

The Impact of Kinesio Taping on Active Phase Labor Pain and Childbirth Experience in Pregnant Women

Soheyla Jouybar (BSc)^{1*}, Soheila Rabipoor (PhD)², Maryam Najjarzadeh (PhD)³, Vahid Alinezhad (PhD)⁴

¹ MSc Student, Department of Midwifery, Faculty of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

² Professor, Reproductive Health Research Center, Urmia University of Medical Sciences, Urmia, Iran

³ Assistant Professor, Department of Midwifery, Faculty of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran

⁴ Assistant Professor, Department of Biostatistics, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Iran

ARTICLE INFO	ABSTRACT
Article type: Original article	Background & aim: Childbirth is a pivotal event in a woman's life, involving both physiological and psychological aspects. Managing labor pain and enhancing the childbirth experience are critical components of maternal care. The present study aimed to determine the impact of Kinesio taping on labor pain intensity and childbirth experience in pregnant women.
Article History: Received: 14-Jan-2023 Accepted: 05-May-2023	Methods: A clinical trial was conducted in 2021 at Imam Khomeini Hospital (RA) in Mahabad, West Iran. A total of 75 pregnant women were randomly assigned to three groups (25 subjects in each group) of intervention 1 (applying Kinesio tape to the skin areas located in T12 to L2 and S2 to S4 vertebrae), intervention 2 (applying Kinesiotape to the skin area of the T1 to T4 vertebrae) and the control group (without intervention). Pain intensity was measured using the Visual Analog Scale, and the overall childbirth experience was assessed by Childbirth Experience Questionnaire (CEQ). Data were analyzed by SPSS software (version 20).
Key words: Kinesio Tape Labor Pain Intensity Labor Experience Active Phase of Labor	Results: Comparison of the mean score of labor pain intensity in the active phase of labor in the three groups showed a significant decrease in pain intensity over time in intervention group 1, compared with the control group ($P < 0.001$). Comparison of childbirth experience scores and its dimensions after intervention in the three groups indicated a significantly greater improvement in intervention group 1 compared to the other two groups ($P < 0.05$). Conclusion: Results showed Kinesio tape that attached to spinal segments, can be used as a non-pharmacological childbirth pain reduction method and it can be used to create a positive childbirth experience.

► Please cite this paper as:

Jouybar S, Rabipoor S, Najjarzadeh M, Alinezhad V. The Impact of Kinesio Taping on Active Phase Labor Pain and Childbirth Experience in Pregnant Women. *Journal of Midwifery and Reproductive Health*. 2025; 13(2): 4723-4736. DOI: 10.22038/JMRH.2023.70111.2059

Introduction

Childbirth is a natural physiological process and an exciting and important event in the life of every woman and her family (1). The pain experienced by mothers during labor is considered one of the severe pains (2). Pain is a common phenomenon and an inevitable part of the childbirth process, which occurs after the stimulation of nerve receptors due to the contraction of the uterine muscles, and is felt in the visceral, pelvic and lumbosacral regions (3).

The uterine structure is strongly innervated by both sympathetic and parasympathetic systems. Sympathetic nerve fibers originate from spinal segments T12 to L2, these nerve fibers are involved in uterine and vascular contractions. Parasympathetic nerve fibers originate from spinal segments S2 to S4, which inhibit uterine contractions and prevent vascular contraction.

The visceral nerve fibers that transmit pain in the uterus are transmitted by two routes:

* *Corresponding author*; Soheyla Jouybar, MSc Student, Department of Midwifery, Faculty of Nursing and Midwifery, Urmia University of Medical Sciences, Urmia, Iran. Tel: 09330158689; Email: soheyla.jouybar@gmail.com



Copyright © 2023 Mashhad University of Medical Sciences. This work is licensed under a Creative Commons Attribution Noncommercial 4.0 International License <mailto:https://creativecommons.org/licenses/by/3.0/>

First, the body of the uterus transmits pain through the sympathetic pathway, in which case the pain caused by the contraction of the uterus is felt in the dermatome of the spinal nerves from T12 to L2, which includes the middle areas of the back, pubis, inguinal area, and middle and front of thigh. Second: Cervix, the pain caused by its dilatation is felt in the sacral dermatome, which includes: perineum, gluteal region, and posterior region of thigh (4). In case of increased pain and excessive anxiety during labor, by stimulating sympathetic nerves, it leads to an increase in the secretion of catecholamines, and this causes a decrease in effective uterine contractions, prolongation of the first and second stage of labor, fetal distress, postpartum stress, increased midwifery interventions, increased requests for cesarean section, and mother's inappropriate experience of childbirth (5-7).

Childbirth experience is defined as an individual life event that is a combination of physiological and mental-psychological processes (9). Although the childbirth experience is inherently unpredictable, it should be a positive event with minimal risk of harmful consequences (1, 10-11). Childbirth is a special experience for a mother and her family (2). The experience of childbirth in women, whether positive or negative, leaves consequences beyond a simple event. A negative childbirth experience may increase the risk of postpartum depression (12). While the positive experience of childbirth improves the mother's well-being and facilitates the relationship between mother and baby (13).

Today, various pharmacological and non-pharmacological methods are used to relieve and decrease labor pain. It seems that alleviating the severity of labor pains using non-pharmacological methods such as massage, acupuncture, and acupressure can improve the mother's childbirth experience (8). One of the non-pharmacological methods based on the Gate Control Theory of Pain is taping therapy, which was invented by Dr. Kenzo Cas in Japan in the 1970s (14). In this method, by continuously stimulating the mechanical receptors of skin through the application of tension or pressure, it leads to sending signals to the spinal levels, and on the other hand, by affecting the path of pain

transmission, it causes presynaptic inhibition and reduces the transmission of pain signals and ultimately inhibits the feeling of pain (15). This method has been widely used in orthopedics, rehabilitation, internal medicine, general surgery, gynecology, and sports medicine (16).

In 1973, Dr. Kenzo Cas designed the Kinesio tape with different principles, which has the ability to stretch up to 40% of the initial length and, unlike previous elastic tapes, allows the limb to have a range of motion (17). Kinesio tape has elasticity and thickness similar to human skin and is made of 100% linen fibers and acrylic with low sensitivity due to the absence of latex (18). In one study, the use of Kinesio tape along with performing breathing exercises has been effective in reducing labor pain and the length of labor (19).

A significant difference was reported between the effectiveness of Kinesio tape and the reduction of labor pain in the active phase of labor in the first hour after using the Kinesio tape, but this difference was not significant for the whole active phase of labor (20). The results of a study which was conducted to compare the effectiveness of Kinesio tape and the electrical stimulation device of acupuncture points on reducing labor pain in the active phase of labor, both were mentioned as effective non-pharmacological methods in reducing labor pain in the active phase of labor, but the Kinesio tape more effectively reduced pain in the first stage of labor than the electrical stimulation device of acupuncture points (21).

One per two women who have given birth reports severe or even very severe labor pain (22) and the response to pain management measures is different in various cultures (24). Also, the Kinesio tape method in reducing labor pain has often been compared with other non-pharmacological methods such as breathing techniques and electrical stimulation devices. Considering to what mentioned above, also no study was found that assessed the impact of Kinesio taping on the experience of childbirth. Therefore, the current study was designed to determine the impact of Kinesio taping on the severity of labor pain and labor experience in pregnant women.

Materials and Methods

This clinical trial was conducted in 2021 on pregnant women referred to Imam Khomeini Hospital (RA) in Mahabad city. (IRCT20210914052479N1).

All pregnant women in the active phase of labor hospitalized in Imam Khomeini Hospital (RA) were evaluated in terms of inclusion criteria, which included women with age of 18-35 years, literacy of reading and writing, low-risk pregnancy with a live and healthy fetus, singleton fetus with cephalic appearance in sonography, gestational age of 37-42 weeks, cervical dilatation of 3-5 cm, at least 3 uterine contractions in a 10-minute interval and normal fetal heart rate as well as not suffering from pre-eclampsia, diabetes, cardiopathy, high blood pressure, nephropathy, epilepsy, psychiatric disorder, rupture of fetal membranes more than 12 hours, consumption of narcotics according to the patient's file and history, no uterine scar, no dermatitis or skin infection at the site of Kinesio tape application, no sensitivity to Kinesio tape, no use of any sedative and narcotics within 48 hours before entering the study.

Exclusion criteria included accelerated stages of labor (first and second stage of labor less than two hours in primiparous women and less than one hour in non-primiparous women), meconium excretion, occurrence of vaginal bleeding during the stages of labor, fetal distress, cesarean section and mother's reluctance to continue the study.

The below formula was applied for sample size calculation, and 18 subjects were calculated for each group, considering 35% attrition, 25 subjects with inclusion criteria were included in each group. The sample size was calculated based on the study by El-Refaye et al. in 2016 which evaluated the effect of kinesio tape along with breathing exercises on labor pain intensity and labor length (19).

$$n = \frac{2d^2 \times (Z_{1-\alpha} + Z_{1-\beta})^2}{(\mu_1 - \mu_2)^2}$$

To select participants, at the beginning convenience sampling was applied. Then the eligible subjects after measuring pain with a visual pain scale, were randomly assigned by a person other than the researcher who was unaware of the division of groups. They were placed in three groups: intervention 1, intervention 2 and control; In this way, to

minimize contact between the groups, every day the first participant chose one of the balls from the bag that contained A-B-C-D-E-F balls, and if the first participant chose ball A or C on that day, every participant who participated in the study on that day was assigned to the intervention group 1, if the first participant chose B or E balls on that day, all participants on that day were assigned to the intervention group 2, and if the first participant chose D or F balls on that day, all the participants on that day were assigned to the control group. This process continued until 25 samples were selected for each group. When 25 samples were selected for one group, the balls related to that group were removed from the bag.

Data collection tools included Visual Analog Scale (VAS), childbirth experience questionnaire, personal-social and obstetrical questionnaire. The Visual Analog Scale (VAS) is one of the most prominent tools for measuring pain, which was first invented in 1921 by Hise and Patresone (25). This tool is a 10 cm ruler, on the left end of which is written "without pain" and on the right end of it is written "most severe pain". A person puts a mark on the continuum according to the amount of perceived pain. This scale is divided from zero to ten as follows: 0-1 no pain, 2-3 mild pain, 4-5 moderate pain, 6-7 high pain, 8-9 maximum pain, 10 unbearable pain (26). In the study by Phan et al. (2012), its validity was reported with correlation coefficient of 0.8 and its reliability was reported as 0.74 using the test-retest method (27). The use of this tool in the study of Jamilian and colleagues (2013) was obtained 0.94 through the content validity of the questionnaire (28). Its reliability was reported as 0.9 (29).

Childbirth Experience Questionnaire (CEQ) is a tool to evaluate the experience of childbirth in pregnant mothers, which was designed by Dancker and colleagues in 2010 (30). This questionnaire is a 23-item tool which includes the four areas of mother's acceptance (8 items), maternity staff support (5 items), mother's sense of perceived security (6 items) and mother's participation during labor and delivery (4 items). In this questionnaire, there are 20 items which are graded with a four-point Likert scale (totally agree with a score of 1, somewhat agree with a score of 2, somewhat disagree with

a score of 3 and completely disagree with a score of 4) and three items with an observational rating scale (VAS). In this way, scores 0-40 (score 1), scores 41-60 (score 2), scores 61-80 (score 3) and scores 81-100 (score 4). A higher score from this questionnaire indicates a better childbirth experience (31).

Some questions in the questionnaire have negative concepts such as experiencing severe pain, feeling tired, fear and having a bad memory (questions 3, 5, 8, 13, 14 and 19) and are scored negatively. In the study of Walker and colleagues (2015), the Cronbach's alpha coefficient for the whole questionnaire was calculated as 0.9 and the Kappa coefficient with retest for the whole questionnaire was calculated as 0.61-0.8 and the overall validity of the questionnaire was calculated using Pearson's correlation coefficient as 0.73 (32). In the study of Ghanbari et al. (2019), Cronbach's alpha coefficient was 0.97. CVR values were obtained higher than 0.69 and CVI values higher than 0.79 (33).

Personal-social and obstetrical questionnaire included questions regarding mother's age, body mass index, place of residence, induction, pregnant mother's education, economic status, acceptance of pregnancy, participation in preparation classes for physiological childbirth, number of abortions, number of children, number of pregnancies, gestational age, fear of childbirth, experience of violent behavior during pregnancy by the husband, neonatal weight, and distance from the last delivery.

A written letter of introduction from the university as well as oral explanations regarding the present study was presented to the hospital director, and the project goals and research methods were explained. The subjects were identified with the relevant code instead of the first and last name. Before the intervention, full explanations about the details of the study were provided to the participants, taking into account the necessary precautions.

The procedure was such that after obtaining written informed consent, pain was assessed by a Visual Analog Scale (VAS), then the participants completed the personal-social and obstetrical characteristics questionnaire. Then Kinesio tape was applied in intervention group 1 and intervention group 2. A sensitivity test was

performed for the participants of intervention 1 and intervention 2 groups, so that a small piece of 1x2 cm Kinesio tape was applied on the lower part of the skin of the front part of the left forearm of the participants for 20 minutes. In case of sensitivity, the Kinesio tape was removed and the person was not included in the study. No sensitivity was observed in the present study. The participants were supervised by the researcher during the entire first and second stage of labor, although the researcher did not play a role in the routine care of delivery room. The researcher explained about how to conduct the study for all three groups and evaluated them in terms of inclusion and exclusion criteria.

The researcher was not involved in sticking the Kinesio tapes, and all the tapes were applied in intervention 1 and intervention 2 groups by a physiotherapist. The type of kinesiotape used in this study is Kindmax brand, made in China, with dimensions of 5 cm x 5 meters. Before gluing the kinesio tape in the groups, the desired area was cleaned with water and cotton, after drying the position, the kinesio tape was applied by pulling the tape until it was flat and did not have wrinkle at the time of gluing.

In the intervention group 1, when the pregnant woman was sitting on the bed in a bent forward position, stretching her legs and bending her head and neck down, and there was no uterus contraction, kinesiotype tape measuring 5 x 10 cm was applied by the physiotherapist in the skin areas of the spine vertebrae, including: T12 and L2 vertebrae, two I-shaped bands as parallel, bilateral and vertical at a distance of 3-4 cm from each other, and in the vertebrae S2 to S4, in the form of a star, in such a way that at first the Kinzio tape was glued in the form of "+" and then on it, in the form of a cross. Kinesio tapes were removed after childbirth when the mother's position was stabilized. In the intervention group 2, when the pregnant woman was sitting on the bed in a bent forward position and stretched her legs and bent her head and neck down and did not have uterine contractions, kinesiotype tape measuring 5 x 7 cm was applied by a physiotherapist as an I-shaped vertical strip in the skin of T1 to T4 vertebrae a tape A vertical I-shape in the area of the skin of the T1 to T4

vertebrae, and the Kinesio tapes were removed after delivery and stabilization of the mother's position (Figure 1).



Figure 1. The site of applying Kinesio tape in intervention 1 group (left picture) and intervention 2 (right picture) group.

In the control group, no intervention was done and no tape was applied. They received routine hospital care.

The level of pain, once before sticking the Kinesio tape immediately after the peak of uterine contraction was measured. Once during uterine dilatation 3-5 cm and immediately after the peak of uterine contraction, was measured. Once during dilatation 7-8 cm and immediately after the peak of uterine contraction using a visual pain scale, in all participants were measured. The childbirth experience questionnaire was also completed by the participants of all three groups from 2 hours after delivery to the time of discharge.

Data were analyzed by SPSS software (version 20) using descriptive and inferential statistics. Quantitative and qualitative data were shown with mean \pm standard deviation and frequency (percentage), respectively. Analysis of variance, chi-square, and Fisher's exact tests were used to examine the differences between the two groups in demographic characteristics. Repeated measures analysis of variance was applied to investigate the level of main variables changes during three sessions. $P < 0.05$ was considered statistically significant.

Results

The statistical results and data analysis are shown in the form of tables and graphs based on the objectives and hypotheses of the research. Twenty-five subjects were selected as participants in all three groups and there was no sample dropout (Figure 2).

There was no mean which measures this time, only pain was measured at the range of 3-5 cm dilatation and 7-8 cm dilatation.

Independent t-test was used and no significant difference was observed before the implementation of the intervention. For this reason, in the analysis of variance of repeated measures, the mean before the intervention was entered as a confounding variable and its effect was controlled to show only the effect of the intervention, and the model of variance analysis of repeated measures was fit with regard to the confounding effect in the mean before the intervention and BMI. Therefore, the confounding effect was controlled and all three groups were considered with the same mean before the intervention and the analysis was done.

As the results show, there is no significant difference between the three groups in terms of quantitative demographic characteristics of the three groups. The analysis of variance in this study revealed that the three groups were homogeneous in terms of mean quantitative demographic characteristics, and only BMI had a significant difference between the three groups (Table 1).

In this study, the results of chi-square test and Fisher's exact test revealed no significant difference between qualitative demographic variables in the three intervention 1, intervention 2 and control groups. In other words, the three groups were homogenous (Table 2).

According to Table 3, the mean scores of labor pain intensity, before intervention and 3-5 cm and 7-8 cm dilatation in intervention group 1 were (8.16 ± 0.68) , (6.60 ± 1.35) and (6.68 ± 1.70) , respectively and in intervention group 2 were (7.64 ± 1.65) , (7.92 ± 1.57) and (8.16 ± 1.31) , respectively and in the control group were (6.96 ± 1.56) , (7.68 ± 1.34) and (9.00 ± 0.95) , respectively. Repeated measurement analysis was used to check the mean score of labor pain intensity scores in 3 time periods between intervention 1, intervention 2 and control groups.

The results of repeated measures analysis of variance showed that there was a statistically significant difference in the mean intensity of labor pain at different times ($P < 0.001$). Also, the significant value of the group variable is less than 0.001, so there is a statistically significant

difference in the mean intensity of labor pain among the three groups ($P < 0.001$).

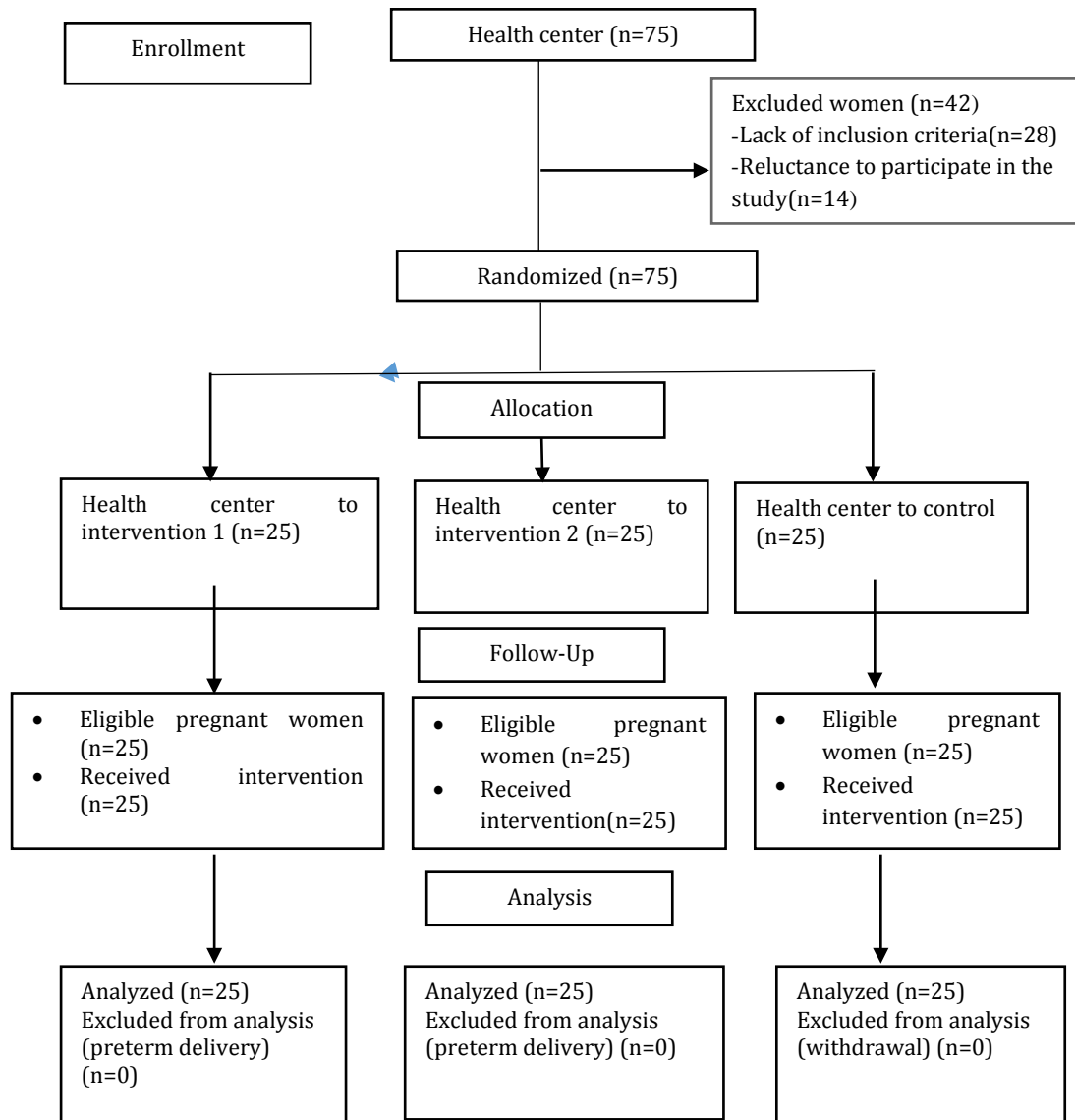


Figure 2. CONSORT Flow diagram of the study

Table 1. Comparison of quantitative demographic characteristics in the three groups

Variable	Intervention group 1 N=25	Intervention group 2 N=25	Control group N=25	Test result of analysis of variance
	Mean±SD	Mean±SD	Mean±SD	
Age (years)	27.72 ± 5.43	27.65 ± 4.90	28.16 ± 5.24	P=0.91 F= 0.08
Husband's age (years)	30.76 ± 6.06	32.88 ± 6.07	32.12 ± 4.20	F=0.94 P=0.39
Gestational age (week)	39.56 ± 1.08	38.80 ± 1.15	39.32 ± 0.98	F=3.25 P=0.51
Number of pregnancy	1.84 ± 1.06	2.16 ± 1.17	2.00 ± 0.86	F=0.58 P=0.56
Number of abortion	0.20 ± 0.40	0.28 ± 0.54	0.28 ± 0.54	F=0.21 P=0.80
Number of live children	0.60 ± 0.70	0.88 ± 0.83	0.72 ± 0.54	P= 0.37 F= 0.99
Height (Meter)	1.60 ± 0.06	1.61 ± 0.05	1.63 ± 0.06	P=0.16 F=1.84
Weight (Kg)	66.80±12.55	72.44±12.90	65.32±11.83	P=0.10 F=2,28
Neonate's weight (gr)	3260.00±393.70	3276.00±309.94	3464.00 ±473.35	P= 0.13 F=2.03
BMI	25.85 ± 4.15	27.79 ± 4.46	24.43 ± 3.68	P=0.02 F=4.06
Distance from last delivery (years)	7.50 ± 2.78	7.06 ± 3.04	6.00 ± 3.14	P=0.38 F=0.98

Table 2. Comparison of qualitative demographic characteristics in the three groups

Variable	Intervention group 1 N=25	Intervention group 2 N=25	Control group N=25	Chi-square test result
	N (%)	N (%)	N (%)	
Induction				
Yes	6(21.42)	10(35.71)	12(42.85)	X²=3.19 P=0.20
No	19(40.42)	15(31.95)	13(27.65)	
Place of residence				
Village	12(41.37)	10(34.48)	7(24.13)	X²=2.13 P=0.34
City	13(26.26)	15(32.60)	18(39.13)	
Education				
Lower than diploma	16(34.04)	18(38.29)	13(27.65)	F=3,51 P=0.47
Diploma	8(38.09)	5(23.80)	8(38.09)	
College	1(14.28)	2(28.57)	4(57.14)	
Husband's education				
Lower than diploma	16(36.36)	17(38.63)	11(25.00)	X²=3.48 P=0.48
Diploma	5(31.25)	4(25.00)	7(43.75)	
College	4(26.66)	4(26.66)	7(46.66)	
Job				
Household	23(33.33)	23(33.33)	23(33.33)	F=0.86 P=0.99
Job outside the home	1(33.33)	1(33.33)	1(33.33)	
Job at home	1(33.33)	1(33.33)	1(33.33)	
Husband's job				
Worker	3(30.00)	4(40.00)	3(30.00)	F=3.76 P=0.46
Employee	5(45.45)	1(9.09)	5(45.45)	
Free	17(31.48)	20(37.03)	17(31.48)	
Economic status				
Less than enough	3(33.33)	3(33.33)	3(33.33)	F=2.06 P=0.88
Enough	20(31.76)	21(33.33)	22(34.92)	
More than enough	2(66.66)	1(33.33)	0(0)	

Variable	Intervention group 1	Intervention group 2	Control group	Chi-square test result
	N=25 N (%)	N=25 N (%)	N=25 N (%)	
Mode of previous delivery				
Nvd	12(26.66)	16(35.55)	17(37.77)	X²=2.33
None	13(43.33)	9(30.00)	8(26.66)	P=0.31
Participation in physiological childbirth classes				
Yes	0	0	2(100)	F=2.73
No	25(34.24)	25(34.24)	23(31.50)	P=0.32
Wanted pregnancy				
Yes	23(35.93)	17(26.56)	24(37.50)	F=7.94
No	2(18.18)	8(72.72)	1(9.09)	P=0.02
Who wanted it?				
Both	21(35.59)	15(25.42)	23(38.98)	F=2.97
Me	1(100)	0	0	P=0.66
Husband	1(25.00)	2(50.00)	1(25.00)	
Desired mode of delivery				
Vaginal delivery	17(35.41)	14(29.16)	17(35.41)	X²=0.55
Cesarean section	6(27.27)	8(36.36)	8(36.36)	P=0.75
Fear of delivery				
Yes	18(32.14)	20(35.71)	18(32.14)	X²=0.56
No	7(36.84)	5(26.31)	7(36.84)	P=0.75
Severity of fear of delivery				
Very low	(0)	1(5)	1(5.6)	
Low	1(5.60)	3(15)	4(22.20)	F=6.40
Moderate	5(27.80)	6(30)	6(33.20)	P=0.60
High	10(55.60)	6(30)	4(22.20)	
Very high	2(11.10)	4(20)	3(16.70)	
Victim of physical violence by spouse				
Never	24(32.43)	25(33.78)	25(33.78)	F=1.84
Sometimes	1(100)	0	0	P=0.99
Victim of psychological violence by spouse				
Never	22(37.93)	18(31.03)	18(31.03)	
Low	1(9.09)	3(27.27)	7(63.63)	F=9.75
Sometimes	2(40.00)	3(60.00)	0	P=0.06
Most times	0	1(100)	0	
Victim of sexual violence by spouse				
Never	24(33.33)	23(31.94)	25(34.72)	
Low	1(50.00)	1(50.00)	0	F=3.14
Sometimes	0	1(100)	0	P=0.76

Table 3. Comparison of the mean score of labor pain intensity in the active phase of labor in pregnant women of the three groups

labor pain intensity score	Mean of labor pain intensity scores in active labor phase of pregnant women in three groups		
	Intervention group 1 N=25	Intervention group 2 N=25	Control group N=25
Before intervention	8.16±0.68	7.64±1.65	6.96±1.56
Dilatation 3-5 cm	6.60±1.35	7.92±1.57	7.68±1.34
Dilatation 7-8 cm	6.68±1.70	8.16±1.31	9.00±0.95

According to Table 4, the significant value of the time variable is less than 0.001, so the assumption (the sameness of the different levels of time factor) is rejected with a maximum confidence of 0.99. Therefore, a statistically significant difference was observed in the mean intensity of labor pain at different times ($P < 0.001$). Also, the significant value of the group variable is lower than 0.001, so a significant statistical difference was observed in

the mean intensity of labor pain among the groups ($P < 0.001$). The analysis of variance with repeated measures has been fitted considering the confounding effect in the mean before the intervention and BMI, therefore the confounding effect has been controlled and all three groups were considered with the same mean before the intervention and the analysis was done.

Table 4. Repeated measurement analysis of labor pain intensity in three periods of time between the three groups

Variable	Sum of squares error	Degrees of freedom	Mean of squares error	F	P-Value
Effect 1 (time)	10.46	2	5.23	10.09	$P < 0.001$
Effect 1 (time and group)	48.96	4	15.33	26.81	$P < 0.001$
Group effect	87.75	2	43.87	29.80	$P < 0.001$

According to Table 5, the results of analysis of variance show that the mean scores of childbirth experience and its dimensions are

significantly different between the three groups ($P < 0.05$).

Table 5. Comparison of the mean scores of women's childbirth experience after the intervention in the three groups

Variable	Mean	Standard deviation	Test result of analysis of variance
Total			
Intervention group 1	72.88	5.34	F=15.80 $P < 0.001$
Intervention group 2	64.16	7.89	
Control group	62.08	8.05	
Personal capacity			
Intervention group 1	23.84	3.40	F=10.56 $P < 0.001$
Intervention group 2	19.76	4.24	
Control group	19.36	3.75	
Professional support			
Intervention group 1	15.76	1.20	F=3.48 $P = 0.03$
Intervention group 2	14.80	1.91	
Control group	14.24	2.75	
Perceived security			
Intervention group 1	19.88	1.69	F=12.88 $P < 0.001$
Intervention group 2	17.24	2.74	
Control group	16.64	2.62	
Participation			
Intervention group 1	21.40	1.29	F=6.33 $P = 0.003$
Intervention group 2	20.40	1.35	
Control group	20.12	1.36	

Discussion

The current clinical trial investigated the impact of Kinesio tape on labor pain intensity and childbirth experience in active labor phase in pregnant women. The mechanism of the effect of these tapes is based on the Gate Control Theory of Pain. In this theory, continuously stimulation of the mechanical receptors of the skin through tension or pressure, leads to sending signals to the spinal levels; on the other hand, by affecting the path of pain transmission, it causes presynaptic inhibition and reduces the transmission of pain signals and ultimately the feeling of pain is controlled (15).

Comparison of the mean score of labor pain intensity in the active phase of labor of pregnant women among the three groups of intervention 1, intervention 2 and control group showed that in the control group the pain intensity increased at different times and closer to delivery, but in the intervention group 1, the pain intensity significantly decreased with labor progress. In the intervention group 2, pain intensity increased in both times close to delivery, but compared to the control group, this increase was not significant.

In the study of Shivaranjani et al. (2019), which was conducted to compare the effectiveness of Kinesio tape and electrical stimulation of acupuncture points on maternal and neonatal outcomes, similar to the findings of the current research, both methods were effective in reducing the labor pain score, but in the group receiving the Kinesio tape, the mean pain score was significantly lower compared to the group receiving the electrical stimulation of acupuncture points (21). In the study of Kaplan et al. (2016), which was conducted to determine the short-term effects of Kinesio tape on the intensity of pain and disability in pregnant women with back pain during pregnancy, pain and disability significantly improved in the intervention group receiving the Kinesio tape (35). In the research of El-Refaye et al. (2016), which was conducted to determine the effect of Kinesio tape along with breathing exercises on the intensity of labor pain and length of labor, as in the present study, it was determined that when the cervical dilatation was 7-8 cm, a significant difference was found between the intervention group and the control group had in

pain intensity (19). In the study of Miquelutti et al. (2018), which was conducted to determine the effectiveness and safety of Kinesio tape on labor pain intensity, maternal satisfaction, and neonatal outcomes, it was found that in the first hour of using Kinesio tape, pain intensity reduced in intervention group compared to the control group (20).

In this study, the location of Kinesio type was selected based on spinal dermatomes related to the uterus. The uterine structure is strongly innervated by both sympathetic and parasympathetic systems. Sympathetic nerve fibers originate from spinal segments T12 to L2, these nerve fibers are involved in uterine and vascular contractions. Parasympathetic nerve fibers originate from spinal segments S2 to S4, which inhibit uterine contractions and prevent vascular contraction(4). In the study of Miquelutti et al. (2018) and the study of Shivaranjani et al. (2019), the study of El-Refaye et al. (2016) the Kinesio tape were attached with different shapes compared to this study, but they cover the same spinal segments. In the study of Miquelutti et al. (2018), it was found that in the first hour of using Kinesio tape, pain intensity reduced. In the research of El-Refaye et al. (2016) , it was determined that when the cervical dilatation was 7-8 cm, a significant difference was found in pain intensity. In the study of Shivaranjani et al. (2019), Kinesio tape was effective in reducing the labor pain score.

Contrary to the previous results, in the study of Miquelutti et al. (2018), although the intensity of pain decreased in the first hour after applying the Kinesiotype, however, this difference was not significant in all the hours of pain assessment (20). This result may be is due to the lack of the control group which did not receive any intervention, although the mentioned study has a control group, but this group is the same as the intervention group 2 in the present study, where Kinesio tape is applied on the area outside the uterine dermatome. In the study of El-Refaye et al. (2016), although the Kinesio tape reduced the pain intensity in the dilatation of 7-8 cm, but no significant difference was observed between the intervention and the control groups in the dilatation of 3-5 cm (19), which may be caused by another pain reduction method that was used in the above study

together with Kinesio tape and affected the results. According to the results of the study by Naguib et al., Kinesio tape did not show a significant effect on labor pain control based on pain measurement; since Kinesio tape was applied close to the uterine dermatome in the control group, it may have affected the results (36).

Comparison of the mean scores of the birth experience in all cases and examining the dimensions of the birth experience such as personal capacity, professional support, perceived safety and participation in women after the intervention in the three groups of intervention 1, intervention 2 and control showed that in comparison between the three studied groups, a statistically significant difference was observed between the intervention group 1 with the intervention group 2 and the control group. The mean difference between the intervention group 1 with the intervention group 2 and the intervention group 1 with the control group was higher in all dimensions and there was statistical significant relationship between them, but no significant statistical relationship was observed between the intervention group 2 and control group in all aspects of the birth experience.

Due to the lack of studies that compare the childbirth experience and the effect of Kinesio tape, we decided to mention the studies related to childbirth satisfaction and non-pharmacological pain reduction methods based on the Gate Control Theory of Pain.

In the studies of Miquelutti et al. (2018) and Naguib et al. (2021), although Kinesio tape did not show a significant effect on reducing the intensity of labor pain, however, satisfaction with childbirth experience was high in mothers using Kinesio tape (20,36); these results are in line with the findings of the current research. In the study of Haseli et al. (2010), which was conducted to investigate the impact of abdominal massage along with breathing techniques on the satisfaction of childbirth on 64 primiparous women, the results showed that abdominal massage along with breathing techniques increases the childbirth satisfaction (37). In the study of Khavandizadeh Aghdam et al. (2013), acupressure during labor also

increased satisfaction (39). Therefore, the method of massage and acupressure is based on the pain gate theory and has a similar mechanism of action with the Kinesio tape pain reduction method, it can be said that they are somewhat consistent with the present study.

Further studies with a larger sample size are suggested to be conducted in an effort to replace pharmaceutical methods with possible side effects. Considering that in this study, the time of the beginning of applying Kinesio tape on pain and childbirth experience was not investigated, this case should also be investigated in future studies. Due to the difference in the duration of labor in nulliparous and multiparous women and the lack of previous childbirth experience in nulliparous and multiparous women, and lack of previous childbirth experience in nulliparous women, it is suggested that separate researches be conducted in these two groups. According to the fact that in this study, Kinesio tape has reduced labor pain, the effect of this tape on episiotomy site pain can be investigated in future studies.

As one of the limitation of the current research, it can be said that the starting time of the effect of Kinesio tape on pain and childbirth experience was not determined. The number of studies conducted in this field was very small, and it was not possible to make comparisons with the results of other studies. Due to the nature of the intervention, it was not possible to blind the researcher.

Conclusion

The use of Kinesio tape to control pain in the stages of labor and the positive experience of childbirth was shown in this study, so that with the progress of time and stages of dilatation in the intervention group 1, the pain had a decreasing trend. In the intervention group 1 Kinesio tape, they are attached to spinal segments and with the control gate mechanism, it reduces pain; this conclusion can be introduced for the use of Kinesio tape as a non-invasive, cheap and safe method for pain relief and a positive childbirth experience. Therefore, this non-pharmacological approach can promote pain management, with aim of positive childbirth experiences.

Declarations

Acknowledgements

This article has been extracted from a master thesis in Midwifery Counseling, approved by the vice chancellor for Research at Urmia University of Medical Sciences, Urmia, Iran. We would like to thank the University for the Financial Support. We also express our deepest gratitude to the subjects, who participated in this study, as well as the authorities of Urmia Nursing & Midwifery School and Mahabad hospital for their valuable support.

If participants met the inclusion criteria, the goals and procedure of the study were described to them, and if they were willing to participate in the study, they gave written informed consent. The participants were assured about confidentiality of data.

Conflicts of interest

Authors declared no conflicts of interest.

Ethical considerations and ethical approval

Obtaining permission from the Research Vice-Chancellor of Urmia University of Medical Sciences, (ethics code IR.UMSU.REC.1400.161)

Funding

In case of any complications, the researcher was obliged to pay the cost of treatment and coordinate for a doctor's visit or hospitalization, and the participation in the plan was voluntary and the participants had full authority to continue or withdraw from the study.

Authors' contribution

SJ and SR contributed to the conception and design of the research. MN performed the quality assessment of the studies. VA interpreted the data. SJ and SR drafted the manuscript. All authors reviewed the manuscript, agreed to be fully accountable for ensuring the integrity and accuracy of the work, and approved the final manuscript.

References

1. Fisher C, Hauck Y, Fenwick JJS, medicine. How social context impacts on women's fears of childbirth: A Western Australian example. *Health Sciences*. 2006; 63(1): 64-75.
2. Perry SE, Hockenberry MJ, Lowdermilk DL, Wilson D, Sams CA, Keenan-Lindsay L. *Maternal Child Nursing Care in Canada-E-Book*. Health Sciences. 2014; 50(3): 31-39.
3. Trout KKJ. The neuromatrix theory of pain: implications for selected nonpharmacologic methods of pain relief for labor. *Journal of Midwifery and Women's Health*. 2004; 49(6): 482-488.
4. Drake R, Vogl AW, Mitchell AW. *Gray's anatomy for students E-book*: Elsevier Health Sciences; 2009; 2(3): 272-273.
5. Rooks JPB. Labor pain management other than neuraxial: what do we know and where do we go next. *Journal of Midwifery and Women's Health*. 2012; 39(4): 318-322.
6. Serçekuş P, Okumuş HJM. Fears associated with childbirth among nulliparous women in Turkey. *Midwifery*. 2009; 25(2): 155-162.
7. Lowe NK. The nature of labor pain. *American Journal of Obstetrics and Gynecology*. 2002; 186(5): S16-S24.
8. Calik KY, Komurcu NJRCMJ. Effects of SP6 acupuncture point stimulation on labor pain and duration of labor. *Iranian Red Crescent Medical Journal*. 2014; 16(10): 11-17.
9. Larkin P, Begley CM, Devane DJM. Women's experiences of labour and birth: an evolutionary concept analysis. *Midwifery*. 2009; 25(2): e49-e59.
10. Lundgren IJM. Swedish women's experiences of doula support during childbirth. *Midwifery*. 2010; 26(2): 173-180.
11. JAVAD NM, Afshari P, Montazeri S, Latifi S. The effect of continuous labor support by accompanying person during labor process. *Scientific Medical Journal*. 2008 ;17(2):22-27.
12. Houston KA, Kaimal AJ, Nakagawa S, Gregorich SE, Yee LM, Kuppermann MJA. Mode of delivery and postpartum depression: the role of patient preferences. *American Journal of Obstetrics and Gynecology*. 2015; 212(2): 229.e1-e7.
13. Tani F, Castagna VJT. Maternal social support, quality of birth experience, and post-partum depression in primiparous women. *The Journal of Maternal-Fetal and Neonatal Medicine*. 2017; 30(6): 689-692.
14. Johannes L. Putting on the Stipes to Ease Pain. *The Wall Street Journal*. 2010;19(2): 107-115.
15. Bridges T, Bridges C. Length, Strength and Kinesio Tape-eBook: Muscle Testing and Taping Interventions: Elsevier Health Sciences. Elsevier Health Sciences. 2016; 22(4): 35-40.

16. Yoshida A, Kahanov LJRism. The effect of kinesio taping on lower trunk range of motions. *Research in Sports Medicine*. 2007; 15(2): 103-112.
17. Kase K, Wallis J, Kase TJCTAotKTMre, McDuffie M. the Kinesio Taping Method Kinesio USA, LLC. International KTA. 2013; 17(1): 25.
18. Koss J, Munz J. What is the Current Level of Evidence and the Efficacy of Medical Taping on Circulation, Muscle Function, Correction, Pain and Proprioception. *Manuelle Therapie*. 2012; 16(03): 138-149.
19. El-Refaye GE, El Nahas EM, Ghareeb HOJBoFoPT. Effect of kinesio taping therapy combined with breathing exercises on childbirth duration and labor pain: a randomized controlled trial. *Bulletin of Faculty of Physical Therapy*. 2016; 21(1): 23.
20. Miquelutti MA, Silveira C, Cecatti JGJPt, practice. Kinesiologic tape for labor pain control: Randomized controlled trial. *Physiotherapy Theory and Practic*. 2019; 35(7): 614-621.
21. Shivananjani B. Effectiveness of Kinesiotaping and Acu-TENS on maternal and neonatal outcomes in the first stage of labor among primigravidas: A Comparative study: College of Physiotherapy, Sri Ramakrishna Institute of Paramedical Sciences. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019; 44(2): 27-39.
22. Abushaikha L, Oweis AJJJonp. Labour pain experience and intensity: a Jordanian perspective. *International Journal of Nursing Practice*. 2005; 11(1): 33-38.
23. Maharlouei N, Rezaianzadeh A, Hesami E, Moradi F, Mazloomi E, Joulaei H, et al. The preference of Iranian women to have normal vaginal or cesarean deliveries. . 2013; 18(11): 943.
24. Peacock S, Patel SJRip. Cultural influences on pain. *British Journal of Pain*. 2008; 1(2): 6-9.
25. Scott J, Huskisson E. Vertical or horizontal visual analogue scales. *Annals of the Rheumatic Diseases*. 1979; 38(6): 560.
26. Qorbanalipour K, Ghaderi F, Jafarabadi MA, Charandabi SM. Validity and reliability of the Persian version of modified Moos Menstrual Distress Questionnaire. *Iranian Journal of Obstetrics, Gynecology and Infertility*. 2016; 19(29): 11-18.
27. Phan NQ, Blome C, Fritz F, Gerss J, Reich A, Ebata T, et al. Assessment of pruritus intensity: prospective study on validity and reliability of the visual analogue scale, numerical rating scale and verbal rating scale in 471 patients with chronic pruritus. *Acta dermatovenereologica*. 2012; 92(5): 502-507.
28. Jamilian M, Jamilian HRJJoAUoMS. The effects of omega-3 and vitamin E on the treatment of primary dysmenorrhea: A randomized double-blind clinical trial. *Journal of Arak University of Medical Sciences*. 2012; 15(3): 1-7.
29. Eriksson K, Wikström L, Årestedt K, Fridlund B, Broström AJAnr. Numeric rating scale: patients' perceptions of its use in postoperative pain assessments. *Applied Nursing Research*. 2014; 27(1): 41-46.
30. Dencker A, Taft C, Bergqvist L, Lilja H, Berg M. Childbirth experience questionnaire (CEQ): development and evaluation of a multidimensional instrument. *BMC Pregnancy and Childbirth*. 2010; 10(1): 1-8.
31. Walker KF, Wilson P, Bugg GJ, Dencker A, Thornton JGJBp, childbirth. Childbirth experience questionnaire: validating its use in the United Kingdom. *BMC Pregnancy and Childbirth*. 2015; 15(1): 86.
32. Walker KF, Wilson P, Bugg GJ, Dencker A, Thornton JGJBp, childbirth. Childbirth experience questionnaire: validating its use in the United Kingdom. *BMC Pregnancy and Childbirth*. 2015; 15(1): 1-8.
33. Ghanbari-Homayi S, Dencker A, Fardiazar Z, Jafarabadi MA, Mohammad-Alizadeh-Charandabi S, Meedya S, et al. Validation of the Iranian version of the childbirth experience questionnaire 2.0. *BMC Pregnancy and q*. 2019; 19(1): 1-10.
34. Walker KF, Wilson P, Bugg GJ, Dencker A, Thornton JG. Childbirth experience questionnaire: validating its use in the United Kingdom. *BMC Pregnancy and Childbirth*. 2015; 15(1): 1-8.
35. Kaplan Ş, Alpayci M, Karaman E, Çetin O, Özkan Y, İltar S, et al. Short-term effects of Kinesio taping in women with pregnancy-related low back pain: a randomized controlled clinical trial. *Medical Science Monitor*. 2016; 22: 1297.
36. Naguib A, Rateb A, Megahed M, Elkady MJEBWshJ. Kinesio Taping for Labor Pain Control: A Randomized Controlled Trial. *Evidence Based Women's Health Journal*. 2021; 11(3): 273-284.
37. Haseli A, Eghdampour F, Ghiasi AJTIJoO, Gynecology, Infertility. Impact of Massage Therapy and Breathing Techniques on the Satisfaction of Primiparous Women with Childbirth. *The Iranian Journal of Obstetrics, Gynecology and Infertility*. 2018; 21(6): 18-26.
38. Hosseini L, Najari S, Haghhighzadeh MJH. Effect of Subcutaneous Injection of Sterile Water on Labor Pain, Type of Labor, and Satisfaction

- with Pain Management in Nulliparous Women. *Ebscohost*. 2010; 16(1): 11-15.
39. Khavandizadeh Aghdam S, Daryabakhsh AJTJJoO, Gynecology, Infertility. Effect of acupressure at Hugo point (LI4) on the process and outcomes of labor in nulliparous women. *The Iranian Journal of Obstetrics, Gynecology and Infertility*. 2012; 15(27): 14-20.