Pain Management Nursing 20 (2019) 17–24

Contents lists available at ScienceDirect

Pain Management Nursing

journal homepage: www.painmanagementnursing.org

Review Article

Effects of Auricular Acupressure on Pain Management: A Systematic Review

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ARTICLE INFO

Article history:
Received 25 May 2017
Received in revised form
3 July 2018
Accepted 27 July 2018

ABSTRACT

Objective: Nearly half of hospitalized patients in the United States have reported experiencing pain even while undergoing treatment for pain. Analgesic use is the most common type of treatment for pain management. Many patients who experience pain seek nonpharmacologic interventions to manage their pain, including forms of complementary or alternative medicine such as auricular acupressure (AA).
Design: This study conducted the first systematic review of the studies that have evaluated the effect of AA as an adjunct on pain management.
Data Sources: We searched PubMed, CINAHL, Embase, Google Scholar, and Wiley for randomized controlled trials on AA.
Review/Analysis Methods: The pain outcomes were pain severity and analgesic consumption. Methodologic quality was also evaluated. Fifteen randomized controlled trials were included in this analysis.
Results: Twelve studies reported statistically significant improvement in the pain outcomes of AA treatment compared with the sham or standard care groups. When methodologic quality was assessed, the selected studies had medium quality, but there was a lack of high quality. This supports that the use of AA for patients may enhance self-management for their pain. However, the small number of studies and the lack of consistent rigorous methodology across the studies preclude definitive statements regarding the effectiveness of AA.
Conclusion: The nursing implications based on this review is that education about AA and complementary or alternative medicine therapies for health care providers may assist them in providing pain control for their patients. In addition, we need to continue research to build on evidence on the effect of AA on pain management.

Pain has long been a major health issue, affecting not only patients' lives but also their families, health care providers, and health care systems. It is estimated that pain affects more than 100 million Americans, and the total annual health care cost as a result of pain in 2010 ranged from $560 billion to $635 billion (Institute of Medicine, 2016). Nearly half of hospitalized patients in the United States have reported experiencing pain even while they are undergoing treatment for pain (Institute of Medicine, 2016). Analgesics are the most common type of treatment for pain management.

Pain medications have many serious side effects including drowsiness, bleeding, and addiction (Institute of Medicine, 2016). Thus, many patients who experience pain seek nonpharmacologic interventions to manage their pain, including forms of complementary or alternative medicine (CAM) such as auricular acupressure (Yeh, Chiang et al., 2014a). According to a 2012 government survey, 91.5 million Americans (38% of Americans) spend more than $30.2 billion dollars each year out of pocket on CAM therapies, including those specifically indicated for pain management (National Institutes of Health, 2016). However, most health insurance providers do not pay for the coverage of CAM treatments (Ananth, 2010).

Auricular acupressure (AA) is a type of CAM therapy used to treat and manage pain, and it is usually used as an adjunctive

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https://doi.org/10.1016/j.pmn.2018.07.010
1524-9042/

therapy (Mehta, Dhapte, Kadam, & Dhapte, 2016). Auricular acupressure is an acupressure therapy that is used on the ear. Auricular acupressure uses the same acupoints as acupuncture but without needle insertion (Mehta et al., 2016). Auricular acupressure uses stimulators (seeds) made of botanical, metal, or magnetic seeds, approximately 2 millimeters in size, which are covered by a small piece of waterproof tape. The ear acupoints may be stimulated by pressure from fingers or hands or automatically by the seeds themselves.

There are many benefits to using AA. First and foremost, AA empowers symptom self-management because patients can be taught to safely self-administer AA (Yeh, Chiang et al., 2014a). This process is in line with the theory of symptom self-management (Hoffman, 2013). The theory of symptom self-management proposes that health care providers can tailor or enhance interventions for patients experiencing unpleasant symptoms to produce better performance outcomes (Hoffman, 2013). Second, AA may decrease medical costs by reducing visits to physicians and the consumption of pain medications. Third, AA is a noninvasive method, so it can be used by persons who do not want to use acupuncture needles (Singh & Chaturvedi, 2015). Auricular acupressure is safer than traditional acupuncture and results in less chance of infection. Fourth, patients who use this therapy experience less interruption in their daily life activities because of the ease of AA self-administration (McDonough et al., 2008).

The use of auricular acupoints originated in China more than 2,000 years ago. In Traditional Chinese Medicine theory, Qi is the energy flow or blood circulation of the body in living creatures (Rerksuppaphol, 2012). Auricular acupressure is used to improve Qi flow among patients with various types of illnesses (Yeh, Chiang et al., 2014a). A detailed map of auricular acupoints has been developed by the World Health Organization (2017). From a physiologic perspective, AA is thought to work through the stimulation of nerves in the outer ear, which connect to specific areas of the brain. The nerves in the ear are also connected with specific parts of the body (Nogier, 2011). This process releases opioid peptides (endorphins, enkephalins, morphine, and dynorphin) and neurotransmitters (serotonin, norepinephrine, and γ-aminobutyric acid) (Molina, 2013). This ear-zone map has been substantiated by functional magnetic resonance imaging (Rabischong & Terral, 2014; Romoli et al., 2014).

Research testing the effectiveness of AA has been conducted on many kinds of pain, including lower back pain (Yeh, Chien, Liang, & Glick, 2015; Yeh, Chien et al., 2013a; Yeh, Morone, et al., 2014b; Lin, Yeh, et al., 2015; Suen, Wong, Chung, & Yip, 2007), dysmenorrhea (Wang, Hsu, Chien, Kao, & Liu, 2009; Cha & Sok, 2016; Yeh, Hung, Chen, & Wang, 2013b), postoperative knee pain (Chang et al., 2012; He, Tong, Li, Jing, & Yao, 2013), postoperative back pain (Chung, Tsou, Chen, Lin, & Yeh, 2014; Yeh, Tsou, Lee, Hsing-Hsia, & Chung, 2010), hip fracture (Barker et al., 2006), acute postpartum perineal pain (Kwan & Li, 2014), and general pain (Rodriguez-Mansilla et al., 2014). Auricular acupressure has been also used as a therapy for anxiety (Michalek-Sauberer, Gusenleitner, Gleiss, Tepper, & Deusch, 2012), substance abuse (Chen, Berger, Gandhi, Weintraub, & Lejuez, 2013), and obesity (Hsieh, 2010). A recently published meta-analysis by Yeh, Chiang et al., 2014a focused on pain management with a mix of auricular acupuncture (16 studies) and AA (7 studies). The 7 AA studies included two intervention studies and five randomized control trials (RCTs). To date no systematic review was discovered that addresses the effect of AA on pain management. No CAM was reported before the 1800s. This is because home remedies were the only care methods available to many at this time (Sherman et al., 2005). This review includes only AA RCTs (n = 15) from the 1800s to 2016. Thus we have conducted the first systematic review to evaluate the effect of AA on pain management comparing the number and selection of AA acupoints, intervention period, intervention frequency, and pain outcome assessments. The pain outcomes were pain severity and analgesic consumption. The data on the efficacy of AA on pain in this systematic review can inform patients, health care providers, and policymakers. Eventually, AA may be used as an intervention to promote pain relief and empower patients to self-manage their pain.

Methods

We decided to conduct a systematic review instead of a meta-analysis because there is a lack of statistical power to support a true combined estimate of the effect of AA on pain management. In the 15 included studies, variability in the intervention (selections of AA acupoints and intervention periods), participants (ages and types of pain), and study design (types of comparison group) makes it difficult to combine individual data. Even if we limit the studies to those with the best criteria for a meta-analysis, in order to decrease variability, the lower-back pain studies (n = 2) would be included in the analysis; thus a total of five lower-back pain studies could not be included in a meta-analysis because one study did not have enough data to calculate the effect size, and two studies were underpowered (Cohen $d < .2$).

Data Sources and Searches

The literature search was developed and executed using PubMed (1809–July 2016), CINAHL (EBSCO, 1981–July 2016), Embase (Elsevier, 1947–July 2016), Scopus (Elsevier, 1823–July 2016), Google Scholar (1989–July 2016), and Cochrane Central Register of Controlled Trials (Wiley, 1992–July 2016). The search terms were “ear acupressure,” “auricular acupressure,” “vestibulocochlear apparatus acupressure,” “vestibulocochlear system acupressure,” “pain,” “pain relief,” and “pain symptom,” with RCTs in the methodology filters. The search strategies are detailed in Table 1.

Inclusion and Exclusion Criteria

Inclusion criteria for published studies were the following: RCTs, published in peer-reviewed journals, published in English, compared auricular acupressure to sham and/or standard medical care, and measured pain outcomes. Studies that were not RCTs, did not use auricular acupressure as an intervention, and had no pain outcome were excluded. The literature search was conducted independently to assess eligibility criteria by the first and the third authors. Discrepancies and disagreements regarding eligibility were resolved by discussion.

Methodologic Quality Assessments

We assessed methodologic quality (MQ) for the selected articles. The criteria were based on previous systematic analyses of CAM research (Boutron, Estellat, & Ravaud, 2005). The criteria were divided into 11 categories: (1) adequacy of allocation sequences between intervention group and sham and/or standard medical care group, (2) concealment of treatment allocation, (3) description of the intervention administration, (4) adequacy of AA training for patients by practitioners, (5) comparison at baseline between AA and sham and/or standard medical care groups, (6) adherence of participants, (7) blinding of participants, (8) blinding of interventionists, (9) blinding of data assessors, (10) follow-up schedule, and (11) use of intention-to-treat strategy. The scores ranged from 0 to 11. Higher scores indicate higher MQ.

Table 1
Search Strategies

PubMed (1809-2016)
((ear or "Vestibulocochlear Apparatus" or "Vestibulocochlear System") and acupressure) or "ear acupressure" or "auricular acupressure" AND Pain or "pain relief" or "pain symptoms"
EMBASE Elsevier (1947-2016)
(Ear/exp or ear or "Vestibulocochlear Apparatus" or "Vestibulocochlear System") and acupressure/exp or "ear acupressure" or "auricular acupressure" Pain/exp or pain or "pain relief" or "pain symptoms"
Cochrane Central Register of Controlled Trials (1992-2016)
((ear or "Vestibulocochlear Apparatus" or "Vestibulocochlear System") and acupressure) or "ear acupressure" or "auricular acupressure" AND pain or "pain relief" or "pain symptoms"
Scopus Elsevier (1823-2016)
((ear or "Vestibulocochlear Apparatus" or "Vestibulocochlear System") and acupressure) or "ear acupressure" or "auricular acupressure" AND pain or "pain relief" or "pain symptoms"
EBSCO CINAHL (1981-2016)
((MH EAR+) or "ear" or "vestibulocochlear apparatus" or "vestibulocochlear system") and MH Acupressure+ or acupressure or "ear acupressure" or "auricular acupressure" And MH Pain+ or pain or "pain relief" or "pain symptoms"
Google Scholar (1989-2016)
((ear or "Vestibulocochlear Apparatus" or "Vestibulocochlear System") and acupressure) or "ear acupressure" or "auricular acupressure" AND pain or "pain relief" or "pain symptoms"

Results

The two researchers located 2,314 articles using the previously listed search terms. After correction for duplication, 1,819 articles remained. The first author screened only titles and abstracts and excluded 1,720 articles that did not meet the inclusion and exclusion criteria. Next, we reviewed 99 full-text articles and excluded another 84 articles for the following reasons: non-English language (n = 26), acupuncture studies (n = 26), no pain management outcomes (n = 15), not an RCT (n = 13), intervention was conducted on body sites other than ears (n = 3), and co-intervention (n = 1). A total of 15 RCT studies were included for this systematic review (Fig. 1).

Characteristics of Included Studies

The seven countries where research was conducted were Taiwan (n = 5), the United States (n = 4), Hong Kong (n = 2), Austria (n = 1), South Korea (n = 1), China (n = 1), and Spain (n = 1) (Table 2). The sample size ranged from 19 to 256 and the median of the sample size was 85. Most individuals in this analysis were female. Type of pain consisted of lower back pain (n = 5), dysmenorrhea (n = 3), postoperative knee pain (n = 2), postoperative lumbar-spine pain (n = 2), hip fracture pain (n = 1), postpartum pain (n = 1), and general pain (n = 1). The pain outcomes of 15 studies were evaluated by pain severity (n = 15) and analgesic consumption (n = 5). Other outcomes, including anxiety (n = 3), physical function (n = 2), depression (n = 1), quality of life (n = 1), and blood samples (n = 1), were also evaluated. Ten instruments for pain measurement were used in the 15 studies: Visual Analogue Scale (VAS) (n = 7), Short-Form Brief Pain Inventory (SF-BPI) (n = 4), Short-Form McGill Pain Questionnaire (n = 3), Menstrual Distress Questionnaire (n = 3), Pain and Catastrophizing Scale (n = 2), Verbal Rating Scale (n = 1), American Pain Society Patient Outcome Questionnaire (n = 1), Medication Quantification Score Version III (n = 1), Verbal Descriptive Pain Scale (n = 1), and Doloplus Scale (n = 1). Seven studies (47%) used more than one pain measurement tool.

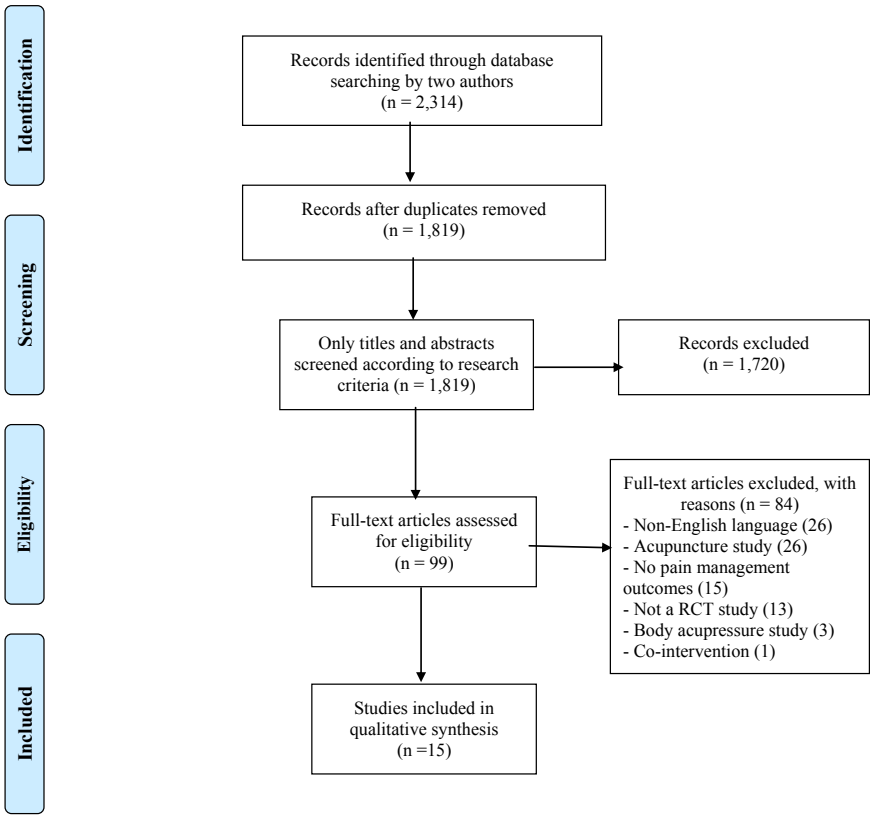

Figure 1. Flow chart of the publication selection process.
(*From:* The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097).

Table 2
Studies of Auricular Acupressure for Pain Management

Author, Country	Sample		Type of Pain	Intervention		AA Session per Point	Duration of AA/(f/u)	MQ	Key Outcomes
	AA	Control		AA Points (N)	Sham Points (N)				
Lin et al. (2015), USA	32	Sham AA, 29	LBP	Shenmen, sympathetic, nervous subcortex (3)	Stomach, mouth, duodenum, kidney (4)	3 times a day for 3 min	4 wk	8	Participants in the real AA group reported a statistically significant (56%) reduction of pain intensity. AA group had a decrease in proinflammatory cytokines and an increase an anti-inflammatory cytokine.
Suen et al. (2007), Hong Kong	28	Sham, 29	LBP	Shenmen, kidney, urinary bladder, lumbosacral vertebrae, buttock, liver, spleen (7)/magnetic seeds (stimulators)/no massage	Same acupoints with AA (7)/botanical seeds/no massage	Not applicable	3 weeks/ (2 & 4 wk f/u)	3	AA significantly reduce the pain intensity level of the elderly suffering from nonspecific LBP ($p < .001$) than control group.
Yeh, Chien et al. (2013a), USA	10	Sham AA, 9	LBP	Shenmen, sympathetic, low back, nervous subcortex (4)	Kidney, mouth, stomach, duodenum (4)	3 times a day for 3 min, plus whenever pain arises	4 wk/ (1-mo f/u)	8	The reductions of worst pain and overall pain intensity in the true AA group were statistically greater than participants in the sham group ($p < .01$) at the completion of AA and 1-month f/u.
Yeh et al. (2015), USA	30	Sham AA, 31	LBP	2 points for LBP, Shenmen, sympathetic, nervous subcortex (5)	Mouth, stomach, duodenum, internal ear, tonsil (5)	3 times a day for 3 min	29 days/ (1-mo f/u)	8	In the AA group a 30% reduction of worst pain was exhibited after the first day of AA treatment, and continuous reduction in pain (44%) was reported by the completion of the 4-wk AA.
Yeh, Chiang et al. (2014a), USA	19	Sham AA, 18	LBP	3 points for LBP, nervous subcortex, Shenmen, sympathetic (6)	Stomach, mouth, duodenum, eye (4)	3 times a day for 3 min, plus whenever pain arises	4weeks/ (1-mo f/u)	8	Participants in the AA treatment group reported statistically significant improvements in pain intensity and physical functioning, which included a clinically significant improvement of 30% or greater.
Cha & Sok (2016), South Korea	45	Sham AA, 46	Dysmenorrhea	Jagung, Sinmun, Gyogam, Naebunbi (4)	Same acupoints with AA (4)/no seeds	Not applicable	3 days	9	There were significant differences in abdominal pain ($p < .001$), back pain ($p < .001$), and dysmenorrhea ($p < .001$) between AA and control groups in South Korea.
Wang et al. (2009), Taiwan	36	Sham AA, 35	Dysmenorrhea	Liver, kidney, endocrine (3)	Same acupoints with AA (3)/no seeds	3 times a day for 15 times	20 days	8	AA group had significantly less menstrual pain and negative effects ($p < .05$) than sham group. NO level increased in AA, although this difference did not achieve statistical significance.
Yeh, Chien et al. (2013a), Taiwan	59	Sham AA, 54	Dysmenorrhea	Shenmen, kidney, liver, internal genitals, central rim, endocrine (6)	Wind stream, esophagus, trachea, pharynx & larynx, internal nose, tonsil (6)	4 times a day for 1 min	2 days	7	Between-group difference was significant in VAS score and MDQ score after the intervention ($p < .05$).
Chang et al. (2012), Taiwan	31	Sham AA, 31	Post-TKR pain	Shenmen, subcortex (2)	Same acupoints with AA (2)/no massage	3 times a day for 3 min	3 days	9	No differences were found in pain scores between the groups at all points. However, analgesic drug use in the AA group patients was significantly lower than in the sham control group ($p < .05$).
He et al. (2013), China	45	Sham AA, 45	Post- TKA pain	Knee joint, Shenmen, subcortex, sympathesis (4)	4 points on the auricular helix (4)	4 times a day for 3 min	7 days	7	AA group pain scores, doses of analgesic, and analgesia-related adverse effects were lower than those of the control group after surgery ($p < .05$).
Chung et al. (2014), Taiwan	40 AA + TEAS	Sham AA, 42; standard care, 45	Post—lumbar surgery	Shenmen, lumbar-sacrum vertebra, kidney, subcortex, stomach (5)	2 cm away from AA points (5)/no seeds	AA: 10 times for 3 min TEAS: two times after surgery for 20 min.	72 hours	9	Adjuvant use of AA combined with TEAS significantly reduced postoperative pain, analgesic requirements, and morphine-related side effects in lumbar spine surgical patients postoperatively ($p < .05$).
Yeh et al. (2010), Taiwan	36	Standard care, 38	Post— lumbar surgery	Shenmen, occipital, lumbar-sacrum, stomach, cardia, endocrine (6)	Not applicable	4 times a day for 3 min	72 hr	7	Although AA group did not provide greater pain relief after lumbar surgery than control group, the participants were satisfied with the level of pain relief.
Barker et al. (2006), Austria	18	Sham AA, 20	Hip pain	Shenmen, hip, and valium point (3)	Tip of the concha (1)	No record	One time	11	Patients in the true AA group had less pain ($p = .0001$) and anxiety ($p = .018$), lower heart rate ($p = .0001$), and higher satisfaction than did patients in the sham control group.

Kwan & Li, (2014), Hong Kong	126	Sham AA, 130	Acute postpartum pain	Apex of the auricle, anus, external genital organs, Shenmen (4)	4 irrelevant points (4)/no seeds	Every 4 hr for 30 sec	48 hr	7	No significant difference in perineal pain perception between the groups was identified.
Rodriguez-Mansilla et al. (2014), Spain	40	Massage group, 40; control group, 40	General pain	Shenmen, myorelaxant, Xin heart (3)	Not applicable	No record	3 mo/ (2-mo f/u)	7	No significant difference in pain severity was identified among groups. AA was slightly more effective than massage therapy.

AA = auricular acupressure; MQ = methodologic quality; f/u = follow-up; LBP = low back pain; NO = nitric oxide; VAS = Visual Analog Scale; MDQ = Menstrual Distress Questionnaire; TEAS = transcutaneous electric acupoint stimulation; TKA = total knee arthroplasty; TKR = total knee replacement.

The range of the AA intervention period varied from a single instance to 3 months. In 33% of the studies (n = 5) follow-up ranged from 2 weeks to 2 months after completing AA treatment. Most treatment sessions lasted 3 minutes per acupoint, at least 3-4 times a day (n = 9).

The most common auricular acupoints (n = 13) were located on the superior and central to the apex of the triangular fossa (also known as the Shenmen acupoint), at auricular acupoints (n = 10) that correspond to the location of the individual's pain, on the inside aspect of the antitragus (n = 7; also called the nervous subcortex), and at the lower border of the inferior antihelix crus (n = 4; also known as the kidney acupoint). Most of the studies (n = 13) used only one group; those with a comparison group included either a sham group (n = 12) or a standard pain treatment group (n = 1). Pressure techniques (n = 10) included hand- or finger-point pressure to acupoints and transcutaneous acupoint electric stimulation (n = 1), which was added to increase stimulation on the ears.

Nine studies used the sham acupoints from non-AA acupoints for the sham group. Three studies used the same ear acupoints in both the AA and sham groups, but for the sham acupoints only a tape without a seed was attached. Ten studies, including a sham group, chose the same number of ear acupoints as the AA group. An electrical point finder in three RCTs was used to locate the points. In seven RCTs both ears were used for the AA intervention, and one ear was used for five trials. However, three trials did not specify whether one or two ears were used. Only 21% of studies (n = 3) used daily diary which was implemented; the diary recorded AA self-treatment, including the frequency and duration of each participant's AA practice and any side effects. Most of the studies reported more than a 75% retention rate among their participants (n = 13), except two studies that reported a 62% and 68% retention rate, respectively.

Methodologic Quality Assessments

To evaluate MQ assessments, five authors (Chung et al. 2014; He et al. 2013; Rodriguez-Mansilla et al. 2014; Suen et al. 2007; Yeh et al. 2010) were contacted to verify proper information because the necessary data were not provided in the articles. Of the 15 RCTs, nine studies had MQ assessments that scored greater than 8 out of 11, with a mean score of 7.7. Five studies attained a score between 6 and 7. Only one study had a score less than 5. The general MQ in the 15 RTCs was ranked as medium, and only four studies were ranked as high. There were four areas of methodologic weakness identified among the studies. First, care providers (practitioners) for the participants (n = 14) were not adequately blinded as to group assignment: The auricular acupoints were visible whether or not participants belonged to the AA group. However, in one study the interventionists who were not acupuncturists were blinded because they were not informed whether the ear acupoints were AA or sham acupoints. Second, an intention to treat analysis for missing data was performed in only four studies. Third, outcome assessors were not adequately blinded in 8 of the 15 studies reported. Lastly, there were not enough details provided to adequately address issues such as generated allocation sequence, concealment of group allocation, administration of the intervention, and credentials and experience of care providers.

Evaluation of Pain Outcomes of AA

Most studies reported significant reduction in pain intensity (Table 2). Twelve studies reported statistically significant improvement in the pain outcomes (pain severity and/or analgesic consumption) of AA treatment compared with the sham or

standard care groups. Even though three studies did not report statistically significant results, a positive pain relief trend was found in the AA group more than the comparison group in the studies by Yeh et al. (2010) and Rodriguez-Mansilla et al. (2014) (Table 2). In Kwan and Li's (2014) study the use of pain medication was found to be a confounding factor because it was used for not only postpartum pain but also breast engorgement pain.

Lower Back Pain

Five RCTs used an AA treatment for lower back pain. Across the studies, pain severity in the true AA group was significantly lower than the sham AA or control group. However, there were differences across the studies, including the number (3-7 points) and selection (Table 2) of AA acupoints, intervention period (3-4 weeks), intervention frequency (no record to at least 3 times a day), daily diary use (n = 2), and pain outcome tools (SF-BPI, Short-Form McGill Pain Questionnaire, and blood biomarkers). These differences make it hard to compare results of the five studies. For instance, the study by Lin et al. (2015) compared blood biomarkers with the SF-BPI pain assessment. Serum blood samples indicated a decrease in proinflammatory cytokines (interleukin-1β (IL-1β), IL-2, IL-6) and calcitonin gene-related peptide and an increase an anti-inflammatory cytokine (IL-4) after a 4-week treatment as pain levels decreased. In Suen et al.'s (2007) study, the sham acupoints were chosen by the same acupoints and seeds were also attached with the AA group, but there was no application of massage. Yeh, Chien et al. (2013a) and Yeh et al. (2015) used a daily diary that was filled out by each participant to record his or her AA practices, analgesic use, and pain intensity for pain measurement. Yeh, Chiang et al. (2014a) chose AA acupoints based on a Chinese Traditional Medicine theory for individual pain sites, unlike the other studies, in which the AA points were taken from previous studies.

Dysmenorrhea

Three studies were conducted to test the effectiveness of AA therapy on alleviating dysmenorrhea and menstrual distress in young women. Dysmenorrhea occurs when the uterus experiences an increase in uncontrolled contractions (Yeh, Chien et al. 2013a). Pain severity in the AA group was significantly lower than the sham AA or control group across the studies. The number of AA acupoints (3-6 points), selection (Table 2) of AA acupoints, period of AA treatment (2-20 days), intervention frequency (no massage to 15 times), daily diary use (n = 1), analgesic control, and pain outcome tools (VAS or Menstrual Distress Questionnaire) varied among the studies. These differences make it difficult to compare the three studies. For instance, whereas Cha & Sok's (2016) and Yeh, Chien et al. (2013a) chose AA acupoints from previous studies, Wang et al. (2009) chose AA acupoints based on consultation with three physicians and experts. Only Wang et al. (2009) used a daily diary, which was filled out by each participant to record the time of application of acupressure and any possible side effects.

Postoperative Knee Pain

Two RCTs using AA therapy for postoperative knee pain are described in Table 2. Across the studies, pain severity in the true AA group was significantly lower than the sham AA or control group. The number (2 and 4 points) and selection (Table 2) of AA acupoints, intervention period (3 and 7 days), and intervention frequency (3 and 4 times a day) in both studies were different. For example, in Chang et al.'s (2012) study, the sham acupoints were chosen by the same ear acupoints with the AA group but were only attached tape without a seed, and there was no application of massage. On the other hand, in He et al.'s (2013) study, the four sham acupoints were chosen because of nonmeridian points. However, both studies used analgesic patient-controlled analgesia (PCA) for all participants as a traditional postoperative pain management and PCA medication records were reviewed at the end of intervention.

Postoperative Back Pain

Chung et al. (2014) and Yeh et al. (2010) tested the effect of an AA therapy on postoperative lumbar surgery patients, and the studies yielded conflicting results. The comparison group (use of transcutaneous electric acupoint stimulation, TEAS), number (5 and 6 acupoints) and selection (Table 2) of AA acupoints, and intervention frequency (10 and 12 times) differed between studies. For example, Chung et al.'s (2014) study examined the effect of AA combined with two uses of TEAS in order to increase impulse on the ear acupoints. However, the period of AA intervention and the usage of analgesic PCA for all participants as traditional pain management postoperatively in both studies were the same.

Hip Pain, Acute Postpartum Pain, and General Pain

Barker et al. (2006), Kwan and Li (2014), and Rodriguez-Mansilla et al. (2014) conducted trials of AA therapy for relieving hip pain, acute postpartum pain, and general pain, respectively. AA was statistically effective in relieving hip pain ($p < .01$) but not acute postpartum ($p > .05$) and general pain ($p > .05$).

Discussion

This systematic review was conducted to evaluate the effects of auricular acupressure on pain management. Importantly, our review of 15 RCTs that met the research criteria is the first to focus solely on the effect of AA on pain relief. This systematic review of AA as an adjunctive therapy reveals statistically significant reductions in various pain types, such as back pain and dysmenorrhea, compared with sham or standard care. However, uncertainty remains regarding the strength of the evidence because of the small number of studies included and lack of high-quality and consistent methodologies.

The mean MQ across the studies was 7.7. According to the MQ scoring system, a score between 7 and 8 indicates medium quality. Although the general MQ of the 15 RTCs was medium, only four studies (36%) were ranked as high. To build strong evidence about the effect of AA on pain management, researchers need to improve methodologic quality in conducting RCTs. Particular areas of poor methodology included the lack of blinding of interventionists and data assessors, lack of usage of intention-to-treat methodology, lack of discussion related to details on generation of allocation sequence, lack of concealment of group allocation, and poor description of care providers' credentials.

The selection of auricular acupoints is one of the crucial factors in AA treatment effects (Yu et al., 2015). The selection of AA acupoints for studies and practice has varied (Yu et al., 2015). Across the 15 studies, the selection of AA acupoints was taken from previous studies, authors' decisions, or recommendation of practitioners based on the ear zone system. The auricular acupoints, Shenmen (n = 13) (He et al., 2013) and corresponding points of individual pain (n = 10), were often chosen. Our perspective, based on our review, is that comparative studies of those various AA acupoints' selection will help us elucidate the best AA acupoint selection protocol for pain types and sites.

The use of sham (placebo) auricular acupoints could help measure the true effect of AA. Seventy-nine percent of the selected studies in this systematic review (n = 12) used sham acupoints to compare with AA acupoints. Most the sham acupoints were outside of AA acupoints (n = 9). However, we need to be cautious about the selection of sham acupoints because there have been reports that a sham acupoint may stimulate a true acupoint because of a short distance between AA and sham acupoints (Yeh, Chang, Chu, & Chen, 2009; Yeh, Chung, Chen, & Chen, 2011). Furthermore, only one study recognized that a sham ear acupoint can cause an impulse to AA ear acupoints (Yeh, Hung, et al., 2013b). This liability needs to be considered and disclosed in reporting of AA studies.

Review and monitoring of pain medications and pain medication adjuvants throughout AA studies are very important to eliminate confounding effects. Pain medication records were reviewed in 60% of the studies (n = 9) at the end of interventions, and only one study monitored the use of pain medications throughout the study (Yeh, Hung, et al., 2013b). Therefore it is important to closely monitor pain medication consumption throughout a study to avoid a confounding effect.

Methods related to acupressure intervention, such as pressure application, duration of session, frequency per day, use of daily diary, and length of intervention, may influence the effectiveness of the intervention (Yeh, Chiang et al., 2014a). In this systematic review the duration of AA treatment for pain was from one time to 3 months. Chronic pain such as lower back pain (3 weeks–3 months) had a longer AA treatment period than acute pain such as postoperative and hip fracture pain (one time to 7 days). Most studies (n = 9) employed 3 minutes on an acupoint per session with at least 3-4 sessions per day. Thus there was a lack of clinical protocols on the duration of AA treatment and per session. Future studies should investigate the optimal frequency, duration of treatment, and duration per session of AA, as well as acupressure techniques. Various methods can be used to stimulate the seed, but without further studies we cannot comment on the effectiveness of one over the other. As is true with all self-management techniques, adherence to carrying out the intervention is crucial to success. The use of the patient daily diary can enhance compliance and aid in communication with the health care provider (Yeh et al., 2015).

The physiologic biomarkers for AA therapy are necessary to build scientific evidence as to effectiveness. Only one RCT measured physiologic biomarkers for pain (Lin et al., 2015), linking relief of pain to a reduction in inflammatory markers. Proinflammatory cytokines can induce afferent neurons and propel pain messaging to the central nervous system (Molina, 2013), so further investigations of the potential for AA to mitigate the release or action of proinflammatory cytokines is warranted.

There are limitations in this systematic review. First, only studies published in English were included in our review. This may have resulted in the exclusion of studies published in other languages. Additionally, negative or nonsupportive studies are many times left unpublished, thus skewing our view of the true effectiveness of this intervention. Lastly, methodologic variability made cross-study comparison difficult.

Conclusions

In 12 of the 15 studies we reviewed, AA therapy revealed statistically significant improvements in decreasing pain severity, analgesic consumption, and adverse effects of analgesics. As such, and based on our review, we provide preliminary evidence that AA may be a beneficial adjunctive therapy for patients with pain. However, the small number of studies and the lack of consistent rigorous methodology across the studies preclude definitive statements regarding the effectiveness of AA.

This review suggests three nursing implications. First, symptom self-management may improve patients' tolerance of pain. Second, education about AA and CAM therapies for health care providers may assist them in providing pain control for their patients. Lastly, additional AA research is required to build on scientific evidence. Positive subjective patient outcomes, less analgesic use, and the lack of adverse effects associated with this modality, support the use of AA as an adjunct to patient pain self-management. Auricular acupressure education for health professionals can enhance their understanding of the usage and mechanism of action of AA as a pain management tool for patients. Health care providers should feel confident considering this self-management modality as an adjunct in their pain management plan. At minimum, they can communicate about AA with their patients who are interested in using it and refer patients to licensed practitioners.

However, we need to continue research on the effect of AA on pain management. To advance the science of AA, and so we can compare results across studies, future research should include the development of standard protocols for the delivery of the intervention, identify relevant physiologic biomarkers, and ensure that high-quality methodologies such as RCTs are used to establish evidence. It is also important that we extend the research of AA effects to other types of pain such as neuropathic pain in cancer patients because different forms of pain may respond differently to this therapy. Advancing scientific evidence about AA therapy can more effectively inform health policy and clinical practice.

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