

Acupressure for Pain of Osteoarthritis : A Systematic Review

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ABSTRACT

Background: Osteoarthritis can be defined as a disorder of movable joints characterized by deterioration of articular cartilage; osteophyte formation and bone remodeling; changes in periarticular tissues; and a low-grade, nonpurulent inflammation of variable degree. Acupressure is a traditional non-pharmacological intervention that promotes blood circulation and muscle activity.

Purpose: This review aimed to investigate the efficacy of acupressure as a complementary therapy method for the pain of osteoarthritis.

Methods: Four electronic databases were searched from PubMed, ProQuest, Scopus, and The Cochrane Library use PICO strategy. In studies comparing acupressure with sham acupuncture, no intervention, or conventional intervention was eligible for inclusion. Article study is published on 2012-2022, using English and design RCT and Quasi-experiment. Prisma analysis was used in selection process. The risk of bias in the included studies was assessed using the Joanna Briggs Institute Critical Appraisal Tools for Quasi-Experimental Studies and Randomized Controlled Trials.

Results: There were 12 reports selected for review with the homogeneity of knee Osteoarthritis. Outcomes were either objectively- or subjectively assessed improvements in specific pain parameters and safety for clinical use. Results showed more clinical trials with proper methodology are needed to confirm the effectiveness of acupressure for the pain of Osteoarthritis. The results of the review showed a positive effect in reducing pain level with acupressure intervention as either the main or complementary therapy.

Conclusion: This systematic review shows that acupressure as a single or complementary intervention provides significant benefits in the management of Osteoarthritis. Further trials with a more rigorous design are needed to further validate and address the limitations of the current evidence.

Keywords: acupressure, complementary therapy, osteoarthritis, pain

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BACKGROUND

Knee osteoarthritis (KOA) is a type of chronic arthritis and is common in the elderly population. The disease slowly affects cartilage, bone, and soft tissue, and causes inflammation and pain, which affects a person's quality of life (QOL). (Mahanani and Idris, 2020). In 2020, the number of elderly people in Indonesia will be 10.7% of the total population, which has the potential to continue to grow and is projected to be 12.5% in 2025 and then in 2030 it will be 14.60%. In 2021, there will be 42.22 % of elderly people in Indonesia have experienced health complaints in the last month, half of whom (22.48 percent) had their daily activities disrupted due to KOA pain. (Girsang et al., 2021). OA affects many areas of QOL such as physical function, emotional behavior, and mental health. OA-related pain is a major factor in poor QOL. The most common pharmacological treatment for pain control is the use of non-steroidal anti-inflammatory drugs (NSAIDs), but these drugs are associated with side effects. Because of the limitations associated with pharmacological treatment, patients opt for generally available alternative therapies for pain management. Popular alternative therapies include therapeutic touch, relaxation techniques, music therapy, acupuncture, and acupressure. (Shu *et al.*, 2021) These alternative therapies, unlike drug treatment, do not produce harmful side effects. Reflexology is an important part of Chinese medicine. It works similarly to acupuncture, which focuses primarily on stimulating acupuncture points or body meridians.(Mahanani and Yusiana, 2020).

Instead of needles, reflexology uses fingers to apply pressure to specific acupressure points. Some practitioners also use palms, forearms, elbows and special tools to stimulate acupuncture points by applying pressure. Stimulating acupuncture points circulates vital energy (qi) through the body's meridian system and balances energy flow for healing. Some practitioners claim that properly stimulating acupuncture points is very effective in controlling the symptoms of many ailments. (Sun *et al.*, 2019). Reflexology has a positive effect on many painful conditions such as migraines, menstrual pain, back pain, and various types of joint pain. This review aimed to investigate the efficacy of acupressure as a complementary therapy method for the pain of osteoarthritis.

OBJECTIVE

This review aimed to investigate the efficacy of acupressure as a complementary therapy method for the pain of osteoarthritis

METHODS***Design***

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) recommendations for reporting systematic reviews and preregistered in PROSPERO (registered on 19 May 2022 #Prospero ID : CRD42022331199).

In this review, for selecting original studies were based on the PICO strategy (parameters included population, intervention, comparison and outcomes). Population is patients with osteoarthritis; Intervention is Acupressure, including manual acupressure and electro- acupressure; Comparison is Sham acupressure, medicine treatment, other active non-acupressure treatments, no (specific) treatment, or acupressure as an adjuvant intervention to another treatment; and Outcomes is Efficacy and Safety.

Search strategy

The search strategy has been carried out by an experienced medical research librarian (DC). The search strategy has been broad, article study is published on 2012-2022, using

English and design RCT and Quasi-experiment. The following databases searched: PubMed, ProQuest, Scopus, and The Cochrane Library. Hand searches conducted of the reference lists of eligible primary studies.

The reference lists of included studies and relevant reviews screened for further identification of potentially eligible trials. To achieve the maximum sensitivity of the search strategy, we combined the Medical Subject Headings (MeSH) where appropriate. The search included the words osteoarthritis, acupressure and pain. A preliminary search was first done in PubMed using the following search strategy: (Osteoarthritis[MeSH] OR (Osteoarthritis [tiab] AND Acupressure [MeSH] OR Acupressure [tiab] AND Pain [MeSH]) OR Pain [tiab]).

Table 1. Search strategy used in the article

Database	Link to the Strategy	Result
PubMed	(((((("osteoarthritis"[MeSH Terms] OR "osteoarthritis"[All Fields] OR "osteoarthritis"[All Fields] OR ("osteoarthritis"[MeSH Terms] OR "osteoarthritis"[All Fields] OR "osteoarthritis"[All Fields])) AND "acupressure"[MeSH Terms]) OR "acupressure"[Title/Abstract]) AND "pain"[Title/Abstract]) OR "pain"[MeSH Terms]) AND (randomizedcontrolledtrial[Filter]))	40,904
ProQuest	ab(osteoarthritis) AND ab (acupressure OR acupressure therapy) AND ab(pain)	54
Scopus	(TITLE-ABS-KEY (osteoarthritis) AND TITLE-ABS-KEY (acupressure) AND TITLE-ABS-KEY (pain))	43
The Cochrane Library	osteoarthritis in Title Abstract Keyword AND acupressure in Title Abstract Keyword OR acupressure therapy in Title Abstract Keyword AND pain in Title Abstract Keyword -	293

Inclusion and exclusion criteria

1. Types of Studies

Osteoarthritis (OA) can be defined as a disorder of movable joints characterized by deterioration of articular cartilage; osteophyte formation and bone remodeling; changes in peri-articular tissues; and a low-grade, no purulent inflammation of variable degree. Knee osteoarthritis (KOA) is a prevalent degenerative joint disease and seriously affects the athletic abilities of middle-aged and elderly patients. Acupressure is a traditional non-pharmacological intervention that promotes blood circulation and muscle activity. Self-administrated acupressure and exercise can be potential management for KOA.

Studies were eligible if they were interventional study, randomized controlled trials (RCTs) that included acupressure as a sole or complementary intervention for any type of OA Thesis and dissertations were also eligible. The study was conducted with a minimum duration of acupressure intervention of 2 weeks. Clinical studies with observational studies, such as case-control studies, cohort studies, cross-sectional, case series, and case reports, conference proceedings, and abstracts were excluded.

2. Participants

We included participants aged middle-aged and older-adult diagnosed with OA (including KOA) according to American College of Rheumatology, Chinese Orthopedic Association or other clinically and/or radiological confirmed cases. There were no restrictions on gender, race, duration and disease severity. Studies involving participants with other types of arthritis, several rheumatic disorders, not specific OA and where data of OA participants cannot be separated were not eligible.

3. Intervention Groups

Studies were included if acupressure was used as a sole therapy. Studies where the intervention group received acupressure in adjunction to the therapy received by the control group were also eligible. We included Acupressure Therapy interventions based on Complementary Integrative Medicine (CIM) theory, including manual acupressure and acupressure thermal, regardless of different acupoints or massage materials. Acupressure Therapy is massage around acupoints and pressure applied on acupoints. Combined interventions of other alternative therapies such as acupuncture, moxibustion, acupoint injection, and auricular acupressure were excluded as they share similar therapeutic effects and the evaluation of the effectiveness of acupressure will be affected. Other forms of massage such as Tuina, reflexology, and trigger point massage were also not eligible.

4. Comparison Groups

Comparison group that received sham acupressure, medicine treatment, no (specific) treatment, other active non-Acupressure Therapies (e.g. exercise or drug therapy), or Acupressure Therapy as an adjuvant intervention to another treatment were eligible. Studies with comparator groups that use similar interventions or complex interventions affecting the evaluation of acupressure effects were excluded.

5. Outcome Measures

The primary outcome was Pain (Visual Analogue Scale) and/or McMaster Universities Arthritis Index (WOMAC) scale. Timing of outcome assessment: We extracted the results data at three time points: less than four months, four to eight months and longer than eight months. Each included study was required to report measurement of outcomes with follow-up of at least 2 weeks. The secondary outcomes were WOMAC pain sub scores, WOMAC physical function sub scores, WOMAC stiffness sub scores, Knee injury and Osteoarthritis Outcome Score (KOOS), Psychometrics Short Form-36 questionnaire (SF-36), Quality of Life and adverse events. We extracted the results data at three time points: less than four months, four to eight months and longer than eight months. Each included study was required to report measurement of outcomes with follow-up of at least 2 weeks.

Study Selection and Data Extraction

Two researchers searched the databases independently, removed duplicates, and assessed the eligibility of the studies. Based on the predefined inclusion criteria, the potentially eligible studies were screened with the full texts. Any discrepancies in the selection of a study for inclusion in this review were discussed with a third review author until a consensus was reached.

For data extraction, the two researchers independently extracted the data using a standard data extraction form. The following information was extracted: first author's last name, publication year, country, study design, sample size (total number and participant numbers each group), patient age, type of OA, disease course (years and severity), details of the interventions and controls (regimens), outcome measures and study results. All disagreements between the two researcher's judgments were resolved with the third review researcher through discussion. The authors of the included studies were contacted for unreported data or missing data.

Analysis

Two review authors individually assessed the risk of bias of the included studies using the Joanna Briggs Institute Critical Appraisal Tools for Quasi Experimental Studies and Randomized Controlled Trials. Any disagreements over a specific domain or study were resolved through discussion or with the involvement of all authors when necessary.

RESULTS

3.1. Literature Search

The searches identified 41,294 records. As many as 220 records were removed before screening because they were duplicate records and 41,074 records were screened for eligibility using title and abstracts. The full texts of 41,060 records were retrieved after applying the PICO parameters, and inclusion and exclusion criteria. The articles excluded were those with different population as many as 3,975 records, other intervention as many as 13,489 records, 7,452 records with wrong comparator, 24,188 records were not intervention study, and 238 records wrong publication (not RCT). In the last screening 1 article was excluded because this article was secondary analysis from another article. The management of this article is carried out using web-based software.

Figure 1. Study selection process

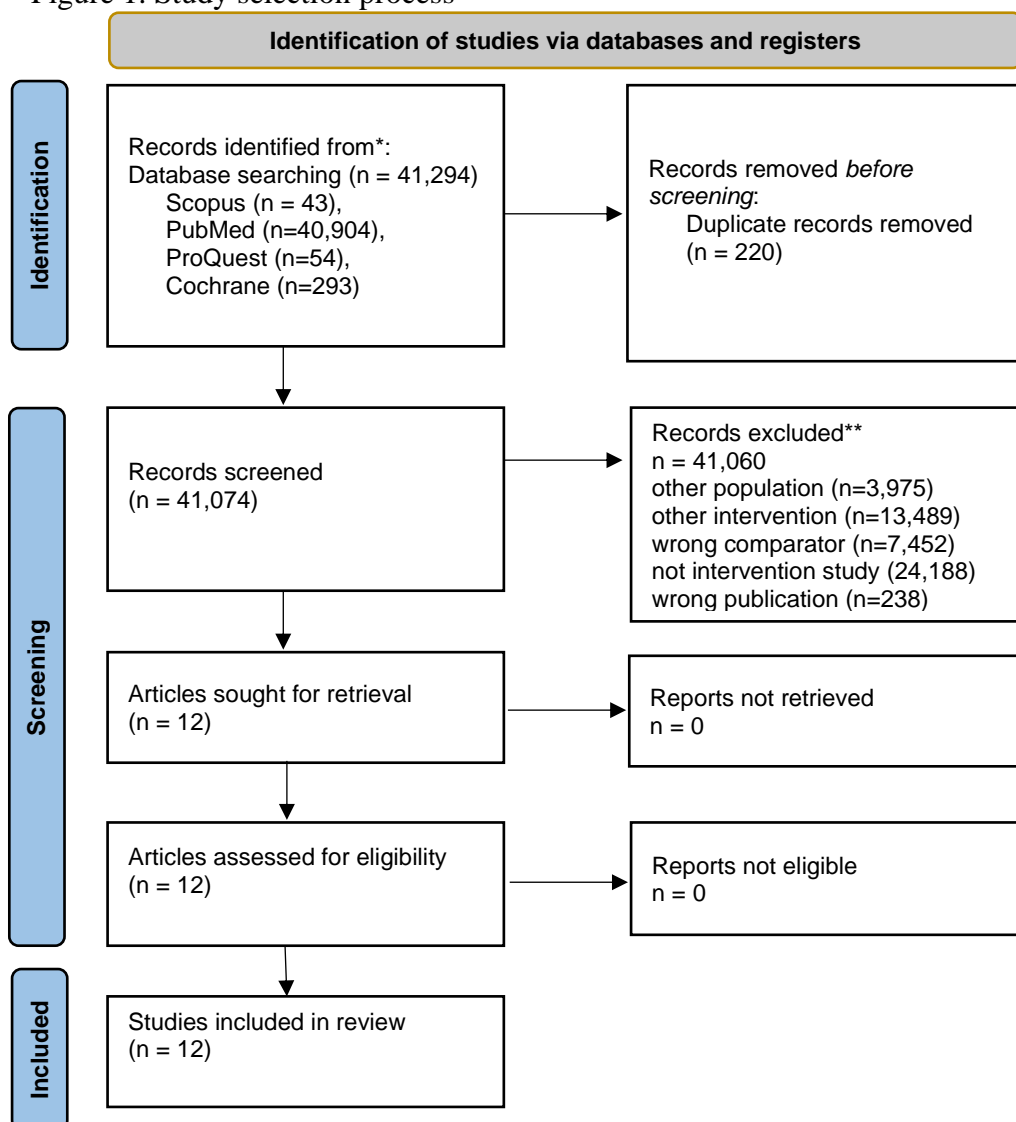


Table 2. Study Characteristic

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
Alinaghizadeh et al., 2021, Outpatient clinics, Iran	To examine the potential efficacy of Ghamz on osteoarthritis outcomes	<p><i>Design:</i> Clinical trial, Randomized, single-blind, sham-controlled clinical trial</p> <p><i>Population:</i> 40 participants; random, divided into 2 groups (1) Acupressure group (20 participants) (2) Sham group (20 participants)</p> <p><i>Outcome :</i> pain, activity daily livings, sport, recreation function, and quality of life</p> <p><i>Instrument :</i> (1) The Visual Analogue Scale (VAS); (2) the KOOS (Knee injury and Osteoarthritis Outcome Score) questionnaire.</p>	<p>Inclusion : (1) Diagnosed KOA using the diagnostic criteria of the American College of Rheumatology (ACR); (2) age over 35 years old, ability to comprehend the protocol of the study, and (3) the ability to complete the interview and understand the instructions.</p> <p>Exclusion: (1) clinical neuropathy; (2) wound over the acupoints; (3) use of CAM within the previous three months; (4) use of opioids or analgesics; (5) had a significant injury in the past 6 months; (6) had an open wound over the knee; (7) used oral corticosteroids within the previous five weeks, intraarticular knee depomedrol corticosteroids in the past three months, or intra-articular hyaluronate during past six months; (8) had chronic diseases such as rheumatoid arthritis, fibromyalgia, cancer, kidney and liver failure, asthma treated with corticosteroids; (9) knee arthroscopy during past a year. Participants were removed from the trial if they discontinued treatment, reacted to the treatment, or failed to adhere to the protocol during the intervention.</p>	The mean pain score in the intervention group was significantly decreased from 5.89 at the beginning study to 4.11 at the end of the study, while the pain score did not change substantially in the sham group. These findings remained consistent after adjusting for covariates of age, weight, and pre-treatment. This study supports evidence that Ghamz therapy provides an effective option for short-term knee pain relief in patients with knee osteoarthritis.
Akbarnezhad et al., 2019(Akbarnezhad et al., 2019)	to assess the effect of acupressure therapy on pain, stiffness, and physical functioning of a knee affected by osteoarthritis	<p><i>Design :</i> Clinical trial, Randomized Controlled Trial, Single-blind</p> <p><i>Compare Therapy :</i> placebo and routine care</p> <p><i>Population :</i> 51 participant divided into 3 groups (1) Control group : 21 people; (2) Placebo group : 15 people; and (3) Intervention</p>	Inclusion criteria: (1) people who were older than 60 years old, diagnosed with grade II to III OA according to Kellgren–Lawrence grading system in one or both knees by a rheumatologist and based on X-ray (2) not having a severe pain in the afflicted knee (less than 90% of maximum pain according to visual	After intervention, ANOVA showed significant differences between groups in regard to total WOMAC index, pain and physical dysfunction ($p < 0.001$). Post hoc comparisons revealed that participants receiving

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
		group : 15 people <i>Outcome</i> : Pain, Stiffness and Physical functioning of knees <i>Instrument</i> : The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)	analogue scale), (3) no pertinent knee surgery history (replacement, reconstructive), (4) acceptable cognitive health status (score of 7 or higher according to Abbreviated Mental Test (AMT)), (5) no health situation contradicting with acupuncture (i.e. open wounds, cancer), (6) no severe symptoms of psychological diseases, (7) no use of narcotics drugs, (8) no other chronic diseases in a critical stage (i.e. insulin-dependent diabetes, lupus), and (9) no injection of analgesics into the afflicted knee in the past 30 days or having plan to inject during the study. Exclusion criteria: (1) withdrawing from the study, leaving the nursing home, (2) death or intensification of symptoms so that hospitalization was needed, (3) development of acute diseases or any intervening conditions, and (4) injecting analgesics medications to the afflicted knee during the study.	acupressure showed a significant decrease in total WOMAC index, pain and physical dysfunction ($p < 0.001$). Indeed, ANCOVA detected a difference in means of pain ($p \leq 0.001$), stiffness ($p = 0.038$) and physical dysfunction ($p \leq 0.001$) in three groups
Cheung et al., 2019(Cheung et al., 2020)	To test the acceptability and feasibility of self-administered acupuncture as an intervention for knee pain among middle-aged and older adults with knee osteoarthritis (KOA).	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Compare Therapy</i> : knee health education sessions about KOA management followed by self-care) <i>Population</i> : 35 participants <i>Outcome</i> : Pain intensity, worst and least pain intensity <i>Instrument</i> : (1) Numeric Rating Scale (NRS); (2) The Western Ontario and McMaster Universities	Inclusion criteria : (1) Self-rated knee pain ≥ 3 and ≤ 7 on an 11-point Numeric Rating Scale, lasting for at least 3 months. (2) A diagnosis of KOA based on fulfilment of any three of the clinical criteria (i.e. morning stiffness ≤ 30 min, crepitus on active joint motion, bone tenderness, bone enlargement and no palpable joint warmth). (3) Chinese ethnicity. (4) Age 50–70 years. (5) Able to provide informed consent. (6) Ability to comprehend Chinese.	Both groups showed a decreasing trend in current knee pain intensity measured using NRS post-intervention. A medium between-group effect size (0.40) was found, but between-group differences were not statistically significant. The other secondary outcome measures were also comparable between both groups post-intervention (all $p >$

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
		Osteoarthritis Index (WOMAC); (3) Range of motion (ROM) of the knee joints; (4) Short-Form Six-Dimension (SF-6D) scores for health-related quality of life.	Exclusion criteria: (1) Medical diagnoses or conditions that would preclude individuals from active participation (e.g. bleeding disorders, alcohol or drug abuse). (2) Cognitive impairment preventing informed consent or understanding of the instructions (score <22 in the Hong Kong Montreal Cognitive Assessment). (3) Participation in other interventional KOA research studies. (4) Skin lesions or infections at the planned treatment sites. (5) Obesity (defined as body mass index >25). (6) Knee pain related to other conditions (e.g. cancer, fracture, rheumatoid arthritis or rheumatism). (7) Previous foot injury or trauma. (8) Use of steroids for knee pain. (9) Pregnancy or contemplation of pregnancy. (10) Receipt of self-administered acupressure in the past 6 months.	0.05)
Guo et al., 2022(Guo et al., 2022)	To assess the effectiveness of Self-administrated acupressure and exercise to be potential management for knee osteoarthritis.	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Compare Therapy</i> : Exercise <i>Population</i> : 220 participants, divided into 4 groups. (1) control group : 55 patients; (2) exercise group : 56 patients; (3) acupressure group : 55 patients; and (4) exercise & acupressure group : 55 patients. <i>Outcome</i> : Pain, stiffness and physical functioning of knees <i>Instrument</i> : (1) Visual Analog Scale (VAS); The Western Ontario and McMaster Universities	Inclusion criteria were: (1) over 18 years old; (2) diagnosed with knee osteoarthritis by American College of Rheumatology clinical criteria; (3) with knee pain for at least 3 months (visual analogue scale score ≥ 4). Exclusion criteria were: (1) with serious medical conditions; (2) with knee replacement; (3) corticosteroids or hyaluronate usage; (4) with knee arthroscopy or injury in a past year; and (5) regular use of massage therapy.	Self-administered acupressure and exercise significantly decreased visual analogue scale (3.75 ± 1.89 versus 2.93 ± 1.73 , $p < 0.05$), pain (7.6 ± 2.8 versus 4.8 ± 2.7 , $p < 0.05$), stiffness (3.75 ± 1.89 versus 2.93 ± 1.73 , $p < 0.05$) at the 16th week ($p < 0.05$) in patients with knee osteoarthritis compared to other intervention. The combination of acupressure and exercise also improved the range of motion (114.4

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
		Osteoarthritis Index (WOMAC)		± 11.5 versus 120.4 ± 11.9 , $p < 0.05$) and walk speed (1.48 ± 0.48 versus 1.76 ± 0.50 , $p < 0.05$) of osteoarthritis patients ($p < 0.05$). Self-administrated exercise and acupressure alleviate the arthritic symptoms (swelling, pain, joint dysfunction and joint deformities) and improve the joint functions, supporting its potential use in the clinical management for osteoarthritis.
Ho et al., 2021(Cheung et al., 2020)	to compare the effectiveness of topical heat pack versus focal application of heat therapy at the acupressure points in the treatment of osteoarthritis of the knee	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Compare Therapy</i> : Thermal gun <i>Acupressure</i> <i>Population</i> : 76 participant; divided into : (1) group 1 (Heat pack) : 38 patients; (2) group 2 (Thermal gun) : 38 patients <i>Outcome</i> : Pain, Stiffness and Physical functioning of knees, Quality of Life <i>Instrument</i> : (1) The visual analog scale (VAS); (2) muscle power; (3) knee ROM; (4) WOMAC and (5) SF-12v2.	Inclusion: (1) male or female patients aged 40 years old or older, (2) clinical and radiological diagnosis of osteoarthritis of the knee based on the OA Knee clinical guidelines and radiological evidence (3) normal skin sensation to heat, cold, pins and pricks (i.e. passed the required Skin Sensation Test), (4) not participating in any other clinical trial at time of this study, (5) be able to complete the whole trial period, and (6) no cognitive dysfunction and was able to sign the consent form. Exclusion : (1) stages 1 & 2 OA of the knee, (2) received bilateral knee arthroplasty before this study, (3) polyarthritis affecting more than both knees, (4) active skin lesion, (5) pregnant or breastfeeding women, (6) received acupuncture and/or moxibustion within 1 month of the study and (7) unable to comply with the study protocol.	In the Thermal gun group, function and total scores (WOMAC) and Physical Composite Scale (SF-12v2) were significantly improved after 8 sessions. Quadriceps strength was significantly improved after 8 weeks (from 4.42 to 4.63; $p = 0.02$). In the Heat pack group, flexion was significantly improved after 8 sessions ($p = 0.02$). Mean VAS scores after Heat pack treatment was consistently better (lower) than mean VAS scores after Thermal gun treatment. The combination of focal thermal therapy at acupressure points is a viable conservative treatment in KOA. The pressure at the acupressure points has a synergistic

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
				benefit than topical thermal therapy alone.
Li et al., 2017(Li, Harris, Tsodikov, Struble, & Murphy, 2018)	To assess the feasibility of a study to evaluate the efficacy of self-administered acupressure in pain and related symptom management for older people with symptomatic KOA. Feasibility with regard to (1) sample recruitment and retention, (2) treatment fidelity and adherence, and (3) tolerability and adverse events were examined	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Compare Therapy</i> : Sham Acupressure <i>Population</i> : 150 participant; divided into 3 groups. (1) Verum Acupressure : 50 patients; (2) Sham Acupressure : 50 patients; (3) Usual Care : 50 patients <i>Outcome</i> : Pain, Stiffness and Physical functioning of knees <i>Instrument</i> : The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)	Inclusion : (1) Age 65 yr or older, (2) meets the American College of Rheumatology (ACR) clinical criteria for knee osteoarthritis; (3) Have moderate to severe knee pain (≥ 3 on a 0-10 numeric rating scale) that has lasted for 3 months or longer; (4) BMI ≤ 45 ; (5) Ability to speak and write in English Adequate cognitive status (score > 5 on the 6-item screener); (5) Adequate functional ability to administer the acupressure protocol (e.g., able to use fingers or device to apply pressure to acupoints, able to easily reach feet to access acupoints); (6) Ability to understand the treatment protocol through demonstration after being instructed; (7) Ambulatory with or without an assistive device Adequate hearing and vision to follow study protocol; and (8) Have a telephone and television Exclusion: (1) Have cancer or received cancer treatment within last 6 months (exception: skin cancer where the location is not around acupoints); (2) Have any bleeding diathesis conditions or taking anti-coagulant/ antiplatelet medications; (3) Have health conditions that could confound the effect of acupressure (e.g., rheumatoid arthritis, lupus, multiple sclerosis, diabetic neuropathy, peripheral neuropathy, Parkinson's disease, limb paralysis); (4) Have ever had knee replacement surgery; (5)	Among those assigned to verum and sham acupressure groups, 94% passed a fidelity check at the second visit, more than 80% reported performing self-administered acupressure as instructed most of the time, and about 10% reported discomfort from performing the acupressure. Thirty adverse events were reported; most were related to pre-existing health conditions. It is feasible to conduct a study of self-administered acupressure for symptom management in community-living older adults with knee osteoarthritis, although sample recruitment may be challenging.

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
			Have received the following treatments or therapies in the last 2 months: occupational or physical therapy, acupuncture or acupressure therapy, opioid therapy, cognitive behavior therapy, arthritis self-management programs, arthroscopic procedure, knee injection; (6) Planned or scheduled new treatment for knee pain in the next 3 months; and (7) Regular current use of narcotics or centrally acting agents (including: Pristig, Duragesic, Fentora, Actiq, Hydrocodone, Lorcet/Lortab, Norco, Cadeline, Hydromorphone, Dilaudid, Demerol, Exalgo, Methadone, Tramadol, Ultram, Meperidine, Methadone, Demerol, Dolophine, Methadose, Percocet, Morphine, MS Contin, Oxycodone, Oxycotin, and Fentanyl)	
Rani et al., 2020(Meenu Rani, Sharma, Advani, & Kumar, 2020)	to check the effectiveness of acupressure therapy with pharmacological treatment on pain, depression, anxiety, and stress in patients with KOA and to assess the effect of pain improvement on psychological health.	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Population</i> : 212 participant; divided into 2 groups. (1) Acupressure Therapy in combination with pharmacological treatment: 106 patients; (2) Usual Care (continued pharmacological treatment) : 106 patients <i>Outcome</i> : Pain and psychological symptoms <i>Intsrument</i> : (1) Visual analog scale and (2) Depression Anxiety Stress Scale-21	Inclusion: (1) patients aged (both genders) from 45 to 70 years, (2) patients with unilateral knee osteoarthritis (from the last 5-6 months), (3) patients scoring grade 2 and grade 3 on the Kellgren-Lawrence scale, and (4) patients having a pain score <2 on the visual analog scale (VAS). Exclusion: (1) patients taking intraarticular injection to manage knee osteoarthritis, (2) patients taking acupressure or acupuncture treatment for knee osteoarthritis, (3) patients who underwent knee replacement, (4) pregnant females, and (5) patients having rheumatoid arthritis and	The patients in the intervention group scored better on the pain scale ($p < 0.001$) and DASS-21 ($p = 0.0001$). However, it may be noted that reduction in the DASS-21 score was not found to be significant for the control group ($p = 0.08$). Pearson's correlation coefficients value ranged from 0.231 to 0.412 for DASS-21 ($p < 0.05$). On analysis, it can be concluded that acupressure can be used as add-on therapy in combination with conventional treatment

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
			other autoimmune disorders.	(pharmacological treatment), which may assist in pain reduction. The reduction in pain directly contributes to improvement in the physiological wellness among patients with KOA.
Rani et al., 2022(M Rani, Sharma, & Advani, 2022)	To test the effect of noninvasive self-performed acupressure therapy as an add-on to pharmacological treatment to manage knee pain and to evaluate the improvement of pain due to intervention according to age and body mass index.	<i>Design</i> : Clinical trial, Randomized Controlled Trial <i>Population</i> : 240 participant; divided into 3 groups. (1) KAP group (verum acupressure and pharmacological treatment) : 80 patients; (2) Comparison Group 1 (sham acupressure and pharmacological treatment) : 80 patients; (3) Comparison Group 2 (pharmacological treatment only) : 80 patients <i>Outcome</i> : Pain, stiffness and physical functioning of knees and Quality of Life <i>Instrument</i> : (1) Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC); (2) Visual analog scale; (3) 36- item Short-Form Health Survey	Inclusion: age 45 years or more, unilateral knee osteoarthritis, meet American College of Rheumatology (ACR) clinical criteria, pain intensity of 3 or more on visual analog scale (10 mm scale), and able to apply pressure at acupoints precisely by self/ with assistance. Exclusion criteria: Prone to fractures that may be due to osteoporosis, suffering from acute and malignant diseases, having significant pain in any part of body whose intensity comparable to knee pain, neurological disorders like dementia, cerebral tumor, and Alzheimer's disease.	Compared with CG-1 and CG-2, participants of the KAP group reported considerable improvements in WOMAC pain (mean difference: -2.50 units; 95% CI: 3.74-1.25, and mean difference: -1.69 units; 95%CI: -3.24 to -0.13 respectively) at 1 year. Similarly, VAS pain, stiffness, and physical function were also improved among the participants of KAP group. Self-administered acupressure has an additive effect to the pharmacological treatment to improve pain, stiffness, and physical function as compared to pharmacological treatment only.
Sorour et al., 2014(Sorour, Ayoub, & Abd El Aziz, 2014)	to assess the effectiveness of acupressure versus isometric exercise on pain, stiffness, and physical function in KOA female patients	<i>Design</i> : Clinical trial, Quasy Eksperimental <i>Population</i> : 60 participant; divided into 3 groups. (1) Isometric exercise : 30 patients; (2) Acupressure : 30 patients; (3) Control : 30 patients <i>Outcome</i> : Pain, stiffness and physical functioning of knees <i>Instrument</i> : The Western Ontario and McMaster	Inclusion: female, age 45-60 years, and diagnosed by rheumatologist as having moderate OA in one or both knees based on X-ray. Exclusion: prior knee surgeries, and having any other chronic disease, and pregnancy.	Pain decreased in the two intervention groups compared to the control group ($p<0.001$), while the scores of stiffness and impaired physical function were significantly lower in the isometric group ($p<0.001$) compared to the other two groups. The decrease in the total WOMAC

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
		Universities Osteoarthritis Index (WOMAC)		score was sharper in the two study groups compared to the control group. In multiple linear regression, the duration of illness was a positive predictor of WOMAC score, whereas the intervention is associated with a reduction in the score. In conclusion, isometric exercise and acupressure provide an improvement of pain, stiffness, and physical function in patients with knee OA. Since isometric exercise leads to more improvement of stiffness and physical function, while acupressure acts better on pain, a combination of both is recommended. The findings need further confirmation through a randomized clinical trial.
Horng et al., 2013(Horng et al., 2013)	to examine whether collateral meridian (CM) therapy was feasible in treating KOA pain.	<i>Design</i> : Clinical trial, Interventional Study <i>Population</i> : 28 participant; divided into 2 groups. (1) Intervention : 14 patients; (2) control : 14 patients <i>Outcome</i> : Pain, stiffness and physical functioning of knees <i>Instrument</i> : (1) Visual Analog Scale (VAS); and (2) The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)	Inclusion: clinically and radiologically diagnosed with knee OA according to the criteria of the American College of Rheumatology and Lawrence radiographic changes in the tibiofemoral joint, which were obtained using a visual analog scale (VAS) pain score higher than 30 mm on a 100-mm scale over the medial side of the knee while walking. Exclusion: patient who had undergone total knee arthroplasty, exhibited uncontrolled hypertension, had a history of cardiovascular	In the CM group, the posttreatment visual analog scale and Western Ontario and McMaster Universities Osteoarthritis Index scores were lower than those of the control group; a significant reduction in pain intensity ($P = .02$, $P = .01$, respectively) and improvement in knee function ($P = .04$, $P = .03$, respectively) were shown in the CM group

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
			diseases, or had neurologic disorders that affected lower extremity functions. Patients who received conflicting or ongoing interventions such as acupuncture, hyaluronan injections, intra-articular corticosteroid, and transcutaneous electrical nerve stimulation and thermotherapy.	at the second and third week. Collateral meridian therapy may be feasible and effective for KOA pain relief and knee function recovery.
Jang et al., 2019(Jang, Lim, & Park, 2019)	to determine effects of auricular acupressure on knee pain, range of motion, and sleep in the elderly with KOA.	<i>Design</i> : Clinical trial, Randomized, Experimental Study <i>Population</i> : 56 participant; divided into 3 groups (1) Intervention group : 28 people; (2) Placebo group : 28 people <i>Outcome</i> : pain, sleep quality, and the time-by-sleep stage <i>Instrument</i> : (1) Visual Analog Scale; (2) WOMAC; (3) Extension and flexion range of motion (ROM) PSQI	Inclusion : 1) aged 65-90 years, diagnosed with degenerative knee arthritis; 2) A person with clear consciousness ; 3) Those inexperienced ear pressure therapy ; 4) Those who complain of sleep disturbances (PSQI more than 5) Exclusion : 1) Those with ear skin disease or trauma; 2) Band-aid eggs Those who have Ludge ; 3) Those who use complementary and alternative therapies using acupuncture or ear pressure; 4) Those who take sleeping pills; and 5) Degenerative knee joint patients undergoing knee surgery or surgery for inflammation are considered	The VAS scores in the experimental group with auricular acupressure significantly decreased through time ($p<.001$) and WOMAC also significantly decreased ($p<.01$) compared with the placebo-control group. There were no significant differences in PPTs. The flexion ($p<.01$) and extension ($p<.001$) ROMs measured for eight weeks improved over time. Meanwhile, sleep quality improved significantly after the intervention termination ($p<.01$), but there was no significant difference found in the time-by-sleep stage.
Chatawatee et al., 2021(Chatawatee et al., 2022)	to assess the effectiveness of the procedure for the relief of knee pain in KOA patients.	<i>Design</i> : A multi-center, open-label, pre-post clinical trial <i>Population</i> : 36 outpatients <i>Outcome</i> : Pain, Stiffness and Physical functioning of knees <i>Instrument</i> : (1) Visual Analog Scale (VAS); (2) The Western Ontario and McMaster Universities Osteoarthritis Index	Inclusion: (1) aged between 40 and 70 years old, (2) patients who were diagnosed with primary osteoarthritis of knee, based on the American College of Rheumatology criteria, (3) patients with osteoarthritis without: an injury, osteoporosis, rheumatoid arthritis, infection arthritis, paralysis or prior surgery on the hip or knee joint, (4) no history	The result revealed that WOMAC and VAS significantly reduced ($p<0.05$) after three times of the treatment with the KOA guideline when compared with day 0. Moreover, the physical examination of the knee was improved. Based on the criteria of the International

Author, year, & location	Objective	Methods	Inclusion & exclusion criteria	Findings
		(WOMAC)	of heart disease or autoimmune disease and thrombocytopenia, (5) no history of herbal allergy, (6) no wounds or symptoms of dermatitis on the knee or any other chronic diseases, (7) and no history of using antihistamines, NSAIDs, immunosuppressant and anti-inflammatory drugs for at least 14 days before entire the experiment. Exclusion: Patients reported with severe osteoarthritis of knee according to Oxford knee score (scores at 0-19 indicate as severe knee arthritis), had any side effects from the herbal knee poultice (herbal allergies, red rash, itching), and suffered from complications that require medications.	Contact Dermatitis Research Group (ICDRG), there was no skin irritation observed in all patients.

DISCUSSION

Summary of Main Results

This systematic review included 8 RCTs and 4 clinical trials that assessed the effectiveness of acupressure for the treatment of pain in patients with knee osteoarthritis (KOA). Based on the results of the 12 articles, acupressure showed beneficial effects in reducing pain, relieving stiffness, improving physical function and quality of life. The results of the review also showed similar results where acupressure had an equivalent effect in reducing pain and relieving stiffness but showing a beneficial effect in improving joint physical function. For studies that have placed acupressure therapy as a complement to conventional interventions, the combined results demonstrated a superior effect on pain relief compared to conventional interventions alone. In terms of functional ability outcomes with WOMAC measures, acupressure showed a superior effect in reducing total scores compared to no intervention but in contrast to sham acupressure. The most pain measurement outcomes were using the Visual Analog Scale (VAS), while other outcomes were sleep quality using PSQI, Physical functioning of knees using the Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire, and quality of life measurement using SF-12v2.

Overall Completeness and Applicability of Evidence

This review was conducted systematically on five databases in several languages. Some restrictions were determined by the inclusion and exclusion criteria method. It is undeniable that there may still be some relevant studies that may have been missed if published and indexed in other databases. We also excluded studies in which acupressure was only performed in duration of less than one week, which may reduce the significance of our findings. We conducted this study specifically on KOA, either in one or both knees. Because

the trials included in this review were conducted in several countries, our findings are generalizable. However, conclusions cannot be drawn about how effective acupressure is in treating KOA due to the small sample sizes and the few included studies. Although intervention duration, frequency, and selection of acupuncture points varied between studies, most of the studies in this review used acupressure on the knee area at least three times a week.

Pain perception and threshold vary from individual to individual. Although pain outcomes in this review were measured using psychometric instruments, there are limitations and uncontrollable variables in these instruments that could affect the results, including the possibility of misleading responses and false negatives. This factor should also be considered and the importance of acupressure in reducing pain for OA requires further validation.

In general, this review provides strong evidence regarding the effect of acupressure in treating pain in KOA, although the findings of this review should be interpreted further, and compared to other therapies with more detailed primary studies.

Potential Biases in the Review Process

The main limitation of this review is that there were a small number of studies with small sample sizes, so that it was not possible to proceed to the meta-analysis process. We used those studies that had a comparison therapy in the form of sham acupressure, but the design of sham acupressure has not been clearly defined in clinical trials. False acupressure designs in the study were described as manipulation of selected points from actual acupuncture points with gentle pressure in one trial, manipulation of selected points near the actual acupuncture points of the same pattern without pressure in one trial and manipulation of points not on the meridians with pressure. Different designs of sham acupressure may more or less produce a placebo effect, influencing the evaluation of the actual effect of acupressure. Therefore, the importance of our results on the comparison of acupressure with sham acupressure should be interpreted with caution.

Agreements and Disagreements with Other Studies or Reviews

Currently, there have been several systematic reviews of acupressure for OA Pain. Compared with previous systematic reviews on acupressure, our results are consistent with their findings on acupressure showing a positive effect in pain reduction. There are also several other reviews that prove the effect of acupressure on other clinical manifestations of OA, for example on joint function and quality of life. The results of our review show results that are also consistent with their findings, namely an increase in quality of life after acupressure therapy, although in upholding this hypothesis it is necessary to conduct further primary research. The results of our review also show that acupressure has a superior effect in reducing pain as a complementary intervention to conventional interventions, but not as a single intervention.

Meanwhile, the effectiveness of acupressure is equivalent to fake acupressure. Our review also overcomes some of the limitations of this systematic review by incorporating up-to-date information, conducting a more comprehensive literature search, excluding mixed-effect interventions for evaluation of the actual effects of acupressure and critically assessing the included trials. Therefore, our findings reflecting the effect of acupressure for OA are more reliable.

Implications for Practice and Research

The clinical effectiveness of acupressure as a sole intervention in reducing pain, relieving stiffness, improving physical function, and improving quality of life remains uncertain in the treatment of OA. As a complementary intervention, its effectiveness for reducing pain is suggestive but requires further validation. Therefore, it is conceivable that

acupressure should be recommended for OA patients with caution because its effectiveness is inconclusive. Due to the small effect size and lack of high quality among the included studies, the effectiveness of acupressure in reducing pain or other specific symptoms should be further confirmed by more high-quality studies.

CONCLUSIONS

This systematic review shows that acupressure as a single or complementary intervention provides significant benefits in the management of osteoarthritis. Further trials with more rigorous designs are needed to validate and address the limitations of the current evidence.

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CONFLICT OF INTEREST

Conflicts of interest None.

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