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EFFECTIVENESS OF ACUPUNCTURE IN THE TREATMENT OF CHRONIC LOW BACK PAIN(LBP): LITERATURE REVIEW

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ABSTRACT

Chronic Low Back Pain (CLBP) or Low Back Pain (NPB) is pain between the costal and gluteal margins that persists for over three months. LPB is a common disease. Fifty percent of the world's population is estimated to experience LBP by 30, and 70% of the population will experience LBP at some point in their adulthood. There is no *gold standard* for LBP therapy, so the therapy needed depends on the patient. One of the therapies used is acupuncture therapy. In a randomized clinical trial, acupuncture therapy demonstrated greater effectiveness in reducing pain intensity for patients with chronic LBP compared to administering oral baclofen at a dose of 30 mg/day. Another study in Germany with 1162 research subjects also found that providing acupuncture therapy in the treatment of chronic LBP had more significant efficacy on the patient's pain and functional status than conventional therapy.

Keywords: Acupuncture, pain level, low back pain (LBP).

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1. INTRODUCTION

Chronic Low Back Pain (CLBP), or chronic low back pain, occurs between the costal and gluteal margins and persists for over three months.[1]*Low back pain* is a severe public health problem worldwide, which impacts limited physical activity and reduced quality of life and causes socioeconomic problems.[2]

LBP is a musculoskeletal disorder that commonly occurs in adults It is estimated that around 50% of the world's population will experience LBP by the age of 30 years, and 70% of the population will experience LBP at some point during their adult life. The high prevalence of LBP in the world today results in enormous economic and social costs, for example in the United States, approximately 91 billion dollars are spent annually on back pain treatment costs, with an additional 50 billion dollars due to lost productivity and disability benefit payments.[3]

The financial and social burden that arises in society causes alternative medicine to be increasingly used by LBP sufferers to treat and relieve pain. Various variations of nonpharmacological treatment, such as manipulation/mobilization, acupuncture, yoga, massagetherapy, and multidisciplinary treatment, have become popular recently.[4]

Acupuncture is one of the oldest complementary therapies from traditional Chinese medicine, commonly called *Traditional Chinese Medicine* (TCM), and is commonly used for various pain conditions.[5] The physiological mechanism of acupuncture is known to activate the endogenous pain control system through needle injections at specific points in the body. Thistechnique produces resistance in *the dorsal horn*, which can activate or inhibit specific points in the body that stimulate the release of opioids such as serotonin and catecholamines. The releaseof this neurotransmitter produces various effects on the body, including analgesic, muscle relaxant, anti-inflammatory, mild anxiolytic, and antidepressant effects.[6]

Due to the increasing use of acupuncture in society today as a therapeutic option to relieve low back pain, in writing this literature review, the author aims to determine the effectiveness of usingacupuncture as an alternative option in the treatment of *low back pain* (LBP) patients.

2. METHODS

This research method uses a descriptive approach by reviewing literature from research articles.We conducted article searches via PubMed (pubmed.ncbi.nlm.nih.gov), ScienceDirect (sciencedirect.com), Cochrane Library, and (cochranelibrary.com) sites.

3. DISCUSSION

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3.1 Acupuncture

Acupuncture comes from the Latin words *Acus,* which means needle, and *Punctur,* which means to pierce.[7] Acupuncture has been used as a minimally invasive therapeutic modality of treatment since approximately 2000 years in the Han dynasty in China.[8] This treatment involves inserting thin needles into specific body parts to activate the meridians, known as the flow of *qi* or *chi*.

Determining acupuncture points involves utilizing surface anatomical signs, comparative, and finger measurements. Fixed anatomical signs, including depressions and bulges, are shaped byjoints and muscles, the configuration of the five senses, the hairline, fingernails and toenails, mammary papillae, and the navel or umbilicus. If one opts for comparative measurements, one can employ joints to measure the length and width of various human bodies. Additionally, the length and width of the patient's fingers play a role in determining acupuncture points.[8]

The human body comprises 12 general meridians, with three meridians each located on both hands and feet Yin and Yang aspects. These meridians play a vital role in acupuncture therapy, as specific points along them are pierced with needles during treatment. The meridians highlightinner-outer connections between various organ pairs, such as the Lung-Large Intestine, Stomach-Spleen, Heart-Small Intestine, Bladder-Kidney, Pericardium-San Ciao, and Gallbladder-Jati. Thisphysiological and pathological relationship underscores the interconnection of each meridian. The meridians serve as indicators of the conditions of the body's organs, with stimulation of specific meridians leading to corresponding bodily responses, such as pain or color changes.[8]

Before performing the acupuncture procedure, the practitioner will conduct a general examination of the patient, including palpating the radial artery, examining the tongue, observing the cornea, and so on. Subsequently, the practitioner will instruct the patient to assume the designated position and insert needles at each point for 15-30 minutes.

3.1 Low Back Pain (LBP)

Low back pain (LBP) is pain and discomfort localized below the costal margin and above the inferior gluteal fold, with or without leg pain.[9] LBP is one of the most commonchronic pain conditions, which causes activity limitations and work absenteeism.[10] Epidemiological data shows that LBP is in 19th place with a percentage of 27%, and the lifetimeprevalence of LBP is 60%.[11]

As many as 60% of adult workers often experience LBP caused by sitting for too long. Incorrect

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sitting posture for a long time can cause stiffness in the back muscles, thereby damaging the surrounding tissue. If this continues for an extended period, it will affect the pressing on the nervepads in the spine, which can put you at risk of developing a Herniated Nucleus Pulposus (HNP).[12]

Chronic low back pain occurs when it lasts for 12 weeks or more. A *systematic review* study conducted in primary care showed that ⅔ of patients experienced chronic LBP.[13] *Low back pain* is a complex and heterogeneous condition accompanied by nociceptive and neuropathic pain mechanisms. In LBP patients, nociceptive pain is caused by activating nociceptors innervating ligaments, joints, muscles, fascia, and tendons in response to tissue injury, inflammation, and biomechanical stress. Pain arising from injury or disease directly affecting the nerve roots innervating the spine and lower limbs characterizes neuropathic back pain and pathological invasive innervation of damaged lumbar discs. Chronic LBP is increasinglyconsidered a mixed pain syndrome consisting of both nociceptive and neuropathic components.The nociceptive component of chronic LBP is often poorly recognized and results in minimal therapy.[14]

We recognize low back pain originating from the vertebral column or its adnexa, caused by noxious stimulation of the lumbar spine structures or from deep soft tissues in the back.[14] In addition to back pain, noxious stimulation of the structures in the spinal lumen can also causereferred pain. The body experiences referred pain in an area different from the location of the painsource. Referred pain arises due to the process of afferent activity in intact nerves. The mechanism of referred pain consists of convergent input from two tissues into the same spinal nerve and projection of the resulting pain sensation into different tissues.[15]

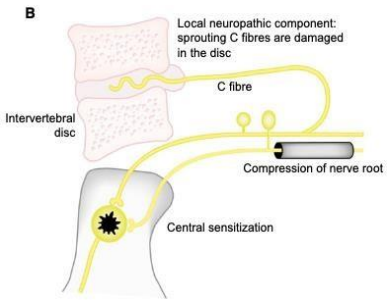

Figure 1. Pathophysiology of LBP

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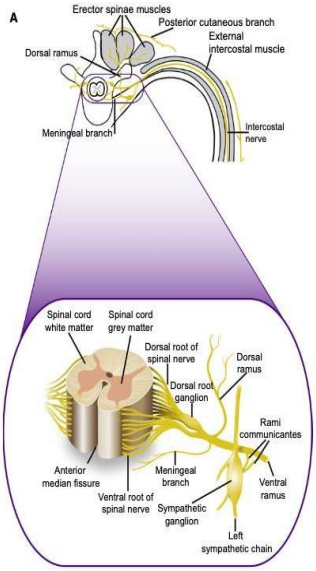

Figure 2. Anatomy of the spinal nerves originating from the spinal cord

In chronic low back pain, degenerated discs can cause neuropathic pain due to nociceptive lesions (*local neuropathic pain*), mechanical compression of nerve roots (*mechanical neuropathic root pain*), or the effects of inflammatory mediators arising from degenerative discs,which can result in inflammation and damage to the nerve roots.[15]

There are several obstacles in diagnosing LBP, such as poor validity of patient reports. In diagnosing patients, they observed their habits, such as sitting, standing, or walking.[16] Apart from that, medical personnel need sufficient time to diagnose. Meanwhile, mostdoctors do not follow existing procedures. Diagnosing LBP requires a skilled and careful examination.[16]

At this time, we recommend obtaining consent in advance to treat low back pain. Patients shoulddiscuss with their doctor the choice of therapy to be used and decide for themselves. There is no g*old standard* for LBP therapy, so the therapy needed depends on the patient. One of the therapies used is acupuncture therapy.

The most common analgesic used to treat LBP is Paracetamol (acetaminophen). This drug has properties equivalent to aspirin. Paracetamol has antinociceptive effects by inhibiting prostaglandin H2 synthase by acting as a substrate for the active site of the peroxidase enzyme. The liver will conjugate this drug as inactive glucuronate and sulfate, causing side effects such as allergies. The oral dose should not exceed 4 grams/day, followed by an IV loading dose of 2 g and 1 g every 4 hours up to a maximum of 4 g per day.[17] Aspirin is the most frequently used type of analgesic. Aspirin has analgesic, antipyretic, and anti- inflammatory effects, which can stimulate the respiratory tract and cause respiratory alkalosis, loss of electrolytes in the kidneys, dehydration, and impaired glucose metabolism. Aspirin also has a uricosuric effect at 5-8 grams/day doses. The dose commonly used to treat pain and feveris 325-650 mg every 4-6 hours.[17] NSAIDs will inhibit cyclooxygenase, which plays an analgesic, anti-inflammatory,

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antipyretic, andanti-platelet role (prevents thromboxane production). Side effects of NSAIDs include damage to the gastric and intestinal mucosa, fluid and electrolyte balance disorders, and can cause analgesic nephropathy. G-*protein-coupled* opioid receptor (GCPR) receptors with varying pharmacodynamics. *Morphine* isa potent opioid analgesic drug that has analgesic effects, euphoria, decreased cough reflex, nausea and vomiting, and pupil constriction. This drug also has significant effects on the digestivetract, such as increased tone, decreased motility, and narrowing of the sphincter. Morphine is onlyused for severe pain at an oral dose of 30 mg every 3-4 hours and 10 mg every 3-4 hours parenterally. This terminology is often used in drugs to treat spasticity due to upper motor nerve disease and pain due to non-specific LBP. The drugs included in this group are carisoprodol, chlorzoxazone, Cyclobenzaprine, metaxalone, methocarbamol, and orphenadrine. Doctors consider Cyclobenzaprine the best drug for treating muscle spasms and have found it effective in treating fibromyalgia. This drug mainly plays a role in the brain stem to reduce muscleactivity of muscles, affecting alpha and gamma motor neurons. The dose used to reduce musclespasms is 15-30 mg once a day. Methocarbamol, a centrally acting muscle relaxant, functions as a carbonic anhydrase and NMDA.

3.3 Acupuncture in the Treatment of *Chronic Low Back Pain* (LBP)

Medical practitioners commonly choose pharmacological therapy as an intervention to alleviate the effects of low back pain (LBP), both on health and functional status resulting from back pain.,both on health and functional status caused by back pain. However, as time passed, many studies were conducted, including nonpharmacological interventions for LBP.[18] Nonpharmacological therapy is associated with a lower risk compared with pharmacological therapy. Therefore, the American College of Physicians also recommends nonpharmacological interventions, including acupuncture, as first-line therapy in patients with chronic LBP.[19]

Practitioners perform the acupuncture procedure for patients with low back pain (LBP) by havingthe patient lie down in a pronation position, exposing the specific body part where the needles willbe inserted. Determining insertion locations varies for each patient, depending on the patient's history and physical examination results. However, several commonly used acupuncture points for LBP therapy are illustrated in Figure 3 and detailed in Table 1.[20]

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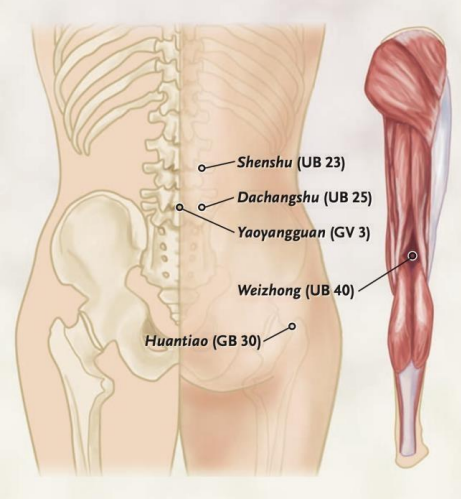

Figure 3. Acupuncture Points in Chronic LBP . Therapy GB *denotes gallbladder* GV: *governing vessel* UB: *urinary bladder*[20]

Table 1. Acupuncture Points in Chronic LBP Therapy

Point	Location
UB 23 (*shenshu*)	Lower border of *the spinous process of the* second lumbar vertebrae, 1.5 *cun* lateral toGV 4
UB 25 (*dachangshu)*	Lower border of *the spinous process of the* fourth lumbar vertebrae, 1.5 *cun* lateral toGV 3
GV 3 (*yaoyangguan*)	Below *the spinous process* fourth *lumbar vertebrae* , equivalent to *the iliac crest*
UB 40 (*weizhong*)	The midpoint of the transverse crease of *the popliteal fossa* , between the tendons *of thebiceps femoris* and *semitendinosus muscles*
GB 30 (*huantiao*)	Junction of the lateral ⅓ and medial ⅔ of the distance between *the greater trochanter* and *sacral hiatus*

After determining the acupuncture point, the practitioner inserts the needle with a 6.4 to 38.1 mmdepth range. Then, the needle is left for 15 to 30 minutes while the patient is asked to relax. Duringthis short period, the acupuncturist occasionally manually stimulates the needle to produce a localized pain sensation, commonly referred to as *de qi*, resulting from the interaction between the needle and connective tissue. In addition to manual stimulation, one can also perform stimulation using other methods., namely electroacupuncture, moxibustion, or heat.[21]

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Acupuncture can reduce pain intensity by stimulating small-diameter afferent fibers, reducing thetransmission of pain signals. Therefore, the perception of pain is also inhibited. Chronic lower back pain reveals spasms and decreased blood flow in the lower back muscles. Acupuncture can improve lumbar function and reduce pain by increasing blood flow and reducing tension in the treated muscles. In addition, research by Inoue *et al.* shows another physiological explanation:[22]

Acupuncture provides much better relief. Acupuncture increased blood flow by 100% when applied to the sciatic nerve roots, compared to a 56.9% increase in blood flow to the lumbar muscles.[23]Concluding that acupuncture reduces pain and contributes to increased nerve blood flow, including circulation in the cauda equina and nerve roots requires further research on this matter. [24]

This scientific paper will discuss the effectiveness of acupuncture compared to pharmacological therapy by reducing pain intensity and improving the patient's functional status. In a randomized clinical trial,[24] the results showed that acupuncture therapy for patients with chronic LBP was more effective in reducing pain intensity than administering oral baclofen at 30 mg/day. Apart from that, acupuncture also has a more persistent antinociceptive effect. A similar study compared acupuncture intervention with the administration of celecoxib, rofecoxib, or paracetamol. However, regarding pain and functional aspects, the results did not show any significant differences immediately after the therapy sessionended.[25]

Another study conducted in Germany with 1162 research subjects reported that the provision of acupuncture therapy in treating chronic LBP had more significant efficacy on the patient's pain and functional status than conventional therapy (medicine, physiotherapy, and exercise).[19] Two similar clinical compared the effectiveness of acupuncture with oral administration of piroxicam at a dose of 30 mg/day. Both studies obtained the same results: acupuncture was more effective inreducing pain than administering piroxicam.[26]

4. CONCLUSION

Acupuncture, as a nonpharmacological therapy, has been proven to be more effective in reducingpain intensity and improving the functional status of patients with *chronic low back pain* (CLBP) compared to administering pharmacotherapy in the form of *muscle relaxants* such as baclofen.

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