Auriculotherapy: neurophysiology, points to choose, indications and results on musculoskeletal pain conditions: a systematic review of reviews

ABSTRACT

BACKGROUND AND OBJECTIVES: Auriculotherapy is widely used to relieve painful conditions, therefore, allowing systematic reviews on the subject. However, they did not propose a unified bank of points of possible choice, their possible combinations or described the location of such points, thus making it the objective of this study.

CONTENTS: The systematic review of revisions methodology (Overview) was chosen to achieve the proposed goal. The quality of such material was ascertained by the tool Assessment of Multiple Systematic Reviews, and the databases consulted were PEDro database, Pubmed, Scielo, and LILACS. The keywords and boolean index applied were: auriculotherapy AND pain; ear acupuncture AND pain; ear acupressure AND pain; auricular therapy and pain; auricular medicine AND pain. A total of 242 studies were found, but only six were systematic reviews in humans involving pain and auriculotherapy alone (without association with another technique). The methodological quality of the studies was high (8-10/11 Assessment of Multiple Systematic Reviews). There is variability in the neurophysiological explanation of action, many possible disorders that can be approached with auriculotherapy (acute, chronic, trauma, pre- and postoperative pain among others). Auriculotherapy showed to be promising in the remission of the pain, adjacent to the conventional treatment, low risk, cost, and easy administration.

CONCLUSION: There are several ways of justifying its neurophysiological effects, and the most used points were ShenMen, the corresponding somatotopic region and the cavum conchae region (vagal stimulation). Auriculotherapy meets the needs of an immense possibility of painful musculoskeletal conditions, with favorable and promising results.

Keywords: Auriculotherapy, Modalities of physiotherapy, Pain, Physiotherapy, Rehabilitation, Traditional Chinese Medicine.

INTRODUCTION

Since 1978, the World Health Organization (WHO) recommends the insertion of complementary and alternative medicine
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CONTENTS

In order to achieve the proposed objective, a systematic review of reviews that addressed AT and pain was chosen (Overview). PEDro, Pubmed, Scielo and LILACS databases were accessed in February 2019. The keywords and Boolean indexes were used as follows: Auriculotherapy AND pain; ear acupuncture AND pain, ear acupressure AND pain; auricular therapy AND pain; auricular medicine AND pain. These words should be present in the title or abstract for the articles to be selected. If in doubt, the studies were fully verified. Filters were applied seeking only
systematic reviews that were in humans, without restriction on
the date of publication. Two evaluators made the selection and
assessments by the Assessment of Multiple Systematic Reviews
(AMSTAR) tool, discussing the score in case of divergence. Al-
though revisions on the theme are not an unpublished subject,
the report of the points or which were the most used are not
always described, making clinical practice and methodological
reproduction difficult. Therefore, books were also consulted
to provide the best description of the use of points, as well as
their location. Table 1 shows the results of the selection in the
databases, and table 2 shows the studies with the application of
the AMSTAR tool in order of the highest score.
Figure 1 shows the subdivision of the pinna necessary to under-
stand and facilitate the interpretation of the description of the
sites in table 3. It is noteworthy that there are normal anatomical
variations from person to person, so at first, the identification
of the structures, as well as the search for specific sites, require
practical training.
Table 3 shows the main points for the relief of painful conditions
according to the unification of several studies, and figure 2 shows
where they are anatomically. This does not mean that all should be applied in a single session
but rather selected according to the combinations already de-
scribed and added to the painful area to be treated (Figure 3).
For example, ShenMen, Kidney, Sympathetic (auriculocybernetics) + lumbar (affected region - AR). However, a systematic re-

**Table 1.** Search and selection of studies in the databases

| Databases | Found | Repeated | Deleted | Final |
|-----------|-------|----------|---------|-------|
| PEDro     | 20    | 2        | 13      | 5     |
| Pubmed    | 112   | 11       | 100     | 1     |
| Scielo    | 33    | 0        | 33      | 0     |
| LILACS    | 77    | 0        | 77      | 0     |
| Total     | 242   | 13       | 223     | 6     |

**Table 2.** Characteristics of systematic reviews and selected meta-analyses

| Authors                        | Objectives                          | Most used AT points                                      | Results (p) | Mean differences in pain | AMSTAR |
|--------------------------------|-------------------------------------|---------------------------------------------------------|-------------|--------------------------|--------|
| Yang et al.7                   | Effect of ear acupressure on chronic low back pain | ShenMen, subcortex, AR (lumbosacral, spine, lumbar, sciatic nerve, hip, popliteal fossa), liver, kidney, sympathetic, bladder, spleen, Ashi points | p<0.001     | - 1.13                   | 11/11  |
| Zhao et al.20                   | Assess the effectiveness of AT in chronic pain | ShenMen, sympathetic, subcortex, thalamus, liver, kidney, heart, bladder, spleen, lung, analgesia, AR and Ashi points | p<0.05      | - 3.76                   | 10/11  |
| Yeh et al.10                    | AT effectiveness in pain management compared to the placebo group | ShenMen, subcortex, lung, thalamus, sympathetic, liver, kidney, analgesia, endocrine and AR. | p<0.05      | 1.59                      | 10/11  |
| Asher et al.14                  | AT in pain management               | ShenMen, thalamus, lung, heart, zero point and AR.       | p<0.05      | 1.56                      | 10/11  |
| Murakami, Fox and Dijkers11     | Immediate pain relief (48h)         | ShenMen, thalamus, lung and AR.                          | p<0.05      | - 1.08                   | 9/11   |
| Usichenko, Lehmann and Ernst51  | Assess the effectiveness of AT in postoperative pain control | Not described                                           | Not described | Not described            | 8/11   |

AR = affected region, somatotopic correspondence of reflexively compromised body area; AT = auriculotherapy; Ashi point = most uncomfortable site; AMSTAR = Assessment of Multiple Systematic Reviews.
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Table 3. Main points to be combined with analgesic purposes

| Points         | Location                                                      | Action                                                                 |
|----------------|---------------------------------------------------------------|------------------------------------------------------------------------|
| ShenMen        | Apex of the angle formed by the upper and lower branch of the helix | Anxiety, mental disorders, emotional stabilization, pain conditions and anti-inflammatory activity |
| Sympathetic    | At the intersection of the lower branch of the anthelix and the helix, in the inner region | Pain in general, nausea, vomiting, hyperhidrosis of the hands and feet. Vegetative stabilization of the viscera |
| Kidney         | In a fossa located below the beginning of the inferior branch of the triangular fossa, in the superior region of the cymba conchae | Urogenital tract disorders, joint problems, menstrual complaints, amenorrhea, premenstrual tension, migraine and for the treatment of chemical dependence. General and chronic bone diseases |
| Liver          | In the lower region of the cymba conchae, above the beginning of the helix root, near the anthelix | Contributes to disorders of muscles and tendons in cases of pain, stiffness and injuries |
| Spleen         | Located at the top of the cavum conchae, near the anthelix and lower than the helix root | Treatment of painful and weak muscles |
| Bladder        | Below the lower branch of the anthelix                        | Urogenital tract disorders: infection, dysuria, polyuria, incontinence, urethral stone and acute nephritis. Idiopathic edema |
| Analgesic or analgesia | Vertically between kidney point and helix root | Analgesia |
| Ear apex       | At the apex of the ear, on the helix                          | Hypertension, allergies, analgesia and emotional harmonization |
| Zero-point     | In the ascending branch of the helix or root                   | Spasmolytic, analgesic and relaxing action |
| Muscle relaxa-| Medially to the spleen point towards the root of the helix     | Muscle relaxant, muscle tension or spasm and insomnia |

Figure 2. Location of the main analgesic points
MR = muscle relaxation; L1 = lung 1; H = heart; L2 = lung 2.

Figure 3. Somatotopic map of the reflex region affected and to be chosen to treat
Table 3. Main points to be combined with analgesic purposes – continuation.

| Points          | Location                           | Action                                                                 |
|-----------------|------------------------------------|------------------------------------------------------------------------|
| Lung 1 and 2    | In the conchae cavity surrounding the heart zone | Respiratory tract and skin disorders such as colds, laryngitis, cough, asthma, bronchitis, dermatitis, urticaria and acne (vagus nerve stimulation) |
| Heart           | Cavum conchae cavity center         | Hypertension, anxiety, depression, insomnia, palpitations, tachycardia and dyspnea, angina and bradycardia (vagus nerve stimulation) |
| Adrenal         | In the prominence of the tragus     | Articular disorders, circulatory, inflammatory processes, rheumatism, arthrosis, bursitis, allergic processes. Stimulates adrenocortical hormones and adrenaline |
| Subcortex       | Lower region of the inner part of antitragus | Pain, anxiety and depression                                           |
| Thalamus        | Above the subcortex point in the inner face and apex of the antitragus | Low back pain and neck pain                                           |
| Endocrine       | At the inner base of the intertragical notch. | Endocrine disorders, hypo, and hyperthyroidism, diabetes, gynecological and rheumatoid disorders. |

view demonstrated the possibility of choosing 15 different points only for the treatment of low back pain, with the thalamus and subcortex being the most frequent. This demonstrates considerable variability among the studies analyzed, as it is suggested to select about 4-6 treatment points. Therefore, it is impracticable to propose associations for each painful case in this format; a book would be needed to address this objective since more than 200 AT points were identified. In any case, some previously used combinations serve as the basis, such as the described auriculocybernetics itself or the following combinations: ShenMen, thalamus, lung + affected region, somatotopic correspondence of reflexively compromised body area (AR); ShenMen + AR (10); thalamus, analgesic + AR; ShenMen, sub cortex + AR. There have been many reported conditions where AT can help to relieve the pain. Some of these indications are as follows: 1) cancer-associated pain, knee arthroscopy, femur fracture, hip arthroplasty; in dysmenorrhea, postoperative pain, hip fracture, low back pain, bone marrow aspiration, acute and chronic pain; 2) spinal pain, lumbar sciat ic pain, cramps, stiff neck, fibromyalgia, rheumatic pain, phantom pain, amputation stump pain, herpes zoster, pain after fractures in general, trigeminal neuralgia, toothache, headache, migraine and tension headache; 3) chronic low back pain, muscle spasm, whiplash injuries, traumatic pain, inflammation after joint sprains, osteoarthritis, pelvic and abdominal pain, shoulder impingement syndrome, adhesive capsulitis, bursitis, lateral epicondylitis, carpal tunnel syndrome and joint pain.

Usichenko, Lehmann and Ernst did not state which AT points were applied in the clinical trials analyzed and their results in statistical terms, which hinders the interpretation and reproducibility of new research. This study was conducted over a decade ago, and others with the same methodological design came later, being more careful. Murakami, Fox and Dijikers highlighted the fact that AT has results as good as their comparative groups, has temporary adverse effects and is less degrading than medications (pain in the site, which can make it difficult to sleep, skin irritation, slight bleeding, dizziness, and nausea) and the application is quick and accessible. However, they expected a more significant reduction in pain. Asher et al. came to a more positive conclusion than previous authors, stating superior pain minimization results when AT was compared with a control group or placebo compared to the same comparison made with systemic acupuncture. Contradicting another systematic review, which shows that AT was not superior to the placebo group and that its effects begin to diminish three months after the end of its application, they nevertheless described it as promising and capable of reducing pain. Jiang et al. found a positive and lasting effect of AT on pain and that adverse effects are insufficient for patients to abandon treatment. In order to resolve these doubts, studies such as Moura et al., with 110 participants, treatment group, placebo, and control, should be encouraged, as they allow reliable conclusions to be based.

The justification for the effects of AT seems to be linked not only to the penetration of the needle into the pinna but to the choice of ideal sites. This is an extensive discussion, but four possible explanations are elucidated: (1) AT acts by a mechanism other than systemic acupuncture; (2) action similar to acupuncture, which would activate meridians, regularization of organ function, Qi and Blood, with consequent normalization of painful pathways (TCM); (3) hypersensitive reflex neuronal pathways that connect the auricular microsystem to the corresponding somatotopic region in the brain, which through the spinal cord reaches the corresponding painful area; (4) AT does not depend on specific points, but rather on the stimulated region. The fourth explanation comes from the stimuli in the conchae region, innervated by the vagus nerve, to be able to induce parasympathetic stimulation. Therefore, analgesia would be caused by the application site and not by the selection of points. That is, AT can function via the central pain control mechanism. However, if the analgesia provided is by specific points or stimulated region, it remains under discussion. What is known is that auricular stimulation is a scientifically validated method, even by functional non-invasive magnetic resonance imaging of brain neuromodulation. The possibility of acting by central descending pain inhibitory mechanism was reinforced by the fact that the effects of AT are blocked by the use of the opioid antagonist naloxone. AT would still be able to increase pain tolerance. Therefore, there is variability in the explanation that indicates the action of AT in pain, but it shows the interest of the scientific community in this microsystem, making it the most studied. Yeh et al. also reported significant pain relief with AT compared to the control or placebo group, noting that the quality of the studies was moderate to high. One of the difficulties with
AT effectiveness reported by these authors would be the limited number of placebo group studies, only 32% of studies involving AT and pain. The patient expectation about the treatment, the relationship with the therapist, and the placebo effect itself may affect the results obtained with AT, but they are present in any other treatment modality. The ShenMen point and the reflex points corresponding to the affected region are the most commonly used in practice, according to the authors mentioned, information that corroborates the findings in table 2. In short, the need for blind, randomized, sample-based clinical trials to define the number of participants should be encouraged when investigating the effectiveness of any treatment method, as well as the review of reviews. The possibility of using this study design, review of reviews, on a specific theme (AT and pain), demonstrates the interest of the scientific community in the topic. So far, the conclusions are cautious, but the systematic reviews that have been included have shown high methodological quality (8-10/11 - AMSTAR) and agree on the following aspects: AT is an adjunct technique to be used to manage pain; to reduce the use of analgesic drugs, minimizing tolerance and adverse effects. It is a treatment with low risk, low cost, and easy administration7,10,11,14,20,21.

**CONCLUSION**

AT has favorable results regarding its effects on pain (although its mechanisms of action continue to be studied), showing to be promising as adjunctive therapy to conventional treatment. The ShenMen point, reflex points corresponding to the site in the affected body, and cavum conchae stimulation (e.g., lung point), ShenMen point, reflex points corresponding to the site in the affected body, and cavum conchae stimulation (e.g., lung point), seems to be the most favorable combination for better pain relief results.

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