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Effect of Kinesio Tape and Conventional Physical Therapy Program on Discogenic Unilateral Sciatica

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Abstract

Background: Numerous musculoskeletal diseases can be treated with Kinesio Taping (KT), however its clinical effectivenessin the treatment of discogenic unilateral sciatica is not well supported by scientific research.

Aim of Study: To explore the efficacy of adding (KT) to conventional physiotherapy in treating patients with discogenic unilateral sciatica.

Material and Methods: A double blinded randomized controlled trial involved thirty male & female unilateral sciatic patients aged from (30:40 y), BMI was (less than 30kg/m^2), were randomly allocated into two equal groups, 15 patients in each group, all received conventional physical therapy. In addition, Group A received KT, Group B received placebo KT. Treatment sessions were applied 2 times weekly for 3 weeks for all groups. Visual analogue scale (VAS) was utilized to assess pain level; Oswestry Disability Index (ODI) was utilized to assess functional disability.

Results: There was a significant decrease in the VAS and ODI scores following the intervention in both groups after treatment in both groups. There was no significant difference on all measured variables between both groups after treatment.

Conclusion: The kinesio tape has no extra benefitsin management of patients of discogenic unilateral sciatica when add to conventional physical therapy.

Key Words: *Lumbar disc herniation – Kinesio tape – Conventional physical therapy – Visual Analogue Scale – Oswestry disability questionnaire.*

Introduction

SCIATICA is a radiating pain that can affect one or both lower limbs and is caused by pressure or inflammation of the lumbosacral nerve roots (L4-S1), which contain the sciatic nerve (SN). The pain may or may not be accompanied by neurological manifestations like weakness or tingling sense **[1]**. Although discogenic lesions causing compression or impingement of the nerve root account for the majority of cases of sciatica, malignancies and lumbar stenosis are also potential causes **[2]**. According to previous study **[3]** non-discogenic causes of sciatica include vascular and bony compression from spinal stenosis, epidural adhesions, benign and malignant tumors, infections, that include discitis and epidural abscess, and compression by gynaecological structures like pelvic endometriosis and uterine fibroid. Studies show a wide incidence of sciatica varying from 1.6% to 43% **[4]**. Sciatica can start slowly or quickly with physical exertion **[5]**. The first symptom that springs to mind is a sharp, radiating pain along the sciatic nerve that gets worse with coughing or stretching the nerve. For this reason, to minimize nerve stretching and delay the onset of pain, patients bend the lower leg that is affected at the hip and knee joints. Additional symptoms include decreased muscle strength in the impacted lower leg as a result of the patient releasing it, restricted spinal mobility in the lumbar area, and increased spinal extensors and paraspinal muscles' tone unilaterally **[6]**. Sciatica is typically unilateral due to the common dorsolateral form of disc rupture and foramin stenosis from degenerative spine diseases. It could be bilateral pain associated with spondylolisthesis, lumbar stenosis, or central disc herniation **[5]**. Generally, the best course of treatment for sciatica is conservative, consisting of non-steroidal anti-inflammatory drugs (NSAIDs), analgesia, epidural or transformative peri-radicular corticosteroid injections, physiotherapy and instructions for active lifestyle **[7]**. Reducing pain is the primary objective of conservative therapies for sciatica, which can be achieved by different category of intervention **[8,4]**.

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The physiotherapy intervention includes exercises such as motor-control exercises, also referred to as specific stabilization exercises, concentrate on improving transversus abdominis and multifidus muscles control, which support the spine and strengthening exercises for other core muscles [9]. Furthermore, KT outperformed with other physical therapy interventions therapies, such as massage, strength/endurance training, acupuncture, and electrotherapy, in improving activities of daily living (ADL) and lowering pain in cases with non-specific low-back pain (NSLBP) [10]. Kinesio tape (KT) is believed to alleviate pain, realign joints, enhance lymphatic and blood circulation, and lessens muscle tension. Furthermore, it is probable that the application of KT alters the muscle fiber recruitment pattern [11]. The star shape/space approach comprised four KT strips that overlap in the shape of a star with 25% tension sustained over the lumbar region where the greatest amount of pain is felt [12] Consequently this study will be conducted to explore the efficacy of adding (KT) to conventional physiotherapy in treating patients with discogenic unilateral sciatica.

Patients and Methods

It is a double-blinded randomized controlled trial (patient and research assistant that is the examiner of all patients) were blinded about patient's interventions and patient's group. Thirty patients diagnosed with sciatica, were referred to the outpatient PT clinic of Al-Ahrar Teaching Hospital, Zagazig, Al-Sharkia Governorate, Egypt. This study was approved by scientific research ethics committee at the Faculty of Physical Therapy, Cairo University. (P.T.REC/012/003772) This study was conducted from May 2022 to June 2024. The sample size for this study was calculated utilizing the G*POWER statistical software (version 3.1.9.2; Franz Faul, University Kiel, Germany). A minimum of 30 subjects is required.

Inclusions criteria:

Patient revered from orthopedic surgeon diagnosis with discogenic unilateral sciatica.

Patients were included if they have: Age between 30 and 40 years to reduce the chance that arthritic changes could have exacerbated sciatica. Symptoms lasting two weeks to three months, with unilateral radicular distribution and leg pain more severe than back pain [13]. Their BMI was <30kg/m^2 [14].

Exclusions criteria:

Patients will be excluded if they have: A history of recent lower limb trauma, individuals exhibiting warning signs of a significant spinal disease, and neurological symptoms such as foot drop, spondylolisthesis, and cognitive impairment. Epidural steroid therapy or surgical intervention; a history of significant psychological disorder or systemic disease. Pregnancy or viscerogenic back pain causes.

Patient's preparation and randomization:

Each participant in the study was randomly allocated to one of the two groups using random number generator (www.randomization.com). When the patients' enrollment was confirmed, they were informed that they had been assigned to one of the two treatment methods.Group A (n=15) received KT treatment and conventional treatment; Group B (n=15) received shame KT and conventional treatment.

Assessment procedures:

The VAS is a highly reliable and accurate technique for quantifying musculoskeletal discomfort [15].Assessment of functional disability: The ODI is a 10-item self-assessment questionnaire with six response options, varying from 0 to 5. These include pain, self-care, walking, sitting; standing, lifting and moving objects sleep disorders, social life, sex life, and travel. After calculating the overall score, the percentage of disability has a range of 0% (no disability) to 100% (complete disability), calculated by dividing the score by 50 and multiplying by 100. This scale's interpretation is based on the following scores: 0 to 20% means minimum disability; 20 to 40% means moderate disability; 40 to 60% means severe disability; 60 to 80% means debilitating low back pain; and anything beyond 80% indicates extreme incapacity, meaning the person is confined to bed [16]. The Arabic version of ODI demonstrated excellent inter-rater reliability and good constructs validity [17].

Treatment procedures:

1- Conventional physical therapyinclude hot pack was applied for ten minutes as part of the traditional physical therapy regimen. Patients received pelvic bridging, pelvic tilt, back extension; static abdominal, cat-camel, and curl-up exercises, each with ten repetitions [18]. A maximum of 3–4 cm^2 of continuous power of 1 MHz–2 W/cm^2 was delivered for 15 minutes, with the ultrasound (US) (Medserve, E2000, England) head moving in overlapping circles and the transducer moving slowly [19]. Interferential 4.000 Hz, TENS for 20 minutes (Medserve, E2000, and England). To create paraesthesia in the pain location, electrodes were positioned in accordance with the dermatome [20,21] Conventional physical therapy applied for both groups group (A) received kt, group (B) received placebo kt.

2- The KT application was completed while seated. At a tension of 25%, four blue I-strips were positioned over the lumbar region's location of maximal pain, overlapping in the form of a star. Applying strips involves pressing them onto the center section before the ends (Fig. 1) [15].

Fig. (1): Kinesio Tape placement

Results

Data collected from both groups before- and after-treatment regarding the VAS, the Arabic version of the ODI, passive hip flexion ROM, and knee extension angle were statistically analyzed and compared.

Subjects' demographic data:

- Group A: The mean ± SD age of group A was 33.40±4.37 years, the weight was 74.73±9.26 kg/m^2, the height was 169.33±8.44 cm, and the BMI was 26.15±3.52 kg/m^2. Table (1).
- Group B: The mean ± SD age of group B was 35.60 ± 6.70 years, the weight was 75±11.06 kg/m^2, the height was 167.60±8.34 cm, and the BMI was 26.63±7.78 kg/m^2. Table (1). No significance change across groups in age, weight. Height and BMI (p>0.05).

Sex distribution:

Group A's sex distribution revealed that there were six (40%) males and nine (60%) females. Group B's sex distribution showed that there were 5 (33%) males and 10 (67%) females. The distribution of sexes did not differ significantly between the two groups (p=0.71) (Fig. 2).

Table (1): Comparison of subjects' demographic data between both groups.

	Group A	Group B	MD	*t*-value	*p*-value	Sig.
	X ± SD	X ± SD				
Age (years)	33.40±4.37	35.60±6.70	–2.20	–1.06	0.29	NS
Weight (kg)	74.73±9.26	75±11.06	–0.27	–0.07	0.94	NS
Height (cm)	169.33±8.44	167.60±8.34	1.73	0.56	0.57	NS
BMI (kg/m^2)	26.15±3.52	26.63±7.78	-0.48	–0.41	0.68	NS

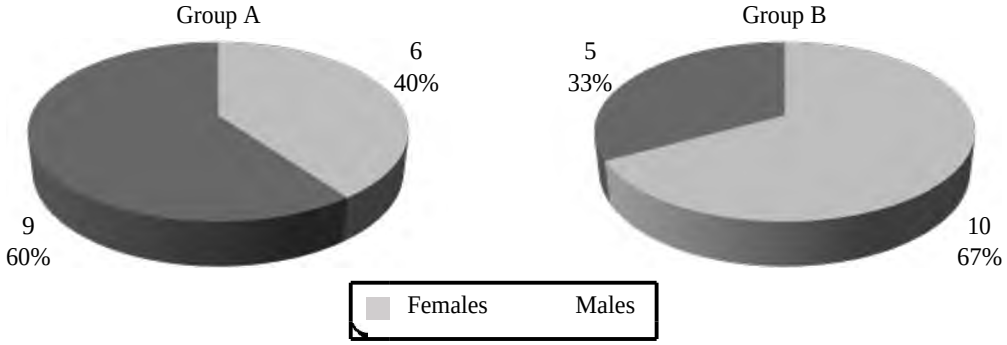

Fig. (2): The frequency distribution of sex of both groups.

Effect of treatment on pain intensity (VAS), back disability (ODI):

I- *Effect of treatment on pain intensity and disability:*

Within group comparison:

Group A:

There was a significant reduction in pain intensityand back disability of group A after treatment compared with before-treatment (p=0.001) with mean ± SD value before was7.33±0.98 and that after treatment was 4.27±0.96. The mean change between before and after treatment was 3.06 and the percentage of change was 41.77%. For back disability the mean ± SD value before treatment of group A was 38.73±8.90% compared with after treatment was 20.67±5.16 (Table 3). The mean change between before and after treatment was 18.07% and the percentage of change was 46.64%. (Table 3).

Group B:

There was a significant reduction in pain intensity and back disability of group B after treatment compared with before treatment (p=0.001) with mean ± SD value before was 7.47±0.64 and that af-

ter treatment was 4.80±0.94. The mean change between before and after treatment was 2.67 and the percentage of change was 35.71%. For back disability mean ± SD value before treatment of group B was 41.80±6.93% compared with after treatment was 23.87±6.44%. The mean change between before and after treatment was 17.93% and the percentage of change was 42.90%.

Comparison between groups:

Before treatment:

The mean change in pain intensity between groups before treatment was –0.13. There was no significant change in pain intensity between group A and B before treatment (p=0.66). For back disability mean change between groups before treatment was –3.07%. There was no significant change in back disability between both groups before treatment (p=0.30).

After treatment:

The mean change in pain intensity between groups after treatment was –0.53. There was no significant change in pain intensity between group A and B after treatment (p=0.14). (Table 3, Fig. 4). For back disability mean change between groups after treatment was –3.20%. There was no significant change in back disability between both groups after treatment (p=0.14).

Table (2): Mean VAS before and after treatment of both groups.

VAS	Pre-treatment $\overline{X}$ ± SD	Post-treatment $\overline{X}$ ± SD	MD	% of change	p-value	Sig.
Group A	7.33±0.98	4.27±0.96	3.06	41.77	0.001	S
Group B	7.47±0.64	4.80±0.94	2.67	35.71	0.001	S
MD	–0.13	–0.53				
p-value	0.66	0.14				
Sig. NS	NS					

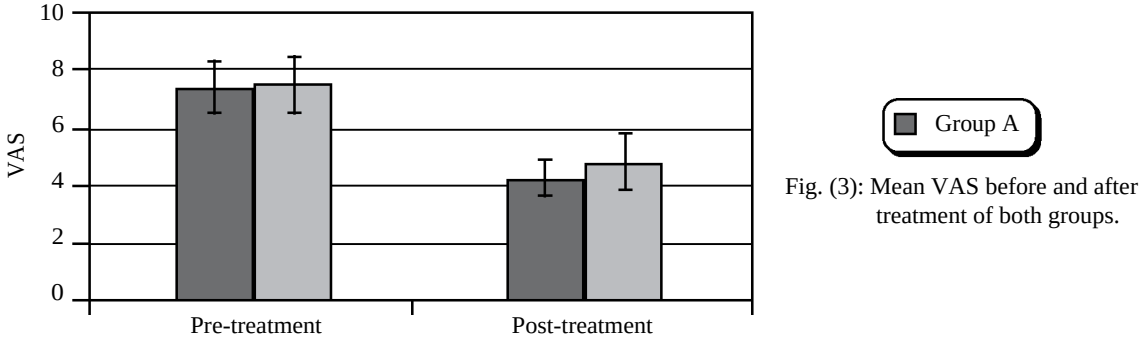

Fig. (3): Mean VAS before and after treatment of both groups.

Table (3): Mean ODI before and after treatment of both groups.

ODI (%)	Pre-treatment X ± SD	Post-treatment X ± SD	MD	% of change	p-value	Sig.
Group A	38.73±8.90	20.67±5.16	18.07	46.64	0.001	S
Group B	41.80±6.93	23.87±6.44	17.93	42.90	0.001	S
MD	–3.07	–3.20				
p-value	0.30	0.14				
Sig.	NS	NS				

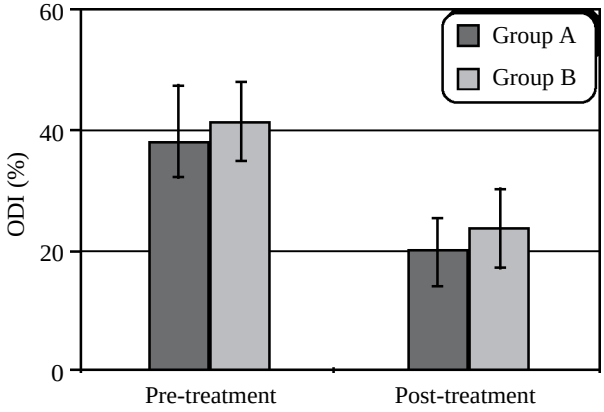

Fig. (4): Mean ODI before and after treatment of both groups.

Discussion

The current study was conducted to examine and compare the effectiveness of adding KT to a conventional physiotherapy program on back pain intensity, back disability in patients with discogenic unilateral sciatica the study's results found a non-significant change between groups in pain intensity (VAS), back disabilities (ODI). The results of this study regarding the efficacy of adding KT on improving pain in patients with unilateral discogenic sciatica came into agreement with many previously published studies. Compared the effects of conventional physiotherapy and KT application on patients with chronic lower back and leg pain founded that no statistical significance (p>0.05) in pain, physical ability, anxiety level, orquality of life. A previous study investigated the effects of KT on the severity of pain and soft tissue mechanical properties in NSLBP found that KT, with or without tape tension, and post-isometric relaxation exercises had similar effects in lowering the resting pain level and found that KT is not better than placebo KT. Study examined the efficacy of KT and core stability exercise on clinical variables after two months of treatment for NSLBP They found that all participants had better clinical results. All of the clinical outcomes were better for the group that included KT in addition to the core-stabilization exercises **[22]**. Randomized sixty individuals with chronic LBP due to lumbar disc herniation into a star shape KTgroup and a placebo taping group they reported a significant lowering in pain level and back disabilities in both groups after 3 weeks, however at follow-up improvement didn't continue in placebo group only **[23]**. Study explored how star-shaped KT affected people with chronic LBP. After applying KT, people with chronic NSLBP showed statistically significant improvements in their disability, pain, trunk muscular isometric endurance, and possibly trunk flexion ROM. Only improvements in pain and trunk muscle endurance were noted 4 weeks following the week with the tape in situ, and overall, the effects were minor **[12]**. Study concluded that individuals with persistent LBP who got exercise and manual therapy for two weeks did not experience any further advantages from KT there was no change in the pain and disability results between the two groups **[24].** Another study reported that KT application didn't improve back disabilities in LBP patients compared with back exercises **[25]**. In individuals with nonspecific chronic LBP, 72 hours of KT resulted in significant decrease in pain intensity but no improvement in disability or lumbar ROM **[26]**. In a systematic analysis of the impact of tape on pain and spinal impairment studied various taping techniques, they were unable to identify conclusive evidence of their efficacy **[27]**. On the contrary, study compared the effects of functional fascial taping with placebo taping in patients with NSLBP and found a significant enhancement in back disabilities measured by ODI in fascial taping group **[28].** When comparing the taping group's improvement over the placebo group in terms of back disability, pain, flexibility, and endurance scores, a statistically significant improvement was observed. When KT was administered to LBP patients and observed a significant reduction in back impairments and pain as compared to the control group **[29].** Another study-discovered that after two weeks of application, KT improved trunk flexion ROM and decreased pain and disability in 44 cases with chronic NSLBP who were included in the KT group or the placebo group but when KT was compared to placebo taping, the results were too slight to be deemed meaningful and clinically relevant.

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تاثير شريط الكينيسيوو برنامج العلاج الطبيعى التقليدى فى علاج مرضى عرق النسا الفقرى احادى الجانب

الخلفيـة: يعتبر شريط كينيسيو أداة علاجية تستخدم لعلاج الاضطرابات العضلية الهيكلية. ومع ذلك، هناك القليل من الأدلة العلمية التى تصف فعاليته السريرية.

الهـدف: دراسة تأثير إضافة شريط كينيسيو إلى برنامج العلاج الطبيعى التقليدى فى علاج المرضى الذين يعانون من عرق النسا أحادى الجانب الفقرى.

العينـة والطـرق: تجربة معشاة ذات شواهد مزدوجة التعمية شملت ثلاثين مريضاً من الذكور والإناث مصابين بعرق النسا من جانب واحد تمت إحالتهم إلى العيادة الخارجية بمستشفى الأحرار التعليمى، تتراوح أعمارهم بين (٣٠:٤٠ سنة)، وكان مؤشر كتلة الجسم (أقل من ٣٠ كجم / م٢)، تم تقسيمهم عشوائيا إلى مجموعتين متساويتين، ١٥ مريضاً فى كل مجموعة، تلقوا جميعاً العلاج الطبيعى التقليدى. وبالإضافة إلى ذلك، تلقت المجموعة (أ) شريط كينيسيو، والمجموعة (ب) تلقت شريط كينيسيو الوهمى. تم تطبيق جلسات العلاج مرتين فى الأسبوع لمدة ٣ أسابيع للمجموعتين. تم استخدام المقياس التمثيلى البصرى لتقييم شدة الألم، وتم استخدام مؤشر أوسويسترى للإعاقة لتقييم الإعاقة الوظيفية لأسفل الظهر.

النتائـج: كان هناك انخفاض كبير في شده الألم والإعاقة الوظيفية لأسفل الظهر بعد العلاج فى كلا المجموعتين مقارنة مع قبل العلاج. كانت هناك زيادة كبيرة فى ثنى مفصل الفخذ السلبى وزاوية تمديد مفصل الركبة بعد العلاج فى كلا المجموعتين مقارنة بما كان عليه قبل العلاج. كشفت المقارنة بين المجموعتين بعد العلاج عن اختلاف ليس له دلاله إحصائية فى شده الألم الإعاقة الوظيفية.

الخلاصـة: إضافة شريط كينيسيو الحقيقى أو الوهمى إلى برنامج العلاج الطبيعى التقليدى لمرضى عرق النسا الاحادى الفقرى يؤدى إلى تحسن الألم والإعاقة.