

## Effect of Kinesiotaping in Reducing Low Back Pain in Pregnant Women: A Meta-Analysis

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### ABSTRACT

**Background:** Pregnancy causes physiological changes that affect the musculoskeletal system and usually poses a risk of low back pain. This study aims to analyze the effect of kinesiotaping on reducing low back pain in pregnant women based on the results of a number of previous primary studies.

**Subjects and Method:** This study uses a meta-analysis method with articles searched using the search keywords "Low back pain" OR "pelvic girdle pain" AND "pregnancy" OR "kinesiotaping" OR "kinesio tape" AND "pain reduction" OR "VAS" AND "Randomized Controlled Trial" OR "RCT" from PubMed, google scholar and science direct and processed using RevMan 5.3. The independent variable is kinesiotaping and the dependent variable is low back pain.

**Results:** 9 RCT articles that fit into the inclusion criteria, with a total of 572 samples. Pregnant women with low back pain who received kinesiotaping had an average VAS score of 1.23 units lower than those without kinesiotaping, and the effect was statistically significant (SMD= -1.23; 95% CI -2.30 to -0.16; p= 0.02). In other words, kinesiotaping is effective in reducing low back pain in pregnant women.

**Conclusion:** Kinesio Taping has an effect on reducing low back pain in pregnant women.

**Keywords:** kinesiotaping, low back pain, pregnancy, visual analogue scale

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### BACKGROUND

Pregnancy is a period in which the fetus develops in the uterus which lasts for 40 weeks or 280 days calculated from the first day of the last menstruation until the time of birth arrives, pregnancy is classified into trimester I which lasts for 12 weeks, trimester II which lasts for 15 weeks and trimester III lasts for 13 weeks (Mardinasari et al., 2022).

Pregnancy also causes physiological changes caused by anatomical and functional needs in pregnant women where the uterus enlarges, loads on the lumbar spine, hip joints, and lower extremities increase due to weight gain in pregnancy (Berber and Satılmış, 2020). Musculoskeletal and usually pose a risk of low back pain (Gharaibeh et al., 2018). In a study (Xue et al., 2021) it has been reported that women who suffer from severe low back pain during pregnancy have

a very high risk of experiencing recurrent pain during subsequent pregnancies and later in life, therefore the problem of low back pain during pregnancy cannot be resolved. ignored

The prevalence of low back pain increases during pregnancy by 20% to 90% (Chamnankrom et al., 2021), with the following study results 2 lower back pain before pregnancy is about 40%, at 20 weeks of gestation 76%, at 32 weeks of gestation 90%. At 20 weeks of gestation, 39% reported mild pain, 20% mild pain and 17% reported severe pain (Backhausen et al, 2019). Based on data from the Ministry of Health of the Republic of Indonesia in 2018, the number of pregnant women in Indonesia reached 5,291,143 people. Meanwhile, based on data from the 2018 Basic Health Research, the prevalence of pregnant women in Indonesia is 4.8%, while for the West Java region it is 5.3%. The results of research on pregnant women in various regions of Indonesia reach 60-80% of people who experience low back pain during pregnancy.

Various conditions can act as etiological factors that cause low back pain during pregnancy such as hormonal, vascular, and biomechanical changes; trauma; metabolic factors; poor muscle control; emphasize; weight gain; a sedentary lifestyle; loss of musculoskeletal function; smoke; young age during pregnancy; joint hypermobility; infection; and low back pain in previous pregnancies (Mahishale and Borkar, 2016; Berber and Satılmış, 2020).

For pregnant women, the use of certain drugs is not recommended because they have a negative impact on the fetus, can affect the growth and development of the fetus in the womb and increase the risk of birth defects, non-pharmacological treatments that can be done for low back pain related to pregnancy are the use of kinesiotaping (Macedo et al., 2019).

The use of kinesiotaping has several positive effects such as supporting injured muscles and joints; improvement of the function and position of the fascia; improve segmental stability; activation of blood and lymph flow by lifting the skin; and deactivation of pain by reducing nociceptive stimuli (Mehran et al., 2012).

Kinesiotaping can effectively adjust the skin and apply pressure, increase the space under the skin or between the dermis and epidermis, promote subcutaneous blood circulation and lymphatic reflux, and accelerate the healing of the injured site through its tension, thereby helping to remove pain-causing substances; kinesiotaping can also produce continuous neural sensory input to skin receptors, thereby relatively inhibiting pain sensory input and increasing its ability to reduce soft tissue mechanical stimulation during lumbar movement (Azab et al., 2020).

The findings from several studies in the field report that kinesiotaping complementary nursing is effective and safe to reduce low back pain in pregnant women. Pain reduction will be more significant if kinesiotaping is combined with other complementary therapies such as: pelvic tilt exercise, back exercises, and breathing exercises (Marfu'ah, 2021).

The use of taping on joints can increase joint stability so that it is effective in reducing muscle spasm and pain. The mechanism of action of kinesio taping includes: supporting injuries to muscles and joints, improving fascia function and position, increasing joint segment stability, improving blood vessel flow and lymph flow by lifting the skin layer, deactivating pain by reducing nociceptor stimulation (Dyani et al., 2019). This study aims to analyze the effect of kinesiotaping on the reduction of low back pain in pregnant women based on

the results of a number of previous primary studies using meta-analysis.

## SUBJECTS AND METHOD

### 1. Study Design

This research is a systematic review and meta-analysis that uses secondary data from the results of previous studies. The approach used in the meta-analysis is a deductive approach (top-down approach) using Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA) (Mikolajewicz and Komarova, 2019a). Article search was conducted in March 2022. The databases used in this search are Google scholar, Pubmed, and Sciencedirect. Search articles using the term Mesh with the keywords "Low back pain" OR "pelvic girdle pain" AND "pregnancy" OR "kinesiotaping" OR "kinesio tape" AND "pain reduction" OR "VAS" AND "Randomized Controlled Trial" OR "RCT".

### 2. Inclusion Criteria

Inclusion criteria 1) full paper articles using a Randomized Control Trial (RCT) study design, 2) The size of the relationship used is Mean SD, 3) The research subjects are pregnant women with low back pain, 4) The intervention given is kinesiotaping, 5) The comparison is without therapy or other therapy, 6) The outcome of the study is a decrease in low back pain as measured using VAS (Visual Analogue Scale).

### 3. Exclusion Criteria

The exclusion criteria for this research article were 1) articles published in languages other than English and Indonesian, 2) articles before 2010.

### 4. Study Variables

The independent variable is kinesiotaping and the dependent variable is low back pain.

### 5. Operational Definition of Variables

All research characteristics are used to decide whether a study is eligible to be included in a systematic review selected

based on the PICO (Population, Intervention, Comparison, Outcome) framework. The study population was low back pain in pregnant women with gestational age between 25-35 weeks. The intervention given is kinesiotaping. As a comparison (Comparison) is not kinesiotaping or other therapies. Outcome used to measure the reduction of low back pain in pregnant women using VAS (Visual Analogue Scale)

**Kinesiotaping** is an elastic waterproof bandage with acrylic adhesive produced from a special material that allows movement. (Kaplan et al., 2016a). With this type of taping cut I Strip: The stretch focuses on the therapeutic zone that is placed directly on the target tissue. Y strip: The strain spreads through and between the 2 tails of the target tissue. X Cut: The stretch focuses directly on the target tissue and spreads through the ends of the tails.

**Low back pain** is one of the musculoskeletal disorders or complaints localized between the XII rib and the inferior gluteus (Mahmud et al., 2021). Assessment for pain using the VAS (Visual Analogue Scale).

### 6. Study Instrument

The study was carried out using the PRISMA flow diagram and assessing the quality of research articles using the Critical Appraisal Checklist for Randommized Controlled Trial Study.

### 7. Data Analysis

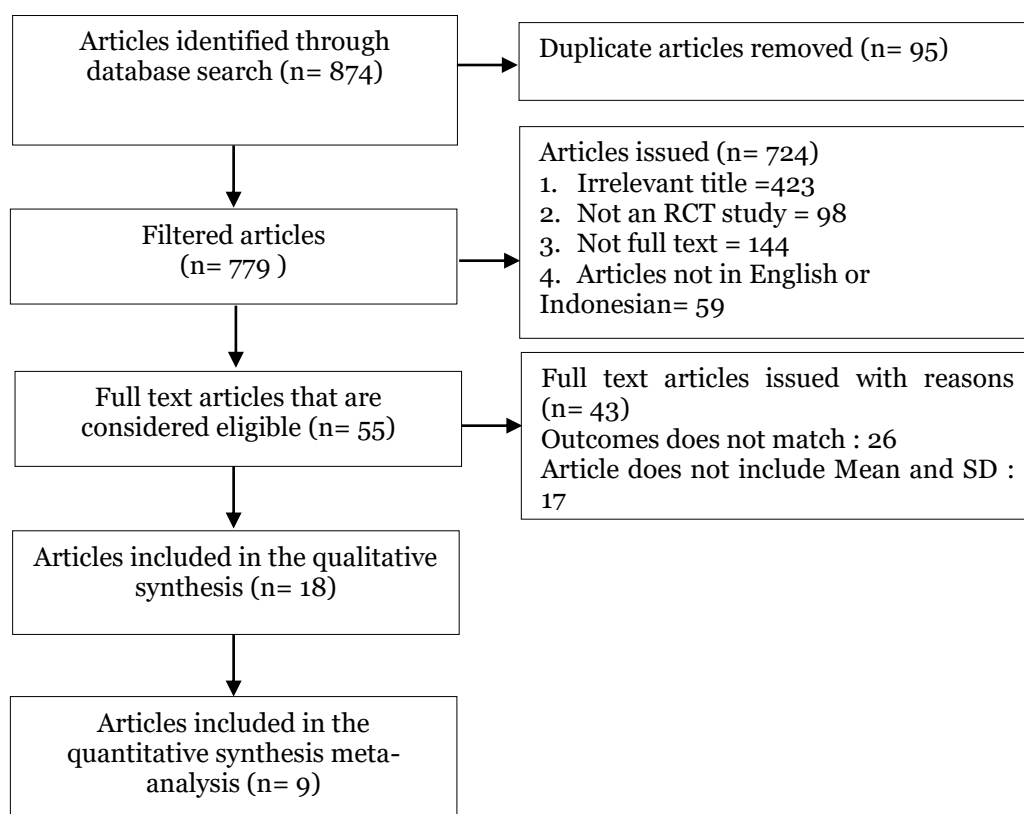
The data in this study were analyzed using the RevMan 5.3 application, to calculate the effect size and heterogeneity of the study. The results of data processing are presented in the form of forest plots and funnel plots.

## RESULTS

The article selection process uses the PRISMA flow chart. A total of 874 articles consisting of 858 obtained from Google Scholar and 16 from Pubmed. A total of 95 articles were deleted because they were

duplicate articles, leaving 797 articles. Then as many as 724 articles were issued on the grounds that the title was irrelevant, the article was not full text, was not an RCT study, and was not in English and Indonesian. The full text of the article that was declared worthy contained 55 articles. There were 12 articles eligible for inclusion in the qualitative synthesis, with 43 articles excluded because the outcome was not appropriate. Finally, 9 articles were included in the meta-analysis (figure 1).

Primary research on the effect of kinesiotaping on low back pain in pregnant women with 9 studies located in Thailand, Iran, China, Poland, Turkey, and Cairo. Assessment of article quality using CASP for RCTs (Table 1). The average research subjects were low back pain in pregnant women with gestational age between 25-35 weeks, type I kinesiotaping (along both sides of the spine with tension 30-50% for acute pain) Kinesio Taping method was used for a period of 2 weeks rest 24 hours after 3 days (Table 2).



**Figure 1. PRISMA flow diagram**

**Table 1. Assessment of the quality of research on Effect of Kinesiotaping in Reducing Low Back Pain in Pregnant Women**

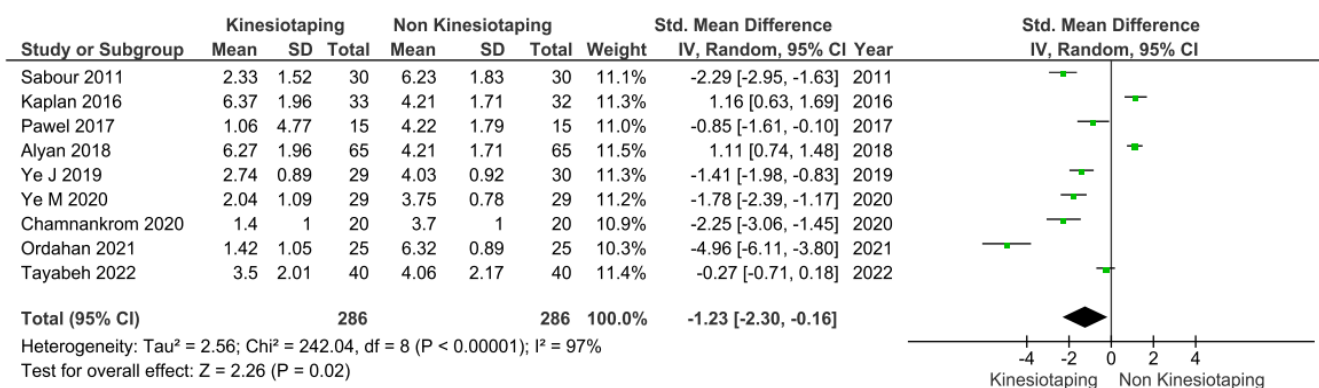
No	Checklist of questions	Publications (Author and Year)								
		Sabbour and Omar (2011)	Kaplan et al. (2016)	Kalinowski and Krawulska (2017)	Alyan and Yousef (2018)	Ye J 2019	Ye M 2020	Chamnan krom et al 2021	Ordahan et. al 2021	Aalishahi et al 2022
1	Does the experiment clearly address the clinical problem?	1	1	1	1	1	1	1	1	1
2	Was the intervention given to the patient randomized?	1	1	1	1	1	1	1	1	0
3	Were all patients included in the study properly accounted for in the conclusions?	1	1	1	1	1	1	1	1	1
4	Are patients, health workers, and researchers blinded?	0	0	0	0	0	0	0	1	0
5	Were the study groups similar at the start of the study?	1	1	1	1	1	1	1	1	1
6	Outside of the intervention studied, were the study groups treated equally?	1	1	1	1	1	1	1	1	1
7	Is the effect of the intervention large enough?	1	1	1	1	1	1	1	0	1
8	How precise is the estimation of the effect of the intervention?	1	1	1	1	1	1	1	0	1
9	Do the benefits provided by the intervention outweigh the costs and disadvantages?	1	1	1	1	1	1	1	0	1
10	Are the results applicable to the context of practice or local populations?	1	1	0	1	1	1	1	1	1
11	Are all other clinically important outcomes considered in this article?	1	1	0	1	1	1	1	1	1
Total		10	10	9	10	10	10	10	8	10

Note: Yes= 1 No= 0

**Table 2. Table of studies Effect of Kinesiotaping in Reducing Low Back Pain in Pregnant Women**

Author (year)	Country	Study Design/ Sample Size	Population	Intervention	Comparison	Outcome
Ordahan et al. (2021)	Turkey	RCT Experiment : 25 Control : 25	Pregnant Woman with Sacro Iliac Joint Pain	Kinesio taping, with the installation of an I-shaped taping with a stretch towards the transverse 80%, then adhesive is given to the right to the left sacroiliac joint, the procedure is repeated once a week for 5 weeks + Pelvic stabilization exercises	Kinesio taping is given without stretching the right left sacroiliac + Pelvic application and 5 days after stabilization exercises KT was removed	The results of Kinesio taping index: $p < 0.01$ were statistically significant in reducing pain 3 days after application and 5 days after stabilization exercises KT was removed
Kaplan et al. (2016)	Turkey	RCT Experiment: 33 Control : 32	Pregnant women. Maternal age between 18 and 40 years, all parity, gestational age between 10 and 30 weeks,	Kinesio Taping, I shape horizontal and vertical + Paracetamol	Paracetamol	Results of kinesiotaping+paracetamol : $p < 0.01$ significantly Reduced lower back pain in pregnant women
Alyan and Yosep (2018)	Cairo	RCT Experiment: 65 Control : 65	Pregnant women. Maternal age between 20-45 years, gestational age 10-30 weeks	Kinesio taping + Paracetamol	Tens + Paracetamol	Results: $p < 0.01$ significantly Reduced low back pain in pregnant women in the first week
Chamnankrom et al. (2020)	Thailand	RCT Experiment : 20 Control: 20	Pregnant women with mechanical low back pain and between 18 and 40 years old, with a gestational age between 28 and 38 weeks	Kinesiotaping (stretched 50%) with trunk flexion position	Placebo taping 50% stretch with the patient standing upright	Results of kinesiotaping: $p < 0.001$ lower back pain reduced after one week of wearing the plaster

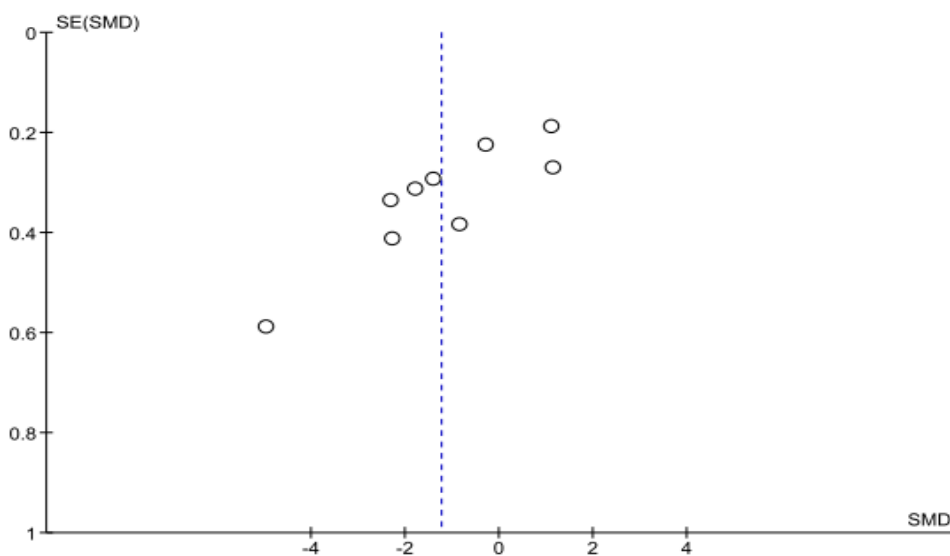
Author (year)	Coutry	Study Design/ Sample Size	Population	Intervention	Comparison	Outcome
Tayabeh et al. (2022)	Iran	RCT Experiment : 40 Control : 40	Pregnant women with mechanical low back pain and between 18 and 40 years old, with a gestational age between 18 and 32 weeks	kinesiotape	adhesive tape	Results: p<0.001 significantly reduced lower back pain after kinesiotaping was removed
Sabbour and Omar (2011)	Cairo	RCT Experiment: 30 Control : 30	Pregnant women aged 25-35 years with a gestational age of 29 to 37 weeks	Kinesio tape + pelvic tilting + exercise	Pelvic tilting + kegel exercise	Kinesiotaping : p<0.001 significantly reduced lower back pain during late pregnancy
Kalinowski and Krawulska (2017)	Poland	RCT Experiment: 15 Control :15	28-40 weeks gestation	Kinesiotaping	Placebo taping	Kinesiotaping : p<0.001 significantly reduced lower back pain during late pregnancy
Ye J (2019)	China	RCT Experiment : 29 Control : 30	Maternal age 21-35 years gestational age 16-40 weeks	KT+Exercise therapy+Low back pain health guidance 50% tention	Placebo taping+Exercise therapy+Low back pain health guidance	Kinesiotaping reduces lower back pain in the last trimester of pregnancy
Ye M (2020)	China	RCT Experiment: 30 Control : 30	Maternal age 27 years gestational age 29– 40 weeks	KT+Psychosupportive therapy 20% tention	Psychosupportive therapy	Kinesiotaping reduces lower back pain in the last trimester of pregnancy



**Figure 2. Forest plot of the effect of kinesiotaping in reducing low back pain in pregnant women**

The forest plot in Figure 2 shows that there is an effect of kinesiotaping on reducing low back pain in pregnant women. Pregnant women with low back pain using kinesiotaping had an average VAS score of 1.23 units lower than without kinesiotaping, and the effect was statistically significant (SMD = -1.23; 95% CI -2.3 to -0.16; p = 0.02). In other words, Kinesiotaping is effective in

reducing low back pain in pregnant women. The forest plot also shows the heterogeneity of effect estimates between studies in this meta-analysis (I<sup>2</sup> = 97% ; p < 0.001). Thus, the calculation of the average estimated kinesiotaping effect from all studies in this meta-analysis uses a random effects model (REM) approach.



**Figure 3. Funnel plot of the effect of kinesiotaping in reducing low back pain in pregnant women**

The funnel plot in Figure 3 shows the asymmetric distribution of the estimated effect on the right and left of the average vertical line of the estimated effect. The estimated effect is more visible to the left of

the vertical line than to the right. So the funnel plot indicates that there is publication bias. Due to the tendency of the distribution of effect estimates to the left of the one-way mean vertical line with the



average effect estimation diamond located to the right of the null hypothesis vertical line in the funnel plot, the publication bias indicates a tendency to overestimate the kinesiotaping effect.

## DISCUSSION

These results are in agreement with a meta-analysis (Xue et al., 2021) showing that kinesiotaping, either alone or in combination with other common therapies, results in greater pain relief and functional improvement in pregnant women with low back pain. Another study stated that for patients with low back pain during pregnancy, progressive muscle relaxation therapy and kinesiotaping can help reduce lower back pain (Chen et al., 2020).

Complementary kinesiotaping nursing is considered effective and safe to reduce low back pain in pregnant women. Pain reduction will be more significant if kinesiotaping is combined with other complementary therapies such as: pelvic tilt exercises, back exercises, and breathing exercises (Marfu'ah, 2021). The use of taping on joints can increase joint stability so that it is effective in reducing muscle spasm and pain. The mechanism of action of kinesio taping includes: supporting injuries to muscles and joints, improving fascia function and position, increasing joint segment stability, improving blood vessel flow and lymph flow by lifting the skin layer, deactivating pain by reducing nociceptor stimulation (Dyani et al., 2019).

Another study that shows that kinesiotaping has an effect on reducing low back pain is according to Prabowo and Wahyuni, (2012) where the use of 2 x a week for 2 weeks accompanied by exercises on the lower back can relax the muscles of the lower back, maintain the range of motion of the pelvic and lumbosacral joints so that pain reduction occurs. In terms of correcting

joint problems, kinesiotaping works by improving the alignment resulting from muscle spasm and shortening, normalizing muscle tone and abnormalities of the fascia of the joint, increasing the range of motion, and reducing pain.

Kinesiotaping is a non-invasive, painless method that has fewer side effects (Ay et al., 2017). Kinesiotaping can effectively adjust the skin and apply pressure, increase the space under the skin or between the dermis and epidermis, improve subcutaneous blood circulation. and lymphatic reflux, and accelerates the healing of the injured site through its tension, thereby helping to remove pain-causing substances. Therefore, Kinesiotaping can be used as an alternative therapy in medicine (Azab et al., 2020).

This meta-analysis shows that kinesiotaping has an effect on reducing low back pain in pregnant women. Pregnant women with low back pain who received kinesiotaping intervention experienced a decrease in pain as measured using the VAS (Visual Analogue Scale) scale.

## AUTHORS CONTRIBUTION

Atik Handariati is the main researcher who selects topics, searches for, and collects research data. Eti Poncorini Pamungkasari and Bhisma Murti played a role in analyzing and analyzing research data.

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### CONFLICT OF INTEREST

The study was conducted without any commercial or financial relationship that could be construed as a potential conflict of interest.

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