



Efficacy of Kinesio Taping in reducing low back pain: A comprehensive review

Kim Trobec¹, Melita Peršolja^{2*}

¹Department of Education, Rehabilitation and Design, Archimedes Academy, Ljubljana, Slovenia, ²Department of Nursing, Unit Nova Gorica, University of Primorska Faculty of Health Sciences, Nova Gorica, Slovenia

ABSTRACT

Introduction: Kinesio Taping is rehabilitative technique used to facilitate the body's natural healing process while providing support and stability to muscles and joints, without restricting their range of motion. We conducted a thorough literature search and evaluation to clarify whether Kinesio Taping is effective in reducing lower back pain.

Methods: Cochrane Library, CINAHL, COBIB.SI, PubMed and Science Direct were searched using Boolean operators search strings of different keywords such as adult, low back pain, Kinesio tape, Kinesio Taping, KinesioTaping, effects. The search was limited to full-text articles published from 2011 to 2016.

Results: A total of 137 records were identified, 123 abstracts screened, and 14 full-text articles assessed for eligibility. Finally, nine publications were selected using Critical Appraisal Skills Program tool: Eight randomized clinical studies and one literature review. The key variables from collected data were the subject characteristics, taping technique, control interventions, instrument, and outcome.

Conclusions: The effect of Kinesio Taping in reducing low back pain is positive but was not statistically significant in analyzed studies. Taping therapy may therefore be used as a supplementary method to conventional physical therapy procedures and may be important for patients because of its easy accessibility and safety.

Keywords: Effect; evidence based nursing; health education; Kinesio Taping; low back pain

INTRODUCTION

Kinesio Taping is rehabilitative technique used to facilitate the body's natural healing process while providing support and stability to muscles and

joints, without restricting their range of motion. It is used in a variety of muscle-skeletal and neuromuscular problems. It is developed by Kenzo Kase, combining kinesiology with chiropractic methods, based on the use of special elastic strips, which mimic the density and elasticity of human skin. The elasticity of the strips is longitudinal while the waved adhesive allows normal mechanical functioning of the skin. Kinesio tape does not contain latex, drugs or chemical substances. It consists of 100% cotton fibers and is sensitive to temperature, water resistant. It

*Corresponding author: Melita Peršolja,
Faculty of Health Sciences – Unit Nova Gorica, University
of Primorska, Delpinova 18/B, 5000 Nova Gorica, Slovenia.
E-mail: melita.persolja@upr.si

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also facilitates lymphatic drainage (1). Enhanced rehabilitation is thought to be the effect of stimulated reactivation, proprioceptive training, reduced pain, stimulation of correct movement patterns, and reduction of muscle imbalance (2,3). When the muscle is inflamed, the space between the skin and muscle is constricted, and the out flow of lymphatic fluid is compromised. Application of the Kinesio Taping results in expansion of skin interstitial space (1,3), which facilitates the drainage of lymphatic fluid, improves blood and lymph circulation, normalizes the pressure on nociceptors, and supports muscles, consequently reducing pain, swelling and inflammation (4). Kinesio tape can be applied for 3-5 days. In rare cases, it can cause skin irritation and is contraindicated in septic arthritis, deep vein thrombosis, malignancies, unhealed wounds, dermatological diseases, and bacterial infections (1).

The diseases of the locomotor system are a widespread problem and a significant socioeconomic problem (5). Pivec and Todorović (6) state that more than 40% of the Slovenian population suffers from back pain, defining it as pain between the lower edge of ribs and top of buttocks. It may include sciatica pain that radiates from the sacrum and then downward to the knee (2). Musculoskeletal conditions are a major cause of productivity loss and within European countries, the highest proportion of people reporting that ever had low back pain (including not diagnosed by a doctor) is in Slovenia (40.7%) (7). Slovenian indicators show that sick leave due to musculoskeletal diseases has a mean duration of 13.9 days (8). Besides the prevalence and gravity of locomotor system disorders, the research database about Kinesio Taping is modest (9) and just two of 25 Slovenian Hospitals provide Kinesio Taping for orthopedic patients (10).

Health-care professionals may provide patients with information about the therapeutic options and techniques for low back pain relief; therefore, we wanted to analyze the published literature with the aim to clarify whether the Kinesio Taping is effective in reducing the low back pain in adults.

METHODS

We systematically reviewed the literature to obtain the evidence pertaining practical use, techniques,

and benefits of Kinesio Taping. The search was conducted in Cochrane Library, CINAHL, COBIB, SI, PubMed and Science Direct databases and was limited to full-text articles in English language, published between 2011 and 2016. Search strings consisted of different combinations of Boolean operators and search terms such as adult, low back pain, kinesiology, Kinesio tape, Kinesio Taping, KinesioTaping, and effect.

The search identified 137 publications, of which 14 complied with the research aims and matched the inclusion criteria. Results were verified for quality using the four point scale Critical Appraisal Skills Program (CASP) (CASP Systematic Reviews Checklist and CASP Randomized Controlled Trials [RCTs] Checklist) (11), and the hierarchy of evidence quality (effectiveness, appropriateness, and feasibility) (12). The compliance with the research aims was ranked from the lowest (poor = 1) to the highest (excellent = 4) (12). The key variables from collected data were the subject characteristics, the taping technique, control interventions, instrument, and outcomes.

RESULTS

In total, 137 records were identified, 123 abstracts screened and 14 full-text articles assessed for eligibility. Nine ($n = 9$) studies were included in qualitative synthesis: Eight randomized clinical studies and one literature review (Table 1). The studies were evaluated for subject characteristics, the taping technique, control interventions, instrument and outcomes identified from 82 codes (Table 2). Although the study participants, the taping techniques, and the evaluation instruments varied between the studies, satisfactory level of evidence has been achieved: Evidence from a review of all relevant RCT's or evidence-based clinical practice guidelines based on systematic reviews of RCT's (13). According to the studies, there is no evidence of efficacy of Kinesio Taping in reducing low-back pain.

DISCUSSION

There is a lack of evidence of efficacy of Kinesio Taping in reducing low-back pain. The studies should be standardized at least in the characteristics of study participants, the taping techniques,

TABLE 1. Characteristics of included studies

Author, year, country, reference	Research typology/ Research objective	Sample, methods	Conclusions	Rating
Alvarez-Alvarez et al., 2014 Finland (15)	RCT/determine the influence of Kinesio tape on the resistance to fatigue of the lumbar extensor musculature in young healthy subjects	Ninety-nine (n=99) healthy subjects were randomized in three arms of the study: (a) Kinesio tape taping: 2.5-5 cm of tape applied with 0% stretch in standing while the rest of the tape was applied in a position of unforced maximum trunk flexion with a tension of between 10% and 15%; (b) placebo taping: Two 10 cm of tape with a tension of 0%; (c) control group tested without any taping Lumbar extensor musculature endurance was measured with the Biering-Sorensen test	The Kinesio tape applied on the lower back significantly delays the onset of paravertebral muscle fatigue in healthy young subjects compared to no tape and produces better effects, although not significant, than placebo application	3
Castro-Sánchez et al., 2012 Spain (17)	RCT/establish whether Kinesio taping could reduce disability, pain, and Kinesio phobia in people with chronic non-specific low back pain	Sixty (n=60) adults with chronic non-specific low back pain, scored of four or more on the Roland-Morris Low Back Pain and disability questionnaire, and not achieving flexion-relaxation in the lumbar muscles during trunk flexion, were randomized into the two arms of the study: (a) Kinesio taping over the lumbar spine; (b) sham taping. Participants in both groups were advised to leave the tape <i>in situ</i> for 7 days	Individuals with chronic non-specific low back pain experienced statistically significant improvements immediately after the application of Kinesio taping in disability, pain, the isometric endurance of the trunk muscles, and trunk flexion range of motion. The effects were generally small and only the improvements in pain and trunk muscle endurance were observed after 4 weeks	4
Hagen et al., 2015 ZDA (9)	RCT/examine the effects of elastic therapeutic taping applied to the lumbar paraspinal region on back muscle endurance, compared to no tape, or a rigid therapeutic taping procedure in individuals with nonspecific low back pain	Back muscle endurance was measured in 16 patients with nonspecific low back pain, using the Biering-Sørensen test under 3 different conditions: Elastic therapeutic taping, no tape, rigid therapeutic taping For the elastic therapeutic taping condition, the tape was applied over the paraspinal muscles according to the Kinesio Tex taping protocol. The rigid therapeutic taping condition consisted of the same tape configuration but using no elastic athletic tape. All participants received each testing condition in random order, with 1-3 days between each condition	Back muscle endurance was higher with elastic therapeutic taping applied over the paraspinal musculature when compared to a no-tape condition. However, the magnitude of the difference did not exceed measurement error. There was no difference in back muscle endurance when using elastic or rigid therapeutic tape	4

(Contd..)

TABLE 1. (Continued...)

Author, year, country, reference	Research typology/ Research objective	Sample, methods	Conclusions	Rating
Kachanathu et al., 2014 Saudi Arabia (14)	RCT/compare physical therapy exercise interventions and use of Kinesio tapes in the treatment of chronic low back pain considering changes in clinical outcome (pain, disability) and physical function (range of motion, strength).	Forty (n=40) patients with chronic low back pain were randomly divided into two groups: (a) Group 1 - Underwent conventional physical therapy with Kinesio taping; (b) Group 2 - Underwent only conventional physical therapy. The intervention sessions for both groups were three times per week for 4 weeks. Outcomes were assessed for activities of daily living using the Roland-Morris Disability Questionnaire, pain severity using a visual analog scale, ranges of motion of trunk flexion and extension using the modified Schober's test	Physical therapy program involving strengthening exercises for abdominal muscles and stretching exercises for back, hamstring, and iliopsoas muscles with or without Kinesio taping was beneficial in the treatment of chronic low back pain	4
Parreira Pdo et al., 2014 Brazil (19)	RCT/compare simple Kinesio taping with Kinesio taping method according to the treatment manual (with convolutions in neutral position) in reducing pain and disability in people with chronic low back pain	148 patients with chronic low back pain were randomized in to two groups. Experimental group participants received eight sessions of Kinesio taping with tension. Control group participants received eight sessions of Kinesio taping with no tension. The clinical outcomes measured were: Pain intensity, disability, global impression of recovery	After 4 weeks of treatment, both groups showed similar reductions in the primary outcomes of pain intensity and disability, with no statistically significant differences between the two treatment conditions	4
Parreira Pdo et al., 2014 (21)	Systematic review/effect of Kinesio taping compared to sham taping (placebo), no treatment or other interventions in people with musculoskeletal conditions	Systematic searches were conducted in MEDLINE, Embase, CEN-TRAL, PEDro, SPORTDiscus, CINAHL, LILACS, SciELO. Trials involving 495 people with musculoskeletal conditions were considered for inclusion. The experimental intervention observed was the use of the Kinesio taping method for any musculoskeletal condition. Records identified through database searching (n=275), studies included in qualitative synthesis (n=12)	Although Kinesio taping is widely used in clinical practice, the current evidence does not support the use of this intervention. The conclusions from this review are based on a number of underpowered studies, therefore large and well-designed trials are greatly needed	4
Sea et al., 2013 Republic of Korea (18)	RCT/examine the effects of Kinesio tape on anticipatory postural control and cerebral cortex potential, in patients with chronic low back pain	Twenty (n=20) patients with chronic low back pain were selected and assigned to (a) control group, to which ordinary physical therapy was applied; (b) experimental group, to which Kinesio tape was applied. Anticipatory postural control was evaluated using electromyography, and movement-related cortical potential was assessed using electroencephalography. Clinical evaluation was performed using a visual analog scale and the Oswestry disability index	Kinesio tape applied to chronic low back pain patients reduced their pain and positively affected their anticipatory postural control and movement-related cortical potential	3

(Contd..)

TABLE 1. (Continued...)

Author, year, country, reference	Research typology/ Research objective	Sample, methods	Conclusions	Rating
Soo-Yong et al., 2015 Republic of Korea (16)	RCT/investigate the effect of Kinesio taping on the kinematics of lumbar-pelvic-hip complex during forward bending in individuals with reduced hamstring extensibility	Eighteen (n=18) males with reduced hamstring extensibility on the right side were randomly assigned to one of two groups: (a) Kinesio tape group; (b) sham Kinesio tape group. Kinematic measurements were obtained using a VICON MX-T20 motion capture system	Kinesio taping does not influence the angle of pelvic anterior tilt or hip flexion during lumbar forward bending. Thus, Kinesio taping is not appropriate as an intervention for the improvement of the movement pattern	2
Thiago et al., 2014 Brazil (20)	RCT/evaluate the influence of lumbar fascia Kinesio taping technique in a forward bending range of motion	The sample consisted of 45 female volunteers and physiotherapy students, who did not present any movement dysfunction and did not perform any regular physical exercises. Participants were paired according to age and BMI and randomly divided into three groups: (a) Control; b) Kinesio without tension; (c) Kinesio Fascia Correction technique. The subjects were assessed by Schober and fingertip-to-floor tests and left the Kinesio tape in place for 48 hours before being reassessed in 24, 48 hours and 30 days after its removal	The fascial correction technique and the application of Kinesio tape without tension, promoted changes in fascia mobility, allowed for discrete gains in lumbar flexibility, and had significant influences on fingertip - to - floor distance. To achieve better results in lumbar fascia mobilization, the use of the Kinesio tape for longer periods is recommended	2

Legend: Compliance with research aims rating scale; 1=Poor, 2=Fair, 3=Good, 4=Excellent. RCT: Randomized controlled trials; BMI: Body mass index

and the evaluation instruments, so the systematic meta-analysis can be performed, to further confirm the results of this review.

Subject characteristics

The studies included in analysis demonstrate an evident lack of homogeneity concerning subjects' characteristics in the area of pain. Pain, which can be fully evaluated and described only by patient, is assessed as nonspecific low back pain (9,14), endurance (9), reduced extent of affected area muscles (9,15,16), related to its intensity (17,18), and duration (17,14,18). Criteria for subject selection varied more obviously in pain definition. The diagnosis of low back pain ranged from "patient seeking treatment" (9,19), "pain score at least 4" (17,18), or had to be diagnosed by an orthopedist (14). Two studies (15,20) researched just healthy subjects. It

seems, that the only criteria, agreed by most analyzed studies are the statement about the chronic pain, describing it as the pain that lasts at least 3 months (14,17-19).

Just a few studies considered other subjects chronic conditions (15-18), two considered the use of analgesics (17,18), the range of age (21,20), and one study excluded subjects with body mass index higher than 29 (20).

Another weakness of literature analyzed is the incoherent therapist characteristics. The subjects were Kinesio-taped by physiotherapists (9,15,14,18,19), taping practitioners (17) or the examiner (20). Considering that knowledge and skills are both needed for quality done interventions, therapists' professionalism is probably a factor that should be taken into account in measuring taping effectiveness.

TABLE 2. Codes sorted by categories

Codes (n=82)	Studies
Category 1 – Subject characteristics (n=19)	
BMI, certified Kinesio Taping practitioners, chronic low back pain, difficulties falling asleep, examiner, fatigue in legs, fatigue in lumbar spine, height, mass, Kinesio Taping method practitioners, mild acute complaints, musculoskeletal conditions, nonspecific low back pain, pain disturbs sleep, pain in lumbar spine, physiotherapist, reduced hamstring extensibility, seeking treatment, young healthy subjects	(9,14-17,19-21)
Category 2 – Taping technique (n=16)	
0-15% tension, 10-15% tension, 25% tension, application time, asterix pattern, fascial correction technique, Kenzo Kase's Kinesio Taping Method Manual, Kinesio Fascia Correction, Kinesio Tex taping protocol over paraspinal muscles, Kinesio Without Tension, overlapping, parallel to the spine, relax muscles, stretch degree, support affected area, tension	(9,14,16,17,19,21)
Category 3 - Control interventions (n=13)	
Control, cope with pain, hamstring and strengthening abdominal muscles, hot pack, improve activities of daily living, physical therapy, placebo taping, reduce pain, stretching exercises for the back, stretching exercises for the iliopsoas, traditional management, transcutaneous electrical nerve stimulation, ultrasound	(9,14,16,18,19,21)
Category 4 – Instrument (n=17)	
Biering–Sorensen test, chronometer, electroencephalography, electromyography, fleximeter, global perceived effect scale, inclinometer, McGill Melzack Pain Questionnaire, McQuade test of trunk muscle endurance, Oswestry disability index, Pain numerical rating scale, Pain visual analogue scale, Rolland-Morris Disability questionnaire, Schober test, SF-36 Questionnaire, Tampa kinesophobia scale, Vicon motion capture system	(9,14-19,21)
Category 5 – Outcomes (n=17)	
Anticipatory postural control, back muscle endurance, cerebral cortex potential, disability, extension, flexion, forward bending range of motion, global impression of recovery, lumbar extensor musculature, lumbar flexion, pain intensity, pain, position duration, quality of life, return to work, trunk extension ranges of motion, trunk flexion range of motion	(9,14-19,21)

BMI: Body mass index

Taping methods

There are different taping methods described in low back Kinesio Taping, such as waves technique (3), Kinesio without tension (20), Kinesio Fascia Correction Technique (20), Kinesio Tex taping technique (9,19), taping over paraspinal muscles either side over lumbar spine (14,17,22), or overlapping in a star shape and asterix taping (17,18). For the stimulation of correct movements, extensibility, and fatigue delay in healthy subjects could be the optimal technique to tape either side over lumbar spine (15) or the fascial correction technique (20). Patients with chronic low back pain could benefit from overlapping technique, where the tape is in a star shape, and in that way reduce the pain, positively affect anticipatory postural control and movement-related cortical potential (18).

Another important question is the Kinesio Taping tension. Researchers approached different tape tensions, ranging from 0% to 25% of tape stretch

over pain area. The tape stretch degree could relieve the pain (3,20), increase muscle endurance (17) and promote mobility (20). According to the creators of the Kinesio Taping method, convolutions increase blood and lymphatic flow, and aid in reducing pain. Therefore, applying proper tension of Kinesio tape is one of the key factors for effective treatment (15,21).

Outcomes

The studies evaluated different outcomes, which hampers comparability. Measuring “pain” as criteria, several subjective instruments were used: Global impression of recovery and quality of life (19,21), Rolland-Morris low back pain and disability questionnaire (14,17,21), the visual analog pain rating scale (14,19,21), and Oswestry disability index (18). Just in one study (18), where the pain was measured with visual analog scale, the effectiveness of Kinesio Taping was significant. All other effects of Kinesio

Taping in reducing low back pain were not significant (9,14,17,16,19-21).

The positive effects of Kinesio Taping were observed on some objective outcomes, such as paravertebral muscle fatigue measured with Biering-Sorensen test (15), on anticipatory postural control and movement-related cortical potential measured with Oswestry Disability Index (18), mobility and flexibility measured with Schober and fingertip-to-floor test (20).

Studies empirically promoting Kinesio Taping examining young healthy subjects (15,18,20), or a small sample (18) could not be used as evidence for clinical practice. In most analyzed studies (9,14,15,17,18,20) the effect of Kinesio Taping is positive, but not statistically significant. On the other side, there is evidence that chronic low back pain can be effectively managed with kinesiotherapy, depending on type and frequency of exercises (22).

CONCLUSION

The effect of Kinesio Taping in reducing low back pain is positive but was not statistically significant in analyzed studies. Taping therapy may therefore be used as a supplementary method to conventional physical therapy procedures and may be important for patients because of its easy accessibility and safety. Further studies are recommended to elucidate the effect of Kinesio Taping on low back pain.

CONFLICT OF INTEREST

The authors declare that no conflicts of interest.

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