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## APPLICATION OF KINESIO TAPE TECHNIQUE IN TREATMENT OF MUSCULOSKELETAL DISORDERS

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**Abstract:** Introduction: Musculoskeletal system disorders (MSD) are disorders affecting the structures of the musculoskeletal system; muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels in the body. MCPs represent a significant proportion of diseases worldwide and have significant economic consequences. Methods: The study was created based on collected data from the scientific literature in order to compare the effect of kinesiotope techniques. Databases of scientific internet portals were used for the purpose of comparing the results of different studies that are similar to this topic. Results: Article present the review and analysis of scientific papers published in different countries: United States, Slovenia, Pakistan, Turkey, Spain, Iran, China, Lithuania, Egypt, Indonesia and Brazil published in the period from 2008 to 2021, and a comparison that was made with the aim of comparing the results of kinesiotope techniques in musculoskeletal disorders. Conclusion: By the application of kinesiotope techniques significant results are achieved in reducing pain, improving the functionality of patients with musculoskeletal disorders, reduction of recovery period and rehabilitation and faster return of patients to their daily activities.

**Keywords:** kinesiotope, rehabilitation, musculoskeletal problems.

### 1. INTRODUCTION

Musculoskeletal disorders (MSDs) are a group of conditions that affect muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels in the body. Musculoskeletal disorders (MSDs) are a group of conditions that cause changes in the body's supporting structures, muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels in the body. MCPs represent a significant proportion of diseases worldwide and have significant economic consequences (Mahadik A, et al 2017). Musculoskeletal disorders are extremely common and include more than 150 different diseases and syndromes, which are usually associated with pain and loss of function (World Health Organ Tech Rep Ser. 2003). Epidemiological studies indicate that the frequency and type of musculoskeletal disorders are much more common in developing countries, and that due to delays in diagnosis or the inability to access appropriate health care facilities, treatment is less effective (Mody G.M, Brooks P.M. 2012). Musculoskeletal disorders are common in men and women of all ages in all socio-demographic strata of the society. They are the most common cause of severe long-term pain and physical disability, and affect hundreds of millions of persons worldwide. They affect all aspects of life and limit daily activities, endangering dexterity and mobility. They affect one in four adults in Europe (Woolf D. A, Erwin J, March L.2012). The prevalence of musculoskeletal disorders is equally represented in men and women of all ages in all socio-demographic layers of society. They are the cause of severe and long-lasting pain and physical disability for hundreds of millions of people around the world. They limit daily activities, reduce dexterity and mobility. According to previous studies, they are present in one out of four adults in Europe. The incidence of MCP according to global studies is 1.3% and is most common in people aged 50-69 years (3.24%). It is estimated that in the world MCP is the third leading cause of disability in the male population and the first in the female population (Galeoto G, et al 2019). Musculoskeletal disorders due to their high prevalence, common risk factors and common pathogens are present in multimorbidity

processes among other chronic conditions (**Duffield J.S, Ellis M.B, et al. 2017**). The characteristic of musculoskeletal disorders is a very common occurrence in most of these conditions. Activities of daily living such as bathing, dressing, getting out of bed or a chair, completing household chores, preparing meals, and shopping are often limited and are performed under the influence of pain, including other common symptoms of these disorders, such as stiffness, limited mobility and impaired physical functioning. (**Spiers N.A, Matthews R.J, Jagger C. et al. 2005**). Pain and functional limitations caused by MCP greatly reduce independence and quality of life and impair an individual's ability to participate in family and social life, as well as to perform work activities (**Clark P. M, Ellis B.M. A 2014**). The Global Burden of Disease (GBD) study investigated the prevalence of musculoskeletal disorders and disability as a consequence of these disorders. Although the prevalence of musculoskeletal disorders varies with age and diagnosis, between 20-33% of people worldwide live with musculoskeletal disorders (**James S.L, Abate D, Abate K.H, et al. 2017**). It is common for MCPs to perform pain reduction treatments. The main strategy for treating acute pain is to find, remove, or treat the cause of the pain in a specific region of the body (**Shaw W., Gatchel, R., et al.2017**). Implementing effective treatments in the treatment of MCP aims to improve quality of life, reduce joint pain and stiffness, limit the progression of joint damage, and maintain or restore functional capacity (**Zhang W, Moskowitz R W, Nuki G, et al. 2008**). Limitations of the musculoskeletal system are defined as functionally limiting problems involving bones, joints, cartilage, soft tissues, and other musculoskeletal structures (**Katz JN, Wright EA, Baron JA, Losina E. 2009**). With each therapeutic intervention, the following must be considered: therapeutic goals; effective communication with the patient; patient positioning; application of treatment techniques (including location, intensity, frequency, and duration), and reassessment of the patient state (**Thain K.P 2017**). The Kinesio Tape (KT) technique was developed by Dr. Kenzo Kase in the mid-1970s with the aim of supporting musculoskeletal structure without excessive mobilization and its side effects. KT was initially used for the elderly with arthritis, and later its application expanded to rehabilitation programs and sports medicine (**Wu WT, Hong CZ, Chou LW 2015**). To date, evidence for the efficacy of the Kinesio Tape technique has relied heavily on case studies, small pilot studies, and studies used by healthy groups of subjects (**Taylor L. R, Brown t, O'Brien L. 2015**). The tape is thin and light, made of 100% cotton fabric that is porous and does not limit the range of motion. It is applied by gluing to skin that is heat-activated and does not contain latex. The tape is waterproof and can last for three to five days (**Parreira PCS, Costa LCM. 2014**). KT mimics the properties of human skin, because it is approximately the same thickness and elasticity as the epidermis (**Basset K.T, Lingman S.A, Ellis R.F 2010**). As for its biomechanical effects, by the application of KT the skin is lifted from the lower fascia and soft tissue, resulting in increased blood circulation and lymphatic drainage, and increased oxygen supply to muscles thus weakening of inflammation (**Abubaker, A. A., & Muaidi, Q. I. 2018**). According to the therapeutic effects, the correct application of KT leads to mechanical changes on the skin, resulting in pressure or decompression, depending on the tension of the tape. Compressive forces stimulate mechanoreceptors, while decompressive forces reduce inflammation and stress on mechanoreceptors, which ultimately leads to a reduction in pain. (**Kinesio Taping Association International. 2016**). The tension provided by the tape can improve proprioception and facilitate proper posture and movement, even after removing the tape (**Lee H, Lim H. 2020**). In clinical application, KT is used in different forms depending on the therapeutic need, so there are techniques such as I-strip, O-strip, X-strip, Y-strip. The applications are different depending on the function, shape and characteristics of the joint. Depending on the effect of the I-tape and O-tape, the technique is used to achieve muscle and fascia stability according to anatomical structures, the X-tape is used to relieve pain due to the effect of lifting the skin, while the Y-tape is most often used to remove swelling and lymphoedema. and fan tape (**Mark D, James A, Paul D, 2008**).

## 2. MATERIAL AND METHODS

This article presents a cross-sectional, retrospective, analytical qualitative study, with the aim of comparing the application and effect of kinesiotope tapes in musculoskeletal disorders: a review of scientific, published literature with a review of the database with key words: musculoskeletal disorders, kinesiotope, rehabilitation, therapy, and pain. Different databases were used in the preparation of the article: Pub Med, Google Scholar, Medline, Hřčak, Dabar, Scis. The criteria for inclusion in this study are scientific papers published during the last 10 years. Out of a total of 45 scientific papers found, 15 papers were singled out that dealt with the same issue, i.e., the application of kinesio tape techniques in the treatment of musculoskeletal disorders.

## 3. RESULTS

By reviewing and analyzing scientific papers published in different countries: United States, Slovenia, Pakistan, Turkey, Spain, Iran, China, Lithuania, Egypt, Indonesia and Brazil published in the period from 2008 to 2021, a comparison was made to compare the results of kinesiotope techniques in musculoskeletal disorders.

*Table 1. Overview of research studies and average qualitative literature.*

Study	Study design	Participants	Clinical condition	Intervention	Results
<b>Mark D, James A, Paul D</b>  <b>USA 2008</b>	RCT	Forty-two subjects clinically diagnosed with rotator cuff tendonitis/impingement were randomly assigned to 1 of 2 groups: therapeutic KT group or sham KT group.	To determine the short-term clinical efficacy of Kinesio Tape (KT) when applied to college students with shoulder pain,	Subjects wore the tape for 2 consecutive 3-day intervals. Self-reported pain and disability and pain-free active range of motion (ROM) were measured at multiple intervals to assess for differences between groups.	The therapeutic KT group showed immediate improvement in pain-free shoulder abduction n (mean $\pm$ SD increase $16.9^{\circ} \pm 23.2^{\circ}$ ; $P = .005$ ) after tape application. No other differences between groups regarding ROM, pain, or disability scores at any time interval were found.

Izvor: (ako je vase pisete istrazivanja autora)

**Tabela 1. (Continued)**

Study	Study design	Participants	Clinical condition	Intervention	Results
<b>Samreena SH, et al.</b>  <b>Pakistan 2017</b>	RCT	There was 50 sample size that were divided into 25 participants in each group, 30 individuals are male and 20 are female participant [mean age 37.62 year SD 7.44 (range 20-50 year) were assigned.	Effective of taping and exercise program in the management of supraspinatus pain.	The style of progress persists, and at the 6 months transcribe stretching, icepack, ultrasound group had overall amounts of pain reduction compared with the kinesio taping, ice pack and ultrasound group. essentially, compare the effects at the four-week record.	This study supported the taping as a useful technique for relieving pain and improving strength in subject with supraspinatus tendonitis. It also revealed that taping is more effective in reducing pain in comparison with exercise therapy.
<b>Leyla E, et al.</b>  <b>Turkey 2018</b>	Crossover	Forty-five patients (34 females and 11 males) aged from 36 to 66 years having lateral epicondylitis for at least 3 months were selected..	Compare the short-term effects of kinesiotaping and extracorporeal shock wave therapy (ESWT) along with physiotherapy on pain,	The patients were randomly assigned to three groups: group 1 (n = 15 patients) received physiotherapy, group 2 (n = 15) received physiotherapy + kinesiotaping, and group 3 (n = 15 patients) received physiotherapy + ESWT. The patients were taped 5 days a	Kinesiotaping was found to be effective for decreasing pain intensity, recovering grip strength, and improving functionality in patients with lateral epicondylitis undergoing rehabilitation.

				week for 3 weeks using muscle and fascia correction techniques.	
<b>González I, Javier, et al.</b> <b>Spain 2018</b>	RCT	An experimental group of forty-one patients was divided into 1 of 2 groups: the kinesio taping technique was applied to the cervical spine (where it was applied with tension), while the other group was given a placebo effect (applied without tension).	The study aimed to demonstrate the short-term effects of kinesio taping on the cervical spine, the effect on neck pain and range of motion in subjects with acute whiplash-related disorders.	A mixed-model analysis of variance (ANOVA) was used to examine treatment effects on each variable. Patients in the experimental group had a greater improvement in the mobility of the cervical spine than subjects in the control group (P .001).	Subjects to whom kinesio taping was applied (appropriate tension) had statistically significant improvements immediately after application of kinesio tape and after 24 hours. Further research should investigate whether kinesio taping provides improved results when added to physiotherapy interventions over a longer period.
<b>Celena y, S. T., &amp; Kaya, D. O</b> <b>Turkey 2019</b>	Case-control within subject design	One hundred and one patients with CLBP age: 53 years, body mass index (BMI): 31.52 (5.57) kg/m <sup>2</sup> were included in this study.	Study was to investigate the immediate effects of kinesio taping on pain and postural stability in patients with CLBP.	Kinesio taping was applied on paravertebral muscles and sacrum with muscle and ligament techniques. Postural stability was assessed with Biodex Balance System (USA) both at static and dynamic mode in bilateral standing position.	Kinesio taping may immediately improve postural stability and decrease pain of patients with CLBP.

<p><b>Donec, V., &amp; Kubilius, R.</b>  <b>Lithuania</b> <b>2019</b></p>	<p>RCT</p>	<p>A randomized study conducted on 187 subjects assigned to the group of kinesiotaping techniques and the control group was conducted in a double-blind controlled trial.</p>	<p>Application of kinesiotaping techniques and their impact on reducing knee pain in subjects with KO</p>	<p>Kinesiotaping techniques were applied to the knee joint region for 4 weeks. The research was done in an outpatient clinic. Pain assessment was done at the beginning of therapy, after one month of control recording and at the end of therapy. The knee injury subscale, and osteoarthritis score (KOOS) was used to assess pain.</p>	<p>More than 70% of patients had reduced pain after applying the kinesio taping technique. Application of a specific kinesiotaping technique is of great benefit for pain relief compared to a non-specific kinesiotaping technique.</p>
<p><b>Ghozy, S, et al.</b> <b>Egypt</b> <b>2020</b></p>	<p>RCT</p>	<p>12 studies and 555 subjects were included in the meta-analysis and systematic review study.</p>	<p>The aim of the study is to evaluate the effectiveness of the kinesiotaping technique in the treatment of pain in the shoulder joint.</p>	<p>Additionally, meta-regression was used to assess the impact of the underlying shoulder disease and the effectiveness of kinesiotaping techniques.</p>	<p>In this study, it was shown that the kinesiotaping technique did not produce results for the treatment of shoulder joint pain. However, it is considered to be useful as a complementary treatment in painful shoulder syndrome.</p>
<p><b>Genç, E., Duymaz, T</b>  <b>Turkey</b> <b>2020</b></p>	<p>RCT</p>	<p>The study included 80 subjects with biceps tendinitis, randomly divided into two groups. 40 respondents in each group.</p>	<p>Effectiveness of applying the kinesiotaping technique in tendinitis of the biceps muscle, reduction of pain and level of functionality of the upper extremities.</p>	<p>The aim of the study was that through two groups of subjects (the group of subjects applying kinesiotaping techniques and exercise and the control group with only the exercise program). An evaluation was done before and after the treatment.</p>	<p>A randomized prospective clinical study showed that kinesiotaping techniques are effective in the treatment of patients with tendinitis of the biceps muscle, reducing pain and increasing the functionality and quality of life of the subjects.</p>
<p><b>Rini, m. P., &amp; Handoyo, R.</b></p>	<p>RCT</p>	<p>A randomized control trial included subjects with chronic low back pain</p>	<p>The aim of the study is to investigate the effect of kinesiotaping technique with</p>	<p>The improvement of the RMDQ score was greater in the intervention group receiving Kinesio Taping and McKenzie (90.44 ± 9.58) than in the control group</p>	<p>The functional status of patients with chronic mechanical low back pain who received kinesio taping with McKenzie exercises was better than those who received McKenzie alone.</p>

Indone sia 2020			McKenzie exercises in subjects with chronic lower back pain.	(67.99 ± 7.84).	
<b>Brito, M., Liane, R et al. [36]</b>  <b>Brazil 2021</b>	RCT	One hundred and thirty patients were included in the study, 70 were excluded according to the exclusion criteria, while 60 subjects were assigned to different groups.	The study aims to demonstrate different taping techniques on fatigue and muscle pain in subjects with lower back pain.	Only female subjects, 60 in total, average age between 18 and 50 years, mean body mass index (BMI) of 22.5 ± 2.5 kg/m <sup>2</sup> who reported non-specific lower back pain were selected.	These studies cannot support any superiority of the application of kinesiotaping techniques compared to another group without kinesiotaping. There was no statistically significant difference between the subjects in whom the kinesiotaping technique was applied compared to the control group.

#### 4. DISCUSSION

By collecting data from scientific articles cited in this article, it can be said that musculoskeletal disorders (MSDs) are a group of conditions that affect muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels in the body. MCPs represent a significant proportion of diseases worldwide and have significant economic consequences (**Mahadik A, et al 2017**). Disorders of the musculoskeletal system include more than 150 different diseases and syndromes, associated with pain and loss of function. Considering the relatively recent application technique of kinesiotagging, the evidence for the effectiveness of the KinesioTape technique relies heavily on case studies, pilot studies and studies that used healthy groups of subjects (**Taylor L. R, Brown t, O'Brien L. 2015**). The correct application of KT leads to mechanical changes on the skin, the result of applying pressure or decompression, in the end everything depends on the tension of the tape. The goal of kinesiotaping tape and its application is to stimulate mechanoreceptors through compressive force, while decompressive forces can reduce inflammation and load on mechanoreceptors (**Kinesio Taping Association International. 2016**). The characteristic of kinesiotaping tape is tension, the goal of applying the tension provided by the tape improves proprioception and can affect proper posture and movement (**Lee H, Lim H. 2020**). Mark D, James A, Paul Dsu in their study of 42 subjects with rotator cuff tendinitis as a therapeutic treatment for KT, concluded that its use may be helpful to clinicians in improving active pain-free ROM immediately after applying tape for patients with shoulder pain. Use of KT to reduce the intensity of pain or disability for young patients with suspected tendinitis (**Mark D, James A, Paul D, 2008**). Kim T, Melita P In 2017, based on clinical studies, they concluded that Kinesio Taping techniques affect the reduction of pain in the lower back, without statistically significant deviation in the analyzed studies. KT therapy can be used as a complementary method in physical therapy and can be of importance for treatment by comparing these studies. The difference in the effect of KT is that KT was used in the study of back pain in the 2017 study as an elective therapy, and as such without other models of physical therapy, the therapeutic effect will not be the same (**Kim T, Melita P. 2017**). Samreena SH, et al. In their study conducted in Pakistan in 2017, they came to the conclusion that in 4 weeks, all participants showed great progress on the pain scale using kinesio taping. Kinesio taping is considered a useful technique for pain relief and strength improvement in subjects with supraspinatus tendinitis. This study can take into account the fact that kinesiotaping reduces pain compared to exercise, and can be a choice in the treatment of supraspinatus tendinitis (**Samreena SH, et al. 2017**). Leyla E, et all. In a study conducted in Turkey in 2018, on forty-five patients (34 females and 11 males) aged 36 to 66 years, who were diagnosed with lateral epicondylitis in the last 3 months, were found to be Kinesio Taping effective in reducing pain intensity, recovery of grip strength, and improving functionality in patients with lateral epicondylitis who are in rehabilitation (**Eraslan L, et al. 2018**). González I, Javier, et all. were in a study published in 2018 in Spain on a study group of 41 patients, in the experimental group of subjects applied Kinesio Taping technique on the cervical spine. Patients with acute pain in whom Kinesio Taping was administered with appropriate tension showed statistically significant improvements immediately after Kinesio tape application and after 24-hour follow-up. and that the effects of the same have significant statistical differences in reduced pain in the first 24 hours compared to a



study published in 2017 in Slovenia, where no significant statistical effect of the same was described (**González I, Javier, et al. 2009**). Abbasi S, Soheila, et al. In their study, aimed to investigate possible changes in postural control during standing upright in subjects with nonspecific chronic low back pain and the effect of Kinesio tape on postural control. Applying kinesiotaping technique, postural control seems to change immediately and has lasting effects until the next day (**Abbasi S, Soheila, et al. 2018**). Also, Celenay, S. T., & Kaya, D. About their study conducted on 101 patients with LBP aged 53 years, included in this study. Kinesio techniques applied to the paravertebral muscles of the lumbar spine and ligaments, immediately increases postural stability and reduces pain in patients with LBS (**Celenay, S. T., & Kaya, D. O. 2019**). Júnior, MADL et al in their study report that kinesiotape is suitable for use, in some cases it can be used by people with chronic low back pain, especially when patients who cannot receive other physical therapy, a combination of taping techniques with physical therapy could significantly improve effect of therapy and reduce disability (**LI Yuejie, et al. 2019**). Donec, V., & Kubilius, R. In 2019, in a study conducted in Lithuania, kinesio taping technique was used as a choice of therapy on the painful knee area for a period of 4 weeks. The therapeutic effect was checked initially, after a month. At the conclusion of the study, they came to the fact that the elastic band can reduce knee pain and reduce the need for pharmacological administration (**Donec V., & Kubilius, R. 2019**). Genç, E., Duymaz, T. in their study published in Turkey 2020 conducted a study on eighty patients with biceps tendinitis, is through a randomized, controlled prospective clinical trial is the first study to demonstrate the effectiveness of the KT method used in the treatment of patients with tendinitis. As a result of the research, it was determined that the application of KT along with exercise therapy is effective in reducing pain and the quality of life of patients (**Genç E., Duymaz, T. 2020**).

## 5. CONCLUSIONS

The review of the results established the importance of the application of kinesiotaping techniques, and their inclusion in the protocol of physical models. The application of kinesiotaping techniques achieves significant results in reducing pain, improving the functionality of patients with musculoskeletal disorders, reducing the period of recovery and rehabilitation and faster return of patients to their daily activities.

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