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FOOT REFLEXOLOGY FOR WOMEN AND FETAL WELLBEING IN LABOR : A REVIEW

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ABSTRACT

Background: *The secretion of catecholamine and epinephrine due to excessive fear and anxiety during labor will increase the intensity of pain and potentially prolonged labor. Reflexology massage leads to release endorphins and enkephalins which have an analgesic effect five times greater than morphine, creates a deep feeling of comfort and balance of mind so the stress symptoms are reduced, and improves the outcomes of labor. This study aims to analyze the effects of foot reflexology for women and fetal wellbeing in labor.*

Methodology: *This systematic review used PRISMA-P (Preferred Reporting Items for Systemic Review and Meta-Analysis Protocols). The keywords used were reflexology or foot reflexology, pain relief, labor pain, primiparaous, effect or effectiveness. Articles were searched through databases PubMed, Google Scholar, and Science Direct. Inclusion were articles that discussed about reflexology and its effects in labor, experimental research and written in English. The selected articles were excluded for irrelevant titles and abstracts, non-full text, research under 2009 and duplicate articles. From 78 articles, only 8 articles were included in this systematic review.*

Results: *This study found that foot reflexology can reduce the intensity of labor pain. It was also decreased duration, anxiety, hemorrhage rate, systolic and diastolic blood pressure, pulse and increased uterine contractions, Apgar scores and maternal satisfaction with a highly statistical significant.*

Conclusion: *Foot reflexology could decrease the intensity of labor pain, anxiety, duration, maternal complications and increase uterine contractions. In addition to improve labor outcomes and mother satisfaction. It is recommended as non pharmacological method which can be applied in maternity hospitals to improve women and fetal wellbeing during labor.*

Keywords: *Reflexology, labor, maternal and fetal wellbeing*

INTRODUCTION

Pregnancy, labor and childbirth are physiological process. However, not all the pregnancies lead to normal labor and childbirth. Globally, there were 830 maternal deaths due to the complications during pregnancy or childbirth everyday. Based on data from WHO, there were 303.000 women mortality during pregnancy and childbirth in 2015 [1]. In Indonesia, the women mortality rate is higher than the other ASEAN countries, which is 305 per 100.000 live births [2]. One of the maternal death causing factors is prolonged labor [1]. Prolonged labor is a condition where the latent phase is more than 8 hours, the unborn child within 12 hours or more labor process, marked by cervical dilatation on the right of alert line [3]. Incidence of prolonged delivery was variety from 1-7%. Prolonged labor caused maternal mortality in the world at an average of 8% and in Indonesia \pm 9% [4].

Excessive pain causes fear and anxiety during labor. It will stimulate the sympathetic nervous system to increase the secretion of catecholamine and epinephrine. This condition increase pain intensity and potentially prolong the first and second stage of labor [5]. Prolonged labor is closely related to the harmful effects on both the mother and fetal, such as the high risk of infection, the possibility of higher postpartum bleeding, fatigue, anxiety, psychosis, fetal head compression, unbalanced oxygen intake, low Apgar score and finally the fetal death [6].

There are two methods to reduce pain intensity, pharmacologically or non-pharmacologically. The disadvantage of pharmacological method is that almost every analgesic drug can pass through the placenta, so it can give an adverse effect on the mother and fetal [8]. Meanwhile, non-pharmacological methods are known cheap and lack of side effects for mother and fetal [9]. Massage therapy has been trusted by various communities to reduce labor pain since hundreds of years ago. In reflexology, applying massage reduce pain, anxiety and affect both physically and psychologically [10-11].

Many research have shown that foot reflexology was a non invasive and very effective method of pain relief. The study stated that postoperative pain can be reduced after the foot reflexology applying, especially in moderate to severe pain levels [12]. Pain and fatigue as a side effect of chemotherapy treatment in cancer patients also can be reduced significantly by these therapies [13]. It was also improved the wellbeing and reduced anxiety levels in women after hysterectomy [14]. In reflexology, the organs associated with neurons are stimulated to reduce tension, stress, and to maintain body balance [15-17]. Additionally, reflexology opens the nerve pathways that have an overload with sensory stimulation, leading to secretion of endorphins and enkephalins which have an *analgesic* effect five times greater than morphine [18-22].

Research related to reflexology in pain management has been carried out, but there are few studies that assess its effect in labor. Therefore, the author intends to conduct a systematic review and aims to analyze the effect of foot reflexology for women and fetal wellbeing in labor.

METHODS

This systematic review used the PRISMA protocol (Preferred Reporting Items for Systematic Reviews & Meta-Analyzes).

Search strategy and study selection

This study aims to analyze all the published articles about foot reflexology for women and fetal wellbeing in labor. Articles were searched through the electronic databases namely PubMed, Google Scholar, and Science Direct from 1 to 20 February 2019. Keywords: (1) "Reflexology " OR "Foot Reflexology", (2) " Pain Relief", (3) " Labor Pain", (4) Primiparaous, (4) " Effect" OR "Effectiveness".

Inclusion Criteria

Inclusion were articles that discuss about reflexology and its effects in labor, experimental research and written in English.

Exclusion Criteria

The selected articles were screened for the title and abstract that were irrelevant and non-full text. Articles written in English was involved only. While, for articles that were started under 2009 and there were duplicate articles, they will be excluded.

Data Extraction

Searching process was carried out for 20 days from 1 to 20 February 2019. Articles that have been screened by the author's team were then extracted into tables with predetermined titles. The article selection process is presented in the chart below:

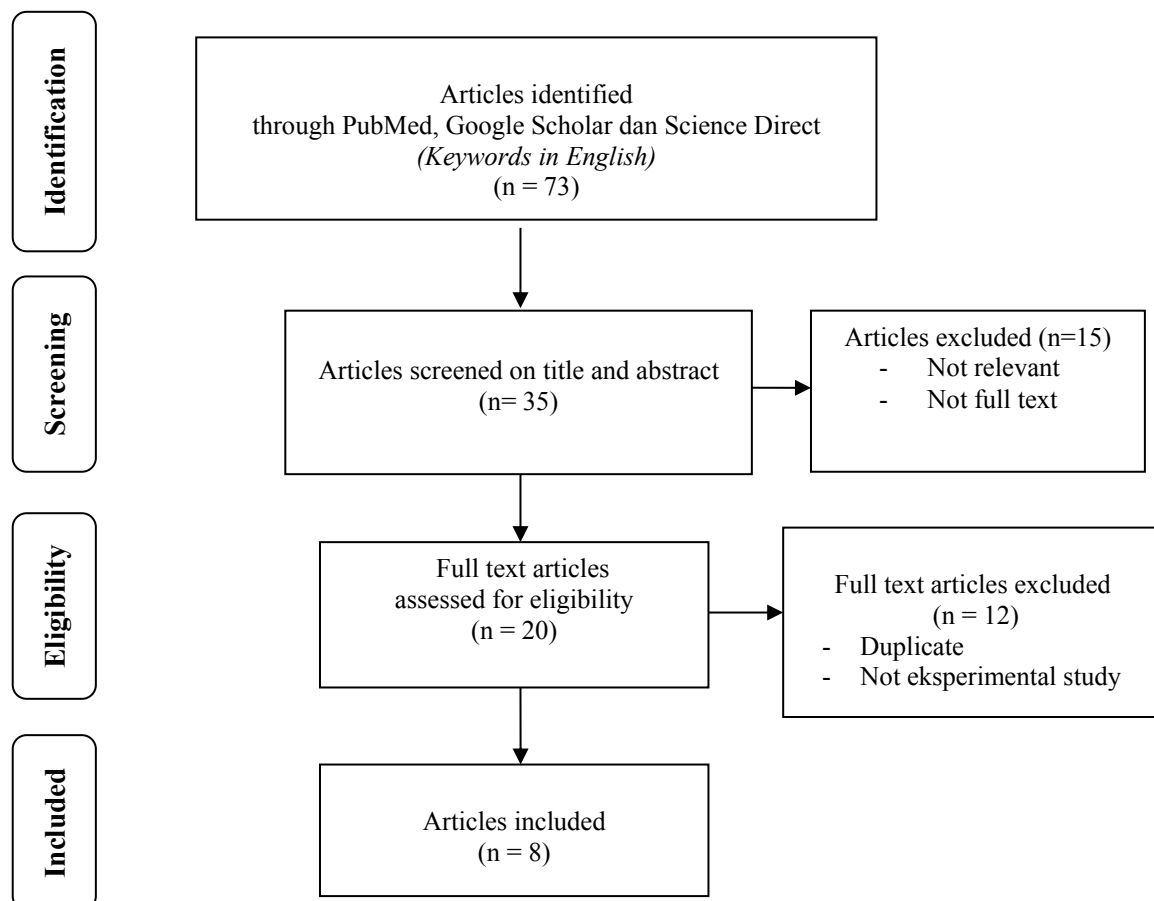


Figure 1. Preferred Reporting Items for Systematic Review and Meta-Analysis

RESULTS

There were 73 articles found with keywords in English. From these numbers, eight articles were included in this study. Table 1 below present evidences about foot reflexology effects for women and fetal wellbeing in labor.



Table 1. The Evidences about Foot Reflexology Effects for Women and Fetal Wellbeing in Labor

No.	Title	Author	Year	Place	Method	Results
1	Reviewing The Effect of Reflexology on The Pain and Certain Features and Outcomes of The Labor on The Primiparaous Women.	The Valiani M, Shiran E, Kianpour M, and Hasanpour M. [15]	2010	Iran	Quasi Experiment	<ul style="list-style-type: none"> - Pain intensity at 3-5 cm, 6-8 cm, 9-10 cm servical dilatation and the second stage was lower in the reflexology ($p < 0.001$). - Duration active phase in reflexology group was shorter than other groups ($p = 0.001$). - Hemorrhage rate in control group was higher than reflexology group ($p < 0.001$). - There were significant differences in systolic and diastolic blood pressure and pulse at 0-15 minutes postpartum. - Apgar score in the first and fifth minute after birth in control group (9.75 and 8.97) and reflexology group (10 and 9.79) with $p < 0.001$.
2	The Effect of Reflexology on Pain Intensity and Duration of Labor on Primiparas.	Dolatian M, Hasanpour A, Montazeri Sh, Heshmat R, Majd HA. [16]	2011	Iran	Randomized Controlled Trial (RCT)	<ul style="list-style-type: none"> - Pain intensity at 4-5 cm, 6-7 cm and 8-10 cm cervical dilatation was lower in the reflexology group ($p < 0.001$). - The duration at three stages of labor in reflexology group was shorter than other groups ($p = 0.001$).
3	The Effect of Foot Reflexology on Anxiety, Pain, and Outcomes of the Labor in Primigravida Women.	Hanjani SM, Tourzani ZM, and Shoghi M. [23]	2015	Iran	Randomized Controlled Trial (RCT)	<ul style="list-style-type: none"> - Reflexology can decreased pain intensity (at 30, 60 and 120 minutes after intervention), duration, anxiety, and frequency distribution of natural delivery ($p < 0.001$). - Apgar score in the first and fifth minute after birth in reflexology group was higher than control group ($p < 0.001$).



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No.	Title	Author	Year	Place	Method	Results
4	Outcomes of Foot Reflexology on the Pain Certain Features of the Labor for the Primiparaous Women.	ElFattah HA, Metwaly S, and Khedr N. [24]	2015	Egypt	Quasi Experiment	<ul style="list-style-type: none"> - The pain intensity at 6-8 cm, 9-10 cm cervical dilatation and the second stage was significantly lower in reflexology group. - There were significant differences between intervention and control group on the frequency of contractions (3.2 vs 2.5), duration (34.2 vs 30.1) and intensity (2.4 vs 2.05). - There was a significant difference in duration of labor between intervention and control group at first stage (7.3 hours vs. 8.9 hours) and third stage (8.4 minutes vs. 13.5 minutes). - In reflexology group, maternal complications was lower than control group and maternal satisfaction was higher than others ($p < 0.001$).
5	Efficacy of Reflexology on First Stage Labor Pains.	Eman, Goweily. [25]	2015	Egypt	Quasi Experiment	There were significant differences in pain responses both physiological and behavioral responses between the intervention and control group.
6	Effectiveness of Foot Reflexology in Reduction of Labor Pain among Mothers in Labor Admitted at PSG Hospital, Coimbatore.	Mathew AM, and Francis Frincy. [26]	2016	Muscat	Quasi Experiment	Pain intensity in control group (6.81) was significantly higher than reflexology group (4.67).
7	Effect of Foot Reflexology on Pain and Outcomes of Labor	Abdulaziz K, <i>et.al.</i> [27]	2017	Cairo	Randomized Controlled Trial (RCT)	- There was a significant pain reduction in reflexology group (6.25) compared to control group (8.40) with $p < 0.001$.



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No.	Title	Author	Year	Place	Method	Results
						- There were significant differences in Apgar score at first and fifth minute after birth between intervention groups (8.65 and 9.8) and control (7.6 and 9.15) with $p < 0.001$.
8	The Effect of Foot Reflexology on the Anxiety Levels of Women in Labor	Erkek ZY, and Aktas S. [28]	2017	Turkey	Quasi experiment	The mean of anxiety score in the reflexology group was lower than the control group ($p < 0.001$).

Eight articles included in this systematic review came from Iran, Egypt, Oman and Turkey. Those articles used experimental study design: three articles were Randomized Controlled Trials (RCTs) and others were Quasi Experimental. Samples in those studies involved 692 mothers.

Studies about reflexology gave the positive results for pain intensity by applying it for 60 minutes [15,25]. Other studies also reported the same results though the duration of massage was different, for about 40 minutes [16,23-27]. Foot reflexology significantly shortened duration of labor at three stages [15,16,23]. Other study also reported that reflexology could reduce maternal anxiety level [23,28]. Additionally, Apgar Score in the first and fifth minutes after birth was higher in the reflexology group than others [15,23,27]. Positive results were also reported by Elfattah *et.al* in his study at Egypt. He reported that foot reflexology could reduce pain intensity, maternal complications, duration of labor and increased uterine contractions and maternal satisfaction [24].

The next study not only assessed physiological pain response but also behavioral response within 60 samples. Physiological responses were especially in respiration, pulse, systolic pressure, nausea, vomiting and skin color between the reflexology group and control group. Assessment of behavioral responses showed significant differences in verbal patient response, facial expression, posture and gross motoric (at 7-8 cm servical dilatation) between two group [25].

DISCUSSION

Labor process begins with uterine contractions which causes cervix dilatation and effacement, and uterine ischemia which causes pain for women [29]. During labor, we can benefit from stimulation of reflexive points of sole to decrease pain, anxiety and increase outcomes of the labor [15,23,24]. Pain in labor must be managed properly, because it can give bad effect to mother and fetal. Effective control of labor pain is important because labor pains alleviation should be somehow such that consciousness of mother is not disturbed and the mother can help, without fetal side effects or any disturbance in labor process or in umbilical uterine blood flow [23]. Eight articles showed positive results on foot reflexology for the level of pain, anxiety, duration, uterine contractions, mother satisfaction, maternal complications and Apgar scores.

a. Pain intensity

Several studies have proven that foot reflexology was a very effective analgesic. Pain intensity at three stages was decreased by applying reflexology \pm 40 minutes [16]. Others studies also provided the similar results related to a significant reduction in pain intensity through the foot reflexology for 40 minutes at labor [23,24,26,27]. Slightly different from previous research, other studies assessed the difference labor pain after reflexology was applied for 60 minutes [15,25]. Although the duration of intervention was different, these studies provided the similar results in labor pain reduction.

There were several reasons that underlie the effects of foot reflexology. First, reflexology opened the overload nerve pathway with the sensory stimulation, led to release endorphins and enkephalins which had an analgesic effect five times greater than morphine [18-22]. Therefore, the pain and stress would be decreased. Second, foot reflexology could eliminate fatigue and anxiety. Third, based on "The pain gate theory", labor pain can be prevented by stimulation which caused the pain gates to be closed, one of them is touch stimulation at reflexology points [30].

b. Anxiety

Studies have shown the effectiveness of foot reflexology for anxiety reduction. Anxiety scores in reflexology group was lower than control group subjects who received the routine care by applying reflexology \pm 30 minutes [28]. These findings were in agreement with Hanjani *et.al* even though the duration was different from the previous study 40 minutes [23]. Foot reflexology greatly reduced the women anxiety, but did not change a person's basic anxiety [31].

Excessive anxiety during labor triggered a response that strengthens pain stimulation in uterus and cervix [32]. Reflexology made the good physiological changes in a systematic or local, muscles relaxation, better blood circulation in the body and eventually created a deep feeling of comfort and balance of mind, so the stress symptoms was decreased [33,34]. Endorphins and enkephalins as natural analgesics and mood enhancers were also secreted in the response to reflexology. This pain reduction was closely related to anxiety decreased [26]. Additionally, foot reflexology also reduced cortisol hormone that was released in response to prolonged physical and psychological stress [35]. Therefore, maternal anxiety can be reduced through the foot reflexology.

c. Duration of labor

Some studies reported that foot reflexology shortened the labor duration at first and third stage [15,23,24]. Even, the study by Dolatian *et.al* actually reported that reflexology therapy shortened duration of all stage in labor [16]. Those studies showed the same results about reflexology for shorter duration of labor, even though the duration of therapy was varied from 40 minutes, 60 minutes to 120 minutes.

Anxiety and fear can stimulate the production of adrenaline and epinephrine which has the opposite properties of oxytocin, so it can disrupt the contraction activities and prolong the labor [36]. Applying reflexology therapy can decrease the adrenaline and noradrenaline hormones and stimulate the increasing of endorphins and oxytocin hormones, so it has positive effects for uterine contractions and duration of labor [37].

d. Uterine contractions

Study reported that the frequency, duration and intensity of uterine contractions increased after applied reflexology for 40-minute [24]. The results of the study were supported by Abasi, Abeian & Fadaai who showed the effect of reflexology on labor could facilitated labor through the increased uterine contractions, reduced pain and the need for intervention [37]. Reflexology reduced adrenaline and noradrenalin, increased endorphins and oxytocin which it would increased the uterine contractions [38]. Because of the increased oxytocin hormone, uterine contractions would increase and accelerated the duration of labor.

e. Mother Satisfaction

The previous study reported that 55% of mothers in reflexology group felt very satisfied, while 58.5% of mothers in the control group felt dissatisfied [24]. These finding were in congruent with Mirzai *et.al*, it showed that 89.71% of mothers revealed reflexology was very helpful for reducing pain, 8.82% did not feel any effects and one subject had increased pain [39]. Reflexology could reduce adrenaline and noradrenalin and increased endorphins and oxytocin which would increase uterine contractions [38]. The release of endorphins made a person relax and comfort. Therefore, besides gave a positive effect on the progress of labor, reflexology also significantly improved peace of mind and had a positive effect on maternal satisfaction [15]. Thus, a high level of mother satisfaction in labor can be achieved through the foot reflexology.

f. Maternal complications

The first hour postpartum was very important and dangerous for the mother. In postpartum care, monitoring of bleeding and mother vital signs were very important. Study reported that there were significant differences in systolic, diastolic and pulse blood pressure at the fifteenth minutes postpartum [15]. These results were supported by McVicar *et.al* who stated that reflexology was effective for reducing cardiovascular parameters including blood pressure and pulse. Although the stress level on a *volunteer* can be reduced, but there was no significant difference in the two groups [40].

Stimulation at the point of reflexology will relax the body. Relaxation of the body will be followed by stopping stress signals and decreasing sympathetic nervous system activity. Therefore, patients given reflexology had lower blood pressure, heart rate and lower respiration rate as a result from decreased of anxiety and stress levels [41].

Study also reported shorter active phase and second stage, less incidence of perineal laceration, and maternal distress during second stage. In addition, to absence of prolonged placental separation and less post partum haemorrhage among the study group subjects with a highly statistical significant difference between the two groups [24]. These findings were in accordance with Valiani *et.al* that stated hemorrhage rate based on the number of used pads in the fourth stage in the routine care group significantly was higher than the reflexology group [15].

g. *Apgar score*

Foot reflexology could decrease the incidence of fetal distress with a highly statistical significant [24]. Some studies also reported that reflexology increased Apgar scores at first and fifth minutes after birth [15,23,27]. Continuing pain and fear in labor could affected the blood vessel system, endocrine, and other body activities which led to difficult labor and could increased the labor with intervention, SC and reduced Apgar scores [42].

CONCLUSION

This systematic review provided valid evidence that foot reflexology could decrease the intensity of labor pain, anxiety, duration of labor, maternal complications and increase uterine contractions. In addition, to improve labor outcomes and mother satisfaction about non pharmacological pain relief measures.

Foot reflexology is recommended as non pharmacological method which can be applied in maternity hospitals to improve women and fetal wellbeing during labor. Further systematic review can be done with the another keywords and methods. Proper and high-quality articles are also needed for more accurate and thorough comparisons and analyzes.

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