JMCH Journal of Maternal and Child Health (2020), 05(06): 705-714
Masters Program in Public Health, Universitas Sebelas Maret

Research

Effect of Acupuncture Therapy on Pain Reduction in Dysmenorrhea Patients: A Meta-Analysis

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ABSTRACT

Background: Dysmenorrhea is a common complaint that usually occurs in adolescent girls and women of reproductive age. Dysmenorrhea is not a disease, but a symptom that occurs due to abnormalities in the pelvic cavity and greatly disrupts women's activities. Acupuncture therapy is a therapeutic method by inserting a needle at the acupoint to reduce pain in dysmenorrhea patients. This study aimed to estimate how great the effect of acupuncture therapy on pain reduction in dysmenorrhea patients based on the results of previous studies.

Subjects and Method: This study was a systematic study and a meta-analysis, with the following PICO: Population= dysmenorrhea patients aged 14-40 years, Intervention= acupuncture therapy, Comparison= no acupuncture therapy, and Outcome= pain reduction in dysmenorrhea patients. The articles were obtained from several databases including PubMed, Google scholar, and Hindawi. These articles were collected for 1 month. The keywords were "acupuncture pain" OR "acupuncture primary dysmenorrhea" AND "acupuncture for dysmenorrhea" AND "randomized controlled trial". The included articles were full-text articles with a randomized controlled trial study design. The articles were collected using PRISMA flow diagram. These articles were analyzed using the Review Manager (RevMan) 5.3 application.

Results: 7 articles from South Korea, Taiwan, Spain, China, India, and Hong Kong were reviewed in this meta-analysis. This study showed that acupuncture therapy was -1.16 better in reducing pain in dysmenorrhea patients (Standardized Mean Difference= -1.16; 95%CI= -1.92 to -0.41; p= 0.003).

Conclusion: Acupuncture therapy can affect pain reduction in dysmenorrhea patients.

Keywords: Acupuncture pain, Acupuncture dysmenorrhea, Primary dysmenorrhea

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Cite this as:
Novitasari E, Soemanto RB, Prasetya H (2020). Effect of Acupuncture Therapy on Pain Reduction in Dysmenorrhea Patients: A Meta-Analysis. J Matern Child Health. 05(06): 705-714. https://doi.org/10.26911/-thejmch.2020.05.06.10.

BACKGROUND

Puberty occurs in adolescents aged 10-19 years. It is a period of maturation of the human reproductive organs. The maturity of the reproductive organs of adolescent girls is characterized by menstruation. This menstrual cycle occurs periodically every month with a normal span of 28 days while the menstrual period occurs between 3-7 days (Rahayu et al., 2017).

Dysmenorrhea is a common complaint that usually occurs in adolescent girls or women of reproductive age (Yu et al., 2014). Dysmenorrhea occurs due to contractions in the uterus or uterine muscles. If there is a strong contraction during menstruation, the

oxygen supply to the uterus will decrease, thus causing pain (Pratiwi et al., 2016).

Dysmenorrhea is a reproductive health problem in women which had a prevalence of around 50-9-% in the world (Joshi et al., 2015). According to the World Health Organization (WHO), the incidence of dysmenorrhea was quite high throughout the world. The incidence of dysmenorrhea in young women was 16.8-81%. In European countries, dysmenorrhea in women was 45-97%. In the United States, dysmenorrhea is the most common cause of the absence of adolescent girls at school. Based on a survey conducted on 113 women in the United States, the prevalence of dysmenorrhea was 29-44%, mostly at the age of 18-45 years (Sulisyorini et al., 2017).

Dysmenorrhea is characterized by lower abdominal pain followed by other symptoms. Dysmenorrhea is a gynecological complaint due to an imbalance of the progesterone in the blood, thus causing menstrual pain in women. The production of prostaglandins in women with dysmenorrhea was 10 times higher than in women without dysmenorrhea (Nurwana et al, 2017).

Dysmenorrhea is classified into two, namely primary and secondary dysmenorrhea. Primary dysmenorrhea is caused by natural chemicals produced by cells of the lining of the uterus called prostaglandins (Nurwana et al., 2017). Secondary dysmenorrhea occurs due to gynecological abnormalities or other factors (Irianto, 2015).

Factors that can affect dysmenorrhea are psychological factor (stress), low pain threshold, menarche at an earlier age, period length, abnormal BMI, lifestyle, and family history. Factors that often occur during dysmenorrhea are psychological factor (stress). Stress can disrupt the endocrine system. It also causes menstrual cramps. In addition, psychological factors are essential to dysmenorrhea because pain can occur due to individual psychological or emotional states, thus causing disorder or insomnia (Ilmi et al., 2017).

Non-pharmacological management of dysmenorrhea is acupuncture therapy. Acupuncture therapy is very helpful because it can reduce the pain of dysmenorrhea by stimulating acupuncture points. It can engage the central nervous system to produce the effects of releasing β-endorphins and enkephalin, thus releasing pain (Oktobriariani, 2016). Acupuncture therapy can reduce the severity of pain and other symptoms during dysmenorrhea, thus improving the quality of life in carrying out daily activities (Caroline et al., 2011). Acupuncture therapy is considered by the public as a complementary treatment that is safely used in dysmenorrhea treatment (Smith et al., 2011).

Acupuncture therapy greatly affects prevention and treatment which is considered to be effective in reducing pain in dysmenorrhea due to the high number of the incidence of dysmenorrhea. Therefore, the study of "Effect of acupuncture therapy on pain reduction in dysmenorrhea patients: A meta-analysis" was conducted to see the effectiveness of acupuncture therapy in dysmenorrhea patients.

SUBJECTS AND METHOD

1. Study Design

This study was a systematic study and a meta-analysis. The articles were obtained from several databases including PubMed, Google scholar, and Hindawi. The keywords were "acupuncture pain" OR "acupuncture primary dysmenorrhea" AND "acupuncture for dysmenorrhea" AND "randomized controlled trial".

2. Inclusion Criteria

The included articles were full-text articles with a randomized controlled trial study design. The study subjects were dysmenorrhea patients aged 14-40 years. The

selected articles discussed acupuncture therapy with pain reduction as the outcome. The intervention was in the form of acupuncture therapy with pain reduction in dysmenorrhea patients as the outcome.

3. Exclusion Criteria

The excluded articles were articles with non-RCT study design, non-full-text articles, study subjects (women) with other gynecological diseases.

4. Operational Definition of Variables

The article search was carried out by considering the eligibility criteria defined using the PICO model. The population of this study was dysmenorrhea patients aged 14-40 years. The intervention was in the form of acupuncture therapy. The comparison was no acupuncture therapy. The outcome was in the form of pain reduction.

Dysmenorrhea pain was pain during menstruation that occurred due to contractions in the uterus or uterine muscles. It was a cramp in the lower abdomen. Instrument: Visual Analogue Scale (VAS) with continuous measuring scale.

Acupuncture therapy was a complementary treatment by inserting needles at acupoints. It aimed to stimulate the body to heal by activating the nervous system, immune system, and blood circulation which could reduce the pain length. Instrument: Medical records with categorical measuring scale.

5. Data Analysis

The data were processed using the Review Manager (RevMan 5.3) by calculating the standardized mean differences to determine the combined study model. The result was in the form of a meta-analysis.

RESULTS

The process of searching for articles by conducting database searches with PRISMA flow diagram is in Figure 1.

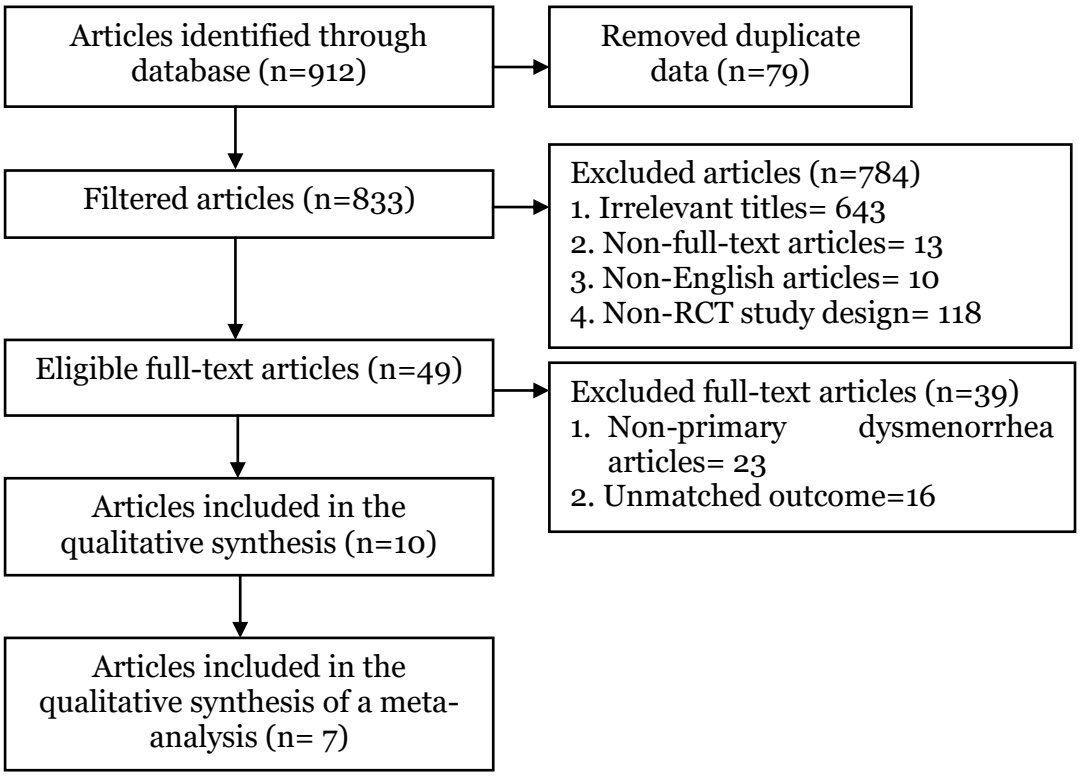

Figure 1. PRISMA flow diagram

Table 1 Assessment of Quality Study

Checklist questions	Cha et al. (2016)			Chen et al. (2010)			Gilarranz et al.(2018)			Pei et al.(2016)		
	Yes	No explanation	No	Yes	No explanation	No	Yes	No explanation	No	Yes	No explanation	No
Did this study discuss a clear study focus?	√			√			√			√		
Was the Randomized Controlled Trial research method suitable for answering study questions?	√			√			√			√		
Were there enough subjects in the study to establish that the findings were not made by chance?	√			√			√			√		
Were the subjects randomly allocated to the experimental and control groups? If not, could this be biased?	√			√			√			√		
Were the inclusion/exclusion criteria used?	√			√			√			√		
Were the two groups comparable at the beginning of this study?	√			√			√			√		
Were objective and unbiased outcome criteria used?	√			√			√			√		
Were objective and validated measurement methods used to measure the results? If not, were the results scored by someone who did not know the group assignment (i.e. was the assessment blinded?	√			√			√			√		
Was the effect size practically relevant?	√			√			√			√		
How precise was the estimated effect? Was there a confidence interval?	√			√			√			√		
Could there be confounding factors that have not been considered?	√			√			√			√		
Were the results applicable to your study?	√			√			√			√		

✓ yes

Checklist questions	Shetty et al. (2018)			Shi et al. (2010)			Wong et al. (2010)		
	Yes	No explanation	No	Yes	No explanation	No	Yes	No explanation	No
Did this study discuss about a clear study focus?	√			√			√		
Was the Randomized Controlled Trial research method suitable for answering study questions?	√			√			√		
Were there enough subjects in the study to establish that the findings were not made by chance?	√			√			√		
Were the subjects randomly allocated to the experimental and control groups? If not, could this be biased?	√			√			√		
Were the inclusion/exclusion criteria used?	√			√			√		
Were the two groups comparable at the beginning of this study?	√			√			√		
Were objective and unbiased outcome criteria used?	√			√			√		
Were objective and validated measurement methods used to measure the results? If not, were the results scored by someone who did not know the group assignment (i.e. was the assessment blinded?	√			√			√		
Was the effect size practically relevant?	√			√			√		
How precise was the estimated effect? Was there a confidence interval?	√			√			√		
Could there be confounding factors that have not been considered?	√			√			√		
Were the results applicable to your study?	√			√			√		

✓ yes

1. Acupuncture therapy on pain reduction

Table 2. 7 The article proved that acupuncture therapy was related to pain reduction in dysmenorrhea patients

Author (year)	Country	Study Design	Sample	P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Cha et al. (2016)	South Korea.	Randomized Controlled Trial.	Acupuncture : 45 No acupuncture : 46	Dysmenorrhea patients aged 14-25 years	This study compared the effect of acupuncture therapy in dysmenorrhea patients as an abdominal pain reduction*, back pain during dysmenorrhea measured before and after in both groups.	There was no effect of non-acupuncture therapy in primary dysmenorrhea patients as pain reduction in the two groups.	Pain reduction in dysmenorrhea patients
Chen et al. (2010)	Taiwan	Randomized Controlled Trial	Acupuncture : 36 No acupuncture : 35	Dysmenorrhea patients aged 14-19 years	This study compared the effect of acupuncture therapy in dysmenorrhea patients as a pain* and anxiety reduction during dysmenorrhea as measured before and after in both groups.	There was no effect of non-acupuncture therapy from dysmenorrhea patients to both groups.	Pain reduction in dysmenorrhea patients
Gilarranz et al. (2018)	Spain	Randomized Controlled Trial.	Acupuncture : 19 No acupuncture : 19	Dysmenorrhea patients aged 18-25 years	This study compared the effectiveness of acupuncture therapy on pain reduction in dysmenorrhea patients	There was no comparison of the effectiveness of the control group that was not given acupuncture therapy in reducing dysmenorrhea pain.	Pain reduction in dysmenorrhea patients
Pei et al. (2016)	China	Randomized Controlled Trial.	Acupuncture : 164 No acupuncture: 165	Dysmenorrhea patients aged 13-18 years	This study aimed to assess the effect of acupuncture therapy in reducing pain intensity in dysmenorrhea patients, measured before and after therapy.	There was no effect of non-acupuncture therapy on reducing pain intensity in dysmenorrhea patients	Pain reduction in dysmenorrhea patients
Shetty et al. (2018)	India	Randomized Controlled Trial.	Acupuncture : 30 No acupuncture : 30	Dysmenorrhea patients aged 17-23 years	This study aimed to evaluate the efficiency of pain in dysmenorrhea patients by providing acupuncture therapy in the pain	There was no evaluation of the efficiency of giving non-acupuncture on the pain *, dizziness,	Pain reduction in dysmenorrhea patients

Author (year)	Country	Study Design	Sample	P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
					*, dizziness, diarrhea, nausea and vomiting groups measured before and after therapy.	diarrhea, nausea and vomiting groups in dysmenorrhea patients	
Shi et al. (2010)	China	Randomized Controlled Trial.	Acupuncture: 10 No acupuncture: 10	Dysmenorrhea patients aged 15-30 years	This study aimed to see the effect of analgesic mechanism in acupuncture therapy on dysmenorrhea pain reduction measured before and after.	There was no effect of the analgesic mechanism on no acupuncture therapy on the reduction	Pain reduction in dysmenorrhea patients
Wong et al. (2010)	Hong Kong	Randomized Controlled Trial.	Acupuncture: 19 No acupuncture: 21	Dysmenorrhea patients aged 14-25 years	This study aimed to evaluate the effect of acupuncture therapy on pain reduction in dysmenorrhea measured before and after pain.	There was no evaluation of the effect of no acupuncture therapy in dysmenorrhea pain patients	Pain reduction in dysmenorrhea patients

2. Forest plot

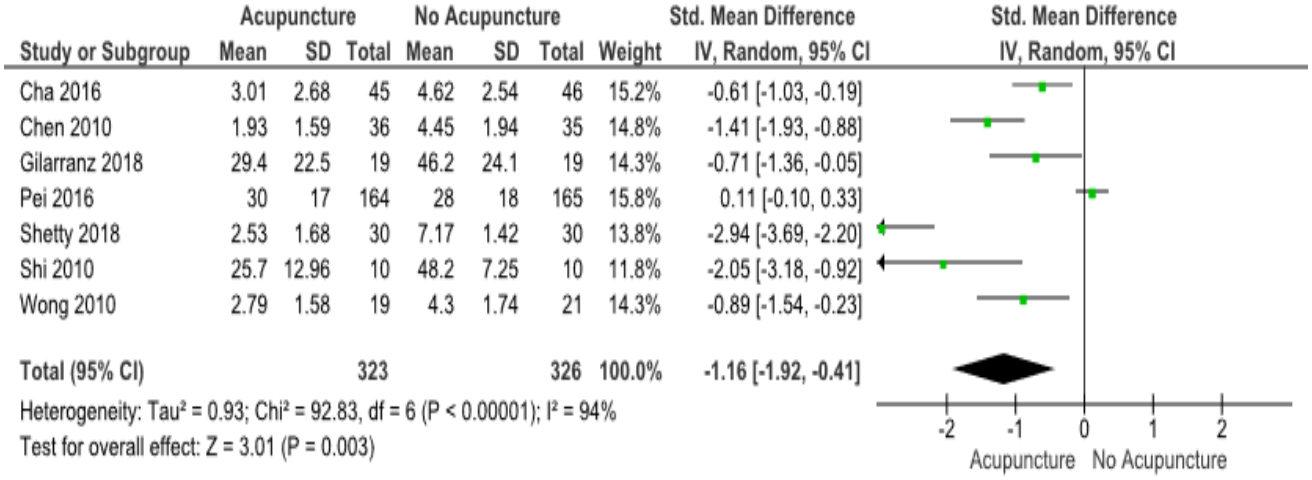

Figure 2. Forest plot of the effect of acupuncture therapy on pain reduction

3. Funnel plot

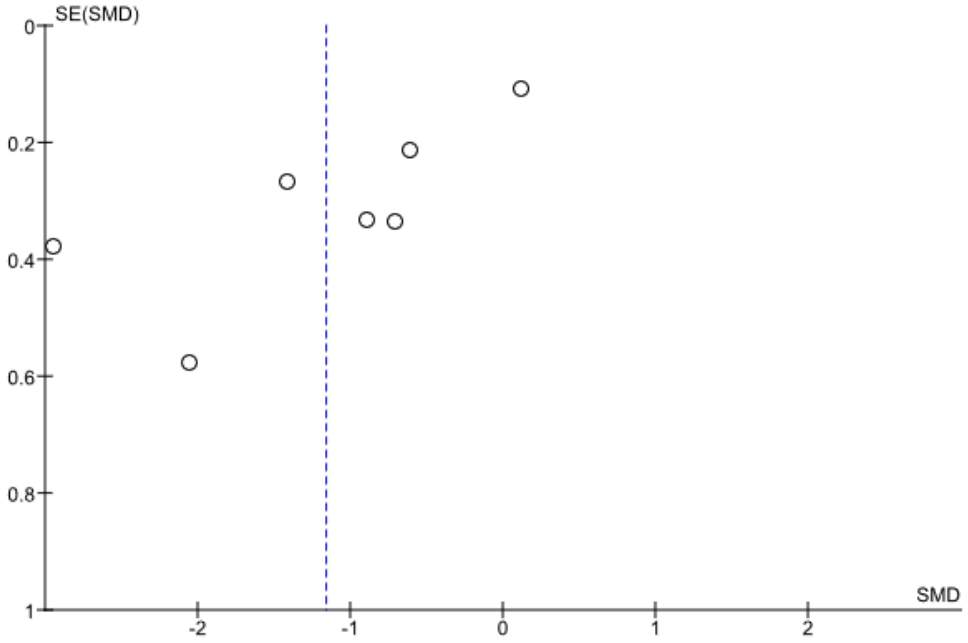

Figure 3. Funnel plot of the effect of acupuncture therapy on pain reduction

Based on the result of the forest plot (Figure 2), acupuncture therapy was -1.16 times better in reducing pain in dysmenorrhea patients than no acupuncture therapy. It was statistically significant (p= 0.003). The heterogeneity of the data was I^2=94%, Therefore, the distribution of the data was heterogeneous (random effect model).

The funnel plot (Figure 3) showed a publication bias characterized by the asymmetry of the right and left plots with 4 plots on the right and 3 plots on the left. The plot on the left had a standard error of between 0.2 and 0.6. The plot on the right had a standard error of between 0.0 and 0.4. Bias occurred due to the imbalance between the distances among studies on both the right and left of the funnel plot.

DISCUSSION

The theme of the systematic study and meta-analysis was the effect of acupuncture therapy on pain reduction in dysmenorrhea patients. This study was considered important due to its rarity. The number of the relevant and accessible study published was not quite large and also had data access problems (duplicate data) (Murti, 2018).

The confounding factor affecting the relationship or effect of exposure to the occurrence of the disease estimated by the study was not the same as the relationship or effect that occurred in the target population: it is the same as the invalid study results (Murti, 2018). The estimation of the combined effects of acupuncture therapy on pain reduction in dysmenorrhea patients was processed using RevMan 5.3 with a continuous method. This method aimed to analyze the effect size or standardized mean difference in bivariate data from two groups that had been controlled for confounding factors by randomization.

The results of the systematic study and meta-analysis were presented in the form of a forest plot and a funnel plot. Forest plot showed an overview of information from each of the studies examined in the meta-analysis and the estimation of the overall results (Murti, 2018). The forest plot showed

visually the amount of variation (heterogeneity) among study results (Akobeng in Murti, 2018).

A funnel plot was a diagram in a meta-analysis that was commonly used to demonstrate possible publication bias. The funnel plot showed the relationship between the effect size and the sample size or the standard error of the effect size of the various studies studied (Murti, 2018).

The systematic review and meta-analysis in this study aimed to increase the generalizability of the findings and obtain convincing conclusions from the results of various similar studies. The result showed that acupuncture therapy was -1.16 better in reducing pain in dysmenorrhea patients than non-acupuncture therapy.

Based on a study conducted by Shi et al (2010), acupuncture therapy was more effective in reducing dysmenorrhea pain than no acupuncture. This study recommended acupuncture therapy because it was safe, efficient, and had a significant effect on reducing dysmenorrhea pain.

This study is in line with a study conducted by Liu et al (2011). This study proved that the acupuncture therapy group had decreased dysmenorrhea pain (SMD -15.56; 95% CI= -22.16 to -8.95; p <0.001). However, there was a non-significant effect in the control group without acupuncture therapy.

This study is in line with a study conducted by Shetty et al (2018) that a study with acupuncture therapy could have a significant effect on reducing dysmenorrhea pain compared to non-acupuncture therapy.

AUTHOR CONTRIBUTION

Elisa was the main researcher who selected the topic, explored, and collected the data. RB Soemanto and Hanung Prasetya analyzed the data and reviewed the documents of the study.

CONFLICT OF INTEREST

This study did not have a conflict of interest.

FUNDING AND SPONSORSHIP

This study used personal funds from the main researcher.

ACKNOWLEDGEMENT

We would like to thank the database providers, PubMed, Google Scholar, and Hindawi

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