

## The Effects of Kinesio Tape on Low Back Pain and Disability in Pregnant Women

### Abstract

**Background:** Low Back Pain (LBP) is one of the most common complaints during pregnancy, which could cause performance disability. Kinesio tape is a drug-free elastic therapeutic cotton tape used in treating musculoskeletal problems. This study aims to determine the effects of Kinesio tape on LBP and disability in pregnant women. **Materials and Methods:** A total of 80 pregnant women with LBP who were referred to the comprehensive health service centers were randomly assigned into the two groups of Kinesio tape and adhesive tape. Pain intensity was determined by the visual analog scale before and on the 1<sup>st</sup>, 2<sup>nd</sup>, 7<sup>th</sup>, and 14<sup>th</sup> day after the intervention and the disability by Roland-Morris disability questionnaire before and on the 7<sup>th</sup> and 14<sup>th</sup> day after the intervention. Data analysis was performed by, Two-way repeated-measures ANOVA, Friedman, and Wilcoxon tests. **Results:** The intensity of pain decreased in both groups compared to the pre-intervention period; Kinesio ( $\chi^2 = 48.94$ ,  $df = 4$ ,  $p < 0.001$ ) control ( $\chi^2 = 22.94$ ,  $df = 4$ ,  $p < 0.001$ ); however, the comparison results of pain intensity were not different in the two groups at different times ( $p \geq 0.05$ ). The effects of time was significant (Two-way repeated-measures ANOVA,  $F_{1,83} = 10.63$ ,  $p < 0.001$ ), but the effects of time and group were not significant ( $F_{1,83} = 0.31$ ,  $p = 0.722$ ) and indicated a decreasing trend of functional disability in two groups. **Conclusions:** The Kinesio tape reduced the disability caused by LBP during pregnancy and had a lasting effect after the tape was removed.

**Keywords:** Disability evaluation, Iran, Kinesio tape, low back pain, pregnancy

### Introduction

Low Back Pain (LBP) is one of the most common musculoskeletal disorders.<sup>[1]</sup> Epidemiological studies show that approximately 45% to 56% of pregnant women develop LBP associated with pregnancy.<sup>[2]</sup> LBP in pregnancy is caused by the direct pressure placed by the fetus on the lumbosacral region.<sup>[3]</sup> Besides, it is associated with gestational age and is prevalent during the first trimester (16.7%), second trimester (31.3%), and third trimester (53%).<sup>[4]</sup> Most women experience LBP for the first time during pregnancy, and one-third of them believe that LBP is their most obvious problem during pregnancy with long-term effects.<sup>[5]</sup> In a study, 51% and 20% of the women reported LBP 1 and 3 years after delivery, respectively.<sup>[6]</sup> LBP is associated with psychological, social, and biophysical factors and causes functional disability more than any other condition.<sup>[7]</sup> Lack of physical activity due to LBP in pregnant women causes

more complications of childbirth and a C-section.<sup>[8]</sup>

Pharmacological and nonpharmacological methods are used in treating LBP.<sup>[8]</sup> However, most of these methods have some limitations due to the specific conditions of pregnancy.<sup>[9]</sup> For instance, paracetamol has little effect on LBP and is not recommended for frequent uses.<sup>[10,11]</sup> Similarly, nonsteroidal anti-inflammatory drugs (NSAIDs) are not recommended to be used after 30 weeks of gestation at the onset of LBP, due to the risk of premature closure of the arterial duct and oligohydramnios.<sup>[6,11]</sup> In addition, opioids, such as morphine and codeine, are classified as C drugs, and their use in late pregnancy is associated with the risk of respiratory depression in infants.<sup>[6]</sup> Therefore, it is necessary to use nonpharmacological methods that improve the condition of pregnant women and do not adversely affect the pregnancy and fetus.

Kinesio tape is a drug-free elastic therapeutic tape. It is made of cotton,

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water-resistant, and is activated by heat.<sup>[2,8,12]</sup> It is similar to the epidermis in thickness, which could increase its original length by 120% to 140%, with the same elasticity as that of skin.<sup>[7]</sup> Kinesio tape exerts its effect through two mechanisms; firstly, it affects skin ruffini receptors as well as pain receptors, thereby leading to the deep sensation of the skin; secondly, it affects the lymphatic system, fascia, muscles, and ligaments indirectly.<sup>[13]</sup> The use of tapes has no effect on the fetus, and no side effects have been reported in patients having used them.<sup>[3]</sup> In their study, Kaplan *et al.*<sup>[14]</sup> examined the effects of Kinesio taping on LBP associated with pregnancy. The results of their study showed that the intensity of LBP was lower in the group of the Kinesio tape and paracetamol than in the group that took paracetamol alone. In another study, Wahyuni *et al.*<sup>[15]</sup> compared the effects of transcutaneous electrical nerve stimulation (TENS) and Kinsey on LBP in pregnant women, the results showed that TENS was more effective than Kinesio in reducing LBP during pregnancy. Many studies have examined the effects of Kinesio taping in nonpregnant patients with nonspecific LBP. However, there is limited clinical experience and documentation showing the effectiveness of Kinesio taping in alleviating pregnancy-related LBP. Existing treatments for pregnancy-related LBP are not adequately identified and are not considered reliable by patients and clinicians. Kinesio taping will be a potential treatment if it is proved effective and tolerable. Therefore, this study aims to determine the effects of Kinesio taping on LBP and disability during pregnancy.

## Materials and Methods

The present study was performed on pregnant women who were referred to the comprehensive health service centers of Rafsanjan between January and September, 2019. This study was a single-blind clinical trial (IRCT20181210041911N) on 80 pregnant women. The sample size was based on Kaplan study<sup>[14]</sup> and using a statistical formula with a statistical power of 95% and test power of 80% and estimation of the standard deviation of pain intensity  $\sigma_1 = 1.81$  was calculated in the Kinesio tape group (Case)  $\sigma_1 = 1.81$  and estimation of the standard deviation of pain intensity  $\sigma_2 = 1.48$  was calculated in the placebo group ( $\alpha = 0.05$ ,  $\beta = 0.2$ ,  $\delta = 1.1$ ,  $k = 1$ ,  $n_2 = k \times n_1$ ). With the least difference in pain intensity between the two groups, which is clinically important, the sample size in each of the two groups was estimated to be equal to 36 people. Due to the possible attrition, 40 people in each group and 80 people in total were selected. The inclusion criteria were signing the informed consent forms, 18–40 years old,<sup>[2,14]</sup> gestational age (18–32 weeks),<sup>[2]</sup> mild to moderate pain in the lower back between T12 and gluteal folds (scoring 1–7 on VAS), no known intervertebral discopathy, having no skin lesion in the lumbosacral area, vertebral anomalies, skin allergy, having singleton pregnancies, no

history of LBP pre-pregnancy, no addiction, not consuming NSAIDs, and having no history of other nonmedical treatments, or having any uncontrolled medical conditions. The exclusion criteria consisted of allergy to Kinesio tape, Kinesio tape dis-attachment before the 5<sup>th</sup> day.

The study samples were selected randomly. For this purpose, out of eight comprehensive health service centers in Rafsanjan four centers were selected randomly via computerized assignment. In this order, the first and second centers were assigned to the intervention group and the third and fourth centers were assigned to the control group. A demographic profile form was completed by the participants. The participants were asked to rate their pain as shown by a Visual Analogue Scale (VAS).<sup>[16]</sup> They also completed the Roland-Morris Disability Questionnaire (RMDQ) for assessing performance disability. This questionnaire consisted of 24 questions about problems that might occur in an individual's daily life concerning painful symptoms in the spine. The participants answered "yes" or "no" to each question. The validity of this questionnaire has been confirmed by some Iranian studies. In addition, the reliability of this questionnaire was reported in terms of the Cronbach's alpha coefficient by Afshar Nejad's research (2009) being equal to 0.88.<sup>[17]</sup>

The researcher was trained by a physician specializing in physical medicine and received confirmation from her. The researcher placed the Kinesio tapes (Kinesiology tape, 5 cm\*5 m Rol, made in Japan) at the desired points in the intervention group. Firstly, the implant area was shaved, and the patient was asked to bend forward. Next, a Kinesio tape with an approximate length of 20 cm and a width of 5 cm with 50% tension was placed on the skin cleaned without grease and lotion. from the bottom of the pain area to the top in the vertical position with a distance of 2 cm from the spine. Another strip was placed in the same way on the other side of the spine at a distance of 4 cm from the previous strip. Next, another strip with the same dimensions, but with 70% tension was transversely attached to the sacroiliac joint. To reduce the pressure of the lumbar vertebrae and support abdominal muscles, a tape was placed without stretching under the abdomen. In the control group, the placebo tape, i.e. the Leukoplast adhesive tape with the width of 5 cm was placed in the same way in the intervention group. On the 1<sup>st</sup>, 2<sup>nd</sup>, 7<sup>th</sup>, and 14<sup>th</sup> days after the intervention, women were asked via a telephone call to determine the amount of pain based on VAS. In addition, on the 7<sup>th</sup> and 14<sup>th</sup> days after the intervention, the Roland-Morris Disability Questionnaire was completed via calling women. In the meantime, on the 5<sup>th</sup> day, the tapes were removed by women. The data were analyzed by the analyst through SPSS (Version 22, IBM Corporation, Armonk, NY, USA). The data were analyzed in SPSS software version 22 and after rejecting the normality of pain-related data (using Kolmogorov-Smirnov test). The Friedman test compared the mean rank, middle,

and quarter ranges pain intensity at different times in each group as well as the Wilcoxon test was used for pain intensity in each group at different times. Due to the normality of disability data (using Kolmogorov-Smirnov test), the two-way repeated measure ANOVA test was used to compare the mean and standard deviation of disability in different groups and times.

### Ethical considerations

The present research project was approved by the Ethics Committee of Rafsanjani University of Medical Sciences with the code IR.RUMS.REC.1397.183. All participants were informed of the objectives of the study and signed an informed consent form, the principles of voluntary participation, anonymity, and confidentiality for the participants, and accuracy and bailment for the texts were respected throughout the study.

### Results

Out of the 80 pregnant women with pregnancy-related pain, 40 were randomly assigned to the Kinesio group (n = 40) and 40 to the control group. Due to local allergic reactions to the tape, one patient in the Kinesio group and three patients in the control group who used Leukoplast tape were excluded from the study. Accordingly, out of all eligible cases (n = 80), 76 patients completed the study, with only their data having been included in the statistical analysis [Figure 1].

The mean and the standard deviation of the demographic variables showed, there was no significant difference between the two groups [Table 1]. The results of the Kolmogorov-Smirnov test showed that the pain intensity variable did not have a normal distribution; therefore, instead of two-way repeated-measures ANOVA, Friedman nonparametric test was used [Table 2]. In both groups, intervention and control of pain intensity at different times were significant Kinesio (Friedman test,  $\chi^2 = 48.94$ ,  $df = 4$ ,  $p < 0.001$ ) control (Friedman test,  $\chi^2 = 22.94$ ,  $df = 4$ ,  $p < 0.001$ ). Comparison of mean rank pain intensity in the intervention and control groups at different times of Wilcoxon test was used [Table 3]. The results showed that the mean rank of pain intensity in the intervention group was significant at all times except the 14<sup>th</sup> day compared

to the 2<sup>nd</sup> and 7<sup>th</sup> days ( $p < 0.05$ ). Also in the control group, only before the intervention with other times and the 2<sup>nd</sup> day with the 7<sup>th</sup> day was significant ( $p < 0.05$ ) and was not significant at other times ( $p \geq 0.05$ ). Performance disability was also assessed in two groups. To compare the mean and standard deviation of performance disability in the two interventions and control groups in three different stages before the intervention on the 7<sup>th</sup> and 14<sup>th</sup> days after the intervention, two-way repeated-measures ANOVA was used [Table 4].

According to the results, the effects of time was significant (Two-way repeated-measures ANOVA,  $F_{1,83} = 10.63$ ,  $p < 0.001$ ), and the disability trend was decreasing in the Kinesio group based on the measurements; however, the interaction effects of time and group were not significant ( $F_{1,83} = 0.31$ ,  $p = 0.722$ ). In addition, the disability was not different in the Kinesio and control groups. In general, disability significantly decreased in both groups, but there was no statistically significant difference between the two groups in comparisons despite a higher reduction in the disability rate in the Kinesio group.

### Discussion

According to the results, pain intensity decreased in both groups after interventional, and the reduction was greater in the Kinesio group although the pain intensity at different times did not show a statistically significant difference between the two groups.

The marked decrease in LBP in both groups after intervention could suggest a strong placebo effect in improving LBP during pregnancy. As this type of pain has no pathological causes and is not usually severe, it could be relieved using complementary methods, such as adhesive tapes at the pain site.

Besides, it could be argued that the reduction in pain in both groups was due to the patients' expectation of the treatment, which had an effect on pain relief. On the other hand, the reduction in the mechanical stimulation of soft tissues when the spine moved after using the Kinesio or leucoplast bands was another reason for achieving similar results in the Kinesio and placebo groups.

As another finding in this study, examination of the dysfunction showed that following the use of Kinesio

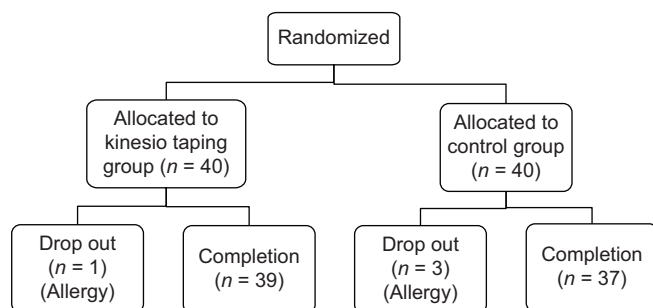


Figure 1: Description of study design

Table 1: Demographic characteristics of participants

	Kinesio	Control	t-test		
	Mean (SD*)	Mean (SD)	t	df**	p
Age	30.40 (4.40)	28.87 (6.21)	1.27	78	0.208
Gestational age	24.75 (4.38)	25.95 (3.70)	1.32	78	0.190
BMI***	24.82 (4.08)	24.70 (4.11)	0.13	78	0.896
Parity	0.93 (0.87)	0.92 (0.85)	0.05	78	0.959
Gravidity	2.10 (1.12)	2.20 (1.18)	0.38	78	0.699

\*Standard deviation, \*\*Degree of Freedom, \*\*\*Body mass index

**Table 2: A comparison of the mean rank scores pain intensity in the groups at different times**

Pain intensity Time application	Kinesio					Friedman test	Control					Friedman test
	Mean (SD)	Percentiles			Mean rank		Mean (SD)	Percentiles			Mean rank	
		25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>				25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>		
Before application	5.26 (1.19)	5	5	6.50	43.11	Chi-squares=48.94, df=4, p=< 0.001	5.03 (1.22)	4.50	5	6	37.89	Chi-squares=22.94, df=4, p=<0.001
1 day after application	4.29 (1.63)	3	4	5	39.14		4.33 (1.64)	3.62	4.75	5	41.86	
2 days after application	3.86 (1.62)	3	4	5	37.41		4.29 (1.62)	3	4.25	5	43.59	
7 days after application	3.43 (1.65)	2	3.50	4	38.69		3.81 (2.02)	2.62	3.50	5	42.31	
14 days after application	3.50 (2.01)	2	3.25	5.50	37.61		4.06 (2.17)	2.62	4	6	43.39	

**Table 3: Results of Wilcoxon test for pain intensity in two groups at different times**

Variable	Group	Time (I)*	Time (J)**	Mean rank	Wilcoxon signed ranks test p
Pain intensity	kinesio	Before application	1 day after application	43.11	
			2 days after application	39.14	<0.001
			7 days after application	37.41	<0.001
			14 days after application	38.69	<0.001
			37.61	<0.001	
		1 day after application	2 days after application	39.14	
			7 days after application	37.41	0.034
			14 days after application	38.69	0.005
			37.61	0.021	
		2 days after application	7 days after application	37.41	
			14 days after application	38.69	0.044
			37.61	0.188	
		7 days after application	14 days after application	38.69	
			37.61	0.691	
	Control	Before application	1 day after application	37.89	
			2 days after application	41.86	<0.001
			7 days after application	43.59	<0.001
			14 days after application	42.31	<0.001
		1 day after application	2 days after application	41.86	
			7 days after application	43.59	0.978
14 days after application			42.31	0.078	
2 days after application		7 days after application	43.39	0.372	
		14 days after application	43.59		
		42.31	0.028		
7 days after application	14 days after application	43.39	0.246		
	42.31	0.276			

\*\*\*(IJ) Measurement steps ( Before application ,1 day after application, 2 days after application ,7 days after application\* 14 days after application)

**Table 4: Comparison of mean and standard deviation of disability in two groups**

Time application performance disability	Kinesio Mean (SD)	Control Mean (SD)	t independent p	Source	Two-way repeated-measures ANOVA				
					Sum square	Mean square	F	p	Effect size
Before application	14.05 (4.48)	13.67 (5.08)	0.741	Time	213.41	116.61	10.63	<0.001	0.12
7 days after application	11.85 (5.00)	12.07 (3.86)	0.837	Time group	6.01	3.28	0.31	0.722	0.00
14 days after application	11.60 (5.69)	11.95 (5.00)	0.785	Error	1566.58	10.97			

taping, the dysfunction decrease was significantly compared to before using it. Besides, the effect of time was significant (Two-way repeated-measures ANOVA,  $F_{1,83} = 10.63$ ,  $p < 0.001$ ) which indicated a decrease in functional disability in the Kinesio group during the assessments. In addition, the effect of the interaction between the time and the groups was not significant ( $F_{1,83} = 0.31$ ,  $p = 0.722$ ) this indicates that despite the decrease in functional disability in the Kinesio group over time, there was no significant difference between the two groups.

The reason for the descending trend in functional disability in the Kinsey group during the follow-up period compared to the control group could be that the Kinesio tape affected mechanical receptors of the skin and the thoracolumbar fascia. In addition, it relaxed the entire tension and fertile tissues helping, change the intensity of the pain. The Kinesio tape also stopped a vicious cycle in which the intensity of the pain caused muscle imbalance and tension.

Kaplan *et al.*<sup>[14]</sup> evaluated the effect of the 5-day intervention of paracetamol and the Kinesio tape and compared it against that of paracetamol alone on pain and disability. The results showed that pain intensity and disability improved significantly in both groups as against before the intervention, having been similar to the results of our study. Besides, the study showed that the Kinesio group was more effective than the control group in all outcomes, and that the combination of the Kinesio tape with paracetamol was more effective than the paracetamol treatment alone. Although the reduction in pain and disability in the recent study was higher in the Kinesio group, no significant differences were observed between the two groups. The differences observed in the two studies could be due to the fact that there was no placebo group in the study of Kaplan *et al.*<sup>[14]</sup> so the placebo effect could not be controlled. Besides, the present study had a longer follow-up period. This was one of the strengths of the present study. A study by Mohamed *et al.* (2018)<sup>[18]</sup> reported that the combination of Kinesio tape and postural correction exercises was more effective than exercise alone. In addition, the study of Mohamed (2018)<sup>[19]</sup> showed that the combination therapy of the Kinesio tape and paracetamol was more efficient than TENS and paracetamol. However, either of these two studies examined the effect of the Kinesio tape independently, and both studies had no placebo group.

Wahyuni *et al.*<sup>[15]</sup> examined the effect of TENS and the Kinesio tape on LBP in pregnant women in the third trimester of pregnancy. Accordingly, they showed that the effectiveness of TENS in reducing LBP in pregnant women was higher than that of the Kinesio tape in the third trimester, which was inconsistent with the present study. Besides, in the study of Mahjur “quoted from Gonzalez Enciso”,<sup>[20]</sup> the use of the Kinesio tape neither improved the function, and nor relieved pain in people with nonspecific LBP. The inconsistency of these results with those of the

present study was probably due to their smaller sample size (18 people in the Wahyuni study and 14 people in Gonzalez Enciso’s study). Accordingly, the small sample size was an important factor in obtaining inconsistent results as the researchers themselves concluded that more research was needed with larger sample sizes. In the present study, pain decreased in both groups compared to the pre-intervention period. In the Kinesio group, pain relief continued even up to day 7 of the study, i.e., 2 days after tape removal. Yet, it did not happen in the control group. Accordingly, this result indicates the high durability of the effect of the Kinesio tape. This finding was confirmed by the study of Natalia Kuciel *et al.*<sup>[10]</sup> who examined the effectiveness of the Kinesio tape in reducing pelvic girdle pain in pregnant women. Besides, this finding could be probably explained by the fact that the Kinesio therapeutic tape restored the proper muscle tone in some cases and then maintained it by restoring the correct movement or postural patterns. The important finding of this study was that, in addition to its uncomplicated nature, Kinesio taping could be recommended in cases where other treatments would be contraindicated in pregnant women.

This study was an experimental study with a control group that selecting a sufficient number of samples ensures the validity of the data. The limitation of our study was the use of subjective tools to measure the dependent variable. This is the case in all studies that measure pain. The data collection was done after the intervention by telephone, which was also a limitation of our research.

## Conclusion

The use of the Kinesio tape reduced the disability caused by LBP during pregnancy and had a lasting effect after the tape was removed. Therefore, we recommend the use of the Kinesio tape as a supplement without drug effects and with a significant effect on the durability of reducing LBP in pregnant women.

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## Conflicts of interest

Nothing to declare.

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