

EFFECT OF COMBINATION THERAPY USING ULTRASOUND AND LOCAL POINT ACUPUNCTURE TO REDUCE NECK PAIN

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ABSTRACT

Background: Neck pain is one of the most frequently reported complaints of the musculoskeletal system. Therapeutic ultrasound is a noninvasive modality commonly used in the management of musculoskeletal disorders. It has been proposed that therapeutic ultrasound has thermal and mechanical effects on deep tissue sites through the delivery of ultrasonic energy. Meanwhile, acupuncture typically includes manual stimulation of needles, but variations are common, such as electrical or heat stimulation of the needles. It is suggested that acupuncture at local myofascial trigger points also has an analgesic effect. The purpose of this study was to investigate the effect of combination therapy using ultrasound and local point acupuncture to reduce neck pain.

Subjects and Method: This was a randomized controlled trial. Total sample of 30 people with neck pain was randomly allocated into treatment group (combination of ultrasound and local point acupuncture), and control group (acupuncture only). The dependent variable was neck pain. The independent variable was ultrasound and local point acupuncture. Neck pain was measured using visual analog scale (VAS). Mean difference of neck pain after intervention between groups was tested using independent t test.

Results: Mean of neck pain score after intervention in the treatment group (combination of ultrasound and acupuncture) (Mean= 2.13; SD= 0.64) was lower than control group (acupuncture only) (Mean= 3.73; SD= 3.23), and it was statistically significant ($p < 0.001$).

Conclusion: Combination therapy of ultrasound and local point acupuncture is effective to reduce neck pain compared to acupuncture only.

Keywords: combination therapy, ultrasound, local point acupuncture, neck pain

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BACKGROUND

The neck is the most important function to support the head and protect the delicate spinal cord. The cervical vertebrae are made up of seven bones (vertebrae) with soft cushions (discs) between each bone. Neck pain can result from a pathological process in the soft tissues, but neck pain often results from conditions related to the

cervical spine (Iman et al., 2018). Sources of neck pain related to the cervical spine include cervical spondylosis, radiculopathy or compression of the nerve roots, myelopathy or compression of the cervical spinal cord, injury, irritation of the paraspinal muscles (Wibowo, 2007). In general, these disorders will result in limited

range of motion, especially extension, lateral flexion, and cervical rotation.

Cases of neck pain around the world are ranked second highest after complaints of low back pain (Dunning et al. 2012). Neck pain is a complaint that often occurs in the general population, the incidence is more dominant in women than men, 54% and 45%, respectively (Alboneh 2017). The prevalence of neck pain reaches 23% worldwide (Barreto & Svec, 2019). WHO data reports disorders of the neck skeletal muscles caused by heavy work up to 45% (Peron et al., 2022). The percentage of the incidence of neck pain is 55% of people in Indonesia experiencing neck muscle disorders caused by sitting for more than 95% of working hours (Care et al., 2022). A study in Bekasi, West Java, Indonesia, found that 71% of workers experienced complaints of neck pain which resulted in disruption of activities (Camila, 2013).

Treatment of neck pain itself can be done by pharmacological and non-pharmacological methods. Pharmacological efforts to reduce pain using pain relievers. While non-pharmacological efforts can be done with acupuncture therapy and physiotherapy (Tunwattanapong et al., 2016). Acupuncture is used as an alternative and complementary medicine that is able to relieve pain (Koonsadi, 2009). Traditionally, acupuncture is thought to restore normal energy flow in the body. In the modern era, acupuncture has been shown to have multiple effects on the central and peripheral nervous systems. Acupuncture as an alternative and complementary medicine is applied based on the concept

which states that disease originates from Qi disorders due to an imbalance of the Yin and Yang energy forces. Qi is a combination of yin and yang energy forces in the body. Local acupuncture points for neck pain cases consist of SJ 17 yifeng, GB 20 fengchi, SJ 3 zhongzhu, GB 39 xuanzhong, BL 10 Tianzhu, Du 14 dazhui, SI 3 houxi, and BL 60 Kunlun (Sim, 2010). The GB 21 Jianjing point is able to relieve complaints of neck, shoulder and back pain (Oktaviani, 2018).

Ultrasound therapy is an intervention that uses sound waves with a frequency of more than 30 KHz, while what is commonly used is sound waves between 0.7 MHz to 3 MHz. The sound waves are used to treat injuries to deep tissue by stimulating cell activity. The goal of ultrasound therapy is to reduce pain, tension and speed recovery (Santoso et al., 2018).

Based on the description of the problem, this study aims to determine whether the combination of ultrasound and acupuncture at local points has an effect on decreasing the pain scale in patients complaining of neck pain.

SUBJECTS AND METHOD

1. Study Design

This was quasy experimental study with control grup. The study was carried out in Pomah Village, Mojo-songo, Boyolali, Central Java, in March 2021.

2. Population and Sample

The study population was people with neck pain in Pomah Village, Mojo-songo, Boyolali, Central Java. A

sample of 30 adults was selected for this study using total sampling.

3. Study Variables

The dependent variable was neck pain score. The independent variable were (a) acupuncture and (b) combination of acupuncture and ultrasound therapy.

4. Operational Definition of Variables

Acupuncture therapy is the insertion using sterile acupuncture needles at local points.

Ultrasound therapy is therapy by applying ultrasonic gel to the location of the neck that is experiencing pain and given exposure to ultrasonic waves.

Numeric Rating Scale (NRS) is a pain scale measurement by filling out a questionnaire. The numerical pain scale is classified into 5, (1) score 0= no pain at all, (2) score 1-3= pain does not interfere with activity, (3) score 4-6= moderate pain inhibits activity, (4) score 7-9= severe pain requiring assistance, (5) score 10= uncontrolled pain and unable to move.

Table 1. Independent t test of mean difference of neck pain before intervention between acupuncture and combination of acupuncture and ultrasound therapy on

Group	N	Mean	SD	p
Acupuncture only	15	3.73	3.23	<0.001
Combination of acupuncture and ultrasound	15	2.13	0.64	

Table 2 showed that mean of neck pain score after intervention in the treatment group (combination of ultrasound and acupuncture) (Mean=

Table 2. Independent t test of mean difference of neck pain after intervention between acupuncture and combination of acupuncture and ultrasound therapy

Group	N	Mean	SD	p
Acupuncture only	15	3.73	3.23	<0.001
Combination of acupuncture and ultrasound	15	2.13	0.64	

5. Study Instrument

Acupuncture was conducted using 1 cun sterile acupuncture needle, ultrasound, ultrasound gel, steril cotton, alcohol 70%, Tweezers, Kom, Nierbeken, used needle holder, and handsocon.

6. Data Analysis

Mean score of neck pain between group after intervention were tested using independent t-test.

RESULTS

Independent t test was used to test the hypothesis of the difference in the effect of acupuncture compared to the combination of acupuncture and ultrasound on neck pain.

Table 1 showed that mean of neck pain score before intervention in the treatment group (combination of ultrasound and acupuncture) (Mean= 5.93; SD= 0.80) was lower than control group (acupuncture only) (Mean= 5.70; SD= 0.72), but it was statistically non significant ($p < 0.001$).

2.13; SD= 0.64) was lower than control group (acupuncture only) (Mean= 3.73; SD= 3.23), and it was statistically significant ($p < 0.001$).

DISCUSSION

This study found that there was no difference of mean score of neck pain before intervention between intervention and control groups. It suggests that randomization was successful in making baseline neck pain level comparable between the two groups.

After intervention, mean of neck pain score in the treatment group (combination of ultrasound and acupuncture) was lower than control group (acupuncture only) and it was statistically significant.

Other study also reported the similar results. The combination of ultrasound and dry needling is more effective in reducing neck disability than the combination of ultrasound and hold relax in myofascial pain syndrome of the upper trapezius muscle (Satriyasa, 2018). Acupuncture is a model of therapy by inserting fine needles into specific points throughout the body. Based on the ancient Chinese philosophy of acupuncture and acupressure, energy (Qi) flows/circulates in 12 meridians located throughout the body. Pain occurs when circulation in the meridians is blocked. Stimulation at several points on the meridians can restore the smooth flow of circulating energy (Qi) and relieve pain. According to the perspective of western medicine, acupuncture is a technique of stimulating peripheral sensory nerves (through activation of peripheral A-delta fibers and C fibers) located at acupuncture points that can activate the central nervous system pain pathways. This mechanism stimulates the release of pain-reducing substances and reduces muscle stiff-

ness and the sympathetic nervous system (Hinman et al., 2012).

Ultrasound is considered capable of reducing complaints of pain. Ultrasound is a physical therapy tool that is widely used to treat disorders in soft tissue lesions. The thermal effect of ultrasound waves stimulates increased tissue blood flow, membrane permeability, and tissue repair. The physiological effect of ultrasound is to increase the temperature in the target tissue, increase blood flow and tissue extensibility and reduce the viscosity of the elements in the tissue.

This study combines ultrasound therapy and acupuncture therapy at BL10 Tianzhu, GB21 Jianjing, and GB20 Fengchi points. Based on the theory, the three points are local and distal points that are useful for dealing with complaints of neck pain (Saputra and Idayanti, 2008). Tianzhu's BL10 point dispels cold wind, stimulates the nerves of the brain, sharpens eyesight, removes blockages, and relieves lower back pain. GB21 Jianjing functions to hold wind and dissipate heat, reduce swelling, and relieve pain. Meanwhile, GB20 Fengchi functions to calm the heart, resist the wind, dissipate heat, and repair the outer tissue.

Pain in the neck associated with weakness in the spleen organ. When the spleen is in a deficient state, the function of the spleen is hampered in transforming and transporting nutrients throughout the body and lowers the immune system. this condition causes the body to be easily invaded by cold wind pathogens due to a state of Zheng Qi or poor immunity. Yang Qi, which functions to heat the body,

becomes blocked and an imbalance of Yin and Yang occurs, resulting in various other manifestations such as fear of cold, fever, and headaches. (Sun et al, 2001; Sim, 2012, Xuemin, 2007).

The results of this study prove that there is an effect of giving a combination of acupuncture and ultrasound therapy to the pain scale. Ultrasound therapy is an intervention that uses sound waves with a frequency of more than 30 KHz, which is generally used between 0.7 MHz and 3 MHz. The sound waves are used to treat injuries to deep tissue by stimulating cell activity. The goal of Ultrasound is to reduce pain, tension and speed up recovery (Santoso et al., 2018).

Neck pain can be caused by all components in the neck, starting from the musculoskeletal system and the nervous system. Neck pain involving disorders of the musculoskeletal system according to the pathophysiological process includes mechanical neck pain or often called non-specific neck pain. It is called non-specific because there is no disease or underlying anatomic structural abnormality, the symptoms that often accompany non-specific neck pain are such as a feeling of stiffness in the neck that can be on one side or both sides of the neck, pain in the neck area that can be felt up to the head. Pure non-specific neck pain is caused by the muscle structure or musculoskeletal system in the neck and is often related to posture or static neck position while working and excessive neck muscle workload when working for a certain period of time (Satriyasa, 2018).

The limitations of this study are the lack of ability to control the diversity of research subjects against interfering factors such as lifting heavy loads, sleeping in a burdened position in one direction, and the type of work.

AUTHOR CONTRIBUTION

Atika Afniratri was principal investigator, participated in the protocol development, study design, conduct of the study, analysis of the data, writing up and revision of drafts of the manuscript. Sholichan Badri participated in co-ordination, data collection, writing up and revision of drafts of the manuscript. Suwaji Handaru Wardoyo participated in the analysis of data, the writing up and revision of drafts of the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

All authors are declared that there was no conflict of interest.

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