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The Effect of Acupressure and Acupunture as Natural Induction Methods for Spontaneous Labor: A Systematic Review

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Abstract. Induction of labor is high all over the world. Pharmacological and mechanical labor induction is one of the most frequent medical actions in midwifery services across the world. This systematic review aims to analyze the effectiveness of acupressure and acupuncture on the induction of spontaneous labor. Articles were retrieved from PubMed, Google Scholar, and ScienceDirect until March 3rd, 2020. Only articles published from 2010 to 2020 were included. Keywords used consisted of "acupuncture," "acupressure for induction of labor," "acupressure for initiation of labor," "term pregnancy". Articles were filtered using inclusion criteria. The literature search resulted in 1.365 articles. A total of 9 articles (5 acupressure and 4 acupuncture studies) were included for review. The total number of participants was 1,656 people. One study suggested that acupressure was effective in increasing cervical maturation. Two studies (1 acupressure and 1 acupuncture) stated that it was raised the frequency of initiation of spontaneous labor. One study showed that acupuncture reduced the need for medical induction. Other studies showed no significant effect. Overall, studies demonstrated a positive effect of acupressure and acupuncture on cervical maturation and increasing the frequency of initiations of spontaneous labor. Besides, it may reduce the need for medical induction. Further investigations are needed.

Keyword: Acupuncture, Acupressure for Induction of Labor, Acupressure for Initiation of Labor, Term Pregnancy

INTRODUCTION

The need for labor induction is high all over the world. The need for high labor induction is associated with an increased incidence of prolonged pregnancy(1). An increase in demand for labor induction during pregnancy was caused by the tendency of pregnant women to feel anxious about the well-being of the fetus and herself when the pregnancy lasts too long(2). The prevalence of labor ranged from 6.8% to 42.2% in the UK, (3), US, Europe, Sri Lanka (4), Australia (5), Brazil (6).

Pharmacological and mechanical labor induction is one of the most frequent medical actions in midwifery services throughout the world. Both of these medical inductions still have side effects. Pharmacological labor induction (oxytocin synthesis and prostaglandin) may cause side effects that endanger the health of the mother and fetus (7–11), namely uncontrolled uterine contractions(7,8), uterine rupture, fetal distress, risk of postpartum bleeding (8), increased pain(10,11). Mechanical labor induction may cause maternal infection by 11.3%, neonatal infection 4.6%, and postpartum infection 3.3%, and hyper uterine contractility 2.7%(12). Therefore, some experts recommend finding alternative methods that are safe and effective for stimulating spontaneous labor to meet the needs of labor induction services(13)(8).

Complementary methods and natural induction alternatives for spontaneous labor have been widely studied. The results of a systematic review and meta-analysis found that herbal medicines were effective for labor induction, but had side effects on maternal and fetal health (14). Acupuncture and acupressure are non-invasive, safe, and widely used alternative methods in obstetric care. A systematic review found that acupressure and acupuncture were effective in shortening the duration of the first stage of labor(15)and cervical maturity(16), but its effect on the stimulation of spontaneous labor initiation remains unclear (15). Therefore, there is an urgent need to examine the evidence supporting the use of acupressure and acupuncture for the stimulation of spontaneous labor in term and post-term pregnancies

OBJECTIVE

This systematic review aims to analyze the effectiveness of acupuncture and acupressure on the induction of spontaneous labor and to provide recommendations on the application of the method

METHOD

This review was based on the PRISMA protocol as writing guidelines. The articles were retrieved from PubMed, Google Scholar, and Science Direct until March 3rd, 2020. Keywords used consisted of “acupuncture”, “acupressure for induction of labor”, “acupressure for initiation of labor”, “term pregnancy”.

The study included in this review were full-text articles in the English language, published from 2010 to 2020, and clinical trial article, the population of pregnant women with gestational age more than 37 weeks, with the manual intervention of acupuncture or acupressure, compared to standard antenatal care /sham/placebo. It should report the following outcomes: cervical maturation / uterine contractions/initiation of spontaneous labor/intervals of intervention until delivery. Data collection was done by selecting the articles according to inclusion criteria by looking at the title, then tracing the information in the abstract, and the next step was full-text reading. Articles that met the inclusion criteria were included in this review literature.

Data extraction using a form for experimental from the Joanna Briggs Institute (JBI). Two reviewers independently assessed the risk of bias for each study using the JBI's critical appraisal checklist. If there are differences of opinion, input from third parties will be requested. Data analysis was done narratively because the measurement results were varied, so it was not possible to proceed to the meta-analysis.

RESULTS

Characteristic of article

All English-language literature was searched with the use of PubMed, Google Scholar, and Science Direct databases. There were 28 articles from PubMed, 1.290 articles from Google Scholar and 47 articles from Science Direct. Articles identified through database searching resulted in 1.365 articles. There were 34 duplicate articles excluded. There were 1.331 articles after duplicate articles removed. Total of 1.314 articles excluded because they were not relevant and were published before 2010. From 17 articles were selected after full-text articles assessed for eligibility. Eight articles were excluded as they do not fit the inclusion; five articles were systematic review, one article case report, one tutorial article and one article compared to medical treatment. criteria. Finally, 9 articles met the inclusion criteria and to be included in this systematic review (Table 1). The literature search scheme is displayed in Chart 1.

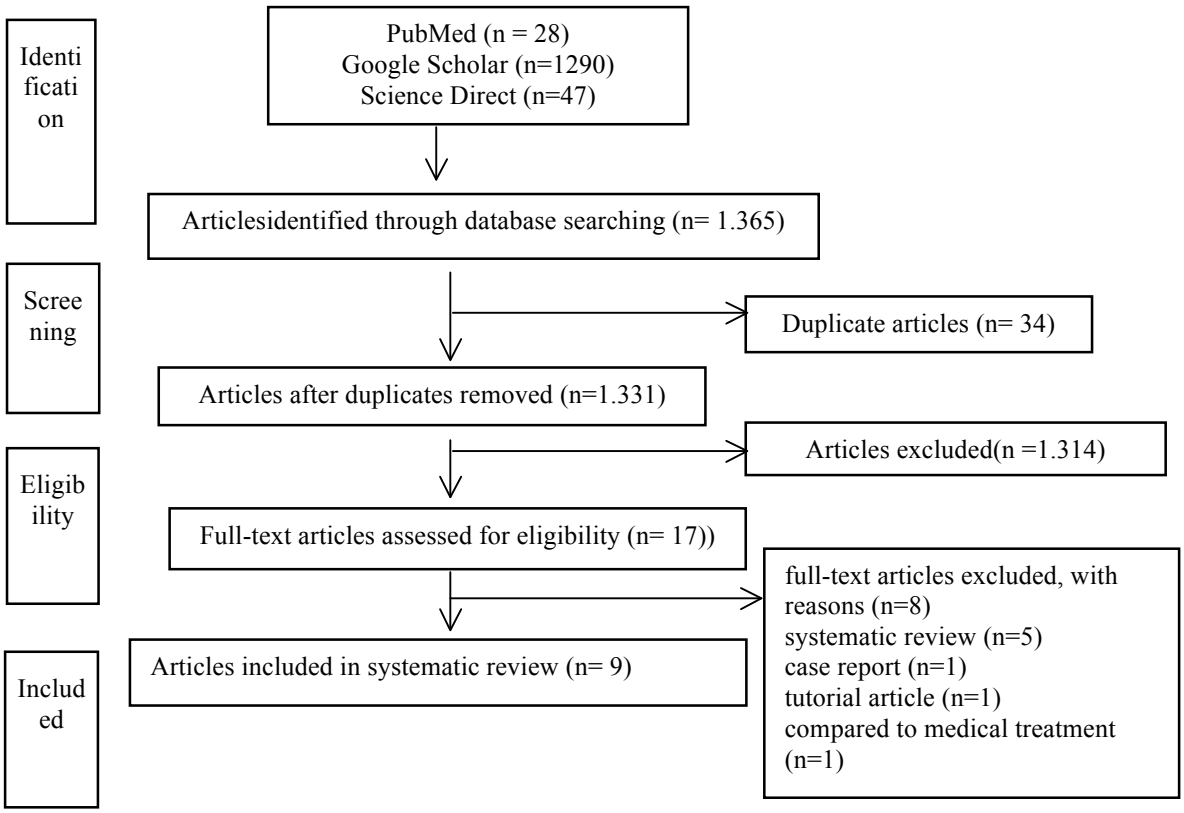

Chart 1. A flow of the Study Selection Process

Table 1. Characteristics of Studies

Authors	Country	Types of study and Respondents	Intervention	Comparison	Follow up Period (days)	Results
Mollart, 2016(17)	Australia	A two-arm randomize control trial 44 healthy primipara pregnant women gestational age 40 weeks2days. 22 intervention, and 22 control	Acupressure was performed by the respondent at points LI4, SP 6 techniques for 2 minutes, repeated every 2 hours throughout the day, while the GB 21 point was pressed for 2 minutes, 2 times each day.	standard antenatal care	9	There was no significant difference in the frequency of spontaneous labor 50% vs 41% (P = 0.37)
Torkzahrani, 2017 (21)	Iran	Randomize Control Trial 262 nullipara, gestational age 39-40 week, 3 groupsAcupressure (n= 54), Fake acupressure(n = 55) standart care (n = 53).	Acupressure at points SP.6, BL.32, BL.60, pressure for 1 minute and released for 1 minute, repeated 5 times. bilateral 2 times a day, continuing until labor	Acupressure Group, Fake acupressure group, and standard care	4	The frequency of spontaneous labor initiation in the three groups involved: at 48 hours: 30% vs 20% vs 22% (P = 0.464) At 96 hours: 14% vs 34% vs 24% (P = 0.111) Mean ± SD interval intervention to labor 124,88±75,93 hours vs , 135,39±70,09 hours vs 114,16± 52,64 hours (P= 0,565).
Torkzahrani, 2015(22)	Iran	Randomize Control Trial 150 primigravida mothers. Gestational age between 39 to 41 weeks. 50 Acupressure by researcher 50 Acupressure by mother 50 controls	Acupressure by researcher acupoint SP.6, acupressure pressed 10 seconds to 2 minutes, resting with the same duration, repeated up to 5 times. acupressure is done in the morning at 09.00-11.00	Acupressure by mother and standard antenatal care group	1-5	Cervical Maturation after 48 hours the mean ± SD were 4.88 ± 1.83 vs 5.12 ± 1.92 vs 4.06 ± 1.59 (P = 0.012, respectively) after 96 hours 1.77 ± 5.08 vs 1.75 ± 5.21 vs 1.96 ± 5.04 (P = 0.95)
Gregson, 2015(18)	UK	A single-blind randomized trial 130 women with normal pregnancies, gestational age ≥ 41 weeks Acupressure (n = 70) Acupressure sham (n = 60)	Acupressure at Point LI4, SP6 was pressed 20 times, intermittent, 4 times a day. A midwife gave the first intervention; the respondent did it afterwards at home	Sham treatment with pressure 20 times intermittently to the patella and olecranon	-	There was no difference in the duration of the intervention to labor between the two groups (P = 0.19)
Teimoori, 2015 (23)	Iran	Randomized control trials 288 women with post-term Pregnancy 144 Intervention 144 Kontrol	Acupressure at points LI4, SP6, GB21, shiatsu technique acupressure for 30 seconds for each point	standard antenatal care	-	spontaneous labor initiation was statistically different 56.9% vs 8.3% average intervals of intervention to labor were statistically

						different between groups of 25.5 vs 9.9 hours
Neri, 2018(19)	Italy	Quasi experimental non equivalent with control grup 375 pregnant women with 41 weeks 2 days gestational age.Non-random 112 acupuncture 263 routine care	Acupuncture, LI4,SP6,TL 3, BL67, GB21, GB31 Every day, for 40-45 minutes	standard antenatal care	9	spontaneous birth rate (75% vs 52.8%; p <0.01). Gestational age at delivery (289 2.7 vs 291 2.1; p <0.05) rate of medically induced labor 19.6% vs 38% (P< 001).
Neri, 2014 (20)	Italy	Randomize Control Trial 202 pregnant women 40 weeks 2 days gestational age and 40 weeks 5 days. Randomization 99 acupuncture 96 observations	Acupuncture LI4,SP6,St36,GB34, LR3, Pc 6 everyday	Observation	7	There was no difference in the frequency of spontaneous labor induction between groups (20% vs 17%) There was no difference in the frequency of amniotic membrane rupture between groups (16% vs 15.3%)
Ajori, 2013 (24)	Iran	a double-blind randomized sham-controlled trial 80 pregnant women with 38 weeks gestational age, 40 acupuncture 40 sham acupuncture	Acupuncture LI4, SP6, BL67 bilaterally for 30 minutes, twice during the study with a distance of 3 days.	sham acupuncture	7	The frequency of spontaneous labor was 94.7% vs 89.2% (P = 0.430) intervention intervals to delivery (days ± SD) 7.76 ± 6.84 vs 9.46 ± 5.97 (P = 0.066)
Modlockl, 2010(25)	Denmark	A double-blind multicentre randomized controlled 125 pregnant women with 41 weeks 6 days gestational age 62 acupuncture 63 sham acupuncture	Acupuncture LI4, SP6, BL67, GV20 for 30 minutes, every 10 minutes the needle was turned. twice a day	sham acupuncture	1	There was no difference in the frequency of spontaneous labor between the two groups 12% vs 14% (P = 0.79)

Nine articles included in the systematic review were conducted in five different countries, Australia (17), UK (18), Italy (19,20), Iran(21–24), and Denmark (25). The total number of participants was 1,656 pregnant women. Two articles recruited less than 100 people as their subjects(17,24), four articles with a sample of 100-202 people (18,20,22,25), three articles with samples above 250 people (20,21,23). All studies used different acupoints, frequencies, duration. Five studies evaluated the effects of acupressure, while four other studies assessed the effects of acupuncture. One study suggested that acupressure was effective in increasing cervical maturation. Two studies (1 acupressure and 1 acupuncture) stated that it was raised the frequency of initiation of spontaneous labor. One study showed that acupuncture reduced the need for medical induction. Other studies showed no significant

effect. Eight studies in this review were randomized controlled trials (17,18,20–25) and one study was quasi experimental(19). The studies in this review were conducted in Iran (21–24), Italy (19,20), United Kingdom (18), Australia (17), and Denmark (25). Five studies recruited.

Pregnant women with gestational age more than 41 weeks as participants(18,19,23,25), 3 studies recruited pregnant women with gestational age 40 weeks (17,20,21), one study recruited pregnant women with gestational age between 39-41 weeks (22), and one study recruited pregnant women with gestational age 38 weeks(24). The choice of the comparation group varied between studies and included standard antenatal care (17,19,22,23), fake acu group (18,21,24,25), and observation (20).

Mollart's study in 67 healthy pregnant women at 40 weeks 2 days gestation. Acupressure was applied to acupoint LI.4, SP.6, pressed for 2 minutes, repeated every 2 hours throughout the day, while the GB 21 point was pressed for 2 minutes (twice/day). The results showed that there was no difference in the frequency of spontaneous labor in the treatment and control groups (P = 0.37).

A study by Torkzahrani found that acupressure was not effective in stimulating spontaneous labor for 48 hours (P = 0.464) and 96 hours (P = 0.111). The subjects were 262 primigravida mothers in their 39-40 weeks of pregnancy. Acupressure was performed at acupoint SP.6, BL.32, BL.60, bilateral duration of 45 minutes (2 x / day). The intervention lasted for 4 days. The evaluation of results was in 48 hours and 96 hours. The fear of respondents was not controlled. Risk of outcome bias because treatment providers knew the allocation of the respondent group(21). The frequency of spontaneous labor initiation in the three groups involved: at 48 hours: 30% vs 20% vs 22% (P = 0.46) and at 96 hours: 14% vs 34% vs 24% (P = 0.111). Mean ± SD interval intervention to labor 124,88±75,93 hours vs , 135,39±70,09 hours vs 114,16± 52,64 hours (P= 0,565).

A study by Torkzahrani in 2015 among 150 primigravida with gestational age between 39-41 weeks. Acupoint used in this study was SP.6, acupressure pressed 10 seconds to 2 minutes, resting with the same duration, repeated up to 5 times. Acupressure was done in the morning at 09.00-11.00. Cervical Maturation after 48 hours, the mean ± SD were 4.88 ± 1.83 vs 5.12 ± 1.92 vs 4.06 ± 1.59 (P = 0.012, respectively). After 96 hours, the mean mean ± SD were 1.77 ± 5.08 vs 1.75 ± 5.21 vs 1.96 ± 5.04 (P = 0.95).

Gregson conducted a study on 130 healthy pregnant women with a gestational age of more than 41 weeks. The results showed that there was no difference in the length of time interventions to spontaneous labor in the acupressure group compared to the sham acupressure group (P-value 0.19). Acupressure was performed with 20 times the emphasis on each point LI.4, SP.6, while the sham acupressure group was given 20 times the pressure on the patella and olecranon regions.

Teimoori's study among 288 post-term pregnant women was given to the intervention group for 30 seconds for each acupoint: LI.4, SP.6, GB.21. The results showed that the frequency of spontaneous labor was more in the 56.9% shiatsu group, whereas in the antenatal care group, 8.3%. The duration of the intervention interval until the onset of labor was not significant.

Neri's study of 375 pregnant women with 41 weeks 2 days gestational age. Acupuncture at LI4, SP6, TL 3, BL67, GB21, GB31 every day, for 40-45 minutes. The frequency of spontaneous births was higher in the intervention group than in control (P <0.01). The need for labor induction was medically lower in acupuncture than in the control group (P <001). The gestational age at delivery was lower in the acupuncture than in the control group (P <0.05). Ajori conducted a study among pregnant women in their 38-40 weeks of pregnancy. Acupuncture was given at acupoint LI.4, SP.6, BL.67, with a frequency of 2 times a week (3 days). The results showed that there was no difference in the duration of the intervention until the start of spontaneous labor between groups (P = 0.06)

Study by Modlock on 125 pregnant women with 41 weeks 6 days gestation. Acupuncture at LI4, SP6, BL67, GV20 point (twice daily). The results were evaluated 24 hours after acupuncture. The frequency of spontaneous labor did not differ between the two groups, with the result of 12% vs 14% (P = 0.79).

The risk of bias in studies was assessed using the critical appraisal checklist from JBI. There were as many as 77.8% of studies not explaining the reliability of measuring instruments and outcome assessors, i.e. training, agreements between assessors, number of assessors. 66.7% of studies that did not blind the treatment providers, 55.6% of studies did not carry out the intention to treat analysis, and there were 44.4% of studies not blinded the participants and outcome assessors of group division. The results of a full study bias risk assessment can be seen in Table 2.

Tabel 2. Risk Of Bias

Risk Of Bias Assessment	Mollart, 2016	Torkzahrani, 2017	Torkzahrani, 2015	Gregson, 2015	Teimoori, 2015	Neri, 2018	Neri, 2014	Ajori, 2013	Modloc, 2010	% Bias
Randomization	√	√	√	√	√	X	√	√	√	11,1
Allocation concealment	√	√	√	√	√	X	√	√	√	11,1
Participants similar at the baseline	X	√	√	X	X	√	√	√	√	33,3
Blinding of participants	X	√	√	√	?	X	?	√	√	44,4
Blinding of delivering treatment	X	X	X	X	?	?	?	X	X	66,7 33,3
Blinding of outcome assessors	√	√	√	?	?	?	?	√	√	44,4
Identically other than the intervention	√	√	?	√	√	√	√	√	√	11,1
Incomplete outcome data	√	√	√	√	?	X	√	√	√	22,2
Analysis intention to treat	X	X	X	√	?	X	√	√	√	55,6
Outcomes measured in the same way	√	√	√	√	√	√	√	√	√	0
The outcome measured in a reliable way	?	√	√	?	?	?	?	?	?	77,8
Appropriate statistical analysis used	√	√	√	√	√	√	√	√	√	0
The trial design appropriate for the topic	√	√	√	√	√	√	√	√	√	22,2

Note : √ = Yes, X= No, ?= Unclear, - = Not applicable

DISCUSSION

Mollart's study in 67 healthy pregnant women at 40 weeks 2 days gestation. Acupressure was applied to acupoint LI.4, SP.6, pressed for 2 minutes, repeated every 2 hours throughout the day, while the GB 21 point was pressed for 2 minutes (twice/day). The results showed that there was no difference in the frequency of spontaneous labor in the treatment and control groups (P = 0.37). There was a high risk of bias in this study because the group division was informed to respondents and intervention providers. There were significant

differences in the respondent's Body Mass Index (BMI) status(17). The effect of acupressure was very dependent on provider ability. In this study, respondents performed acupressure independently, and their skills could be diverse, so the results were biased (26).

A study by Torkzahrani found that acupressure was not effective in stimulating spontaneous labor for 48 hours (P = 0.464) and 96 hours (P = 0.111). The subjects were 262 primigravida mothers in their 39-40 weeks of pregnancy. Acupressure was performed at acupoint SP.6, BL.32, BL.60, bilateral duration of 45 minutes (2 x / day). The intervention lasted for 4 days. The evaluation of results was in 48 hours and 96 hours. The fear of respondents was not controlled. Risk of outcome bias because treatment providers knew the allocation of the respondent group(21). A similar study by Torkzahrani on 150 primigravidas gestational age 39-41 weeks. Acupressure was performed at acupoint SP.6 for 20 minutes. The results of cervical ripening differed significantly between the three groups after 48 hours (P = 0.012), but there was no significant difference after 96 hours (P = 0.95)(22). Risk of bias because there was no blinding of treatment providers.

Gregson conducted a study on 130 healthy pregnant women with a gestational age of more than 41 weeks. The results showed that there was no difference in the length of time interventions to spontaneous labor in the acupressure group compared to the sham acupressure group (P-value 0.19). Acupressure was performed with 20 times the emphasis on each point LI.4, SP.6, while the sham acupressure group was given 20 times the pressure on the patella and olecranon regions. Characteristics of the respondents were significantly different between groups, i.e. BMI and bishop score. Treatment providers were not blind to group allocations. The reliability of measuring instruments and outcome assessors were not explained in the article, so the results of the study were biased (18).

Shiatsu acupressure in Teimoori's study among 288 post-term pregnant women was given to the intervention group for 30 seconds for each acupoint: LI.4, SP.6, GB.21. The results showed that the frequency of spontaneous labor was more in the 56.9% shiatsu group, whereas in the antenatal care group, 8.3%. The duration of the intervention interval until the onset of labor was not significant. Risk assessment of bias in blinding of participants, delivering treatment, outcome assessors could not be assessed. The characteristics of respondents were significantly different between groups, so the results of the study risk bias (23).

Neri's study of 375 pregnant women with 41 weeks 2 days gestational age. Acupuncture at LI4, SP6, TL 3, BL67, GB21, GB31 every day, for 40-45 minutes. The frequency of spontaneous births was higher in the intervention group than in control (P <0.01). The need for labor induction was medically lower in acupuncture than in the control group (P <001). The gestational age at delivery was lower in the acupuncture than in the control group (P <0.05). The risk of bias was high because the sampling was random; the respondents were free to choose the group according to the respondents' choice. The reliability of the measuring instrument was not explained(19). A similar study by Neri among 202 pregnant women in their 40 weeks 2 days - 40 weeks 5 days pregnancy. Acupuncture LI4, SP6, St36, GB34, LR3, PC 6 (once a day). The results showed that the frequency of induction of spontaneous labor did not differ between groups (20% vs 17%), and the incidence of amniotic membrane rupture did not differ between groups (16% vs 15.3%)(20).

Ajori conducted a study among pregnant women in their 38-40 weeks of pregnancy. Acupuncture was given at acupoint LI.4, SP.6, BL.67, with a frequency of 2 times a week (3 days). The results showed that there was no difference in the duration of the intervention until the start of spontaneous labor between groups (P = 0.06)(24). The result was a risk of bias because the treatment providers knew the allocation of the respondent group. The reliability of measuring instruments and the outcome assessors were not explained. Study by Modlock on 125 pregnant women with 41 weeks 6 days gestation. Acupuncture at LI4, SP6, BL67,

GV20 point (twice daily). The results were evaluated 24 hours after acupuncture. The frequency of spontaneous labor did not differ between the two groups, with the result of 12% vs 14% (P = 0.79). The outcome assessor knew the group allocation, and the reliability of the measuring instrument was not explained in the article.

Acupressure/acupuncture in pregnancy can stimulate the uterus to contract through the parasympathetic nerve, as well as through the central nervous system (increasing the release of the thalamic nucleus) and the hypothalamic anterior pituitary system. It can increase the secretion of the hormone oxytocin, and improve labor progress, thereby stimulating labor naturally(27). Increased uterine contractility can occur either by the release of central oxytocin or by parasympathetic stimulation of the uterus (16).

The difference in results in research can be due to various factors. Studies in this literature have variations in the selection of acupoints, duration, frequency, and gestational age of respondents. The ineffectiveness of acupressure/acupuncture can be caused by improper acupoints, too few frequencies, and an insufficient number of treatment sessions (26). Besides, differences in the characteristics of respondents between groups will affect the validity of research results. There was a statistically significant difference in the respondent's BMI(17,18,23). BMI is one of the factors that influence the success of labor stimulation. Obese pregnant women will experience metabolic disorders and experience changes in hormone secretion in adipose tissue. Free leptin, cholesterol levels, and LDL levels increase in obese pregnant women so that it can reduce the strength of uterine muscle contractions. Low oxygen saturation in obese pregnant women leads to an increase in lactic acid in the myometrium, which can inhibit uterine contractions (28).

Clinical studies to evaluate the effects of acupuncture or acupressure on the stimulation of spontaneous labor are still necessary. The previous research suggested conducting further studies using more rigorous research methods, i.e. the addition of other acupoints (18), increase in duration and frequency of interventions (24), compared with sham acupressure groups(17), and controlling the stress level of the respondent (21,24).

All the studies in this review have not controlled all confounding factors, e.g. stress levels of respondents. The body's response to stress will release hormones (beta-endorphin, adrenocorticotropin, cortisol, epinephrine) and neurotransmitters (catecholamines)(29,30). These hormones act on the myometrium, and if the levels are excessive, it will weaken uterine contractions so that it will interfere the labor (30).

CONCLUSIONS

In conclusion, the effectiveness and benefits of both acupressure and acupuncture cannot be determined because the limited number of studies and the risk of bias. However, a beneficial effect on increasing cervical maturation, increasing the frequency of spontaneous labor initiation, and reducing the need for medical induction are shown in small studies. Based on the results of existing studies, no side effects have been reported, so it can be said that both acupressure and acupuncture are safe to apply as natural alternative induction methods. Based on this systematic review, we hypothesized that variations in gestational age, frequency, duration, acupuncture points used and confounding factors may be the cause of the ineffectiveness of acupuncture/acupressure therapy. Further study using rigorous study methods, controlling all confounding factors with a focus of evaluation on clinical and biochemical effects are needed. The key strength of the study was the use of two reviewers for all stages of the review, i.e. screening of title/abstracts, study selection, data extraction and quality assessment. Besides, this is the most recent systematic review in the past 10 years evaluating the effect of acupuncture/acupressure on labor induction. The studies included in this review were limited to strict inclusion criteria such as manual acupuncture/acupressure methods without the use of any additional tools. Studies with acupuncture using laser or acupressure using tools were not included in this study. The findings of this study have to be

seen in the light of some limitations. This review has scant literature sources due to limited prior research studies that were relevant to the topic. Some studies had low methodological quality, and the last, a lack of reliable data limit us to performed meta-analysis for this review.

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