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Masters Program in Public Health, Universitas Sebelas Maret

Meta-analysis

# Effectiveness of Acupuncture Therapy to Reduce Pain in Patients with Upper Trapezius Myofascial Pain Syndrome: A Meta-Analysis

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## ABSTRACT

**Background:** Upper trapezius myofascial pain syndrome is a muscle pain condition associated with sensory, motoric, or autonomic functions and generated by trigger point arising from hardened and stiff taut band of muscle fiber while being touched as well as palpated. One of the interventions to reduce the pain is by using acupuncture therapy. The study aims to analyze and estimate the effectiveness magnitude of acupuncture therapy toward the pain reduction in patients with upper trapezius myofascial pain syndrome.
**Subjects and Method:** This was a systematic review and meta-analysis study using PRISMA diagrams. The article search was conducted based on the eligibility criteria using the PICO Model. population: patients with upper trapezius myofascial pain syndrome. Intervention: acupuncture therapy. Comparison: placebo acupuncture. Outcome: reduced pain. The articles used were from 6 databases, namely Pubmed, Google Scholar, Science Direct, Scopus, Spinger Link, and Hindawi Key words for article search were "acupuncture" OR "acupuncture therapy" AND "upper trapezius pain" OR "upper trapezius myofascial pain syndrome" OR "upper trapezius MPS" AND "Randomized Controlled Trial" OR "RCT". Inclusion criteria used of the study were full text articles with Randomized Controlled Trial study design, measure of association used was Mean SD. Articles were analyzed using the Review Manager 5.3 application.
**Results:** The 9 articles reviewed were from Taiwan, China, UK, Turkey, Brazil, and Iran. The study result indicated that acupuncture therapy was effective in reducing pain in upper trapezius myofascial pain syndrome. Upper trapezius myofascial pain syndrome that obtained acupuncture therapy had average score of pain -1.16 units lower than placebo acupuncture (SMD= -1.16; CI 95%= -1.93 to -0.39; p= 0.003).
**Conclusion:** Acupuncture therapy was effective in reducing pain in upper trapezius myofascial pain syndrome.

**Keywords:** acupuncture, pain, upper trapezius myofascial pain syndrome, randomized controlled trial, meta-analysis.

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## BACKGROUND

In this modern era, a lot of people spend time to finish their job without considering the long-term effects. One of the effects is physical fatigue and musculoskeletal disorder (ILO, 2016). The most common musculoskeletal disorders affect the wrists, elbows, shoulders, the back to the neck or torso (Balogh et al., 2019). Pain has long been known as one of health issues.

Practically, every human has experienced pain with different quality and quantity (Wignyomartono, 2012). The International Association for the Study of Pain defines pain as an unpleasant emotional and sensory experience associated with actual and potential tissue damage (Moayedi and Davis, 2013).

Pain is frequently associated with musculoskeletal problems, one of them is myofascial pain syndrome. Myofascial pain syndrome is a chronic muscle pain (*fascia*) associated with sensory, motoric, or autonomic functions and generated by myofascial trigger points (Anuphan and Chang, 2021). Myofascial pain syndrome may spread in certain region and is local in nature. Pain in upper trapezius musculus develops because of excessive muscle works and activities that lead to spasm, tightness, and stiffness of the muscle (Atmadja, 2016). If spasm continuously occurs, it may lead to reduced microcirculation around the muscle area, and eventually generates tissue ischemia. An abnormal knot will be formed within the muscle fiber that creates taut band and generated pain perception arising from hypersensitivity (Wirayani et al., 2020).

Myofascial pain syndrome incidences rate is relatively substantial, with 85% general population has endured myofascial pain during their lifetime and the annual prevalence is 46%. The incidences among women and men are almost equal with 54% and 45% respectively even though the prevalence with trigger point does not exceed 25% (Desai et al., 2013).

Myofascial pain syndrome management can be implemented non-pharmacologically by administering acupuncture therapy. Acupuncture is an approved method in treating pain cases and does not cause any hazardous side effects and relatively safe to administer (WHO, 2013). Based on an ancient philosophy acupuncture serves to circulate energy (*Qi*) through 12 meridians all over the body. Pain may occur when circulation in meridians are blocked, hence it requires stimulation in several points to restore the fluency of energy circulation (*Qi*) (Chon and Lee, 2013). In neuro-acupuncture, the acupuncture working mechanism is by means of neural transmission to brain by activating pain modulatory system, suppressing the transmission and perception of pain stimulation. The activation od pain pathways will stimulate the activity of hypothalamus to stimulate the release of neurotransmitter (endorphin and monoamine) to hold up pain. Acupuncture analgesia involves cerebral cortex, hypothalamus, thalamus, and limbic system (Bai et al., 2020).

Numerous primary studies prove that acupuncture therapy may give effect to reduce the pain scale in patients with upper trapezius myofascial pain syndrome both curatively and for rehabilitative purpose. By conducting meta-analysis study, it is expected to be beneficial in identifying the effectiveness magnitude of acupuncture therapy reduce pain in patients with upper trapezius myofascial pain syndrome.

## SUBJECTS AND METHOD

### 1. Study Design

The study was conducted by using systematic review and meta-analysis during the period of 2009 to 2021. Article searching employed databases such as Pubmed, Google Scholar, Science Direct, Scopus, Spinger Link, and Hindawi. Keywords in searching through the databases were “acupuncture” OR “acupuncture therapy” AND “upper trapezius pain” OR “upper trapezius myofascial pain syndrome” OR “upper trapezius MPS” AND “Randomized Controlled Trial” OR “RCT”.

**2. Steps in Conducting Meta-Analysis**

Meta-analysis was conducted through five steps, as follow:

a. Formulate research questions in PICO (Population, Intervention, Comparison and Outcome)
b. Search for primary study articles from various databases (Google Scholar, Pubmed and Springerlink)
c. Perform screening and conduct critical quality primary studies
d. Perform data extraction and enter the estimated effect of each primary study into the RevMan 5.3 application
e. Interpret the result and draw conclusion.

**3. Inclusion Criteria and Exclusion Criteria**

Inclusion criteria used of the study were full text articles with Randomized Controlled Trial study design, measure of association used was Mean SD.

Meanwhile, exclusion criteria of the study were non-full text articles and published in non-English and non-Indonesian language, article with quasi-experiment, protocol study, pilot study, cohort, case control, and cross-sectional study design.

**4. Study Variables**

The independen variables is Acupuncture Therapy and the dependen variable is Reduced upper trapezius myofascial pain syndrome pain.

**5. Operational Definition of Variables**

**Acupuncture therapy** was an intervention by inserting acupuncture needles at acupoint COVID-19 Patient Mortality is the death of a person caused by COVID-19. Categorized by dead and alive groups.

**Reduced upper trapezius myofascial pain syndrome pain** was reduced pain in upper trapezius muscle after obtaining acupuncture therapy.

**6. Study Instrument**

The study was guided by PRISMA flow diagram and critical appraisal tools randomized controlled trial (RCT) established by CEBM University of Oxford for quality assessment of the studies.

The following are indicators in critical appraisal:

1. Did the study discuss a distinct focus of question/problem?
2. Did randomized controlled trial accordingly answer the study problems?
3. Were there sufficient number of subjects in the study to determine that the findings are not discovered coincidently?
4. Were subjects randomly allocated into experiment and control groups?
5. Were inclusion/exclusion criteria used?
6. Were both groups equivalent initially?
7. Were the criteria of the result objective and unbiased to be used?
8. Did the study use an objective and validated measurement method to measure the result? If it did not, were the result measured by someone who did not know the groups' task (blinding measurement)?
9. Was the effect size practically relevant?
10. How accurate was the effect estimation? Was there any confidence interval?
11. Was there any unpredictable confounding factor?
12. Was the result applicable into your study?

**7. Data Analysis**

The study used RevMan 5.3 for data analysis to determine the effect size and study heterogeneity. The result of meta-analysis data processing was presented in the forms of forest plot and funnel plot.

## RESULTS

Effectiveness of Acupuncture Therapy to Reduce Pain in Patients with Upper Trapezius Myofascial Pain Syndrome contains 9 articles. The articles come from 3 continents namely Asia (Taiwan, China, and Iran), Europe (UK and Turkey), also America

(Brazil). The article review process is carried out using a PRISMA flow diagram, with the search flow as follows.

Article searchs were conducted using 6 database. The database are; Pubmed, Google Scholar, Science Direct, Scopus, Spinger Link, and Hindawi. Key words for article search were "acupuncture" OR "acupuncture therapy" AND "upper trapezius pain" OR "upper trapezius myofascial pain syndrome" OR "upper trapezius MPS" AND "Randomized Controlled Trial" OR "RCT".

After conducting an initial search on the database, 1.232 articles were found, then 368 published duplicate articles were deleted to obtain 863 articles. Followed by the article selection process by issuing as many as 802 so that there are still 61 full text articles that are considered feasible. Then as many as 52 full text articles were issued, leaving 9 final articles that will be included in a qualitative synthesis. This is shown in Figure 1 PRISMA flow.

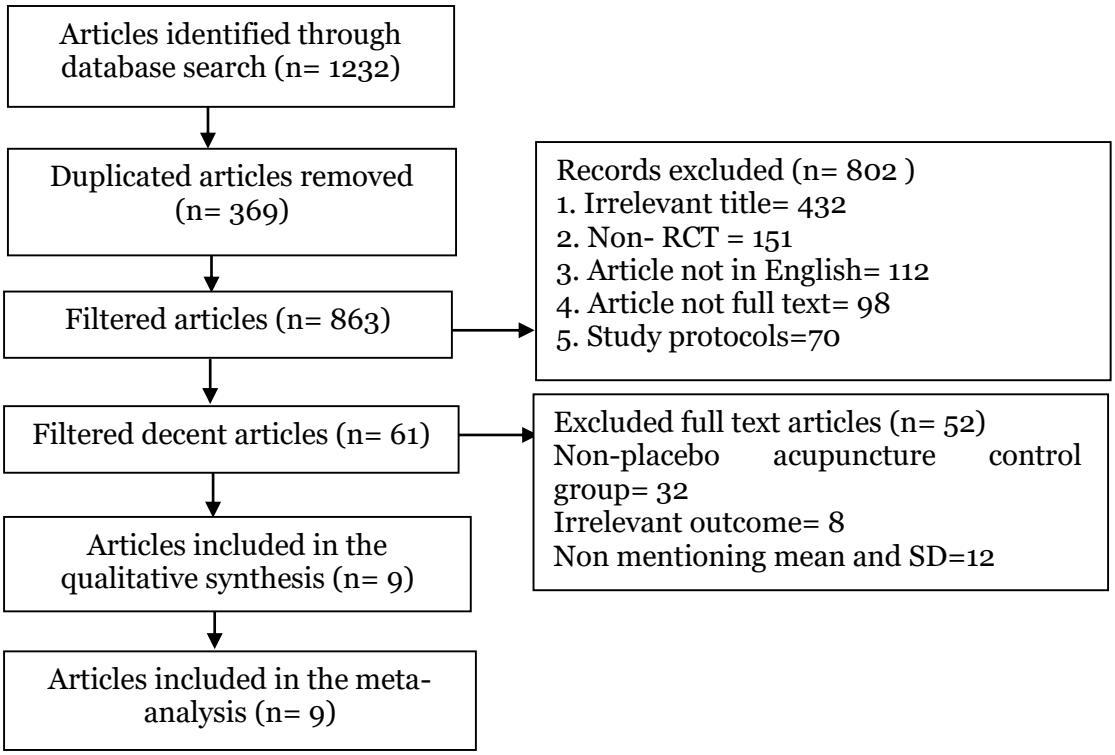


**Figure 1. PRISMA Flowchart**

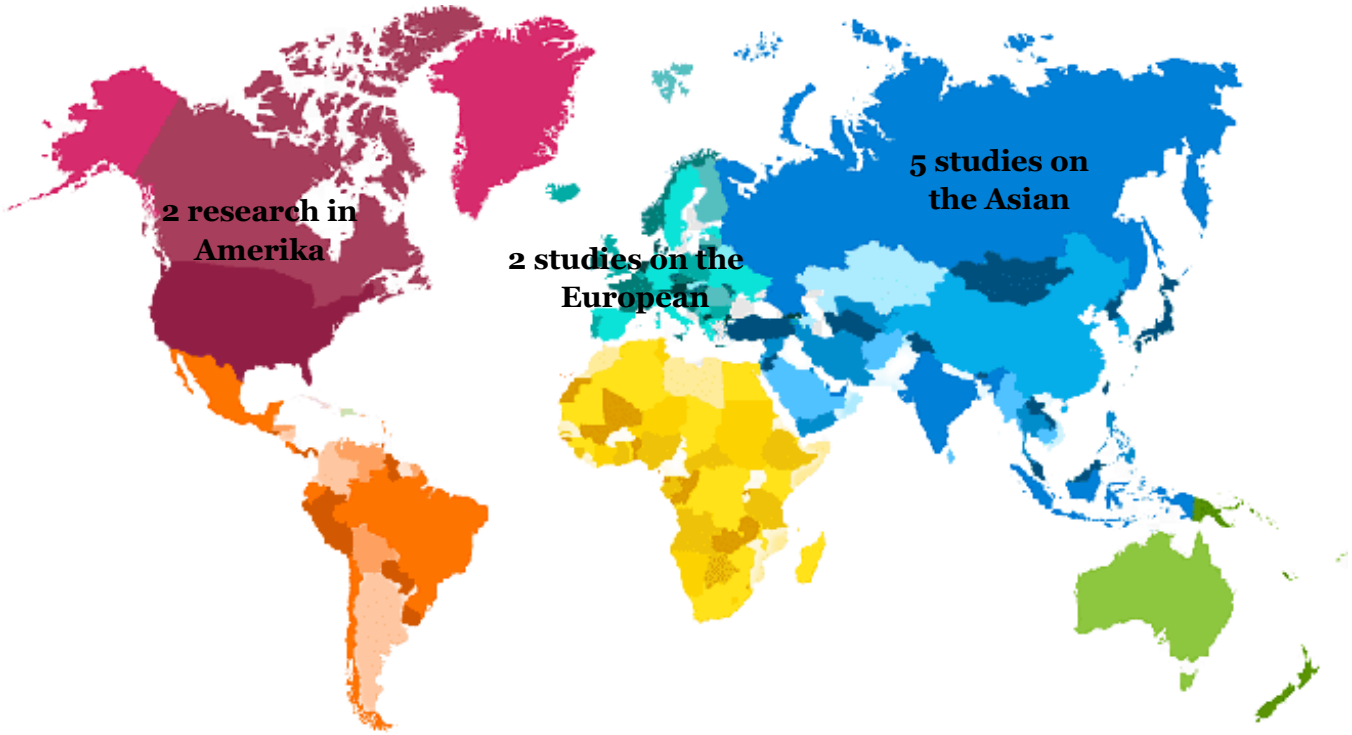


**Figure 2. Distribution map of primary studies**

**Table 1. Critical Appraisal for Randomized Controlled Trial Studies of the Effectiveness of Acupuncture Therapy to Reduce Pain in Patients with Upper Trapezius Myofascial Pain Syndrome**

| Primary Study | Criteria | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| Chou et al., (2009) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Ma et al., (2010) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Tough et al., (2010) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Chou et al., (2012) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 11 |
| Tekin et al., (2013) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 10 |
| Aranha et al., (2015) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 11 |
| Müller et al., (2015) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Wang et al., (2018) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 11 |
| Eslamian et al., (2020) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |

Note: Yes= 1; No= 0

**Table 2. Description of Primary Studies included in Meta-analysis**

| Author (Year) | Country | Study Design | Sample | | P Population | I Intervention | C Comparison | O Outcome | Mean | | SD | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TA | AP | | | | | TA | AP | TA | AP |
| Chou et al., (2009) | Taiwan | RCT | 10 | 10 | Patients with upper trapezius MPS in University Hospital, aged 18-55 years old | Acupuncture therapy (ashi point, TE5 and LI11) | Placebo acupuncture | Reduced pain (VAS) | 3.3 | 7.1 | 1.1 | 0.9 |
| Ma et al., (2010) | China | RCT | 15 | 13 | Patients with upper trapezius MPS aged 18-65 years old in Yat-Sen Memorial Hospital | Acupuncture therapy (ashi point) | Placebo acupuncture | Reduced pain (VAS) | 3.1 | 5.1 | 2.1 | 1.8 |
| Tough et al., (2010) | UK | RCT | 17 | 17 | Patients with upper trapezius MPS in Physio-therapy Depart-ment of Derriford Hospital, aged >18 years old, VAS >3 | Acupuncture (ashi point and GB21) | Placebo acupuncture | Reduced pain (VAS) | 1.7 | 3.2 | 2.0 | 2.8 |
| Chou et al., (2012) | Taiwan | RCT | 15 | 15 | Patients with upper trapezius MPS, aged 18-60 years old, VAS >5 | Acupuncture therapy (ashi point, LI11, LI10 and TE5) | Placebo acupuncture | Reduced pain (VAS) | 3.4 | 7.7 | 1.06 | 0.88 |
| Tekin et al., (2013) | Turkey | RCT | 22 | 17 | Patients with upper trapezius MPS, aged 24-65 years old, pain ≥6 months | Acupuncture therapy (ashi point) | Placebo acupuncture | Reduced pain (VAS) | 2.2 | 5.3 | 2.0 | 1.8 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aranha et al., (2015) | Brazil | RCT | 25 | 23 | Patients with upper trapezius MPS, aged 18-60 years old, pain ≥6 months | Acupuncture therapy (*ashi point,* GB20, GB21, LI4, LV3) | Placebo Acupuncture | Reduced pain (VAS) | 4.56 | 2.35 | 6.17 | 1.33 |
| Müller et al., (2015) | Brazil | RCT | 12 | 11 | Patients with *upper trapezius* MPS in University of Campinas, aged 18-40 years old | Acupuncture therapy (*ashi point,* GB20, GB21 and LI4) | Placebo acupuncture | Reduced pain (VAS) | 3.14 | 4.78 | 1.76 | 2.37 |
| Wang et al., (2018) | Taiwan | RCT | 20 | 19 | Patients with upper trapezius MPS in Chang Gung Memorial Hospital, aged 20-55 years old, VAS score 3-7 | Acupuncture therapy (*ashi point*) | Placebo acupuncture | Reduced pain (VAS) | 3.00 | 2.47 | 1.71 | 1.26 |
| Eslamian et al., (2020) | Iran | RCT | 25 | 25 | Patients with upper trapezius MPS in Physical Rehabilitation Clinic, aged 25-55 years old | Acupuncture therapy (*ashi,* GB20, GB21, TE15, SI11, SI12, LI4, LI10, LI11, DU20) | Placebo acupuncture | Reduced pain (VAS) | 3.16 | 5.08 | 2.19 | 2.53 |

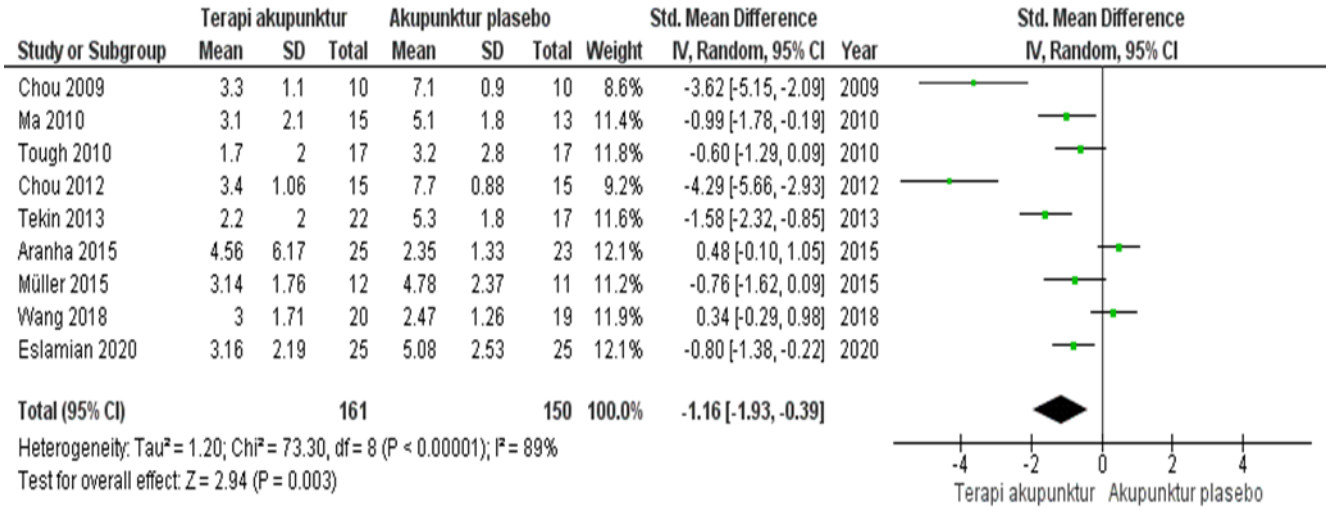


**Figure 3. Forest plot of the effectiveness of acupuncture therapy to reduce pain in patients with upper trapezius myofascial pain syndrome**

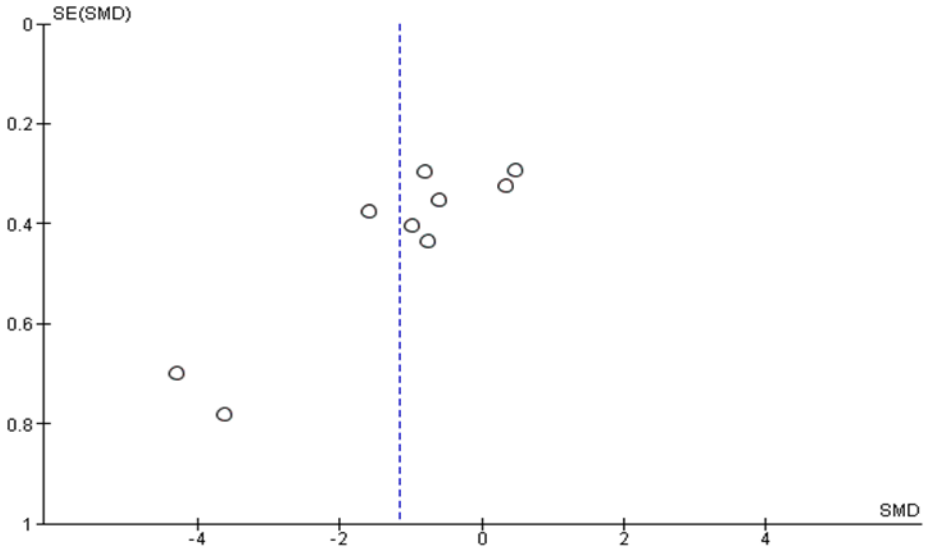


**Figure 4. Funnel plot of acupuncture therapy effectiveness to reduce pain in patients with upper trapezius myofascial pain syndrome**

**a. Forest Plot**

Forest plot in Figure 3 indicates that acupuncture therapy was effective to reduce pain in patients with upper trapezius myofascial pain syndrome. Patients with upper trapezius myofascial pain syndrome who obtained acupuncture therapy had average pain score -1.16 unit lower than those who obtained placebo acupuncture (SMD= -1.16; CI 95%= -1.93 to -0.39; p= 0.003). The Forest plot also indicated an extremely heterogenous heterogeneity of estimated effects among primary studies ($I^2$= 89%; p<0.001). Therefore, the average estimated effect was calculated by using random effect model.

**b. Funnel Plot**

Funnel plot in Figure 4 indicated asymmetrical estimated effects distribution between right and left hemispheres of average estimated effects vertical lines. It indicated there was a publication bias since there were more estimated effects distributed in the right hemisphere than in the left hemisphere of vertical line and opposite to the direction

of the average estimated effects that were located in the left hemisphere of hypothesis 0 vertical line. The occurrence of publication bias may reduce the actual effect of acupuncture (*underestimate*).

## DISCUSSION

The systematic review and meta-analysis study discussed about the effectiveness of acupuncture therapy to reduce pain in patients with upper trapezius myofascial pain syndrome. The independent variable used was acupuncture therapy. Whereas the dependent variable was reduced pain in patients with upper trapezius myofascial pain syndrome. The 9 randomized control trial studies from Asia (Taiwan, China, and Iran,) Europe (UK and Turkey), also America (Brazil) indicated a result that patients with upper trapezius myofascial pain syndrome who obtained acupuncture therapy had an average pain score -1.16 unit lower than those who obtained placebo acupuncture (SMD= -1.16; CI 95%= -1.93 to -0.39; p= 0.003).

The result of the study is in line with a study by Li et al. (2017) that indicates acupuncture is effective in treating upper trapezius myofascial pain syndrome cases. In the group with acupuncture therapy intervention indicates the occurrence of reduced pain intensity by (SMD= -3.60; CI 95%= -5.2 to -2.1; p = 0.02) and is able to reduce tissue sensitivity by (SMD= 2.20; CI 95%= 1.2 to 3.1; p = 0.048) as the result of acupuncture analgesia working system. Wang et al. (2017) also conducts a study with a result that manual acupuncture may reduce pain intensity in patients with upper trapezius myofascial pain syndrome (SMD= -0.90; CI 95%= - 1.48 to -0.32; p = 0.002). Reduced pain is significantly observed in the first session (SMD= -1.05; CI 95%= - 1.84 to -0.27; p = 0.009) and the eight session of therapy (SMD= -1.96; CI 95%= - 2.72 hingga -1.20; p < 0.001). Furthermore, another study also indicates that acupuncture therapy may reduce the pain intensity of upper trapezius myofascial pain syndrome with significance value (SMD= 0.60 CI 95%= -1.29 to 0.09; p < 0.001) in acupuncture group is better than control group since there is an increased range of motion. In addition, there is an increased blood flow and oxygenation as the result of microcirculation (Tough et al., 2010).

To reduce the pain intensity, acupuncture works through four domains namely local inflammation reaction, meridian intercellular transduction, cutaneous somatovisceral reflex, and neural transmission to the brain (Tekin et al., 2013). The activation of this pain pathway will stimulate hypothalamus in releasing monoamine and endorphin neurotransmitter to hold up pain message. Acupuncture analgesia involves cerebral cortex, hypothalamus, thalamus, and limbic system. Posterior cornu of medulla spinalis stimulation will be forwarded to mesencephalon. At the mesencephalon there are PAG (β-endorphin) cell lines, nucleus raphe magnus cell (releasing serotonin), and para gigantocellular reticular nucleus cell (releasing nor-adrenalin). During its way to thalamus, there is pituitary hypothalamus collateral that will release β-endorphin to be circulated all over the body. And the synapse of the three nucleus is passed to prefrontal cortex, post central cortex, and limbic system to block pain signal (Bai et al., 2020).

## AUTHORS CONTRIBUTION

Niken Putri Eka Saraspuri was the main researcher who selected the topic, search for, and collected study data. Didik Tamtomo and Bhisma Murti analyzed the data and reviewed the study documents.

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**CONFLICT OF INTEREST**

There is no conflict of interest in the study.

## REFERENCES

Anuphan T, Chang K (2021). Myofascial Pain Syndrome. StatPearls. https://-www.ncbi.nlm.nih.gov/books/NBK-499882/.

Atmadja AS (2016). Sindrom Nyeri Myofasial. Cermin Dunia Kedokteran. 43(3): 176–179. http://www.cdkjournal.com/index.php/CDK/article/download/29/26.

Bai Y, Wang Y, Chen B, Qin Y, Lei Q, Zhao H, Lu J, et al. (2020). Stuck-moving needle acupuncture myofascial trigger point to treat idiopathic frozen shoulder: study protocol for a randomized controlled trial. Trials. 21(1): 1–13. Doi: 10.1186/s13063-020-04799-w.

Balogh I, Arvidsson I, Bjork J, Hansson GA, Ohlsson K, Skerfving S, Nordander C (2019). Work-related neck and upper limb disorders-Quantitative exposure-response relationships adjusted for personal characteristics and psychosocial conditions. BMC Musculoskelet Disord. *20*(1): 1–19. Doi: 10.1186/s12-891-019-2491-6.

CEBM (2016). Critical appraisal for randomized controlled trials. University of Oxford. https://www.cebm.-net/wp-content/uploads/2016/02/-Year-4-Critical-Appraisal-of-RCTs-Oct-2016-.pdf. Accesed in February 10, 2022.

Chon TY, Lee MC (2013). Acupuncture. Mayo Clin Proc. 88(10): 1141–1146. Doi: 10.1016/j.mayocp.2013.06.009.

Desai MJ, Saini V, Saini S (2013). Myofascial Pain Syndrome: A Treatment Review. Pain Ther. 2(1): 21–36. Doi: 10.1007/-s40122-013-0006-y.

ILO (2016). Non-Standard Employment Around the World. In ILO Cataloguing in Publication Data. 44(29): 7-41. https://www.ilo.org/wcmsp5/groups/public/dgreports/dcomm/publ/documents/publication/wcms_534326.-pdf.

Li X, Wang R, Xing X, Shi X, Tian J, Zhang J, Ge L, et al. (2017). Acupuncture for myofascial pain syndrome: A network meta-analysis of 33 randomized controlled trials. Pain Phys. 20(6): E883–E902.

Moayedi M, Davis KD (2013). Theories of pain: From specificity to gate control. J Neurophysiol. 109(1): 5–12. Doi: 10.1152/jn.00457.2012.

Tekin L, Akarsu S, Durmus O, Cakar E, Dincer U, Kiralp MZ (2013). The effect of dry needling in the treatment of myofascial pain syndrome: A randomized double-blinded placebo-controlled trial. Clin Rheumatol. 32(3): 309–315. Doi: 10.1007/s10067-012-2112-3.

Tough EA, White AR, Richards SH, Campbell JL (2010). Myofascial trigger point needling for whiplash associated pain-A feasibility study. Manl Ther. 15(6): 529–535. Doi: 10.1016/j.math.2010-.05.010.

Wang R, Li X, Zhou S, Zhang X, Yang K, Li X (2017). Manual acupuncture for myofascial pain syndrome: A systematic review and meta-analysis. Acupunct Med. 35(4): 241–250. Doi: 10.1-136/acupmed-2016-011176.

WHO (2013). WHO traditional medicine

strategy 2014-2023. WHO Library Cataloguing-in-Publication Data. Doi: 10.3390/biom11101457.

Wignyomartono S (2012). Akupunktur untuk Persalinan Bebas Nyeri. Sebelas Maret University Press.

Wirayani MNK, Wahyuni N, Sugiritama IW (2020). Hubungan Antara Postur Kerja Dan Masa Kerja Dengan Terjadinya Myofascial Pain Syndrome Otot Upper Trapezius Pada Penjahit Garmen Di Batubulan Gianyar. Majalah Ilmiah Fisioterapi Indonesia. 8(1): 31. Doi: 10.24843/mifi.2020.-v08.i01.p07.