

The Effect of Kinesiotaping Therapy Augmented with Pelvic Tilting Exercises on Low Back Pain in Primigravidas During the Third Trimester

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ABSTRACT

Objective: The study was designed to evaluate the analgesic effect and possible adverse effects of kinesiotaping augmented with pelvic tilting exercises on low-back pain in primigravidas during the last trimester. **Patients and methods:** Sixty primigravidas in third trimester suffering from low back pain. Their age ranged from 25-35 years with mean value (29.08 ± 5.08), ranged from 29 to 37 weeks gestation with mean value (30.7 ± 4.96) and their body mass index not exceeding 40 Kg/m^2 with mean value (34.21 ± 6.96). The subjects were selected from the obstetric outpatient clinic, Kasr El-Aini Hospital, Faculty of medicine, Cairo University. All the women were randomly divided into two equal groups in numbers. Group A (control group) 30 women and Group B (study group) 30 women. All women in both groups received pelvic tilting exercises and postural advices however group B received kinesio taping techniques prescribed for low back pain during pregnancy for two weeks, in two applications each of them continued for three days with one day as rest in between them, in addition to pelvic tilting exercises and postural advices as group A. All patients in both groups were evaluated for pain severity, functional disability and the curvature of the lumbar region before participation in the study and after two consecutive weeks. **Results:** The results of both groups (A and B), in (VAS) and Oswestry disability questionnaire scores showed a highly significant ($P < 0.01$) decreased in pain scores both groups, but for Oswestry disability questionnaire scores in group A pre and post treatment results there was no significant difference. However, there was a highly significant decreased ($P < 0.01$) in group (B) compared to group (A) after the end 14th day of the treatment in pain and functional disability scores respectively. Group (A) showed a highly significant ($P < 0.01$) increased in the degree of lumbar lordosis results while, group (B) showed significant ($P < 0.05$) increased in the degree of lumbar lordosis results, Also, Comparing the results of both groups (A and B) after the end of the treatment there was no significant difference ($P > 0.05$). **Conclusion:** it can

be concluded that kinesiotaping augmented with pelvic tilting exercises is an effective method in treatment of low back pain during late pregnancy.

Key Words: Kinesio taping, pelvic tilting exercise, Low back pain during pregnancy.

INTRODUCTION

Back pain in pregnancy is very common. It is estimated that between 50% and 80% of women experience some form of back pain during pregnancy 9% claimed they were completely disabled by pain, this discomfort most commonly last months of pregnancy. Such pain can range from mild pain associated with specific activities to acute back pain that can become chronic back pain. Studies show that lower back pain in pregnancy usually occurs between the fifth and seventh month of being pregnant. In some cases, pregnancy pain in the lower back can begin as early as 8 to 12 weeks after becoming pregnant. Women with pre-existing lower back problems are at higher risk for back pain, and their back pain can occur earlier in the pregnancy²².

Back pain is a common complaint during pregnancy. Various explanations on the pathophysiology that leads to back pain in the antenatal period have been advocated, including the increase in load on the back as a result of the total weight gained during pregnancy and the weight of the fetus; hormonal changes in the pregnant woman, which destabilizes the spine and sacroiliac joints as well as connective tissue, microtrauma in the sacroiliac joints resulting from trunk extensor muscle forces to balance the anterior flexion moment caused by the growing fetus²³.

Kinesio Taping is currently regarded by physiotherapists as a method supporting rehabilitation and modulating some physiological processes. It is employed in

orthopedics and sport medicine. This sensory method supports joint function by exerting an effect on muscle function, enhancing activity of the lymphatic system and endogenous analgesic mechanisms as well as improving microcirculation²⁰.

Taping a joint increases mechanical joint stability directly but also may increase proprioceptive signals which are thought to be important in the regulation of the tone of muscles which helps to ensure stability¹⁴. The kinesio taping technique reduces acute or chronic muscle spasm, edema, and pain¹².

Pelvic tilts are particularly effective in relieving lumbar pain. Knee pull, straight leg raising, curl up, lateral straight leg raising, and the Kegel exercises are also successful in relieving low back pain in pregnant women. Water aerobics is another recommended strategy that has shown to reduce pain and, as a result, the need for sick leaves in women with lumbar pain during pregnancy⁸.

The purpose of this study was to determine the analgesic effect and possible adverse effects of kinesiotaping augmented with pelvic tilting exercises on low-back pain in primigravidas during the last trimester.

SUBJECTS MATERIALS AND METHODS

Subjects

This study was carried out on Sixty primigravidas in their third trimester suffering from low back pain. Their age ranged from 25-35 years with mean value (29.08±5.08), ranged from 29 to 37 weeks gestation with mean value (30.7± 4.96) and their body mass index not exceeding 40 Kg/m² with mean value (34.21±6.96). The subjects were selected from the obstetric outpatient clinic, Kasr El-Aini Hospital, Faculty of Medicine, Cairo University. All subjects were referred by obstetricians after complete medical examination. All subjects assigned an informal consent form before starting the study.

Inclusion Criteria of the Subjects

Subjects were free of history of previous surgeries in the back, serious back injury at time of study (disk prolapsed,

spondylolithesis) and they did not have medical problem that had the risk to terminate pregnancy. Patients did not attend antenatal classes and they did not have concurrent injuries of cervical and/or thoracic spine.

Exclusion Criteria of the Subjects

Subjects with history of previous surgeries in the back, serious back injury at time of study (disc prolapse, spondylolithesis), Concurrent injuries of cervical and/or thoracic spine and those who attended antenatal classes, were excluded from the study.

Subjects were randomly assigned into two Groups

Group A (Control Group): thirty primigravida suffering from low back pain during pregnancy received pelvic tilting exercises and instructions concerning low pain during pregnancy. Patients were evaluated before participation in the study and after two weeks.

Group B (Study Group): thirty primigravida suffering from low back pain during pregnancy received pelvic tilting exercises and Instructions concerning low pain during pregnancy in additional to kinesiotaping techniques prescribed for low back pain during pregnancy for two weeks, in two applications each of them continued for three days with one day as rest in between the two applications. Patients were evaluated before participation in the study and after two weeks.

Materials

- 1- Weight-height scale was used to measure the body weight and height and then body mass index (BMI) was calculated for each subject before the beginning of the study.
- 2- Visual Analogue Scale is a graphic rating scale, which is commonly interpreted as a valid report of pain intensity and was used to record the degree of pain intensity (Appendix II). VAS is a-10 cms line, at one end was written (no pain = zero) and at the other end was written (worst pain the patient ever felt = 10). Each subject was asked to mark and score on the line at the point that representing her intensity of pain².

- 3- Oswestry Questionnaire consists of 10 multiple choice questions for back pain; patient select one sentence out of six that best describe her pain, higher scores indicated great pain and disability. It is used to measure functional disability⁶.
- 4- Flexible ruler (Flexicurve) is a strip of lead covered with plastic, which can be bent in one plane only and retains the shape into which it is bent was used to determine the degree of lumbar lordosis. This is done by the use of $\theta = 4 \text{ Arctang } 2L/H$ equation to convert the collected data to degree. In the equation, the L letter is the length of two obtained spinous process to the nearest millimeter. The length of a perpendicular line (H) drawn from the L to the mid curve¹⁹.
- 5- Cotton and Alcohol are used to clean skin prior to Kinesio Tape application, as skin should be free of oils and lotions. Anything that limits the acrylic adhesive's ability to adhere to the skin will limit both effectiveness and length of application.
- 6- Kinesio Tape is an elastic adhesive tape that is used for the kinesiaping method. (Kinesio Tex® Gold (GKT15024), Albuquerque, USA) Kinesio Tape has been designed to allow for a longitudinal stretch of 55-60 % of its resting length. This degree of stretch approximates the elastic qualities of the human skin. The tape is not designed to stretch horizontally. The Kinesio Tape is applied to the paper substrate with approximately 25% of available tension. The average roll of Kinesio Tex® Gold Tape size is 5 cm×5m (2in×16.4ft) and it can stretch 35% from its resting length.

Methods

A. Evaluation procedure:

1- History taking:

A detailed history was taken from each pregnant woman in both groups (A & B) to confirm that the only cause of low back pain is pregnancy and to exclude any neuromuscular or neurological disorders before pregnancy that may be the cause of low back pain.

2- Weight and height:

Weight and height were measured for each patient to calculate the body mass index (BMI)

according to the following equation¹⁵: $BMI = \frac{weight(kg)}{height(m)^2} kg/m^2$. It was measured before

starting the study in order to gain homogeneity between cases.

3- Pain assessment:

Pain was assessed by visual analog scale (VAS) for each woman in both groups (A&B) before starting the study and after the end of study. VAS is a scale that allows continuous data analysis and uses a 10cm line with 0 (no pain) written at one end and 10 (worst pain) on the other end².

4- Functional Disability:

Functional disability of each pregnant woman in both groups (A&B) before and after treatment was measured using Oswestry disability questionnaire. It is valid and reliable tool. It consists of 10 multiple-choice questions for back pain; subjects selected one sentence out of six that best describe her pain, higher scores indicated great pain. Scores of minimal disability: (0-20%), Scores of moderate disability: (20%- 40%), Scores of severe disability (40%-60%), Scores of crippled subjects: (60% - 80%) and Scores of patients confined to bed (80%-100%)⁶.

5- The degree of Lumbar curvature:

By using a flexible ruler (Flexicurve) used to determine the degree of lumbar lordosis¹⁹. (fig.1) In the sagittal plane before and after the end of treatment for both groups (A & B).

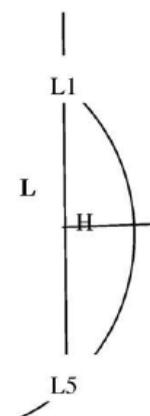


Fig. (1): Lumbar lordosis is excessive curvature of the lumbar part of the spine between L1 and L5. This is the lowest curve of the spine—just above the sacrum. Lordosis can be measured using the following formula: $\theta = 4 \times [\arctan(2H/L)]$, where L is the distance between L1 and L5, and H is the distance between the midline of L and the deepest part of the curve¹⁹.

B. Treatment procedure:

Patients in both groups received pelvic tilting exercises from different positions, instructions concerning low back pain during pregnancy concerning sitting, standing, lifting and lying¹⁶.

Pelvic tilting first step

Lie on your back with your knees bent and feet flat on the bed. Pull in your tummy and tilt your pelvis up, flattening out the lower back. Hold this position for 2 – 3 seconds and then slowly relax half way. Continue tilting your pelvis up and relaxing to the half way position. Aim for the movement to be slow and smooth. (fig.2)

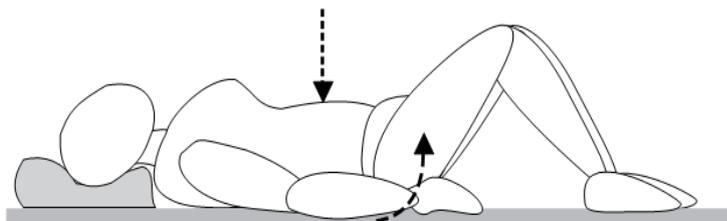


Fig. (2): Illustrate pelvic tilting from crock lying position.

Pelvic tilting second step

Kneel on all fours. Pull in your tummy towards the spine and tilt your pelvis so that

your back becomes rounded. Hold this position for 2 – 3 seconds and slowly relax. (fig. 3)

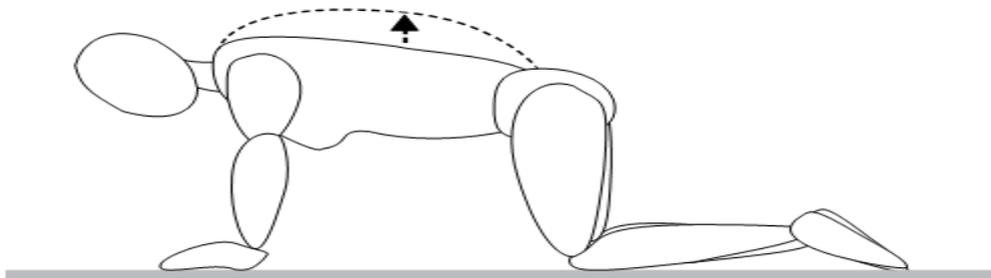


Fig. (3): Illustrate pelvic tilting from prone kneeling position.

These exercises can be done when kneeling, sitting or standing and all women in both groups were instructed to exercise ≥ 2 times per day and to perform each exercise with 10 repetitions for two consecutive weeks.

Instructions concerning low back pain during pregnancy:**Sitting:**

The pregnant women were instructed to choose a comfortable chair that supports back and thighs and place equal weight on each of her buttocks with her thighs fully supported, for at least 2/3 of their length, no more than two fingers-width from the popliteal fossa, and

horizontal (i.e. hips at 90°, knees at 90°) and her feet fully supported and flat on the supporting surface.

Lying:

Women were advised that additional support may be necessary in the form of pillows, or extra mattress support, in order to gain not only a position of comfort but one that will facilitate quality 'positioning' to prevent symptoms. Comfort in supine lying can be increased with pillows under the thighs and with three or four pillows or a wedge raising the head and shoulders sufficiently to avoid supine hypotension.

Side lying with pillows under the top forearm and knee was usually advised as a comfortable position in pregnancy but was not advised if the woman is suffering from any pelvic discomfort. Instead, side lying with the top leg supported by the underneath leg but separated by a pillow was recommended to be more comfortable.

Standing:

Subjects were instructed that the posture should be as tall as possible with both the abdomen and buttocks tucked in. Women imagined being pulled up from the top and back of the head with weight evenly distributed over both feet and feet slightly apart. They were advised to avoid standing for long periods and avoid high heels in favor of a medium or low heeled shoe. Shoulders that are relaxed and down help to prevent thoracic aches.

Household Activities:

All subjects were advised that many tasks such as ironing or preparing food can be undertaken in a sitting position instead of standing. Working surface at the correct height or the use of a high stool will avoid the need to stoop and the subsequent backache that a stooping posture can bring about and making beds or cleaning the bath in the kneeling position prevents lumbar strain.

Walking:

Women were informed that walking is acceptable daily exercise for most people; however, walking for too long may provoke pain.

Lifting:

Subjects were advised to perform lifting with loads held close to the centre of mass and that heavy lifting should be avoided or shared. Any load carrying must maintain good posture (e.g. using two shopping bags, one in each hand) rather than one causing side flexion of the trunk. Lifting an object close to the body with the knees bent and the back kept straight would take away the strain by the thigh muscles, not those of the back. All twisting movements while lifting are dangerous and must not be performed. Avoid lifting at certain times of day such as on arising in the morning or after sitting for a prolonged period of time.

Kinesio Taping Techniques:

Patients only in group B (study group) received kinesio taping techniques. With patient standing and leaning forward to perform maximum flexion of the spine, Alcohol was used to clean skin prior to tape application as skin should be free of oils and lotions then application of kinesio taping techniques (Kase et al., 2003). Bilateral kinesio "I" strip for Para spinal muscles: Each patient was asked to flex her back and then the therapist applied the kinesio tape with the base of tape applied with no tension and then applied very light to light tension (15-25% of available tension) When the tail of the tape was approximately one to two inches from the end, stopped tension and lay the end down with no tension. Then the applied tape strip was rubbed to initiate glue adhesion prior to moving the muscle from its current stretched position¹² (Fig.: 4 a and 4 b).



Fig. (4 a): Application of kinesio taping



Fig. (4b): Application of kinesio taping

"I" form application was applied to stabilize lumbosacral ligaments. The middle part of the

tape was stretched maximally, and then applied, and both ends attached to the skin without stretching. (Fig. 4 c).

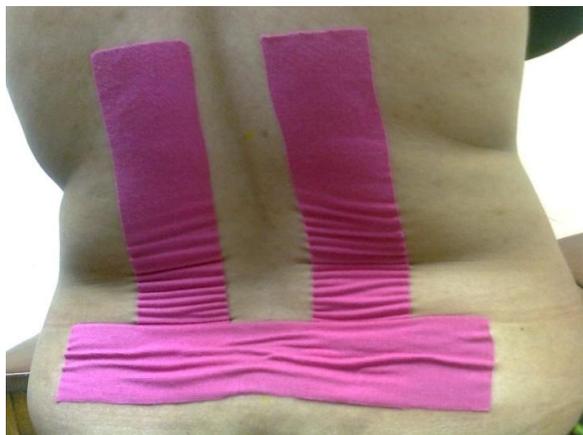


Fig. (4c): Application of kinesio taping.

The tape was applied for three days and then removed for one day and reapplied for another three days for two consecutive weeks¹² hence, to remove easily the tape from the patient they were instructed that it is generally much easier to do when they have bathed or the tape is

moist. It is best to remove from the top down. This will be in the direction of the body hair and should limit discomfort. Lift the tape from the skin, applying tension between the skin and the tape, and then push the skin away from the tape rather than pulling the tape away from the skin¹².

Statistical Analysis

All statistical calculations were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) and the statistical significance at a confidence of 95% (α -level of 0.05).

RESULTS

The pretreatment evaluation indicated no significant difference ($P>0.05$) in all measured parameters between both groups as indicated in table (1 and 2).

Table (1): Shows the mean values and standard deviations of pain assessment, functional disability and degree of lumbar curvature scores before and after treatment in both groups.

		X	SD	Percentage of improvement	
Pain assessment	Group (A)	Before	7.67	1.37	18.7744
		After	6.23	1.83	
	Group (B)	Before	7.73	1.46	69.8577
		After	2.33	1.52	
Functional Disability	Group (A)	Before	52.90	10.87	0.5104
		After	52.63	13.64	
	Group (B)	Before	56.17	11.92	37.7426
		After	34.97	13.71	
The degree of Lumbar curvature	Group (A)	Before	34.77	8.11	4.74547
		After	36.42	8.23	
	Group (B)	Before	36.53	8.10	2.272105
		After	37.36	7.98	

X: Mean

SD: Standard Deviation

Pain assessment scores

The severity of low back pain measured by the visual analogue scale as reported by the women revealed a highly significant decrease ($P<0.01$) after the end of two consecutive weeks of treatment in each group. While comparing both groups (A and B) the post treatment scores showed that group (B) was highly significantly ($P<0.01$) decrease than

group (A) at the end of treatment. (Table 1 and 2)

Functional Disability

The mean values of Oswestry disability questionnaire scores were presented in table (1 and 2) post treatment results showed a no significant difference ($P>0.05$) shown after two consecutive weeks of treatment in group (A). However, there was a highly significant

decrease ($P < 0.01$) in group (B) comparing post treatment results in both groups (A and B) showed a highly significant decrease ($P < 0.01$) in group (B) compare to group (A) after the end of the 14th day of treatment.

The degree of lumbar curvature

The degree of lumbar lordosis post treatment results in group (A) showed highly significant

increase ($P < 0.01$) and the post treatment results obtained in group (B) showed a significant increase ($P < 0.05$). while, comparing post treatment results for both groups (A and B) showed that the degree of lumbar lordosis results in group (A) was highly significant increase ($P < 0.01$) at the end of treatment as compared with group (B). (Figure 5)

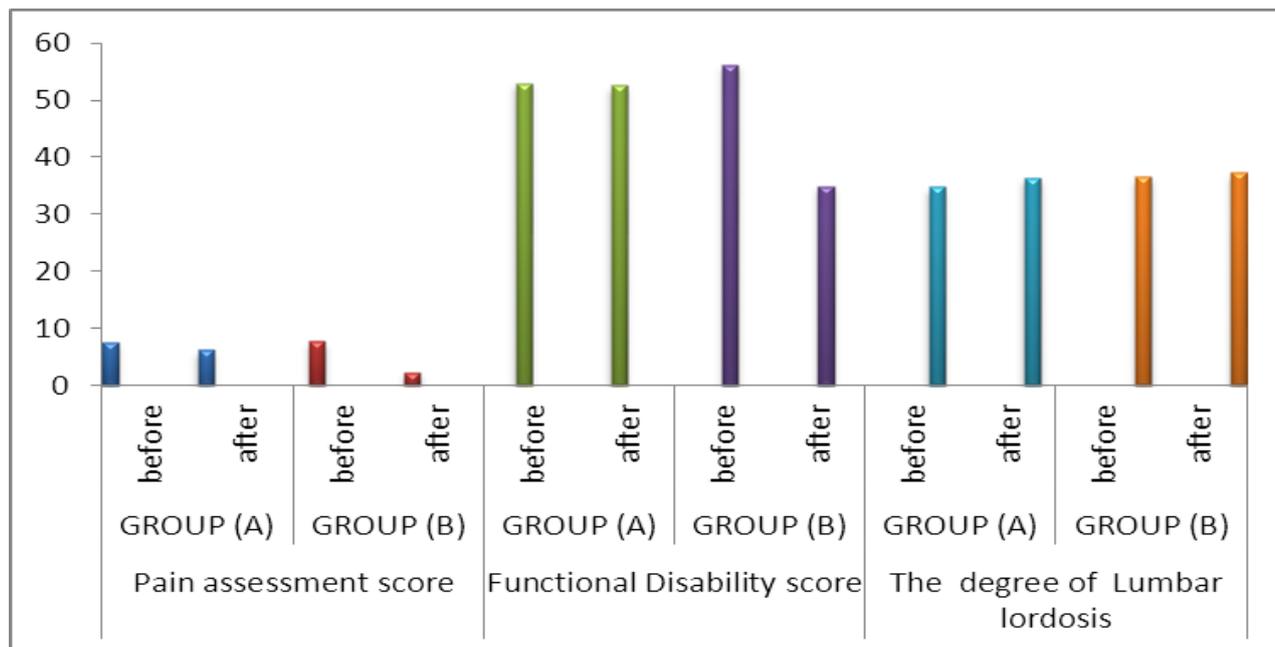


Fig. (5): The mean values of pain assessment, functional disability and degree of lumbar curvature scores pre and post treatment in both group (A) and (B).

DISCUSSION

Pain intensity, reflected in pain assessments, pain associated with physical activity and decrease the angle of lumbar curvature were found to be significantly decreased over the study period in patients receiving the kinesiotaping than other in the control group.

The reasons for improvement in this study may be related to physiological mechanisms by which KT is presumed to have a therapeutic benefit: 1) gather fascia to align the tissue in its desired position, 2) lift the skin over areas of inflammation, pain, and edema, 3) increase stimulation of the mechanoreceptors to either stimulate or limit movement, 4) provide a positional stimulus to the skin, and 5) decrease pressure over the lymphatic channels that provide a path for the removal of exudates¹². These physiological

mechanisms remain theoretical because there is limited research to support these concepts.

Two theories may aid in understanding this finding. One theory is that KT increases blood circulation in the taped area¹¹, and this physiological change may affect the muscle and myofascia functions after the application of kinesio tape. An additional theory is that KT stimulates cutaneous mechanoreceptors at the taped area, and this stimulation may affect the ROM^{9,10,18}.

However, some studies have reported contradictory results. Morrissey (2000)¹⁷ reports that when taping is applied to an under active muscle, it reduces the length of the muscle and thus moves the length-tension curve toward the left while resting. Alexander et al. (2008)¹ argued that the excitability of motor neurons decreases with taping in the direction of the muscle fiber, while Tobin and Robinson, (2000)²¹ reported that taping the

muscle in a crossing pattern results in a noticeable reduction in muscle activity.

In contrast, Chen et al. (2007)³, Cools et al. (2002)⁴ and Fu et al. (2008)⁷ reported that taping of the skin had no effect on the excitability of the muscles of healthy persons.

Perhaps the simple answer is the one given by Cowan et al. (2002)⁵ who stated that since normal healthy adults do not have any pains, reduction of muscle power does not take place, and therefore no change in muscle power is shown. The hypothesis of Alexander et al. (2008)¹ provides the basis for this explanation.

Alpha-motor neurons which innervate skeletal muscle and gamma-motor neurons which innervate muscle spindles are not individually activated but are activated simultaneously. This phenomenon is called alpha-gamma coactivation. Unlike skeletal muscle fiber, when muscle spindle fiber contracts, the sensitization of groups Ia and II afferent nerve fibers does not reduce but rather is maintained in a state of continuous excitement. The result is that excitability of motor neurons neither decreases nor increases but rather continues at the same level¹³.

Accordingly, if the skeletal muscle underneath the skin is actually shortened by the tape, there will not be any changes in latency, amplitude or nerve conduction velocity of the motor neurons through continuous input of afferent neuron from the muscle spindle fiber¹⁰. Kinesio taping neither increases nor decreases motor nerve conduction velocity. Stimulation of the skin by KT may not be enough to create changes in muscle activity¹³.

Also, it should be noted that the studies by (Morrissey, 2000)¹⁷ and (Tobin and Robinson, 2000)²¹ used non-elastic sports tape and McConnell tape, therefore there were possible differences in the degree of tactile stimulation²³.

Conclusion

The previous results of this study objectively demonstrate that kinesiotaping augmented with pelvic tilting exercises is an effective method in treatment of low back pain during late pregnancy.

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المخلص العربي

تأثير استخدام الشريط اللاصق كينيزيو ودمجه مع تمارين إمالة الحوض علي آلام أسفل الظهر لدى السيدات الحوامل للمرة الأولى أثناء الأشهر الثلاث الأخيرة من الحمل

أجريت هذه الدراسة لتحديد تأثير استخدام الشريط اللاصق بالإضافة إلى تمارين ميل الحوض في تخفيف آلام أسفل الظهر لدى السيدات الحوامل للمرة الأولى أثناء الشهور الأخيرة من الحمل . وقد أجريت هذه الدراسة علي ستون سيدة حامل للمرة الأولى تعانين من آلام أسفل الظهر في الشهور الأخيرة من الحمل وتراوح أعمارهن ما بين (25 إلي 35 عام) ، وكذلك تراوحت مدة الحمل ما بين 29 إلى 37 أسبوعاً من الحمل . وتم اختيارهن من العيادة الخارجية لأمراض النساء و التوليد بقصر العيني- جامعة القاهرة . هذا وقد تم تقسيم المرضى إلى مجموعتين متساويتين في العدد : المجموعة (أ) (مجموعة الضابطة) ثلاثون سيدة ، المجموعة (ب) (مجموعة الدراسة) ثلاثون سيدة . تم علاجهن جميعهن في كلا المجموعتين باستخدام تمارين إمالة الحوض بالإضافة إلى تعليمات إرشادية حول آلام أسفل الظهر أثناء الحمل لكن المجموعة (ب) تم علاجهن باستخدام الشريط اللاصق كينيزيو لمدة أسبوعين.. وقد تم اختبارهن قبل وبعد العلاج باستخدام المقياس المرئي المدرج لمعرفة درجة الإحساس بالألم والاختيار لقياس مدي درجة الانحناء في الفقرات القطنية من العمود الفقري وأيضاً استقصاء اوسوستري لمعرفة معدل الإعاقة الوظيفية . وقد أوضحت المعالجة الإحصائية للنتائج أن هناك انخفاض ذو دلالات معنوية في درجة شدة الألم ومعدل الإعاقة الوظيفية وتحسن في مدي درجة الانحناء بالمنطقة القطنية للمجموعة الدراسة عند مقارنتها بالمجموعة الضابطة . مما سبق يتضح أن الشريط اللاصق كينيزيو ودمجه مع تمارين إمالة الحوض له تأثير ايجابي في علاج آلام أسفل الظهر أثناء الحمل الأولى في شهوره الأخيرة .

الكلمات الدالة : الشريط اللاصق كينيزيو ، تمارين إمالة الحوض ، آلام أسفل الظهر أثناء الحمل .