; CG1 - 9; CG2 - 7.	IG - unspecified	Singles session of 20 min	6	IG similar to CG1 and CG2 (p>0.05). No improvement in pain.
Bakir, Baglama and GURSOY ²	To examine the effect of foot reflexology on pain and quality of sleep in patients with rheumatoid arthritis	CG - routine monitoring of the polyclinic	60 patients with rheumatoid arthritis. CG - 30 and IG - 30.	IG - Vaseline for lubrication, 5 min of general warm up movements. A) 3 min for the brain part (in the pituitary and pineal gland in the hallux). B) the spinal cord point, from the hallux to the middle of the heel. C) 2 min minimum pressure on the solar plexus point (reflex point of the central nervous system reflex point on the plantar surface). D) 3 min to stimulate the lymphatic system. E) 3 min in each region of the diaphragm; in the thyroid, stomach, and adrenal glands points. F) 5 min general movements.	6 sessions of 60 min (30 min each foot), 1 x week	5	IG superior to CG (p<0,01)
Uysal et al. ¹⁹	To determine the effect of 2 methods of foot massage on symptom control in people with colorectal cancer	CG1 - classical foot massage (<i>effleurage</i> , <i>petrisage</i> , friction, and vibration) was applied for 10 min on each foot, including the dorsum and sole of the feet. CG2 - routine clinical care	60 patients w/ colorectal cancer who received chemotherapy. IG -30, CG1 - 30 and CG2 - 30.	IG - stimulated reflex points: A) lymphatic system; B) organs included in the radiation area in the pelvic region - stomach, liver, spleen, spinal cord, colon and rectal orifice; C) sciatic region; D) brain, pituitary gland, hypothalamus, pineal gland and solar plexus.	2 x week, for 5 weeks. 30 min each session. 20 min on the right foot (represents the sympathetic system) and 10 min on the left foot (represents parasympathetic system)	5	IG effective in reducing pain and fatigue level, CG1 effective in reducing pain level. IG and CG1 superior to CG2 (p<0.05)
Nazari et al. ²⁰	Determine and compare the effects of reflexology and relaxation on pain in women with multiple sclerosis	CG1 - Jacobson and Benson techniques via guided relaxation recording. 2 x week, for 4 weeks, 40 min. CG2 - usual care	75 women with multiple sclerosis. IG - 25, CG1 - 25 and CG2 - 25.	IG - General massage, followed by pressure and thumb walk movements on the points of the solar plexus, hypothalamus, pituitary gland, spinal cord, Kidney 1 (K1), adrenal glands and pelvis. 20 min on each foot. Finishing with pressure in the solar plexus.	2 x week, for 4 weeks, 40 min.	5	IG superior to CG1 and CG2 (p<0.05). No difference between the 3 groups 2 months later (follow up)
Hanjani, Tourzani and Shoghi ²¹	Determine the effect of foot reflexology on anxiety and pain in primiparous women	CG - massage on other parts of the foot (unspecified).	80 primiparous women in labor, IG - 40 and CG 40.	IG - sunflower oil, massage performed on the entire soles of the feet at first. Later, rotational pressure on the pituitary gland, solar plexus and uterus points.	Single session, 40 min, 20 on each foot.	4	IG superior to CG (p<0.001)

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Table 2. Characteristics of the analyzed clinical trials – continuation

Authors	Objectives	Counter Intervention	Population	Foot reflexology	Duration and sessions	PEDro scale	Results
Stephenson et al. ²²	Compare the effects of partnered foot reflexology on pain and anxiety in cancer patients	CG - conventional hospital care, attention, and 30 min of reading on a topic the patient enjoys.	86 participants w/ cancer in random regions and metastasis. IG - 42 and CG - 44.	IG - Initial 10 min of general relaxing massage involving ankle, dorsal and plantar portions of the feet. 15 min of specific stimulation corresponding to the patient's areas and organs of complaint. Stimulation was also performed on the pituitary, thyroid and adrenal gland, and solar plexus points. A final 5 min of general relaxing massage.	A 30 min session applied by the patient's partner.	4	IG superior to CG (p<0.001)
Özdemir, Owayolu and Owayolu ²³	To evaluate the effect of foot reflexology on fatigue, pain and cramps in hemodialysis patients	CG - no mention of intervention	80 patients on hemodialysis. IG - 40, CG - 40.	IG - 5 min initial general relaxing massage involving ankle, dorsal and plantar portions of the feet. 7 min of specific stimulation corresponding to areas and organs of complaint of the patient. 7 min of stimulation on the pituitary, thyroid, parathyroid, pancreas, adrenal glands, and solar plexus points. Final 3 min of relaxing massage. Pressure, sliding and kneading were performed on the mentioned points.	3 sessions in one week after hemodialysis. 30 min, 15 min on each foot	3	IG superior to CG (p<0.05)

IG = Intervention group; CG = Control Group; min = minutes.

tal and metastases), were benefited by foot intervention in other studies, leaving uncertainty about the effectiveness in these cases. Foot reflexology has shown promise in three major groups, neuromusculoskeletal with acute low back pain, rheumatoid arthritis, after tibial fracture surgery and multiple sclerosis, in the hospital labor setting, after cesarean section, pre-vaccine, newborns in pre-puncture, or hemodialysis and migraine outpatients. It's worth noting that the described positive results were based on studies of moderate to good methodological quality (93%) and only one study of poor quality (7%). This classification is based on the PEDro scale criteria of "excellent" quality of 9-10, "good" of 6-8, "moderate" of 4-5, and "poor" when less than 4. When the recent considerations of a study²⁴ were applied, 29% of the analgesic effects obtained with foot reflexology fit into studies of methodological quality 8-10, considered "excellent".

Besides the use of sunflower oil, almond oil or petroleum jelly lubricants and a variation of 2-30 minutes of stimulation on each foot, two forms of feet intervention were found. One uses classical massage movements of *effleurage*, *petrissage*, friction, and vibration and works the foot in its plantar and dorsal aspects. The so-called reflexology form is applied to specific points by means of a somatotopic map, stimulating the areas where the patients complained of pain, and the following points: solar plexus, hypothalamus, pituitary gland, pineal gland, thyroid, parathyroid and adrenal gland, central nervous system and lymphatic

system. From the analyzed articles and the information present in the study, it's possible to structure the practice by starting the stimulation in the solar plexus, followed by the area that represents the location of body reported as painful and complement it with accessory points related to the clinical condition, presented in figure 1. The thumb walk technique was one of the most described, consisting of making flexion movements of the distal interphalangeal joint followed by short slidings. Besides sustained pressure and slidings, the use of accessories such as golf or tennis balls, river stones, broom or bamboo handles, foot roller, and surfaces of different textures can also be used by the professional, as well as guiding the patient to self-application.

In general, the effects were promising for the improvement of pain (82%), whether justified by the gate control theory, release of endorphins, or by the release of "energy blocks" by stimulating local circulation. A plausible explanation would be that the feet receive multiple nerve roots (L4 - S3) capable of propagating stimuli via the spinal cord and cortex, consequently emitting resolving efferences⁵. Whether the benefits are from stimulating specific reflex zones or the feet as a whole still remains to be discussed. In three studies where the intervention group was superior to the control (nonspecific zones on the feet and segmental massage), the stimuli were applied to specific locations on the feet^{6,7,15}. In five other studies with beneficial effects, the intervention group worked on the feet in general^{13,16,20,22,23}. Two more studies also massaged the feet

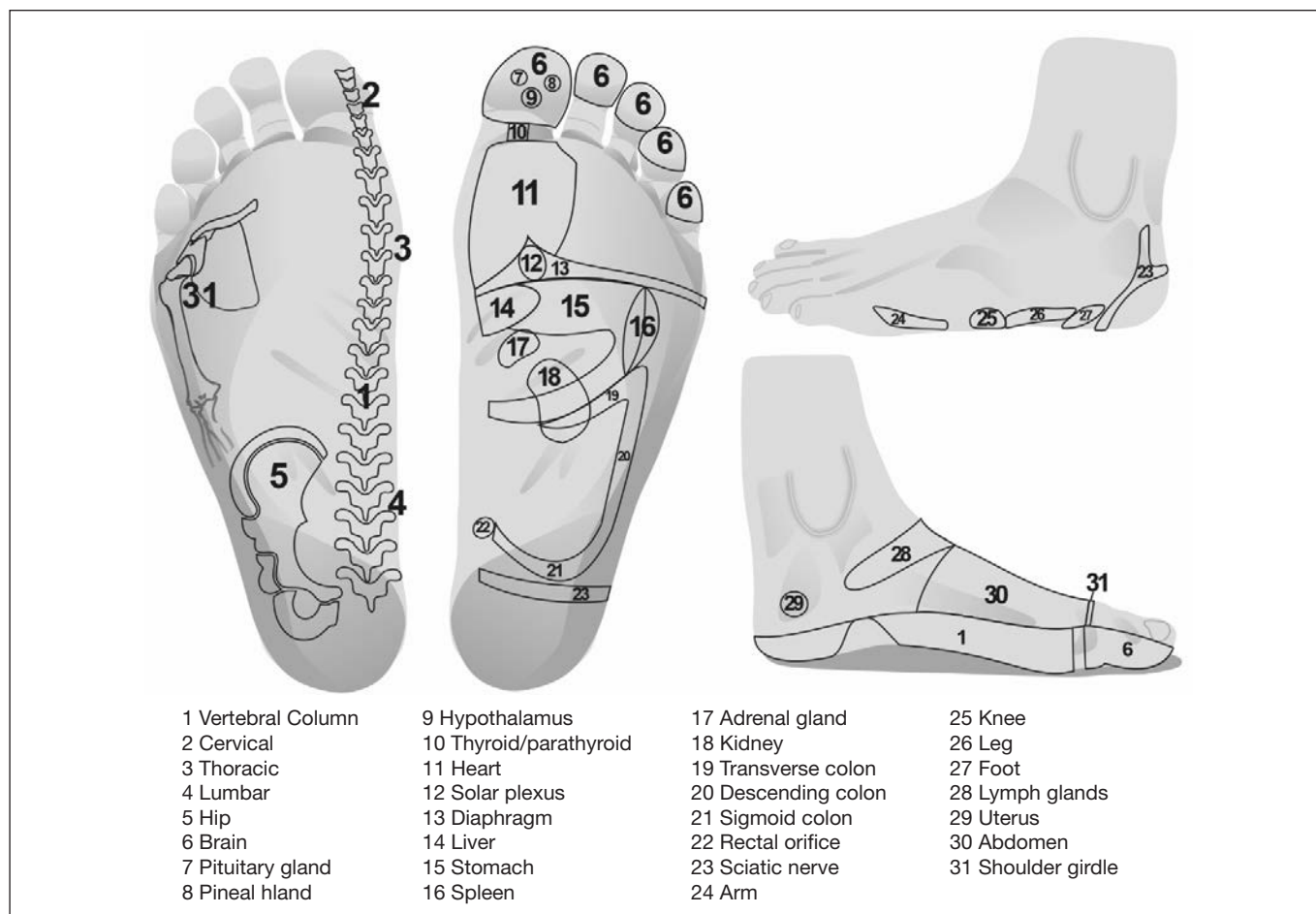


Figure 1. Representation of feet stimulation points.

Source: authors' personal archive

as a whole, reaching good results, but similar to the counter-interventions of acupressure and hand plus feet massage^{14,17}. Another four studies described the use of reflexology, but they stimulated too many areas, which ended up stimulating the entire foot of the participants^{2,5,19,21}. It should be taken into account that, by massaging the whole foot, the reflex areas will be as well, but that some studies have shown stimulation effects in specific areas to be greater than stimulation in random areas^{2,5-7,19}. Further studies are needed so that the relationship between areas of the foot and their specific effects are understood with more depth.

Of the three studies in which there was no pain improvement, two were of “excellent” methodological quality, used both reflex and randomized massage and should be considered in future research to determine whether the chosen resource is in fact ineffective or doesn’t meet the studied population of patients with heart disease and breast cancer^{10,11,18}. Even if not all of the analyzed studies have “excellent” quality, the current scenario can be considered positive for a path that leads to more reliable statements regarding foot reflexology for pain reduction. According to the new criteria, approximately 57% of the promising studies were classified with a quality of “excellent” and “good”, 36% “moderate” and 7% “poor”. This systematic review analyzed the results of foot reflexology as the single form of intervention, eliminating

the effects of others and discriminating its effect in isolation. However, the technique is commonly used as a complementary therapy and whether its effects are better when associated with other approaches is beyond the scope of this study. The analysis of variables other than pain was also not part of the present proposal. Therefore, for the record, improvements in fatigue, dyspnea, physical function, and anxiety were reported^{5,11,13,14}.

CONCLUSION

Most studies have shown that foot reflexology is effective in reducing pain, and the common practice is bilateral, lasts 2 to 30 minutes per foot, and follows the sequence of stimulating the solar plexus, corresponding area of pain in the body and accessory areas correlated to the diagnosis, or massaging the feet as a whole. These statements are based on studies of moderate to good methodological quality.

AUTHORS' CONTRIBUTIONS

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Data Collection, Conceptualization, Resource Management, Research, Methodology, Writing - Preparation of the original

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