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THE EFFECTS OF INSTRUMENT-ASSISTED SOFT TISSUE MOBILIZATION AND KINESIO TAPING ON PAIN, FUNCTIONAL DISABILITY AND DEPRESSION IN PATIENTS WITH CHRONIC LOW BACK PAIN: A RANDOMIZED TRIAL

ORIGINAL ARTICLE

ABSTRACT

Purpose: Low back pain is a common condition that can become chronic, which reduces the life quality of the patient by causing functional disability and depression. This study aimed to investigate the effects of instrument-assisted soft tissue mobilization (IASTM) and kinesio taping (KT) along with conservative treatment in patients with chronic nonspecific low back pain (CNLBP).

Methods: A total of 30 patients with chronic low back pain aged between 30-50 years included in the study were randomized to IASTM (n=15) and KT (n=15) groups. Both the groups underwent conservative treatment that comprised of a hot pack, ultrasound, transcutaneous electrical nerve stimulation (TENS) and home exercises. In this study, assessments were made using the Visual Analogue Scale (VAS), Roland Morris Disability Questionnaire (RMDQ), and Beck Depression Inventory (BDI). The measurements were carried out at the beginning and end of the treatment.

Results: As a result of the study, IASTM method improved in parameters such as pain (p<0.05), functionality (p=0.001) and depression (p<0.05). As a result of the study, the KT group improved in parameters such as pain, functionality and depression compared to pre-treatment (p<0.05). However, the two treatments were not superior to each other in pain (p=0.241), functionality (p=0.687) and depression (p=0.699) parameters.

Conclusion: It has been observed that both treatments have positive effects on many parameters such as pain, disability, depression and mental state in patients with CNLBP. This study demonstrates that IASTM and KT treatments can be used to support therapeutic effects in patients with CNLBP.

Keywords: Athletic tape, Chronic pain, Depression, Low back pain, Manual therapy.

KRONİK BEL AĞRILI HASTALARDA ALET DESTEKLİ YUMUŞAK DOKU MOBİLİZASYONU VE KINEZYOLOJİK BANTLAMANNIN AĞRI, FONKSİYONEL YETERSİZLİK VE DEPRESYON ÜZERİNE ETKİLERİ: RANDOMİZE BİR ÇALIŞMA

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bel ağrısı kronikleşebilen, fonksiyonel yetersizlik ve depresyona neden olarak hastanın yaşam kalitesini düşüren yaygın bir durumdur. Bu çalışma, kronik nonspesifik bel ağrısı (KNBA) olan hastalarda konservatif tedaviye ek olarak uygulanan Enstrüman Destekli Yumuşak Doku Mobilizasyonu (EDYDM) ve Kinezyolojik Bantlama (KB) yöntemlerinin etkilerini araştırmayı amaçladı.

Yöntem: Çalışmaya dâhil edilen 30-50 yaş arası toplam 30 kronik bel ağrılı hasta randomize olarak EDYDM (n=15) ve KB (n=15) gruplarına ayrıldı. Her iki gruba da sıcak paket, ultrason, transkutanöz elektriksel sinir stimülasyonu (TENS) ve ev egzersizlerinden oluşan konservatif tedavi uygulandı. Bu çalışmada Görsel Analog Skalası (VAS), Roland Morris Engellilik Anketi (RMEA) ve Beck Depresyon Envanteri (BDE) kullanılarak değerlendirilmeler yapılmıştır. Ölçümler tedavinin başında ve sonunda yapıldı.

Sonuçlar: Çalışma sonucunda EDYDM yöntemi ağrı (p<0,05), işlevsellik (p=0.001) ve depresyon (p<0,05) gibi parametrelerde iyileşme sağladı. Çalışma sonucunda KB grubu ağrı, fonksiyonel yetersizlik ve depresyon gibi parametrelerde tedavi öncesine göre iyileşme sağladı (p<0,05). Ancak iki tedavinin ağrı (p=0,241), işlevsellik (p=0,687) ve depresyon (p=0,699) parametrelerinde birbirlerine üstünlükleri yoktu.

Tartışma: KNBA olan hastalarda her iki tedavinin de ağrı, yeti yitimi, depresyon ve ruhsal durum gibi birçok parametre üzerinde olumlu etkilerinin olduğu görülmüştür. Bu çalışma, EDYDM ve KB tedavilerinin KNBA'lı hastalarda terapötik etkileri desteklemek amacıyla kullanılabileceğini göstermektedir.

Anahtar Kelimeler: Atletik bantlama, Kronik ağrı, Depresyon, Bel ağrısı, Manuel terapi.

INTRODUCTION

Low back pain (LBP) is associated with absenteeism and disability; therefore, it is an important public health condition that can be a reason for frequent referral to health services (1). The most common type of LBP is nonspecific LBP, which affects patients of all ages, resulting in a significant increase in the burden of the disease worldwide (2). Chronic nonspecific low back pain (CNLBP) is characterized by pain between the costal margin and inferior gluteal folds, muscle tension and stiffness, limitation of movement and disability that lasts for 12 weeks or longer, and it is one of the main causes of disability throughout life (3).

Various methods for the treatment of LBP have been identified in literature according to the duration and classification of the symptoms. These treatment methods can be grouped as electro-physical agents, manual therapy, kinesio taping (KT), general exercises, spinal stabilization exercises, patient education and behavioral and cognitive therapy (4). Despite undergoing treatment for CNLBP with these frequently used methods, disease relapse is common after recovery. Because of this, more effective approaches are necessary for the management of LBP (3). With treatments such as manual therapy, soft tissue mobilization and massage, the use of tools that allow physiotherapists to evaluate and treat patients has been introduced in clinics (5,6).

In recent years, a popular treatment method used for myofascial restriction and used in addition to conventional treatment for chronic pain is instrument-assisted soft tissue mobilization (IASTM) (7). IASTM is performed using instruments specifically designed to provide a mobilizing effect to the soft tissue (e.g., scar tissue and myofascial adhesion) to reduce pain and improve the range of motion and function (8). The use of these instruments allows for deeper penetration of the tissue and treatment to a specific area. It is believed that this also provides a mechanical advantage for the clinician as it reduces the stress on the hands (8,9).

One of the techniques commonly used as an adjunct in the treatment of various musculoskeletal disorders is KT, which is performed using an elastic tape called kinesio tape (10–12). KT is based on three

basic concepts: space, movement and cooling. The area of painful and inflamed muscle swelling due to edema narrows after treatment. To increase the skin and subcutaneous interstitial area by using kinesio tape to improve circulation and movement, the skin is lifted. Thus, the increased circulation and movement leads to the cooling of that area and as a result, the inflammation is reduced. Pain reduction, improved circulation, acceleration of tissue healing, increased performance, prevention of injury and reeducation of the neuromuscular system are achieved as a result of KT (13).

In this study, the effects of only IASTM and only KT on pain, functional disability and depression were examined. The hypothesis of the study; pain, functional disability and depression levels of the patients in the IASTM group will improve more than KT application.

This study planned to compare the effects of IASTM and KT on pain, functional disability and depression in patients with chronic low back pain.

METHODS

This therapeutic prospective, single-center, randomized study included patients with CNLBP who presented to a physical therapy and rehabilitation outpatient clinic between March 2019 and August 2019 and met the study criteria. An experienced physiatrist performed physical and radiological examinations to confirm the diagnosis and evaluate the eligibility criteria. Prior to the study, all patients were informed about the nature of the study, and written informed consent was obtained. The study protocol was approved by the Faculty of Medicine Clinical Research Ethics Committee of Marmara University (Approval Date: 14.06.2019 and Approval Number: 09.2019.563), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

A total of 30 patients were admitted to the outpatient clinic with a diagnosis of NCLBP. Inclusion criteria of the patients were as follows: the patients should be aged between 30 and 50 years, have had low back pain lasting for at least 12 weeks, have not received any physical therapy in the last six months, have not undergone any IASTM or KT, have had normal mobility of the hip joint and have had a

Visual Analog Scale value of more than 3. Exclusion criteria of the patients were as follows: Body Mass Index BMI over 35, presence of allergies and skin diseases, pregnancy, major structural spinal deformities (scoliosis, kyphosis or stenosis), inflammatory diseases, extruded and sequestered hernias, signs of neurological diseases, orthopedic diseases (e.g., fractures) and a history of spinal surgery.

The power analysis and sample size calculation were performed using the G*Power 3.1 software (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) based on pain severity assessed by the VAS. In literature, a study by Moon JH. et al. was found to be similar to this study (14). For the significant difference between the two groups, the effect size ($d=1.266$) was calculated using the “Means: Difference between two independent means (two groups)” method, and for this effect size 80.6% statistical power level and 5% significance level were calculated for each effect size. It was determined that there should be a minimum of 11 observations in the group. The aim of the study was to reach a minimum of 22 people.

Randomization

The power analysis results for our study determined that the IASTM and KT groups would consist of 15 people each, and a total of 30 patients would be included in the study. Of 47 patients who applied to the hospital with the complaint of low back pain, the first 15 (11 males, 4 females) who agreed to participate in the study and met the inclusion criteria were allocated to the IASTM group. The KT group included the second group of 15 patients among the patients who agreed to participate in the study and met the inclusion criteria according to a ratio of 1:1. While the process was on-going, 3 out of 47 patients were excluded because they refused to participate in the study, and at the beginning of the study, 14 patients were excluded because they did not meet the inclusion criteria (Figure 1. Flow chart showing patient recruitment).

Outcome measures

Before the treatment, demographic and socio-demographic characteristics of the patients, such as age, gender, BMI were recorded. The VAS, RMDQ and BDI were used for assessing pain, functional

disability and depression, respectively. The patients were evaluated before the first session and immediately after the last session.

To assess the level of pain, each end of a 100 mm line was marked as 0 and 10, respectively, and each 10 mm was marked. The patients were asked to mark their pain level on the line, and the VAS score between 0–10 was determined. A score of 0 was rated as ‘no pain’ and that of 10 was rated as ‘worst imaginable pain’ (15).

The Turkish version of the RMDQ was used to assess functional disability. The RMDQ is a tool that was first developed in 1983 for measuring the level of disability experienced by a person with low back pain. The RMDQ consists of 24 items, including physical ability/activity (15 questions), sleep/rest (3 questions), psychosocial (2 questions), household management (2 questions), eating (1 question) and pain frequency (1 question). The original 24-item questionnaire has been shortened and adapted to create 18-item and 23-item versions for use in other countries (16). The questionnaire was adapted into Turkish in 2001 by Kucukdeveci et al. This questionnaire contains 24 items related to daily activities that may be restricted due to low back pain, where each positive response corresponds to a point on the scale. In this survey, the ‘Yes’ option is evaluated as 1 point, the ‘No’ option is evaluated as 0 points for each question and the final scores are summed up. The final score of the RMDQ can be scored from 0 to 24 and is determined as the sum of the obtained values. The higher the score, the greater the disability (17).

To evaluate depression, the Beck Depression Inventory was developed in 1974 by Beck et al. It consists of twenty-one questions, each question is scored separately, and the total score is the sum of the scores for each item. The score that can be obtained from the scale varies between 0–63. Scores ranging ‘0–9’ indicate minimal depression; ‘10–16’ indicate mild depression; ‘17–29’ indicate moderate depression and ‘30–63’ indicate severe depression (18). The Turkish version of the BDI was used to assess depression (19).

Treatment

All patients received a hot pack (15 minutes) to

Table 1. Instrument-Assisted Soft Tissue Mobilization and Kinesio Taping Treatments

	IASTM	KT
15 sessions (five days /a week)	- Hot pack (15 minutes) to the lumbar region	
	- TENS treatment (50–100 Hz and 0.05–0.07 msec) to the lumbar region	
	- Continuous ultrasound (for 7 minutes at 1.5 W/cm ² intensity)	
	- Home exercise program; (10 repetition, 3 times a day) (posterior pelvic tilt, prone trunk hyperextension, bridging, cat/camel exercises)	
once in three days for a total of six sessions	- Lumbar paraspinal muscles (5 minutes) and right and left hamstrings (3 minutes for each).	- Lumbar and right and left hamstrings regions
	- Angle of 45 degrees to the skin surface	- Muscle technique (Kinesio Tape Tex Gold)
		- 10%–25% of the stretch of the tape

IASTM: Instrument-Assisted Soft Tissue Mobilization; KT: Kinesio Taping., Hz: Hertz, msec: Millisecond, W/cm²: Watt/centimeter².

the lumbar region, transcutaneous electrical nerve stimulation (TENS) treatment at a frequency and duration of 50–100 Hz and 0.05–0.07 msec, respectively, and continuous ultrasound (Chattanooga Intellect Advanced Monochromatic Stim) for 7 minutes at 1.5 W/cm² intensity for 15 sessions. These patients were also provided with a home exercise program that included posterior pelvic tilt, prone trunk hyperextension, bridging and cat/camel exercises. Patients were asked to perform ten repetitions of the home-based exercises three times a day for five days a week. In addition to these treatments, the first group received IASTM and the second group received KT.

IASTM (GrastonTr, FizyoTools, Istanbul, Turkey) was applied the lumbar paraspinal muscles (5 minutes) and right and left hamstrings (3 minutes for each). Instruments of different sizes and shapes were used for the mobilization (Figure 2). The instruments were used vertically, horizontally and diagonally at an angle of 45 degrees to the skin surface. After the first day of mobilization, participants received IASTM once in three days for a total of six sessions (Table 1).

KT of the lumbar and right and left hamstrings re-

gions was performed using the muscle technique, with 10%–25% of the stretch of the tape (Kinesio Tape Tex Gold, Turkey; Figure 3). The taping treatment continued for a total of six sessions, once every three days from the first day of the treatment. Patients were asked to not remove the tapes until the next taping session. At the beginning of each taping session, the previous tapes were removed using alcohol, and new ones were applied (Table 1).

Statistical Analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 21.0 software package (IBM Corp., Armonk, NY, USA). Descriptive data were presented in mean ± standard deviation (SD), median (min-max) or number and frequency, where applicable. The Shapiro–Wilk test was used to check the normality of the data. The t-test was used to compare quantitative continuous data between the two independent groups. The difference between within-group repeated measurements was analyzed using the matched group t-test for paired samples, and repeated measurements were analyzed using repeated measures analysis of variance. p<0.05 was determined as the level of statistical significance.

Table 2. Baseline Characteristics of Participants

	Mean	IASTM (n=15)		KT (n=15)		P
		SD	Mean	SD	Mean	
Age (years)		37.33	7.14	37.33	6.66	1.000
Body Mass Index (kg/m²)		26.27	4.30	25.81	3.92	0.757
Gender	Female	n	%	n	%	X ² =0.000 p=0.659
	Male	4	26.70	4	26.70	
		11	73.30	11	73.30	

SD: standard deviation, X²: chi-square test, kg/m²: kilogram/meter², p<0.05 statistically significant.

RESULTS

Baseline characteristics of the participants are shown in Table 2. There was no difference between the groups in terms of the T₀ VAS score ($p>0.05$). VAS score T₁ value did not differ significantly according to the group variable ($p>0.05$). VAS score T₁ value decreased significantly ($p<0.05$) compared to the T₀ value in both the groups (Table 3).

There was no difference between the IASTM and KT groups in terms of the T₀ values and the Roland Morris Disability Index score ($p>0.05$). There was

no significant difference in the T₁ values according to the group variable ($p>0.05$). The T₁ values in both the groups showed a significant decrease compared to the T₀ values ($p<0.05$; Table 3).

When the T₀ value was examined in the IASTM and KT groups, there was no difference found between the groups in terms of the Beck Depression Inventory score ($p>0.05$). The T₁ values decreased significantly ($p<0.05$) compared with the T₀ values in both the groups. When the T₁ values were examined, no significant difference was observed according to the group variable ($p>0.05$; Table 3).

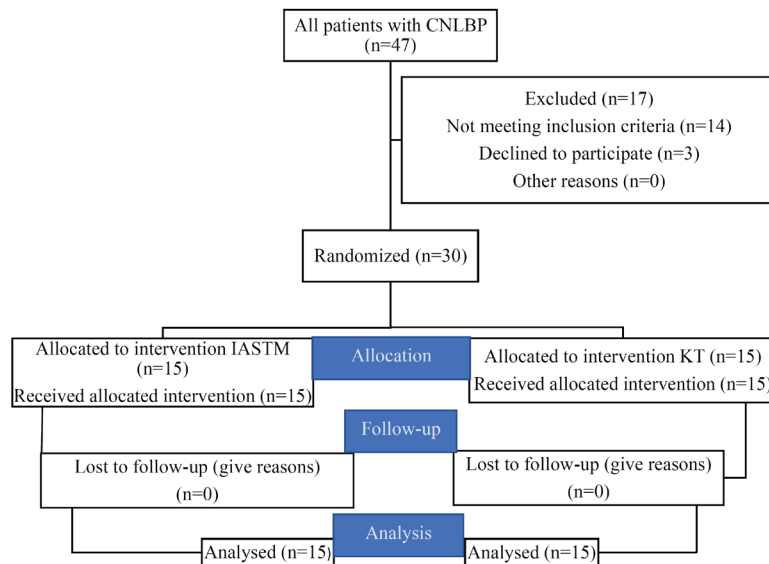


Figure 1. Flow diagram

Table 3. Evaluation of Intragroup and Intergroup Pain, Functional Disability and Depression Scores

	Groups	IASTM (n=15)		KT (n=15)		t	P
		Mean	SD	Mean	SD		
VAS	T ₀	6.00	1.20	7.00	1.73	-1.840	0.076
	T ₁	3.20	1.01	3.93	2.12	-1.208	0.241
	t	7.897		8.563			
	p	0.000		0.000			
Roland Morris Disability Index	T ₀	12.00	5.59	13.53	3.89	-0.872	0.391
	T ₁	7.67	5.30	8.33	3.50	-0.407	0.687
	t	4.165		6.145			
	p	0.001		0.000			
Beck Depression Inventory	T ₀	15.27	7.35	15.93	7.53	-0.245	0.808
	T ₁	10.07	6.23	9.20	5.91	0.391	0.699
	t	7.597		7.463			
	p	0.000		0.000			

SD: standard deviation, T₀: before the treatment, T₁: after the treatment., $p<0.05$ statistically significant, t: t test (Paired Samples)

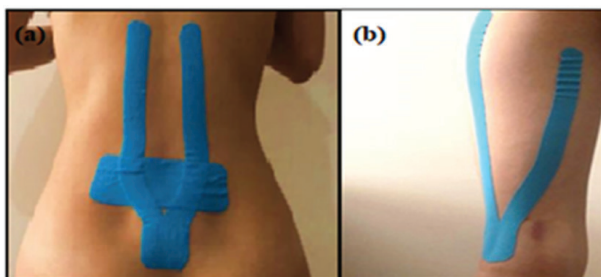


Figure 2. Kinesio taping application. (a) Lumbar kinesio taping (b) Hamstrings kinesio taping



Figure 3. Kinesio taping application. (a) Lumbar kinesio taping (b) Hamstrings kinesio taping

DISCUSSION

In this study, participants received IASTM and KT in addition to ultrasound, TENS, hot pack and exercise therapy for chronic low back pain, and the effects of these treatments on pain, functional disability and depression were evaluated. This study results indicated that there was a significant improvement in pain, functional disability and depression levels after the treatment in both groups. However, no difference was observed between the two treatment modalities.

VAS is a practical and reliable tool that is frequently used in studies for the assessment of acute and chronic pain. A study reported that IASTM for 4 weeks reduced pain in patients with chronic low back pain (20). In another study, it was observed that a single session of IASTM for the hamstrings significantly reduced pain in patients with CNLBP (14). Patients with active trigger points in the

right upper trapezius muscle reported that receiving IASTM twice-a-week for 4 weeks in addition to stretching exercises considerably reduced pain (20). In this study, both the hamstring and lumbar regions were treated once-a-week for 3 weeks. Consistent with the literature, it was observed that the pain decreased significantly.

Castro-Sánchez et al. compared KT and placebo in terms of pain and disability in patients with CN-LBP and found a significant difference between the groups according to the evaluation at the end of the first month; however, it was concluded that the effect of KT was low and not clinically significant (21). In another study, in which 60 patients with chronic low back pain were divided into KT, placebo and control groups, the tapes were removed after 48 hours. The study found that KT and placebo were more effective in reducing pain compared with no treatment; however, it was observed that these two groups did not have a significant difference between them (22). Macedoa et al. divided 108 female patients with chronic low back pain into four different groups; a group in which a stretched tape was applied, a group in which an unstretched tape was applied, a placebo tape group and a control group. At the end of 3 days, when compared with the other groups, it was observed that there was a significant decrease in pain in the group in which the stretched tape was applied and in the group in which the unstretched tape was applied (23). In this study, the tape was applied with a 10%–15% tension. Similar to the study of Macedoa et al., in our study, it was observed that the VAS value decreased significantly after KT, in which tape was applied with tension to the lumbar and hamstring region.

Among the treatments used in this study, both IASTM and KT are effective treatments for fasciae. While the fasciae were mobilized using IASTM, the tissues under the fasciae were treated using KT. Kafa et al. examined the effects of KT time on epidermal–dermal distance, pain, edema and inflammation in 12 experimental animals with soft tissue trauma; the tape was applied for 30 minutes in one group and 6 hours in the other group. After the application of the tape, pain was reduced in both the groups, and it was histologically observed that the KT method elevates the fasciae, improves blood

flow and increases the epidermal–dermal distance (24).

It is known that psychosocial factors, such as having depression, fear, and negative beliefs about pain are among the behaviors that may pose a risk for chronic low back pain. For the evaluation of the functional disability in chronic low back pain, questionnaires and scales, such as the RMDQ and the Oswestry Disability Index are used. Castro-Sánchez et al. applied kinesiotope with 25% tension on the lumbar region in a study in which they evaluated pain, disability and kinesiophobia in people with CNLBP. The tapes were not removed for one week, and the results were measured at the end of that week and after 4 weeks. Functional disability according to the RMDQ showed a significant improvement after treatment; however, 4 weeks later, these effects were not found to be significant (21). Luz et al. randomly divided 60 CNLBP patients into three groups as the KT, placebo tape and the control groups. The patients in the taping groups remained taped for 48 hours. Functional disability was assessed using the RMDQ before the treatment, right after 48 hours of taping and 7 days after the treatment. When the measurements in the KT and control groups were compared 48 hours after the treatment, it was observed that the KT was more effective in the treatment of functional disability. However, the difference was very small and hence, was not considered to be clinically significant. There was no significant difference between the groups in the measurements obtained after 7 days (22). In this study, similar to studies in literature, functional disability in the IASTM group and the KT group showed a significant improvement compared to pre-treatment levels; however, there was no significant difference between the groups. The treatment modalities used and restriction of functional movement increased patient comfort. However, as there was no follow-up period in this study, evaluations were only performed immediately after the end of treatment. Therefore, whether our study provided permanent improvements in functionality could not be monitored.

It is known that biological and psychosocial factors have an effect on the development and chronicity of low back pain. Various studies demonstrate that depression and pain avoidance behavior cause

chronic pain, and it is emphasized that the most common of these psychosocial behaviors are anxiety and depression (25). In this study, according to the Beck Depression Inventory scores, both groups belonged to the 'mild depression' category before the treatment. After the treatments, to determine whether there was an improvement in their mood the patients were asked to fill the questionnaire once again. According to the results of this study, there was a significant improvement in mood after the treatment in both the groups, but there was no difference between the two groups in terms of this parameter. We believe that the improvement in psychological factors evaluated using this scale is due to the reduction in pain and the improvement in physical factors. One of the reasons for the improvement in the KT group may be that the taping technique has a corset-like supportive effect, which reduces the patient's bed rest period and improves quality of life.

As a result, it has been observed that both treatments have positive effects on several parameters, such as pain, disability, depression and mental state in patients with CNLBP. The main strength of this study is that the groups were equal in terms of demographic characteristics, such as age, BMI and gender as well as socio-demographic characteristics, such as physical activity, marital status and smoking. In addition, the 'actual power' of this study was 91%.

The main weakness of this study was the absence of a control group that could have undergone conventional treatment and the fact that the patients were not observed after a certain time period to see whether the improvements were permanent after the treatments were completed. In addition, future studies should conduct evaluations comparing genders.

In the treatment of patients with chronic low back pain, IASTM and KT techniques reduce pain; it can be used safely in the clinic due to its positive effects on functionality and depression as a result of the decrease in pain intensity. Since chronic pain in various regions may also have effects on disability and depression, IASTM and KT applications can be applied in the treatment of these regions. Studies using IASTM and KT techniques in the treatment of

chronic pain in different regions may contribute to the literature.

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REFERENCES

- Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, Woolf A, Vos T, Buchbinder R. A systematic review of the global prevalence of low back pain. *Arthritis Rheum.* 2012; 64(6):2028-37.
- Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *Lancet.* 2017; 389(10070):736-747.
- Alahmari KA, Rengaramanujam K, Reddy RS, Samuel PS, Tedla JS, Kakaraparthi VN, Ahmad I. The immediate and short-term effects of dynamic taping on pain, endurance, disability, mobility and kinesiophobia in individuals with chronic non-specific low back pain: A randomized controlled trial. *PLoS One.* 2020; 15(9):e0239505.
- da Silva T, Mills K, Brown BT, Pocovi N, de Campos T, Maher C, Hancock MJ. Recurrence of low back pain is common: a prospective inception cohort study. *J Physiother.* 2019; 65(3):159-165.
- Portillo-Soto A, Eberman LE, Demchak TJ, Peebles C. Comparison of blood flow changes with soft tissue mobilization and massage therapy. *J Altern Complement Med.* 2014; 20(12):932-6.
- Fousekis K, Eid K, Tafa E, Gkrilias P, Mylonas K, Angelopoulos P, Koumoundourou D, Billis V, Tsepis E. Can the application of the Ergon® IASTM treatment on remote parts of the superficial back myofascial line be equally effective with the local application for the improvement of the hamstrings’ flexibility? A randomized control study. *J Phys Ther Sci.* 2019; 31(7):508-511.
- Seffrin CB, Cattano NM, Reed MA, Gardiner-Shires AM. Instrument-Assisted Soft Tissue Mobilization: A Systematic Review and Effect-Size Analysis. *J Athl Train.* 2019; 54(7):808-821.
- Ikeda N, Otsuka S, Kawanishi Y, Kawakami Y. Effects of Instrument-assisted Soft Tissue Mobilization on Musculoskeletal Properties. *Med Sci Sports Exerc.* 2019; 51(10):2166-2172.
- Hammer WI. The effect of mechanical load on degenerated soft tissue. *J Bodyw Mov Ther.* 2008; 12(3):246-56.
- Choi IR, Lee JH. Effect of kinesiology tape application direction on quadriceps strength. *Medicine (Baltimore).* 2018; 97(24):e11038.
- Slevin ZM, Arnold GP, Wang W, Abboud RJ. Immediate effect of kinesiology tape on ankle stability. *BMJ Open Sport Exerc Med.* 2020; 6(1):e000604.
- Yam ML, Yang Z, Zee BC, Chong KC. Effects of Kinesio tape on lower limb muscle strength, hop test, and vertical jump performances: a meta-analysis. *BMC Musculoskelet Disord.* 2019; 20(1):212.
- Cools AM, Witvrouw EE, Danneels LA, Cambier DC. Does taping influence electromyographic muscle activity in the scapular rotators in healthy shoulders? *Man Ther.* 2002; 7(3):154-62.
- Moon JH, Jung JH, Won YS, Cho HY. Immediate effects of Graston Technique on hamstring muscle extensibility and pain intensity in patients with nonspecific low back pain. *J Phys Ther Sci.* 2017; 29(2):224-227.
- Sevier TL, Stegink-Jansen CW. Astym treatment vs. eccentric exercise for lateral elbow tendinopathy: a randomized controlled clinical trial. *PeerJ.* 2015; 3:e967.
- Stevens ML, Lin CC, Maher CG. The Roland Morris Disability Questionnaire. *J Physiother.* 2016; 62(2):116.
- Küçükdeveci AA, Tennant A, Elhan AH, Niyazoglu H. Validation of the Turkish version of the Roland-Morris Disability Questionnaire for use in low back pain. *Spine (Phila Pa 1976).* 2001; 26(24):2738-43.
- Calvo-Lobo C, Vilar Fernández JM, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Rodríguez-Sanz D, Palomo López P, López López D. Relationship of depression in participants with non-specific acute or subacute low back pain and no-pain by age distribution. *J Pain Res.* 2017; 10:129-135.
- Hisli N. Beck Depresyon Envanterinin geçerliği üzerine bir çalışma. *Türk Psikiyatri Derg.* 1988; 6:118-26.
- El-Hafez HM, Hamdy HA, Takla MK, Ahmed SEB, Genedy AF, Abd El-Azeim ASS. Instrument-assisted soft tissue mobilisation versus stripping massage for upper trapezius myofascial trigger points. *J Taibah Univ Med Sci.* 2020; 15(2):87-93.
- Castro-Sánchez AM, Lara-Palomo IC, Matarán-Peñarocha GA, Fernández-Sánchez M, Sánchez-Labraca N, Arroyo-Morales M. Kinesio Taping reduces disability and pain slightly in chronic non-specific low back pain: a randomised trial. *J Physiother.* 2012; 58(2):89-95.
- Luz Júnior MA, Sousa MV, Neves LA, Cezar AA, Costa LO. Kinesio Taping® is not better than placebo in reducing pain and disability in patients with chronic non-specific low back pain: a randomized controlled trial. *Braz J Phys Ther.* 2015; 19(6):482-90.
- Macedo LB, Richards J, Borges DT, Melo SA, Brasileiro JS. Kinesio Taping reduces pain and improves disability in low back pain patients: a randomised controlled trial. *Physiotherapy.* 2019; 105(1):65-75.
- Kafa N, Citaker S, Omeroglu S, Peker T, Coskun N, Diker S. Effects of kinesiological taping on epidermal-dermal distance, pain, edema and inflammation after experimentally induced soft tissue trauma. *Physiother Theory Pract.* 2015; 31(8):556-61.
- Hanley MA, Jensen MP, Ehde DM, Hoffman AJ, Patterson DR, Robinson LR. Psychosocial predictors of long-term adjustment to lower-limb amputation and phantom limb pain. *Disabil Rehabil.* 2004; 26(14-15):882-93.