JMCH Journal of Maternal and Child Health (2022), 07(01): 9-21
Masters Program in Public Health, Universitas Sebelas Maret
Meta-Analysis

Meta-Analysis: Are Acupressure and Birthing Ball Exercise Associated with Labor Pain?

Susiana Yuni Astuti[1)], Uki Retno Budihastuti[2)], Hanung Prasetya[3)]

[1)]Master's Program in Public Health, Universitas Sebelas Maret
[2)]Department of Obstetrics and Gynecology, Dr. Moewardi Hospital/
Faculty of Medicine, Universitas Sebelas Maret
[3)]Study Program of Acupuntur, Health Polytechnics, Ministry of Health Surakarta

ABSTRACT

Background: Management of pain in labor is identified as one of the most important topics related to pregnancy and childbirth. Acupressure and birthing ball exercise are one of the non-pharmacological methods of managing labor pain to help mothers cope with the labor process. This management can relieve pain sensations by increasing the woman's well-being, comfort, and sense of control in labor. This study aims to estimate the effect of acupressure and birthing ball exercise on labor pain.
Subjects and Method: This was a systematic review and meta-analysis conducted using PRISMA flow diagrams. Search articles through journal databases including: PubMed, Science Direct, Google Schoolar and SpingerLink by selecting articles published in 2010-2021. The keywords used are ("labor pain" OR labor pain) "AND ("acupressure" OR "acupressure hegu") AND ("birthing ball" OR "birthing ball exercise") AND "randomized controlled trial". Inclusion criteria were full paper articles with Randomized Controlled Trial (RCT) research methods, the size of the relationship used with Mean SD, the intervention given was acupressure and birthing ball exercise, research subjects were mothers in the first stage of active labor. Eligible articles were analyzed using the Revman 5.3 application.
Results: Meta-analysis of 16 articles showed results for acupressure (SMD -1.29; 95% CI= -2.35 to 0.24; p=0.02) and birthing ball exercise (SMD -0.73; 95% CI= -1.56 to 0.11; p=0.09).
Conclusion: Acupressure and birthing ball exercise each have an effect on reducing labor pain.

Keywords: Acupressure, birthing ball exercise, labor pain

Correspondence:
Susiana Yuni Astuti. Master's Program in Public Health, Universitas Sebelas Maret. Jl.Ir. Sutami 36A, Surakarta 5712, Central Java, Indonesia. Email: susianayuni.a@gmail.com Mobile: 0813-90940681.

Cite this as:
Astuti SY, Budihastuti UR, Prasetya H (2022). Meta-Analysis: Are Acupressure and Birthing Ball Exercise Associated with Labor Pain?. J Matern Child Health. 07(01): 9-21. https://doi.org/10.26911/thejmch.-2022.07.01.02.

Journal of Maternal and Child Health is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

BACKGROUND

Childbirth is a natural process. Physiologically the labor process is caused by uterine contractions, which will cause the cervix to open and thin, until the fetus and placenta are released. These contractions cause pain called labor pain, making the mother feel uncomfortable, anxious and afraid (Widiastini & Karuniadi, 2020). Labor pain is a physiological condition that is generally experienced by almost all maternity mothers (Asmadi, 2012).

The International Association for the Study of Pain (IASP) defines pain as an

uncomfortable sensory experience associated with tissue damage. Physiologically, labor pain begins to arise in the first stage of labor, the latent phase and active phase, in the active phase there is a peak of pain where the opening reaches 10 cm. In this phase the contractions become more flexible, longer and stronger so that the pain felt becomes more intense (Gau et al., 2011).

According to several studies on pain management, as many as 35% experienced moderate labor pain, 30% experienced severe labor pain and 20% experienced extreme labor (Arma et al., 2015). Gau et al (2011) found that 89% of primiparous women and 84% of multiparous women described their labor pain as very severe and unbearable. Kamalifard et al (2007) also found that 76.3% of primiparous women and 73.3% of multiparous women reported their labor pains at the most severe level of pain. This shows that both primiparas and multiparas are equally overwhelmed by severe pain. In 2017, about 810 women died because they could not prevent pregnancy complications. Prolonged delivery is the cause of complications with an incidence of 69,000 or 2.8% of deaths (WHO, 2018). If this pain is not handled properly it will cause anxiety, fear and stress in the mother so that it will increase the intensity of the pain felt (Lingling et al., 2017).

Efforts to relieve labor pain can use pharmacological and non-pharmacological methods. Given the potential for adverse effects on the mother and fetus, the use of pharmacological methods of analgesics and anesthetics may not be the first choice for delivery. These methods include massage, the use of birth balls, touch therapy, relaxation, warm compresses and cold compresses, the use of aromatherapy, breath control, positioning, music therapy, hypnotherapy, acupuncture, acupressure and others (Yeung et al., 2019).

Acupressure is a needleless acupuncture method that originated in traditional Chinese medicine. The acupressure method uses the hands to massage specific body parts at acupuncture points. The points associated with childbirth are sanyinjiao and hegu (Fenge, 2012). The results of previous studies showed that acupressure at the Hegu and Ciliao points could significantly reduce labor pain compared to the control group with a slight advantage at the Ciliao point (Ozgoli et al., 2016). Another study conducted on nulliparous women showed that acupressure at the sanyinjiao and hegu points also significantly reduced labor pain so that this method could be used effectively in labor (Sehhatie-Shafaie et al., 2013).

Birth ball is one of the popular tools used in hospitals and clinics in the United States in the delivery process. In Indonesia, the use of birth balls is currently still rare but has begun to be applied to overcome labor pain (Marwiyah and Pusporini, 2017). A study on the effect of birth balls on labor pain in Iran found that there is a significant relationship between the use of birth balls and the intensity of labor pain (Makvandi et al., 2015).

Studies using birth balls for labor pain management, 84% stated that birth balls can relieve contraction pain, 79% can relieve back pain and 95% stated that they are comfortable when using birth balls. The benefits obtained by using a birth ball during labor are reducing pain and anxiety, minimizing the use of pethidine, helping the process of descending and rotating the fetal head, reducing the duration of the first stage of labor, increasing maternal satisfaction and well-being during labor (Hau et al., 2012).).

Based on the number of cases of labor pain that occur and the need for appropriate intervention, the researchers are interested in studying the effect of acupressure and birthing ball exercise on labor pain. The data obtained will be analyzed using meta-analysis by synthesizing the results of studies carried out to reduce bias.

SUBJECTS AND METHOD

1. Study Design

This study uses a systematic review and meta-analysis study design. Using the PRISMA flow chart guidelines. Article searches were carried out using journal databases including: PubMed, science Direct, Google Scholar and SpingerLink articles in the 2010-2020 range with the keywords ("labor pain" OR labor pain) "AND ("acupressure" OR "acupressure hegu") AND ("birthing ball" OR "birthing ball exercise") AND "randomized controlled trial".

2. Inclusion Criteria

This study has inclusion criteria, including: Full paper article with a Randomized Controlled Trial (RCT) study design, articles published in Indonesian and English, the relationship measure used with Mean SD, Interventions given are acupressure and birthing ball exercise, research subjects are mothers in active phase I delivery and pain measurement using VAS or NRS.

3. Exclusion Criteria

In this study, there were exclusion criteria, including: Mother in active phase I giving birth with multiple pregnancies and comorbid conditions, mother giving birth in active phase I with pathological pregnancy and malpresentation of the fetus.

4. Operational Definition of Variables

The formulation of the research problem was carried out by considering the eligibility criteria defined using the PICO, namely, Population: active first stage birthing mothers with labor pain, Intervention: acupressure and birthing ball exercise, Comparison: no acupressure and no birthing ball exercise, and Outcome: labor pain.

Acupressure is one of the effective non-pharmacological techniques in labor pain management. Acupressure is also known as needleless acupuncture, or massage acupuncture. This technique uses pressure, massage, and massage techniques along the body's meridians or energy flow lines. This acupressure technique can reduce pain and make delivery time effective (Yildirim et al., 2018).

Birthing ball exercise is physical therapy or simple exercise using a ball, where the exercise is applied to pregnant women, mothers giving birth, and postpartum mothers (Kustari, et al 2012).

Labor pain is a manifestation of uterine muscle contractions, these contractions then cause cervical dilatation. With the opening of the cervix, labor will occur. The severity of labor pain is different at the beginning and end of the active and transitional stages of labor and continues to increase (Judha et al., 2012).

5. Instrument

The instrument in this study used a Visual Analog Scale (VAS) or Numeric rate scale (NRS) as a measuring tool for labor pain in mothers in the first stage of active labor.

6. Data Analysis

Data analysis in this study was carried out using the Review Manager application (RevMan 5.3). Data were analyzed based on variations between studies by determining the use of random effects analysis models. In this study, I^2 was used to quantify the dispersion. The results of data analysis are in the form of the effect size value of the heterogeneity of the study which later the results of the data that have been analyzed

are interpreted in the form of forest plots and funnel plots.

RESULTS

Research from the primary study related to the effect of acupressure and birthing ball exercise on labor pain contained 16 articles with a total sample of 8737 participants, 4329 participants for the intervention and 4408 participants for comparison. Articles were obtained from 2 continents, namely, 14 studies came from the Asian continent and 2 studies came from the European continent. Each study had a sample of less than 100 participants. The outcome for some articles is that there is a decrease in the level of labor pain after being given acupressure and birthing ball exercise interventions.

The article search was carried out using a database based on the PRISMA flow diagram, which can be seen in Figure 1. The study quality assessment was carried out qualitatively and quantitatively. Assessment of research quality using the Critical Appraisal Skills Program (CASP) can be seen in Table 1. Each of the 11 questions was answered with the answer choices: Yes, No and Unclear. After assessing the quality of the study, a total of 16 articles included in the quantitative synthesis process of the meta-analysis were analyzed using RevMan 5.3.

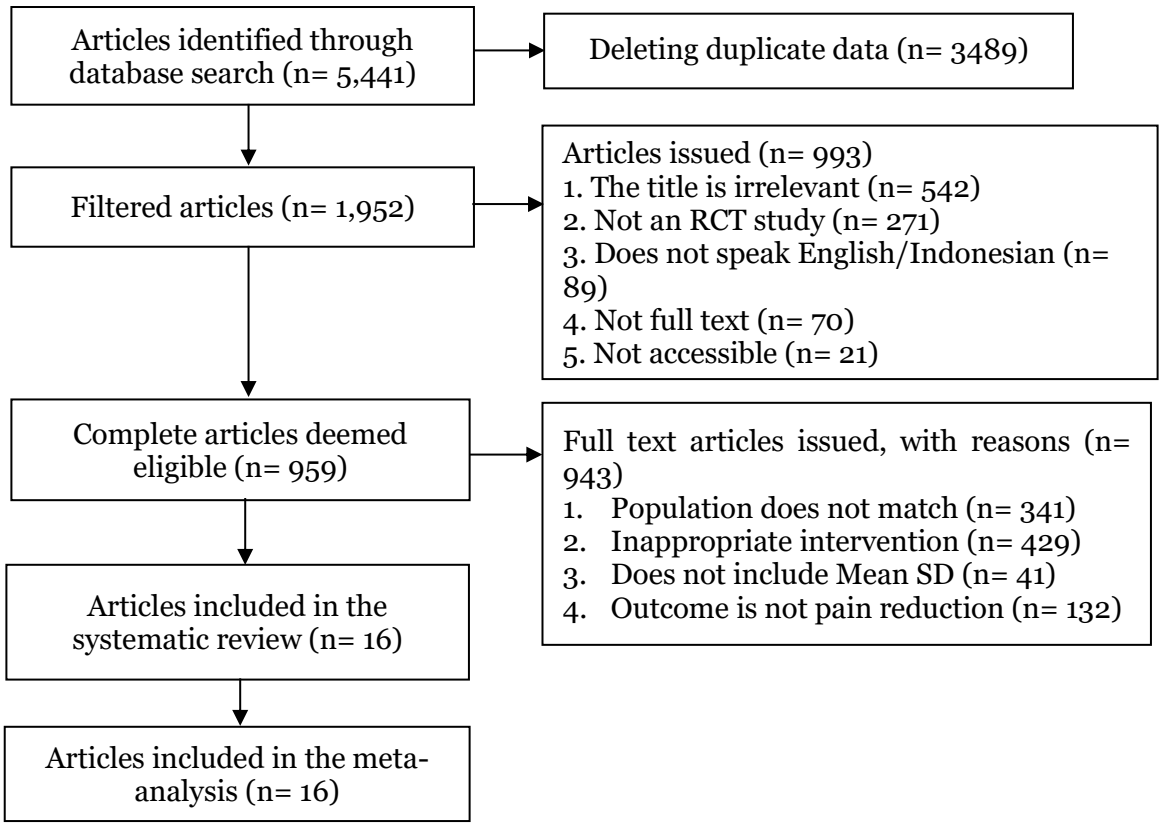

Figure 1. PRISMA Flow Diagram

Table 1. Research Quality Assessment of the Effect of Acupressure on Labor Pain

No.	Questions	Mirzaee *et al* (2020)	Ozgoli *et al* (2016)	Alimoradi *et al* (2020)	Hamidzadeh *et al* (2011)	Halmaci *et al* (2017)	Sehhatie-Shafaie *et al* (2013)	Dabiri *et al* (2014)
1.	Does the experiment answer the clinical problem clearly?	1	1	1	1	1	1	1
2.	Was the intervention given to the patient randomized?	1	1	1	1	1	1	1
3.	Are there blinding of patients, health workers, and researchers?	1	1	1	1	1	1	1
4.	Were the study groups similar at the start of the study?	1	1	1	1	1	1	1
5.	Outside of the intervention under study, were the study groups treated equally?	1	0	1	1	1	1	1
6.	Were all patients included in the study properly accounted for in the conclusions? were all patients analyzed according to the randomized study groups?	1	1	1	1	1	1	1
7.	Is the effect of the intervention large enough?	1	1	1	1	1	1	1
8.	How precise is the estimation of the effect of the intervention?	1	1	1	1	1	1	1
9.	Are the results applicable to the context of practice or local populations?	1	1	1	1	1	1	0
10.	Are all other clinically important outcomes considered in this article?	1	1	0	1	1	1	0
11.	Do the benefits provided by the intervention outweigh the costs and disadvantages?	1	1	1	1	1	1	1

Table 2. Research Quality Assessment of the Effect of Birthing Ball Exercise on Labor Pain

No.	Questions	Aktas et al. (2021)	Taavoni et al. (2011)	Gau et al. (2011)	VaiJayan-thimala et al. (2014)	Shirazi et al. (2019)	Hau et al. (2012)	Henrique et al. (2018)	Delgado-Garcia et al. (2011)	Taavoni et al. (2016)
1.	Does the experiment answer the clinical problem clearly?	1	1	1	1	1	1	1	1	1
2.	Was the intervention given to the patient randomized?	1	1	1	1	1	1	1	1	1
3.	Are there blinding of patients, health workers, and researchers?	1	1	1	1	1	1	1	1	1
4.	Were the study groups similar at the start of the study?	1	1	1	1	1	1	1	1	1
5.	Outside of the intervention under study, were the study groups treated equally?	0	0	1	1	1	1	1	1	1
6.	Were all patients included in the study properly accounted for in the conclusions? were all patients analyzed according to the randomized study groups?	1	1	1	1	1	1	1	1	1
7.	Is the effect of the intervention large enough?	1	0	1	1	1	1	1	1	1
8.	How precise is the estimation of the effect of the intervention?	1	1	1	1	1	1	1	1	1
9.	Are the results applicable to the context of practice or local populations?	1	1	1	1	1	1	1	1	1
10.	Are all other clinically important outcomes considered in this article?	0	1	1	1	1	1	1	1	1
11.	Do the benefits provided by the intervention outweigh the costs and disadvantages?	1	1	1	0	1	1	1	1	1

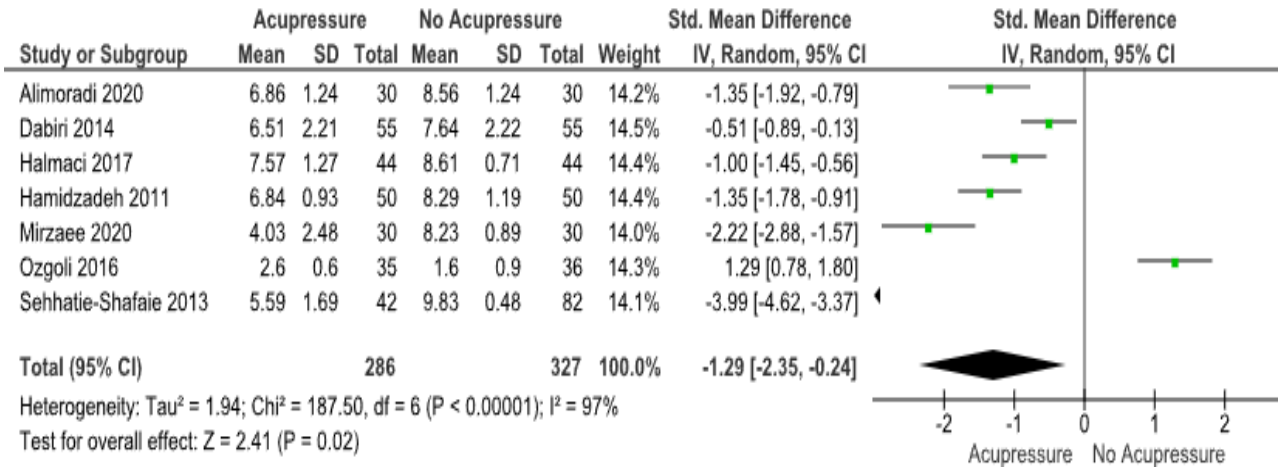

Figure 2. Forest plot of Acupressure on labor pain

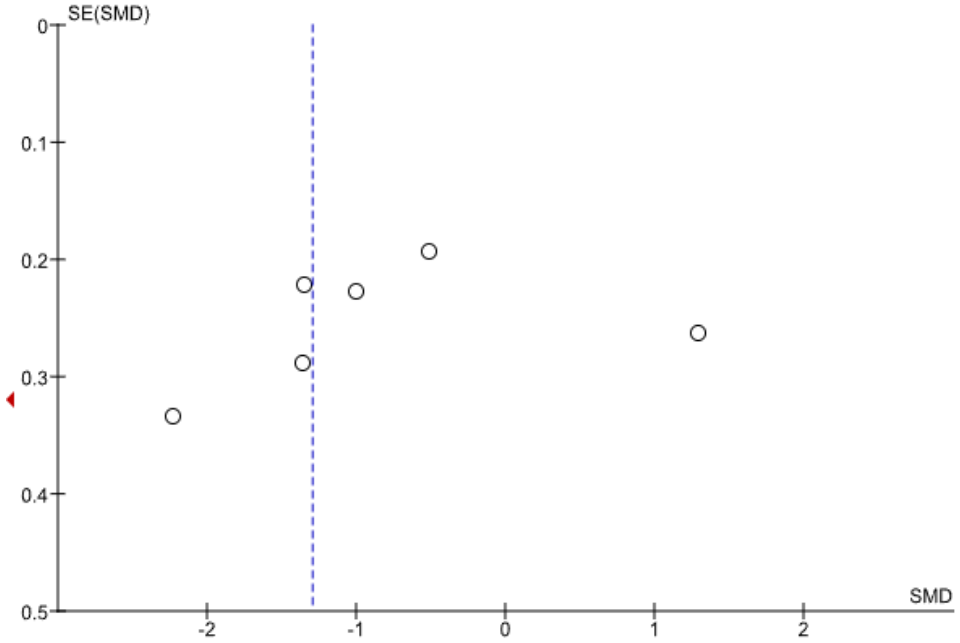

Figure 3. Funnel plot of Acupressure on labor pain

1. Effect of acupressure on labor pain

a. Forest plot acupressure on labor pain

Interpretation of the results of the meta-analysis process can be seen through the forest plot. Figure 2 shows as many as 7 articles of acupressure can reduce labor pain compared to other interventions or not given an intervention. Meanwhile, there was high heterogeneity between experiments (I^2= 97%; p<0.001). Thus, the Random Effect Model (REM) was used to analyze the data in the forest plot. The results of the analysis of the acupressure intervention found that -1.29 times the effect of reducing labor pain compared to other interventions or no intervention, and statistically significant (SMD= -1.29; 95% CI= -2.35 to 0.24; p = 0.02).

b. Funnel Plot of acupressure on labor pain

A funnel plot is a plot that represents the approximate size of the effect of each study on the estimate of its accuracy which is

usually the standard error. Figure 3 funnel plot of acupressure on labor pain, shows there is a publication bias which is characterized by asymmetry of the right and left plots.

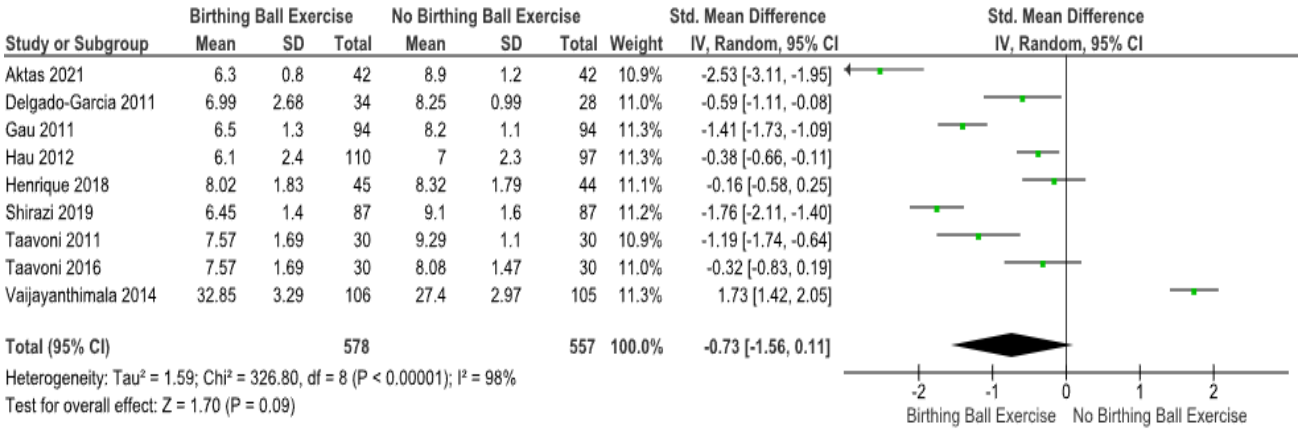

Figure 4. Forest plot Birthing ball exercise on labor pain

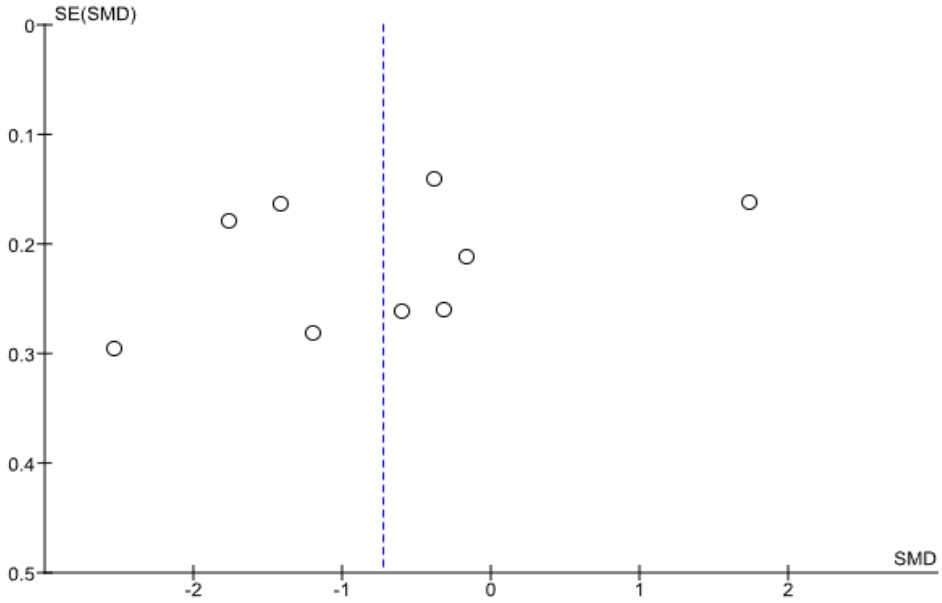

Figure 5. Funnel plot Birthing ball exercise on labor pain

2. The effect of birthing ball exercise on labor pain

a. Forest plot birthing ball exercise on labor pain

Interpretation of the results of the meta-analysis process can be seen through the forest plot. Figure 4 shows as many as 9 articles reporting that birthing ball exercise can reduce labor pain compared to other interventions or not given an intervention. Meanwhile, there was high heterogeneity between experiments (I^2= 98%; p<0.001). Thus, the Random Effect Model (REM) was used to analyze the data in the forest plot. The results of the analysis of the birthing ball exercise intervention were found to be -0.73 times having an effect on reducing labor pain compared to other interventions or no intervention, but statistically not

significant (SMD 0.73; 95% CI= -1.56 to 0.11; p=0.09).

b. Funnel Plot birthing ball exercise on labor pain

Figure 5 funnel plot of birthing ball exercise on labor pain, shows that there is a publication bias which is indicated by the asymmetry of the right and left plots.

DISCUSSION

Pain is an unpleasant feelings that are very subjective because each person feels pain in terms of its scale or level, and only that person can explain or evaluate the pain he experiences (Wilson, 2014).

Physiologically, labor pain begins to arise in the first stage of labor, the latent phase and active phase, in the active phase there is a peak of pain where the opening reaches 10 cm. In this phase the contractions become more flexible, longer and stronger so that the pain felt becomes more intense (Gau et al., 2011). These contractions cause pain in the waist, abdomen and radiating towards the thighs. The level of labor pain is described by the intensity of pain perceived by the mother during the delivery process (Judha et al., 2012).

There are many interventions that can be given to pregnant women who experience labor pain, one of which is acupressure and birthing ball exercise. These two interventions are non-pharmacological treatments that are quite often used in labor pain management (Yeung et al., 2019). Acupressure is also known as needleless acupuncture, or massage acupuncture. This technique uses pressure, massage, and massage techniques along the body's meridians or energy flow lines. This acupressure technique can reduce pain and make delivery time effective (Yildirim et al., 2018). According to research Levett et al (2014) reported that the sanyinjiao, hegu and zhiyin acupressure points are acupressure points that have been shown to be effective in reducing labor pain, either by using one acupuncture point or several acupuncture points.

Birthing ball exercise is one way to help mothers cope with pain during labor. This birthing ball exercise can be used in various positions, making you feel comfortable using gravity while increasing the release of endorphins because the elasticity and curvature of the ball stimulates the hip receptors that are responsible for secreting endorphins (Taavoni et al., 2016).

There are 7 research articles with randomized controlled trials study design as a source of meta-analysis of the effect of acupressure on labor pain. The forest plot results showed that acupressure could reduce labor pain as much as -1.29 times compared to other interventions or no intervention, and was statistically significant (SMD= -1.29; 95% CI= -2.35 to 0.24; p=0.02).

And there are 9 research articles with randomized controlled trials study design as a source of meta-analysis of the effect of birthing ball exercise on labor pain. The results of the forest plot showed that birthing ball exercise could reduce labor pain as much as -0.73 times compared to other interventions or no intervention was given, but it was not statistically significant (SMD -0.73; 95% CI = -1.56 to 0.11; p = 0.09).

The results of this study are in line with Hamidzadeh et al. (2011) which found that women who received acupressure at the hegu point experienced lower levels of labor pain severity immediately and 20, 60 and 120 minutes after the intervention compared to those who received touch. at the same point. Acupressure can also help in producing endorphins that are useful for reducing pain (Alimoradi et al., 2020).

This statement is also in line with Hamlacı and Yazici (2017) where it was

concluded that the administration of hegu acupressure was far superior and effective compared to touch in the management of labor pain in active phase I birth mothers. The use of hegu point acupressure intervention can not relieve pain completely, but this intervention can inhibit labor pain when there is an increase in cervical dilatation and an increase in uterine contractions (Dabiri & Shahi, 2014). Acupressure at the hegu point in general can stimulate the release of endorphins in the blood so that pain during labor can be controlled. Acupressure can also stimulate the release of oxytocin from the pituitary gland, which directly stimulates uterine contractions. In addition, acupressure stimulation according to gate control theory results in a stronger, faster opposite message and travels along small gelatinous nerve fibers and then blocks the pain message so that the brain does not record the pain message (Mirzaee et al., 2020).

The results of this study are in line with Aktaş et al (2021) regarding the effect of birthing ball exercise on labor pain management in women in Turkey. This study states that the birthing ball exercise applied to mothers in the active phase of the first stage of labor is very significant in relieving pain in the labor process. This study recommends the use of birthing ball exercise for labor pain management in the delivery room. In this study, birthing ball exercise was carried out 3 times during the first stage of the active phase with a duration of 30 minutes for each intervention (Vaijayanthimala and Judie, 2014).

Discomfort in childbirth can be overcome with body positions that support gravity and positions that accelerate cervical dilation such as walking, squatting, kneeling, and sitting (Delgado et al., 2019). This opinion is supported by research from Gau et al (2011) concluding that birthing ball exercise is effective in reducing labor pain. This will help the fetus descend into the pelvic cavity and the mother will feel less pain. As a labor pain reliever, birth balls can be used simultaneously with other non-pharmacological methods such as massage, aromatherapy, music therapy and warm or cold compresses (Shirazi et al., 2019)..

Statistically insignificant results were obtained which are in line with Vaijayanthimala and Judie (2014) because the study concluded that pain is something that is individual, unpleasant, and never ending. Pain is a subjective feeling of discomfort and only the person suffering from it can explain how severe the pain is (Farrag, 2018).

The pain felt by respondents varied in the treatment group and the control group. Pain that occurs due to stress in the face of labor so that it can stimulate excessive uterine contractions. Uncontrolled uterine contractions will deliver pain during labor (Rahimi et al., 2018). This is in accordance with the gate control theory which states that pain depends on the work of large and small nerves in the dorsal root ganglion.

During labor pain impulses travel from the uterus along the large nerve fibers toward the uterus to the substantia gelatinosa in the spinal column, transmitting cells project pain messages to the brain. The presence of stimulation causes opposing messages that are stronger, faster and travel along small nerve fibers. The opposite message closes the gate in the gelatinous substance and blocks the pain message so that the brain does not perceive the pain (Yuksel et al., 2017).

AUTHORS CONTRIBUTION

Susiana Yuni Astuti is the main researcher who selects the topic, searches and collects research data. Uki Retno Budihastuti and Hanung Prasetya analyzed data and

reviewed research documents.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

ACKNOWLEDGEMENT

The researcher would like to thank all those who have helped in compiling this article and also thank the database providers PubMed, Science Direct, Google Scholar and SpingerLink.

REFERENCES

Aktaş D, kolsuz S, ertuğrul M, beşirli EG, gündoğan FR. (2021). Effect of Birth Ball Exercising for the Management of Childbirth Pain in Turkish Women. Bezmialem Scie. 9(1): 46–52. https://doi.org/10.14235/bas.galenos.2020.3898.

Alimoradi Z, Kazemi F, Gorji M, Valiani M. (2020). Effects of ear and body acupressure on labor pain and duration of labor active phase: A randomized controlled trial. J. Midwifery Womens Health. 51(4): 102-113. https://doi.org/10.1016/j.ctim.2020.102413

Arma Nuriah, Karlinah N, Yanti E (2015). Bahan Ajar Obstetri Fisiologi (Obstetrics Physiology Teaching Materials). Yogyakarta : Deepublish.

Asmadi (2012). Teknik Prosedural Keperawatan: Konsep dan aplikasi kebutuhan dasar klien (Nursing Procedural Techniques: Concept and application of client's basic needs). Jakarta : Nuha Medika.

Dabiri F, Shahi A (2014). The effect of LI4 acupressure on labor pain intensity and duration of labor: A randomized controlled trial. Oman Med J. 29(6): 425–429. https://doi.org/10.5001/omj.2014.113.

Delgado A, Maia T, Melo RS, Lemos A. (2019). Birth ball use for women in labor: A systematic review and meta-analysis. Jpn J Nurs Sci. 3(5): 92–101. https://doi.org/10.1016/j.ctcp.2019.01.015.

Farrag RE (2018). Using of birthing ball during the first stage of labor: Its effect on the progress of labor and outcome among nulliparous women. Int J Nurs Didact. 8(09): 01–10. https://doi.org/10.15520/ijnd.v8i09.2289

Fenge A (2012). Terapi Akupresur Manfaat dan Teknik Pengobatan (Acupressure Therapy Benefits and Treatment Techniques) (C. C. Corp (ed.)).

Gau ML, Chang CY, Tian SH, Lin KC. (2011). Effects of birth ball exercise on pain and self-efficacy during childbirth: A randomised controlled trial in Taiwan. J Midwifery Womens Health. 27(6): e293–e300. https://doi.org/10.1016/j.midw.2011.02.004.

Hamidzadeh A, Shahpourian F, Orak RJ, Montazeri AS, Khosravi A (2011). Effects of LI4 Acupressure on Labor Pain in the First Stage of Labor. J Midwifery Womens Health. 57(2): 133–138. https://doi.org/10.1111/j.15-42-2011.2011.00138.x.

Hamlacı Y, Yazici S. (2017). The effect of acupressure applied to point LI4 on perceived labor pains. J Tradit Chin Med. 31(3): 167–176. https://doi.org/10.1097/HNP.0000000000000205.

Hau WL, Tsang SL, Kwan W, Siu King Man L, Lam KY, Ho LF. (2012). The Use of Birth Ball as a Method of Pain Management in Labour. Int J Nurs Didact. 12(1): 1–6. https://hkjgom.org/sites/default/files/pdf/v12-p63-birth-ball.pdf.

Judha M, Sudarti, Fauziah A. (2012). Teori

Pengukuran Nyeri & Nyeri Persalinan (Pain Measurement Theory & Labor Pain). Yogyakarta : Nuha Medika.

Kamalifard M, Pirdel M, Bani S, Gojazadeh M, Taghavi S. (2007). Comparison and evaluation of labor pain and factors influencing pain perception. J. Midwifery Womens Health. 1(5): 271–278. https://medwelljournals.com/-abstract/?doi=rjmsci.2007.271.278

Levett KM, Smith CA, Dahlen HG, Bensoussan A (2014). Acupuncture and acupressure for pain management in labour and birth: A critical narrative review of current systematic review evidence. J Midwifery Womens Health. 22(3): 523–540. https://doi.-org/10.1016/j.ctim.2014.03.011.

Lingling W, Xiaohui L, Yuzhu Y, Ke S, Ling W, Wei Y, Shangrong L, Hongying H. (2017). Effectiveness of acupuncture versus spinal-epidural anesthesia on labor pain: a randomized controlled trial. J Tradit Chin Med. 37(5): 629–635. https://doi.org/10.1016/s0254-6272(17)30316-3

Makvandi S, Latifnejad Roudsari, Sadeghi R, Karimi L (2015). Effect of birth ball on labor pain relief: A systematic review and meta-analysis. J. Obstet. Gynecol. 41(11): 1679–1686. https://-doi.org/10.1111/J.Obstet.Gynecol.12802.

Marwiyah N, Pusporini LS (2017). Package of Birthing Ball, Pelvic Rocking, and Endorphin Massage (Bpe) Decrease the First Step Labor Pain. J Clin Nurs. 2(1): 65. https://doi.org/10.24990/-injec.v2i1.124.

Mirzaee F, Hasaroeih FE, Mirzaee M, Ghazanfarpour M. (2020). Comparing the effect of acupressure with or without ice in LI-4 point on labour pain and anxiety levels during labour: a randomised controlled trial. J. Obstet. Gynecol. 41(3): 395–400. https://doi.org/10.1080/01443615.2020.1747412.

Rahimi F, Goli S, Soltani N, Rezaei H, Amouzeshi Z (2018). Effects of Complementary Therapies on Labor Pain: A Literature Review. Mod. Care J. 15(1): 1–7. https://doi.org/10.5812/-modernc.69306.

Shirazi MG, Kohan S, Firoozehchian F, Ebrahimi E. (2019). Experience of childbirth with birth ball: A randomized controlled trial. Int. J. Sci. Res. Innov. 7(3): 301–305. https://doi.-org/10.15296/ijwhr.2019.50.

Taavoni S, Sheikhan F, Abdolahian S, Ghavi F. (2016). Birth ball or heat therapy? A randomized controlled trial to compare the effectiveness of birth ball usage with sacrum-perineal heat therapy in labor pain management. J. Midwifery Womens Health. 24(3): 99–102. https://doi.org/10.1016/j.-ctcp.2016.04.001

Vaijayanthimala M, Judie A (2014). Effectivenness of Birthball Usage During Labour on Pain and Child Birth Experience Among Primi Parturient Mothers : A Randomized Interventional Study. Int J Sci Res Innov. 3(7): 416–418. https://doi.org/10.15373/2-2778179/july2014/129.

Widiastini LP, Karuniadi IGAM (2020). The application of yoga pranayama and gym ball exercise on labor pain during active phase at PMB Desa Blahkiuh, Abiansemal, Badung. J Obstet Gynecol 4(1): 27. https://doi.-org/10.24843/jsgs.2020.v04.i01.p07.

Wilson M. (2014). Integrating the Concept of Pain Interference into Pain Management. Int J Sci Res Innov. 15(2): 499–505. https://doi.org/10.1016/j.-pmn.2011.06.004.

Yeung MPS, Tsang KWK, Yip BHK, Tam

WH, Ip WY, Hau FWL, Wong MKW et al. (2019). Birth ball for pregnant women in labour research protocol: A multi-centre randomised controlled trial. J Integr Med. 19(1): 1–6. https://doi.org/10.1186/s12884-019-2305-8.

Yildirim E, Alan S, Gokyildiz S (2018). The effect of ice pressure applied on large intestinal 4 on the labor pain and labor process. Complement Ther Clin Pract. 3(2): 25–31. https://doi.org/10.1016/j.ctcp.2018.02.015.

Yuksel H, Cayir Y, Kosan Z, Tastan K (2017). Effectiveness of breathing exercises during the second stage of labor on labor pain and duration: a randomized controlled trial. J Integr Med. 15(6): 456–461. https://doi.org/10.1016/S2095-4964(17)60368-6.