

DOI: 10.2478/tperj-2018-0014

The potential value of kinesio taping for the management of nonspecific low back pain

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Abstract

Background: Kinesio Taping (KT) is a widely used treatment method in the clinical practice that is also largely applied as a therapy for lumbar pain. The method was invented in 1970 by Kenzo Kase et al. and is represented by the application of adhesive tapes on the skin, that are very thin and with elasticity similar to the skin. Although it is frequently used, the efficacy of kinesio taping is still to be proven, and the mechanism it is based upon still remains unclear. Lumbar pain is a very important health issue worldwide; it is pain in the lumbar-sacral region, at the L4-L5 level. Chronic lumbar pain has a high prevalence across the world, affecting especially patients that are over 45 and being associated with high medical and social costs. *The aim* of this paper is to present a systematic literature analysis regarding the effects of kinesio taping on lumbar pain and on the degree of disability it can lead to.

Materials and methods: The research is based on the analysis of relevant scientific studies on the effects of kinesio taping on lumbar pain published in different data basis such as NCBI, PubMed, Crossref, Cochrane Library, Scope Med, Net Journals, and Research Gate between 2012 and 2017.

Results: 30 articles were included in the study out of the total number on the topic, articles that correspond with the aim of the study and that present the most recent advancements in the field.

Conclusions: KT generally has effects that are similar with those of traditional treatment methods for lower back pain and for the disabilities it can produce, but results appear much faster; moreover, the efficacy is higher when KT is associated with traditional treatment options.

Keywords: lower back pain, kinesio taping, treatment, effects, efficacy

Rezumat

Introducere: Kinesiotaping (KT) este o metodă de tratament cu largă utilizare în practica clinică, foarte folosită și la persoanele cu dureri lombare. Metoda a fost inventată în anii 1970 de Kenzo Kase et al. și constă în aplicarea pe piele a unei benzi adezive, subțiri, cu elasticitate similară pielii. În ciuda utilizării frecvente, eficacitatea kinesiotapingului este nesigură, iar mecanismele care stau la baza efectelor sale sunt neclare. Durerea lombară este o problemă de sănătate importantă în întreaga lume; ea reprezintă durerea din zona lombosacrală, frecvent localizată la nivelul L4-L5. Durerea lombară cronică are o prevalență crescută în întreaga lume, ea afectând mai ales persoanele sub 45 de ani și fiind asociată cu costuri mari, medicale și sociale. *Scopul* acestui studiu îl reprezintă o analiză sistematică a literaturii recente de specialitate privitoare la efectele kinesiotaping asupra durerii lombare și asupra dizabilității legate de aceasta.

Material și metodă: Cercetarea se bazează pe analiza unor studii științifice relevante referitoare la efectul KT asupra durerii lombare și asupra dizabilității legate de aceasta publicate în bazele de date: NCBI, PubMed, Crossref, Cochrane Library, Scope Med, Net Journals și Research Gate, în intervalul 2012-2017.

Rezultate: Din numărul total de articole luate în studiu au fost analizate 30 de articole de cercetare corespunzătoare scopului acestui studiu și au fost evidențiate cele mai noi informații legate de acest domeniu.

Concluzii: KT are în general, efecte similare metodelor tradiționale de tratament asupra durerii lombare și asupra dizabilității legate de aceasta, dar rezultatele favorabile se obțin mai rapid; în plus, eficacitatea sa este mai mare atunci când se asociază cu tratamentele tradiționale.

Cuvinte cheie: durere lombară joasă, kinesiotaping, tratament, efecte, eficacitate

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Introduction

According to the International Association for the Study of Pain (IASP), pain is defined as a unpleasant sensorial and emotional experience associated with a real organic injury or with potential injury described as a lesion [1,2]. Pain has a subjective character, with 2 components, a sensorial (somatic) component and a psychological (affective) component, that play a very important role in the perception of pain. The most frequent causes for pain are muscular and skeletal damage or diseases that lead to injury, irritation or inflammation of the soft tissues, which can lead to functional failure [2]. Lower back pain can be defined as pain localized between the lower margin of the ribcage and the upper part of the buttocks, including the lumbar-sacral area, between the L4 and L5 vertebrae [3]. It is one of the most frequent musculoskeletal disorders that affects up to 80% of the adult population at least once in a lifetime [4,5]. There are many causes for lower back pain among which we mention scoliosis, bad posture during sleep, muscle and ligaments tension or straining [6,7]; it can appear after repeated injuries or after physical stress, together with an imbalance in the muscles of the lumbar and pelvic regions, phasic muscles become insufficient, and postural muscles become hyperactive and tensed [8,9,10]. Lower back pain can also be caused by traumatic or osteoporotic fractures of the vertebrae, by tumors, infections or by the acceleration of intervertebral disc degeneration, after a surgical slip [11]. Sometimes lower back pain can appear after a specific movement such as lifting bending or curving, and in the elderly in case of exaggerated activity [12]. Among the risk factors there are physical work, overweight and obesity, and pregnancy [7,13].

Any type of lumbar pain which is caused by a strain in the muscles of the spine and by the abnormal stress exerted upon the region is considered mechanical lumbar pain [12,14]. Mechanical pain which has a musculoskeletal origin that cannot be attributed to a certain pathology such as spine fractures, ankylosing spondylitis, infections of the intervertebral discs (discitis), tumors, osteoporosis, HIV infection, autoimmune diseases, is defined as nonspecific lumbar pain (NSLBP) [15,16]; it represents 85-90% of the lower back pain causes. [8,17,18] The incidence is high among workers that

have to endure high physical effort such as lifting weights or standing for long periods of time [19,20]. Lower back pain can manifest as neuralgic pain, as a twinge, burning sensation or cramps; it can be sharp or dull pain, intense or attenuated [12]. In the case of nonspecific lower back pain the symptoms and severity depend on the type of physical activity of the patient [8,12,21]. Depending on its duration, lower back pain can be classified as acute (appears suddenly and lasts for less than 6 weeks), subacute (lasts for 6-12 weeks), and chronic in the case of 10-15% of the patients (lasts for longer than 12 weeks) [19,20].

According to the "European Guideline for the Management of Chronic Nonspecific Low Back Pain" from 2004, the prevalence of nonspecific chronic lower back pain is around 23% leading to an increase of the socio-economical costs [15,16]. The prognosis is unfavorable as this type of pain limits activity, determines invalidity for long periods of time and lowers the quality of life, being one of the main causes for absenteeism in the workplace [5,14,22,23,24,25]. In many countries, especially in developed countries, nonspecific chronic back pain represents the main cause for incapacity and loss of life quality for people under 45 [9,20,25,26,27].

In order to establish pain intensity one can use verbal scales ("Verbal Descriptor Scale") such as "Oswestry Low Back Pain Disability Questionnaire", or numerical scales ("Numerical Rating Scale"). A very sensitive method for establishing the variations in pain intensity is the "Visual Analogue Scale" (VAS). Changes in the quality of chronic pain can be assessed by using the "McGill Pain Questionnaire". Evaluating of lumbar incapacity can be achieved with the help of the "Rolland Morris Disability Questionnaire" (RMDQ) that allows the evaluation of daily physical activities affected by chronic lower back pain [28] and with the Oswestry questionnaire ("Oswestry Disability Index" - ODI) that establishes the different limits in the case of daily activity. The trunk's range of motion (flexion and extension) can be appreciated with the modified Schober test, and the resistance of trunk muscles can be measured with the "McQuade Trunk Test". Apart from pain and incapacity the patients can present depression, given by chronic pain, increased prescription drugs consumption, and the risk of losing their job [29].

Gaskin D.J. estimate that the financial burden given by lower back pain is higher than the annual costs with heart disease, cancer, and diabetes [30,31]. Approximately 20% of the direct costs related to this pathology are represented by physiotherapy, prescription drugs, and other healthcare fundamentals, while the rest of the money is spent indirectly through work absenteeism and loss of productivity [32,33].

At this point in time medical doctors recommend for the treatment of lower back pain, apart from traditional treatment methods, the kinesio taping method, which is an application of adhesive taping, invented by Kenzo Kase [31,34].

The present study finds its **aim** in giving a general view on the uses of kinesio taping (KT) in clinical practice, as well as offering an overview of the literature data on the potential beneficial effects of KT in the treatment of lower back pain.

Material and methods

We have identified numerous studies on the topic of kinesio taping effects in the treatment of chronic lower back pain by using the following online data bases: NCBI, PubMed, Crossref, Cochrane Library, Scope Med, Net Journals, and Research Gate. The search criteria, as well as criteria for inclusion in the study were: full text papers, original articles, randomized clinical trials, reviews, and metaanalysis, in English and published between 2012 and 2017. We used the following key words in our search: low back pain, kinesio taping, treatment, effects, and efficacy.

The following were included in the study: scientific papers that had an abstract, contained original data on the topic, and which studied the effects of kinesio taping in the treatment of chronic lower back pain, with or without the association of conventional treatment, disregarding the gender of the patients and their origins. Case studies and articles that did not reach the aforementioned topic were not included in this research.

Results and discussions

Numerous conservative treatments for lower back pain have been investigated along the years, treatments that have shown different clinical benefits [7,35]. They have been developed in order to improve the ability of performing routine activities ("Activities of Daily Living" - ADL), quality

of life, as well as in order to reduce pain and to teach patients how to manage their pain [9,36].

Pharmacologic therapies are the main treatment type for acute lower back pain and consist of prescription analgesics, notwithstanding their adverse effects [31,37]. The most widely used drugs in the treatment of lower back pain are analgesics and NSAIDs, opioids, corticosteroids, muscle relaxants, anticonvulsants, and antidepressants. [2,38] For persistent unspecific chronic lower back pain clinical guidelines recommend different treatment options that vary depending on the duration of the symptoms, such as: physical exercise, kinetotherapy, acupuncture, transcutaneous electrical stimulation, laser therapy, UV light, infrared light, shortwave therapy, ultrasound therapy, patient education and self training [39,40].

The recommended exercises in the management of chronic lower back pain include both general and specific exercises for back stabilization [39,41]. They can be useful both for the improvement of flexibility and for reducing pain intensity when they are performed on a regular basis. Therapeutic exercise programs include stretching exercises, muscle strengthening exercises, leading to a better muscular balance, and to a better flexibility at that level [9].

Physical therapy consists of exercises, soft tissue massage, joint mobilization, relaxation exercises, posture correction exercises, balance and walking exercises, tractions, compressions and hydrotherapy [2,40,42,43].

Apart from the aforementioned treatment options, which have proven a moderate efficacy, the "European Guidelines for the Management of Chronic Lower Back Pain" also recommend educational or cognitive-behavioral programs [40,44,45].

As stated by Hoffman A.J., the "World Health Organization" recommends a series of cheap and easy to use methods, such as patient education and self-treatment techniques, that allow patients a better control over the treatment of pain, with better and longer lasting results [31,46].

In the last years, one of the frequently used therapeutic interventions for the preventions and treatment of sports injuries, and for different

clinical entities, including lower back pain, is the taping method [27,47].

Taping techniques set an aim in supporting the lower back, correcting posture and reducing the pressure exerted upon the spine during different activities, being useful both in the treatment and in the prevention of lower back injuries [12].

Therapeutic taping can be used as a supplementary method, together with physical therapy, and can be applied by using two types of tape – rigid and elastic, adhesive or non-adhesive. The first taping type used in the treatment of musculoskeletal injuries was the rigid taping; it protects muscles and joints by intensifying proprioception and by the support they offer [27,48]. Traditional taping techniques used to treat musculoskeletal injuries are based on the application on joints of an adhesive, non-elastic tape, made of cotton and zinc oxide, which offers structural and biomechanical support, limits the degree of joint movement and compression [31,49,50,51]. The new technique invented by Kenzo Kase, named from here on kinesio taping, is different from the traditional taping techniques [31,34]. It was first used in Europe in 1998. In 2007, European KT instructors founded the "K-Active Europe Association of Instructors and Therapists" and implemented an educational system called kinesiology taping based on the theoretical objectives of kinesio taping, scientific research results and clinical experience [52].

Kinesio taping is a simple treatment, economical, accessible, and safe for the treatment of pain and of musculoskeletal dysfunctions. It consists of applying an adhesive elastic tape, very thin, on the skin [12]. The tape, called kinesiology tape (K-active tape) contains no latex, no chemical or pharmacological substances, and is temperature sensitive, water resistant, with an acrylic adhesive that is heat sensitive [3,12,20,53].

In comparison with the tape used by athletes, or other types of therapeutic tapes, the elastic therapeutic tape allows longitudinal stretching of the muscle in order to diminish pain and to improve muscular performance when it is applied in the stretched position, and it can stretch to over 120-140% from its original length [27,54].

All studies consider a 25% tension tape as a therapeutic tape; this kind of tape has different

shapes and sizes and can be applied using various techniques – pain relief, rehabilitation, lymphatic drainage, and techniques for posture correction and for sports performance [31].

In case of injury, when the kinesio taping is applied on the soft tissues or on the joints, it ensures support and protection and helps diminishing the pain and edema. Moreover, it strengthens the support structure in their relaxed position and protects injured tissues from following consequences [2]. In unspecific lower back pain, kinesio taping supports the affected area, relaxes the muscles, and reduces pain sensation [20]; it is applied over and around the muscles in order to prevent over-contraction, lowering pressure and diminishing inflammation that can both lead to pain [20,55].

During the last years, numerous studies have explored the kinesio taping for evaluating the effects this method has when used as a conservative therapy in the treatment of musculoskeletal pathologies. For this purpose several clinical trials, systematic reviews and metanalysis have been carried out, but the conclusions were varied [27]. Castro-Sánchez A.M. et al., have carried out a controlled, randomized trial, in order to establish if the kinesio taping can reduce incapacity related to lower back pain and kinesiophobia, in people with unspecific chronic lower back pain [5]. Also, they have examined the effect that elastic kinesio taping has on the isometric resistance of the trunk muscles and on the flexion of the body. The subjects included in the study were randomly divided in 2 groups: the kinesio taping group and the sham taping group (placebo). In both groups the taping was applied on the lower back region and was kept for 7 days. The results showed statistically significant improvements after the kinesio taping use, regarding incapacity, pain, isometric strength of the trunk muscles, and in the degree of trunk flexion. Generally, the effects on pain and incapacity, although statistically significant, were so low compared to the placebo group that they could not be considered clinically significant. After 4 weeks they have observed improvement only in regard to pain and trunk muscle strength [5].

The effects of applying elastic kinesio taping on the paravertebral lumbar region on the muscle strength, in comparison with a rigid therapeutic

taping method, and with the lack of any tape, were examined by Hagen L. et al. in 2015, in subjects with unspecific lower back pain. They concluded that the muscular strength of the back was higher in the patients with elastic taping in comparison with those who do not received taping, but equal with those who received rigid taping [54].

Regarding the pressure that can be used when applying kinesiio taping in subjects with chronic lower back pain, Parreira Pdo C. et al. [3,56] have observed similar results in the reduction of pain intensity and incapacity in both methods, respectively with a 10-15% tension (that generated circumvolutions) or without tension (when circumvolutions can be avoided). A significant improvement regarding reduction of pain and limiting lumbar movement and incapacity was shown by Asthana D. et al. in patients with chronic lower back pain that benefited from kinesiio taping in association with conventional treatment [16].

Moreover, Paoloni M. et al. has observed a significant decrease in pain intensity in patients with chronic lower back pain that were treated with a combination of physical exercises and kinesiio taping [57].

According to Bayomi A.Y.I. kinesiio taping represents a therapeutic mean that is useful as an adjuvant of physical therapy, and that can aid in diminishing incapacity and lower back pain [7].

In a controlled, randomized trial, researchers have compared conventional physical therapy (that included muscle strengthening exercises for the abdominal muscle groups and stretching exercises for the back, tendons, and iliopsoas muscle) and kinesiio taping for the treatment of chronic, unspecific, lower back pain. 40 patients with chronic lower back pain were included in this study and were divided into 2 groups: one group received conventional physical therapy associated with kinesiio taping, while the other group only received conventional physical therapy. In all patients they evaluated the effects on daily physical activity using the "Rolland Morris Disability Questionnaire" (RMDQ), the pain severity using an analogue visual scale (VAS) and the degree of trunk flexion and extension, using the Schober test. The conclusion was that a physical therapy program, combined or not with taping, is beneficial in treating chronic lower back pain [8].

The efficacy of adding kinesiio taping to the classic physical therapy program, was analyzed by Added M.A.N. et al. In their study physical therapy included a combination of manual therapy techniques, general exercises, and specific stabilization exercises. They came to the conclusion that in the case of patients with chronic, unspecific lower back pain, applying this type of treatment for a period of 5 weeks led to reduced pain intensity evaluated on the VAS scale and to a better movement of the trunk [20,40].

Some authors concluded that using only kinesiio taping does not prove beneficial for the patients with chronic lower back pain [23,32,56]. They have observed that the therapeutic effects of this technique are similar to the placebo, incapacity and pain intensity improving after 48 hours of taping without any clinical relevance [23,32,56]. According to the study results from Added M.A.N. et al., using kinesiio taping as an integrated part of a treatment program based in exercised and manual therapy does not change the final results [32]. Also, Vanti C. et al. concluded in their metanalysis of randomized, controlled clinical trials, regarding pain and incapacity in patients with lower back pain, that in comparison to sham taping, elastic taping does neither significantly reduce pain intensity, nor incapacity [27].

In another metanalysis, Montalvo A.M. et al. came to the conclusion that in the case of musculoskeletal injuries, kinesiio taping has lowered lumbar pain intensity, but not to any further extent in comparison to other therapeutic techniques. Therefore, they suggest using kinesiio taping in association with traditional therapies or instead of them [51].

From the study they have analyzed, Mostafavifar M. et al. reach the conclusion that there is enough evidence both for and against using kinesiio taping in treating lower back pain, for improving performance and function [55].

Despite this controversy and despite using different techniques for the prevention and treatment of injuries and for rehabilitation, at this point kinesiio taping can be used for diminishing pain, improving functional capacity, movement degree, and for maintaining posture [2]. Kinesiio taping (KT) has the advantage of being a cheap and easy to use method, with faster results.

Numerous hypotheses exist on the mechanisms that are at the base of KT efficacy. One of the hypotheses implies that KT determines a stretch at skin level or exerts a pressure at this same level with a further stimulation of the cutaneous mechanoreceptors (large myelinated fibers) and in this manner, respecting the “gate control” theory, inhibits the transmission of pain signals [2,8,58]. This was a theory of Melzack R. and Wall P.D. who state that the spinal cord has a neurological gate that is able to block pain signals or allows pain signals to travel towards the brain [8,57,59]. Moreover, this external load stimulates the Golgi tendon organs and spinal muscles, modifying proprioception and postural awareness [2,31,34,57].

Another hypothesis states that when the elastic tape is applied on certain body areas it produces convolutions that determine a microscopic lifting of the skin, facilitating microcirculation in blood and lymphatic vessels, decompressing free superficial nerve endings and reducing pain intensity [31,60].

Conclusions

Lower back pain is a frequent clinical problem that mostly affects subjects aged under 45, with serious social and economic consequences. There are different therapeutic approaches, kinesio taping being one of them. This is a conservative therapy developed by Kenzo Kase. This intervention is widely used in the medical practice, although the mechanisms that lead to its beneficial effects remain unclear. Kinesio taping is an advantageous method as it is simple, safe, cheap, accessible, and easy to use.

Studies that have been carried out have shown a series of beneficial effects on reducing pain intensity and/or incapacity, sometimes significant, in patients with chronic lower back pain. In the case of kinesio taping in comparison to classic treatment options, results are seen faster, although end results do not differ from those obtained by applying classical treatment options.

Numerous researchers consider kinesio taping to be more efficient in patients with lower back pain when it is used as an adjuvant method and, therefore recommend using it as a supplementary therapy, together with tradition treatment options. Currently, there is no certainty regarding the efficacy of kinesio taping in the treatment of lower

back pain as there is not enough scientific proof to justify the use of KT as a single therapy.

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