ORIGINAL ARTICLE

The Impact of Shiatsu Massage on Labour Pain and Anxiety: A Randomized Controlled Trial

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ABSTRACT

Background: Labour pain experienced by women during childbirth can significantly affect the mother's psychological condition and birthing process. This study aimed to determine the effect of shiatsu massage on pain and anxiety during labour.

Method: This randomized controlled trial was conducted on 80 nulliparous pregnant women who gave birth in four low-risk maternity clinics in Samarinda, Indonesia, from February to May 2022. The women were randomized into intervention (N=40) and control (N=40) groups based on random allocation. Certified midwives performed shiatsu massages following standard protocols. Pain was assessed using the Numeric Rating Scale, and anxiety was assessed using the Hamilton Anxiety Rating Score at three times including before the intervention (T0), the latent phase (T1), and at transition phase (T2). The impact of the intervention was analyzed using repeated measures analysis of variance by SPSS 26. A p-value less than 0.05 was considered statistically significant.

Results: The intervention group showed a significant reduction in labour pain scores from 6.85±1.00 (T0) to 6.13±0.88 (T1) and 4.78±0.83 (T2) (P<0.001), while the control group showed an increase from 6.85±1.00 (T0) to 8.05±0.64 (T1) and 8.85±0.48 (T2) (P<0.001). Anxiety scores in the intervention group decreased from 28.53±4.41 (T0) to 26.15±3.59 (T1) and 20.65±2.69 (T2) (P<0.001), whereas the control group experienced an increase from 25.55±3.16 (T0) to 27.05±3.36 (T1) and 31.73±3.27 (T2) (P<0.001). The between-subject effects in time levels for labour pain and anxiety in the two study groups had a significant impact (P<0.001).

Conclusion: Findings showed that shiatsu massage was effective and safe for relieving pain and reducing anxiety during childbirth of nulliparous women. This research suggests that shiatsu massage can be used as an effective alternative method to relieve pain and anxiety during labour in low risk pregnancies, particularly in settings with limited access to pharmaceutical analgesics.

Trial Registration Number: IRCT20220317054316N1.

Keywords: Anxiety, Labour pain, Pregnant women, Shiatsu massage

INTRODUCTION

The pain of labour is the first thing a pregnant woman thinks about when it comes to giving birth. The primary and common aspect of a woman's delivery experience is the pain of labour.[1] The complicated phenomenon of labour pain involves both physiological and psychological processes.[2] According to physiological theory, the process of labour starts with uterine contractions, which are followed by cervical dilation that permits the fetus to enter the pelvis, causing the pelvic floor and vagina to distend and stretch.[3] Women experience increased frequency and intensity of the pain due to uterine contractions as the labour progresses.[4] Labour pain is a combination of visceral pain and somatic pain.[5] Visceral labour pain occurs during the early first stage of childbirth.[6] The pain is primarily mediated during the initial stage of labour by mechanical distension of the lower uterine segment, with contributions from mechanical dilatation of the cervix and muscular contraction.[7] Visceral pain decreases in hormone progesterone but increases oxytocin, so that, during uterine contraction with stretching muscle and dilatation of the cervix, pain is transmitted by myelinated "C" Afferent fibers to sympathetic fibers.[8] The nociceptive impulses during the dilatation phase were mostly transported to the posterior nerve root ganglia at T10 to L1 when uterine contractions were stimulated. This caused stretching, distension, and activation of excitatory nociceptive afferents in the cervix.[8]

Labour pain experienced by women during the birthing process can affect the psychological condition of the mother, the birthing process, and the well-being of the fetus.[4, 9] Elevated blood pressure, pulse rate, and breathing rate can all be brought on by severe pain, leading to anxiety and other mental distress.[6, 10] This can inhibit the release of the hormone oxytocin, resulting in inadequate contractions, disruption of cervical dilation, and prolonged labour.[11] Prolonged labour increases the risks of complications that may lead to maternal morbidity and mortality.[12] In Indonesia, the incidence of complications during labour is 71%, with the most common complications being anxiety due to severe labour pain 53% and 41% prolonged labour. Anxiety or severe pain is not usually a complication of childbirth, but this has an impact on labour with Sectio Caesarea.[13] Therefore, one of the essential goals of healthcare provision for mothers during labour is to control the labour pain.[14]

Providing women in labour with safe care and comfort is at the core of midwifery. One non-pharmacological approach to pain management during childbirth is massage therapy. Massage treatment helps labouring moms and the fetus experience fewer adverse effects by reducing the need for pharmaceutical pain medication during the early stage of labour.[15] Massage induces relaxation during labour, thereby reducing pain severity, relaxing muscle spasms, increasing physical activity, being a channel for mothers' attention, and contributing to the whole relaxation.[16]

Meanwhile, Shiatsu massage is a widely used supplementary therapy technique. A particular type of massage called shiatsu was developed in Japan and is strongly influenced by traditional Chinese medicine. It entails applying various intensities of pressure to particular body parts in order to ease discomfort, lessen anxiety, and relieve physical pain. Oriental medicine claims that Shiatsu massage, which involves applying thumb and hand pressure to certain places on the body, activates a body's own healing energy to alleviate symptoms.[17] This technique uses finger pressure on points Bladder 31 (BL31), BL32, BL33, and BL34 in the latent and active phases and Kidney 1 (KI-1) and Heart Protector-8 point (HP-8) in the transition phase.[18] Pressure at this point not only stimulates the skin and relaxes the muscles but also helps the lymph system and the secretion of hormones, such as endorphins. Shiatsu massage has a positive effect through the mechanism of diverting attention to pain

(distraction), where the focus on pain or painful stimuli is diverted or reduced, thereby providing a relaxing effect on the muscles. Moreover, Shiatsu stimulates the release of oxytocin from the pituitary gland, which can stimulate uterine contractions to improve the smoothness of the labour process and manage labour.[19] The Shiatsu effect refers to modulation during a treatment session as a form of outcome. In labour pain, pain impulses are delivered by nociceptors C to the sympathetic nerve, and Shiatsu may relieve pain immediately by employing gate control principles. The thick, twisted type Aß nerve fibers get a direct and safe sensation when the mechanoreceptors are activated through slight stretching and gentle pressure during a shiatsu massage. The neospinothalamic tract fast route will then carry it to lamina II and III Subtansia gelatinosa (SG), the spinal cord dorsal horn. The dorsal horn of the spinal cord enkephalin interneurons will discharge their contents in response to increased Aß stimulation. This neurotransmitter closes the SG gate and reduces pain by triggering a voltage-dependent magnesium blockade.[17-19]

A study was conducted to evaluate the effect of the Shiatsu technique on labour induction in post-term pregnancy in Iran. The Shiatsu technique was applied by an experienced midwife for the intervention group. Results showed that more than half of the women in the Shiatsu group experienced spontaneous labour initiation, compared to nearly 10% of women in the control group.[20] Another study concludes that the Shiatsu technique is a safe complementary method for inducing labour in post-term pregnancies.[21] Another study in India found that Shiatsu massage was effective in reducing labour pain scores.[22]

Despite its advantages, medical practitioners in the present day have not yet taken notice of this technique. In addition, the Shiatsu massage technique is not often used in therapeutic settings, and there is very little published research about it. In Indonesia, the literature to support Shiatsu massage to relieve pain and anxiety during childbirth is inadequte. This gap highlights the need for more studies to explore the potential benefits of Shiatsu massage for managing labour pain and anxiety. Thus, this study aimed to evaluate the effect of Shiatsu massage on labour pain and anxiety.

MATERIALS AND METHODS

This clinical trial which was conducted from February to May 2022 in four maternity clinics in Samarinda, East Kalimantan, Indonesia, included pregnant women seeking normal vaginal delivery at low-risk maternity clinics. Two clinics were randomly assigned to the intervention group, receiving Shiatsu massage alongside routine care during labour, while the remaining two formed the control group, receiving routine care alone throughout delivery.

The sample size was determined based on the findings of a study conducted by Akkoz Cevik,[23] using a significance level of 5%, power of 80%, and anticipating a minimum difference in pain scores of 0.23 points between the intervention and control groups, with a standard deviation (SD) of 0.5. Following the inclusion of a 10% attrition rate, the adjusted minimum sample size for this study was estimated 80 participants. As a result, 40 pregnant mothers were selected for each group, with 20 participants assigned to each group within the four clinics (Figure 1). The sample size for each group was calculated using the following formula:

$$N = [2\sigma^2(Z\alpha_{/2} + z_\beta)^2] / \Delta^2$$

The inclusion criteria were nulliparous pregnant women with normal pregnancies with a gestational age range of 37 to 42 weeks, mothers with a single fetus with a cephalic presentation, and currently in the latent phase of labour, willingness to participatethe in research, and lack of pre-eclampsia, mental health problems and other co-occurring conditions (including cardiovascular, nephrological, neurological,
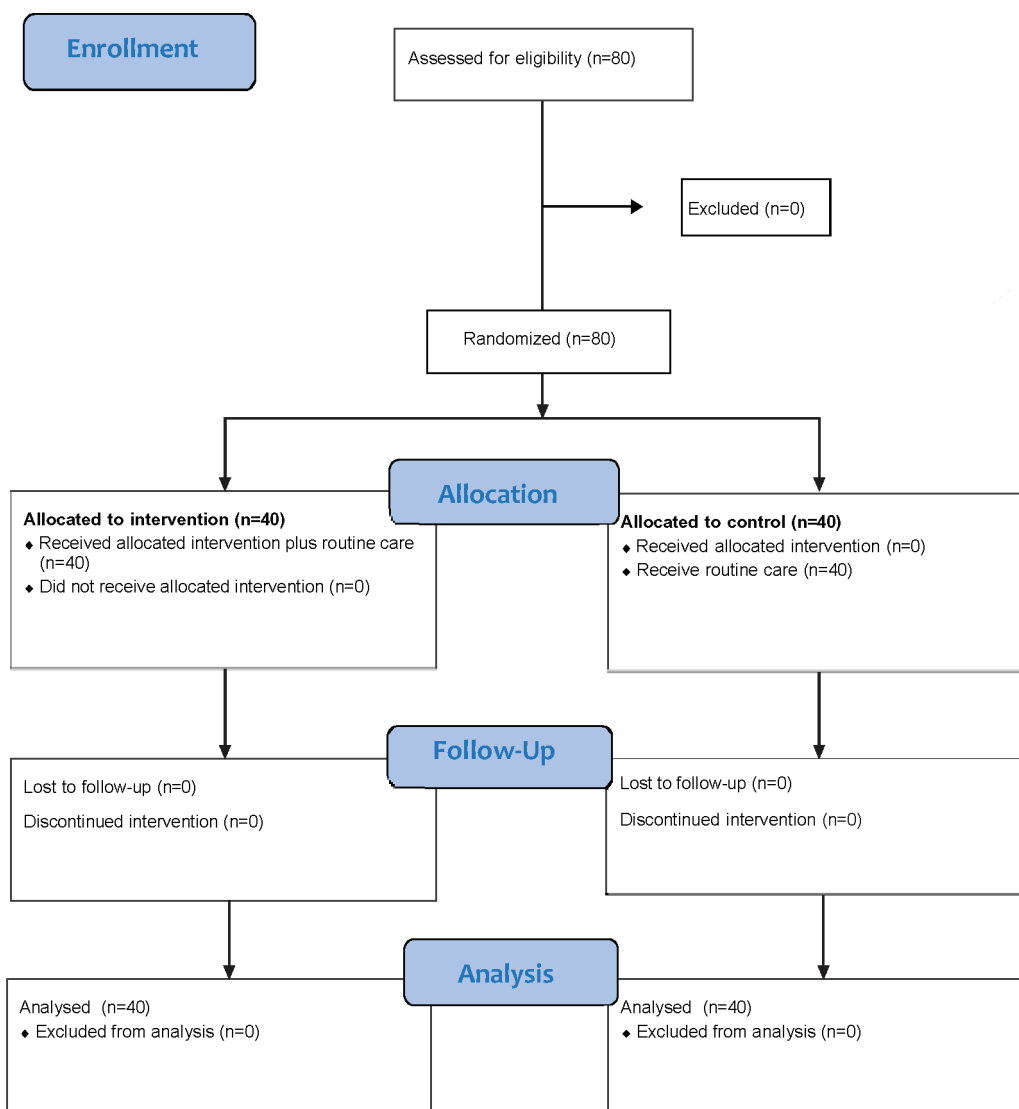
Figure 1: CONSORT flowchart of the study.

hematological, and musculoskeletal diseases) identified by the healthcare provider during pregnancy. The other inclusion criteria were not having the presence of wounds, fractures, areas of inflammation, varicose veins, and new scars, which are contraindications for Shiatsu massage or vaginal birth. Exclusion criteria were mother's unwillingness to participate, fetal distress, and some maternal complications including hemorrhage and high blood pressure during the intervention.

A systematic sampling was used in this study. By dividing the population size by the number of samples needed, the period of sampling was found. The intervals to select the mother were calculated using the formula below:

$$K = N/n$$

Where: K is the interval, N is the total number of pregnant women who came to the clinics within three months, and n is the total number of pregnant women who referred to the clinics within one month. By applying this formula, the value of K=150/30=3. Therefore, the interval was 3. The first pregnant women were selected using simple random sampling from a random table. The following was the order in which pregnant women were recruited to each research location: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, etc.

This research used Shiatsu massage as the intervention. Shiatsu massage is performed by certified midwives following standard

protocols.[18] Massage is a type of Japanese bodywork in which certain parts are stretched, kneaded, and gently compressed with fingers to access the meridians.[22, 24] This is referred to as an execution step—identifying the precise sacral groove work that needs to be done. Then, the Shiatsu protocol is applied to the opening of ostium (os) i.e. 1–3 cm (latent phase), 4–7 cm (active phase), and 8–9 cm (transition phase).[9]

The implementation steps were specified to the sacral groove work where BL31, BL32, BL33, and BL34 are located. Finding the precise sacral groove was crucial for balancing the energy of the sacrum, which helped the labouring mother feel more at ease and reduce pain.[18] BL31 is located behind the first sacral foramen, and BL32 is located at the second posterior, halfway between the spinous process of the second sacral vertebra. BL33 is located at the posterior superior iliac spine, in the third posterior sacral foramen, at the sacral area and BL34 is located at the fourth posterior sacral foramen at the sacral region. Figure 2 displays an illustration of the particular sacral groove.[25]

In the latent phase (opening of os 1-3 cm), a sixteen-minute massage is required, where one thumb is pressed for one minute on each point. A brief massage was started in the area surrounding the crease from BL31 to BL34's pressing point. There are four steps involved. The activities of the Shiatsu massage in the latent phase are shown in Figure 3.

In the active phase (opening of os 4-7 cm), the buttock spot was located by the masseuse, which is roughly 3.5 thumbs away from the midline and parallel to the fourth lumbar
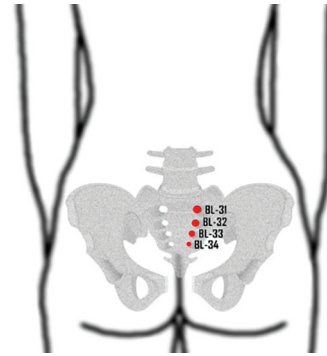

Figure 2: The specific sacral groove work where the Bladder 31 (BL31), BL32, BL33, and BL34 were discovered.

segment (L4). Then, pressure was applied by the masseur using the two thumbs on each side to cup the top of the iliac crest once for one minute (Figure 4).

In the transition phase (opening of os 8-9 cm), the masseuse located the KI-1 point, the HP-8, and the HP-6. One thumb was pushed for a minute at each point (Figure 5).

All in all, the intervention group should receive three times Shiatsu massages in each phase. Other than shiatsu massage, routine care was also given to the mothers. The routine care was provided by teaching the mother deep breathing relaxation techniques and encouraging her to choose a comfortable position. The relaxation technique is done by inhaling slowly through the nose and exhaling slowly through the mouth. In addition, mothers can choose a comfortable position, such as standing, sitting, or lying down. The duration of time for deep breathing techniques and the selection of a comfortable position are adjusted to the needs and preferences of the mother during labour. The control group received teaching to have a deep breathing relaxation technique and to choose
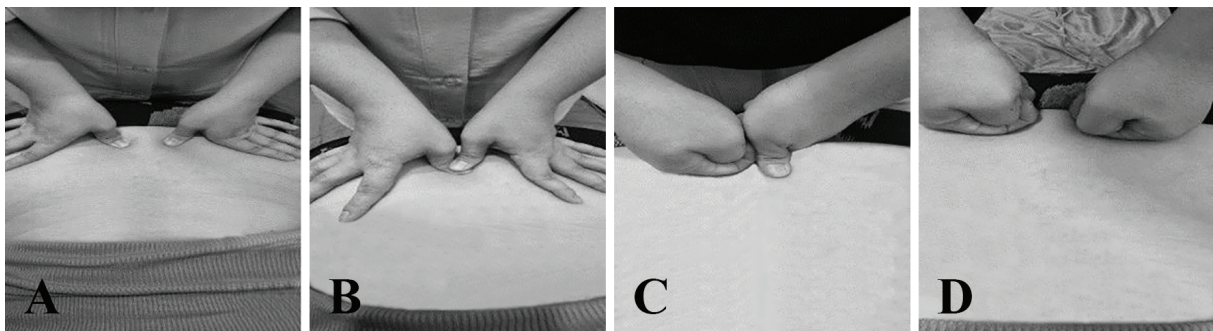
Figure 3: The activities of the Shiatsu massage in the latent phase.

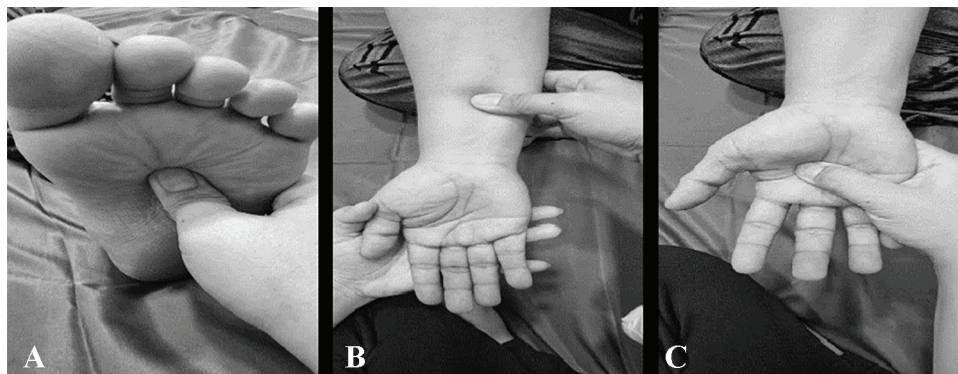**Figure 4:** The activity of the Shiatsu massage in the active phase.

a comfortable position. It was the same with the routine care received by the mother in the intervention group.

Demographic characteristics including age, education, occupation, and ethnicity were collected. Labour pain scores were assessed using the Numerical Rating Scale (NRS).[26] This scale consists of values from 0 to 10, where 0 indicates no pain and 10 indicates unbearable pain.[27] Respondents were asked to choose the integer that best reflects the intensity of the pain they feel.

The anxiety scores were assessed using the Hamilton Anxiety Rating Scale (HAM-A) developed by Hamilton (1959).[28, 29] This instrument consists of 14 items with three domains: a series of symptoms measuring psychological anxiety (mental agitation) (items 1 to 3) and psychological distress (items 4 to 6), and somatic anxiety (physical complaints related to anxiety) (items 7 to 14). Each item is rated using an ordinal scale ranging from 0=none, 1=mild, 2=moderate, 3=severe, and 4=very severe. The minimum score is 0, and the maximum score is 56. A score of less than 14 indicates don't worry; a score of 14 to 20 indicates mild anxiety; a score of 21 to 27 indicates moderate anxiety; a score of 28 to 41 indicates severe anxiety; and a score of 42 to 56 indicates very severe anxiety. Based on the results of this study, Pearson correlations were used to determine the validity of individual items in the context of the scale as a whole, with validity values ranging from 0.529 to 0.727, based on test results conducted by Ramdan (2022) in his research on measuring work-related stress in nursing.[30] In addition, the reliability of this instrument has also been measured using Cronbach's alpha and showed a value of 0.756, which indicates good internal consistency.

The NRS and HAM-A assessments were performed at the recruitment time as baseline/before Intervention scores (T0) in both groups. In the intervention group, assessment was conducted 30 minutes after the Shiatsu massage was administered at the latent phase (T1) and 30 minutes after the Shiatsu massage was administered at the transition phase (T2). However, in the control group, T1 measurements were taken after 30 minutes when they were in the latent phase, and the T2 measurement was taken after 30 minutes when they were in the transition phases.

Figure 5: The activities of the Shiatsu massage in the transition phase. A) KI-1 point, B) HP-8 point, C) HP-6 point

The data were analyzed using Statistical Package for Social Science (SPSS) Version 26.0 Statistics for Windows. The sociodemographic data of the pregnant mother was presented using mean and SD for continuous data and frequency and percentage for categorical data. The impact of the Shiatsu massage on labour pain and anxiety was determined by analyzing the data using mixed design repeated measures analysis of variance. The P-value less than 0.05 was considered significant.

The study protocol was approved by the Health Research Ethics Committee of Health Polytechnic, Ministry of Health, East Kalimantan, Indonesia (LB.01.01/7.1/001509/2022). The chosen expectant pregnant women were informed about the study and given the opportunity to take part in it. In adherence to legal and ethical standards in human research, informed written consent was sought and obtained from them. Moreover, the pregnant women were assured of the confidentiality of their information, and they were allowed to withdraw from the study at any time without any change in their care.

RESULTS

The majority of the women were 23 years old, had middle school or senior high school education, worked as housewives, and were from immigrant ethnic groups. The age range in the intervention group was 23.58±2.65, and it was 23.63±2.84 in the control group, which were not statistically significant (P=0.93). Based on the statistical analysis, there was no statistically significant difference between the socio-demographics of the intervention and control groups (P>0.05). Socio-demographic information about pregnant women is shown in Table 1.

The test results showed that in the intervention group, the mean scores for each labour pain decreased after the intervention (P<0.001). Meanwhile, the control group showed that the mean score for each labour pain increased (P<0.001). In addition, there was a significant difference in the mean score of labour pain between two groups at T1 and T2 (P<0.001) (Table 2).

Table 1: Socio-demographic features of the pregnant women (N=40)

Variables		Intervention group N (%)	Control group N (%)	P value
Education	Middle School/Senior High School	33 (82.50)	33 (82.50)	1.00*
	Bachelor	7 (17.50)	7 (17.50)	
Occupation	Housewife	28 (70.00)	34 (85.00)	0.10**
	Government/Private company employees	12 (30.00)	6 (15.00)	
Ethnic group	Local ethnic Kalimantan	16 (40.00)	19 (47.50)	0.49**
	Immigrant ethnic	24 (60.00)	21 (52.50)	

*Fisher's exact test; **Chi-Square test

Table 2: Comparison of the mean score of labour pain and anxiety before the intervention, at the latent phase, and the transition phase

Variables		Intervention group Mean±SD	Control group Mean±SD	P value*
Labour pain	T0[a]	6.85±1.00	6.85±1.00	1.00
	T1[b]	6.13±0.88	8.05±0.64	<0.001
	T2[c]	4.78±0.83	8.85±0.48	<0.001
P value**		<0.001	<0.001	
Anxiety	T0	28.53±4.41	25.55±3.16	<0.001
	T1	26.15±3.59	27.05±3.36	0.25
	T2	20.65±2.69	31.73±3.27	<0.001
P value**		<0.001	<0.001	

[a]T0: Baseline/Before Intervention; [b]T1: Latent Phase; [c]T2: Transition phase; *Independent t-test; **Repeated measurement

Table 3: Between-subject effects in time level for labour pain and anxiety in the intervention and control groups

Outcome	Time Level	Mean diff (95% Confidence interval)	P value*	Partial $\acute{\eta}^2$
Labour pain	T0[a]-T1[b]	0.24 (0.09, 0.57)	<0.001	0.39
	T1-T2[c]	-0.28 (-0.52, -0.03)	<0.001	0.59
Anxiety	T0-T1	-2.34 (-3.41, -1.34)	<0.001	0.43
	T1-T2	-5.50 (-6.44, -4.56)	<0.001	0.81

[a]T0: Baseline/Before Intervention; [b]T1: Latent Phase; [c]T2: Transition phase; *Repeated Measure ANOVA

It was found that after the intervention, the average anxiety value decreased in the intervention group (P<0.001). In the control group, it was shown that the average anxiety score increased (P<0.001). Apart from that, significant differences were observed in the mean score of anxiety between the two groups at T0 and T2 (Table 2).

The results showed that the between-subject effects in time levels for labour pain and anxiety in the two study groups had a significant impact, with substantial changes over time in both variables (P<0.001) (Table 3). Additionally, we would like to report that none of the pregnant women in the intervention group experienced any adverse effects from the Shiatsu massage. This supports the safety of the intervention and further validates the positive outcomes observed in the study.

Discussion

The research results showed that Shiatsu massage could reduce pain and anxiety during childbirth. This is in line with the main aim of this research, i.e. to examine the effect of Shiatsu massage on pain and anxiety during childbirth. However, little research has been done to assess the impact of Shiatsu massage on the course of labour. These results are consistent with those of previous research, which found Shiatsu therapy was more effective in reducing pain levels in primigravid women during the first active phase of labour and speeding up the normal labour process.[19] Additionally, another study also supported these findings by showing that Shiatsu massage not only reduced the perception of labour pain but also improved the mother's coping abilities during labour.[22] In contrast, some studies show varying results depending on the method and population studied.[31-34] Another study showed that the Shiatsu technique was a safe complementary method for induction of labour in post-term pregnancies, which provides another perspective on the use of Shiatsu massage during labour.[20]

Additionally, Shiatsu massage during labour is thought to have few adverse effects and is a simple procedure to perform on expectant mothers.[35] Shiatsu will increase the production of endorphins and decrease the release of catecholamines.[19] This eases the mothers' tense muscles and lessens their worry.[1] Patients who experience lower back discomfort experience less pain and anxiety after receiving Shiatsu massage.[36] Several other studies have shown significant improvements in anxiety, depression, and pain, as well as improvements in sleep quality, in patients who received Shiatsu massage with conditions of anxiety, depression, chronic pain, and sleep disorders.[33, 34, 37] Alternating massages and Shiatsu treatment can reduce blood levels of stress hormones such as cortisol, adrenaline, and norepinephrine.[31, 38]

Although the effectiveness of Shiatsu massage in lowering labour pain and anxiety was unknown earlier, it was claimed that massage enhanced parasympathetic nervous system activity, decreasing labour time, and enhancing delivery pleasure.[1] In line with our findings, the results of the aforementioned investigations revealed that shiatsu massage had a good influence on the health concerns of many patients.[31, 32, 34] Numerous studies have demonstrated the beneficial effects of Shiatsu massage on several health issues. For example, a study conducted on the impact of Shiatsu massage on patients suffering from

chronic lower back pain indicated a significant reduction in pain intensity and improvement in functional mobility after a series of Shiatsu massage sessions. This suggests that Shiatsu massage can be an effective intervention for managing chronic pain conditions.[17, 36]

Additionally, as to the effects of Shiatsu massage on anxiety and depression in patients with generalized anxiety disorder, the findings of a study showed a substantial decrease in anxiety and depressive symptoms, highlighting the potential of Shiatsu massage as a complementary treatment for mental health conditions. The study also noted improvements in sleep quality, which is often disrupted in patients with anxiety and depression.[34, 37, 38]

The present research provides important insights for clinical practice in maternal care during labour. The use of Shiatsu massage as a non-pharmacological intervention can be a safe and effective alternative for managing pain and anxiety, which in turn can improve the birth experience and maternal well-being. This is especially relevant in Indonesia, where access to more advanced pain management methods may be limited. This research could also influence health policy by encouraging the integration of complementary therapies such as Shiatsu massage into standardized maternity care programs.

One of the strengths of this study is its holistic approach to evaluating the impact of shiatsu massage on labour pain and anxiety. By using various evaluation tools and considering various parameters, this research provides a more comprehensive understanding of the effectiveness of shiatsu massage in reducing pain and anxiety during labour. On the other hand, there was a limitation in this study; we did not carry out laboratory tests, so it is difficult to determine exactly how shiatsu massage affects hormonal responses related to pain and anxiety in childbirth in each individual.

CONCLUSION

Shiatsu massage is effective and safe for relieving pain and reducing anxiety during childbirth of nulliparous women, particularly where pharmacological options are limited. However, it should be restricted to low-risk pregnancies. Trained masseuses are necessary to ensure the safety and effectiveness of the technique. Future research should delve deeper into women's experiences and perceptions of Shiatsu massage during labor. Furthermore, researchers are suggested to evaluate clinical protocols, including Shiatsu massage and monitoring for side effects and suitability in higher-risk pregnancies.

Authors' Contribution

Conseptualization, methodology, and drafting the manuscript were done by HN, MR, BA, and SM. HN collected data. HN and MR were responsible for data analysis and interpretation. The initial manuscript has been drafted by HN. MR, BA, and SM were done critical revisions for important intellectual content. All authors read and agreed to the final version of the manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Conflict of Interest: None declared.

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