Vpliv kinezioloških trakov na zmanjšanje bolečine pri bolnikih z lateralnim epikondilitisom

The impact of kinesio taping on pain relief in patients with lateral epicondylitis

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Izvleček

Namen: *Namen raziskave je bil oceniti vpliv kinezioloških trakov na zmanjšanje bolečine pri bolnikih z lateralnim epikondilitisom komolca (LE), obravnavanih s fizioterapijo, in sicer primerjalno s fizioterapijo in uporabo kinezioloških trakov.*

Metode: *V retrogradni študiji smo pregledali medicinsko dokumentacijo skupno 188 bolnikov, obravnavanih v Univerzitetnem kliničnem centru Maribor v obdobju med 2012 in 2013 zaradi LE. V analizo smo vključili 95 tistih bolnikov, ki so bili zdravljeni z enako večmodalno fizikalno terapijo z ali brez kinezioloških trakov (skupina T0 in T1). Stopnjo bolečine smo ocenjevali z vizualno analogno lestvico (VAS) pred in po zaključeni obravnavi. Za primerjavo med skupinami smo uporabili Studentov t–test in Pearsonov χ^2 test, za primerjavo ocen VAS pred in po obravnavi pri obeh skupinah pa smo uporabili analizo varian-*

Abstract

Purpose: *To compare the short–term effect of kinesio taping on reducing pain in subjects with lateral epicondylitis (LE) treated with physiotherapy alone compared to physiotherapy with-kinesio taping.*

Methods: *We retrospectively reviewed the medical documentation of 188 patients diagnosed with LE and treated between January 2012 and December 2013. Ninety–five patients who were treated with the same multi–modality physiotherapy with or without kinesio taping (T0 and T1 groups, respectively) were included in our analysis. Pain intensity was measured using a visual analogue scale (VAS) before therapy and after therapy was concluded. To compare the groups, we used Student's t–test and Pearsons χ^2–test. To compare the VAS score of the two groups before and after treatment, we used analysis of variance for repeated measurements. Statistical significance was set at $p<0.05$.*

ce (ANOVA) za ponovljene meritve. Za stopnjo statistične značilnosti smo izbrali p < 0,05.

Rezultati: *Povprečna ocena VAS 1 v T0 je bila 6,3 ± 1,5 (razpon 4 do 9, mediana 6), in v T1 6,4 ± 1,8 (razpon3 do 10, mediana 6,5). Povprečna ocena VAS 2 v T0 je bila 2,1 ± 1,7 (razpon 0 do 7, mediana 2,0) in v T1 1,4 ± 1,6 (rang 0 do 6, mediana 1,0). Na podlagi analize variance smo ugotovili, da se je VAS2 v obeh skupinah statistično evidentno znižal (p < 0,001), medtem ko razlika v spremembi ocene VAS med skupinama ni bila statistično značilna pri izbrani stopnji značilnosti (p = 0,056), čeprav je bila izkazana manj kot 6 % verjetnost, da je ta razlika naključna.*

Zaključek: *Z retrogradno analizo nismo uspeli dokazati vpliva kinizioloških trakov na kratkotrajno zmanjšanje bolečine pri bolnikih z LE. Vendar glede na vprašljivo naključnost tako nizko izkazane verjetnosti (manj kot 6 %) obstaja upravičen sum, da bi uporaba KT pri LE lahko bila učinkovita.*

Results: *The mean VAS score prior to treatment (VAS1) in theT0 group was 6.3±1.5 (range, 4–9; median, 6), andthe mean VAS score in the T1 group was 6.4±1.8 (range, 3–10; median, 6.5). The mean VAS score after treatment (VAS2) in theT0 group was 2.1±1.7 (range, 0–7; median, 2), and the mean VAS score in the T1 group was 1.4±1.6 (range, 0–6; median, 1). The pain in both groups was significantly reduced (p<0.001), whereas the difference between the two groups was not statistically significant at the 0.05 level, although marginally (p=0.056).*

Conclusions: *Based on a retrospective analysis, we were not able to confirm the short–term effect of kinesio taping on reducing pain in subjects with LE; however, due to the low probability of obtaining our results by chance (< 6%), it is reasonable to suggest that the use of KT may be effective in treating LE.*

INTRODUCTION

Lateral epicondylitis (LE), or tennis elbow, is characterised by pain in the lateral elbow which is exacerbated by attempts to extend and supinate the wrist and hand against resistance (1). LE is the most common cause of acute and chronic elbow pain, and an important arm disorder with an estimated prevalence of 0.7%–4.0% in the general population (2,3). Even though the common term for LE is tennis elbow, only 5% of patients actually play tennis. Most cases of LE are associated with work–related activities (2).

The injury in patients with LE involves the origin of the common extensor tendon on the lateral epicondyle of the humerus (1). The dominant hand is affected more than the contralateral hand, and problems usually arise between 40 and 60 years of age (4,5).

The treatment of LE is mainly conservative; however, it is unclear if physical therapy or any other treatment provides outcomes superior to simple rest and activity modification over an interval of 1 year (6, 7). Even so, conservative treatment that entails physical therapy, as well as the use of different orthoses, medications, local infiltration of medications, and most recently, kinesio taping (KT), varies widely.

A review of the literature identified>40 different treatments for LE (8). The multiplicity of possible treatments is indicative of the often contradictory and constantly changing evidence regarding the relative efficacy of treatment (1). Thus, only limited evidence exists regarding the effectiveness of each treatment modality, and therefore none of the existing treatment modalities is recommended as first–line treatment for LE; the effectiveness of orthoses is similar (5, 8, 9). Nevertheless, based on a review of the literature, it can be concluded that progressive exercises that strengthen and stretch the affected muscles are beneficial in the treatment of LE. Physical therapy that emphasises stretching and strengthening

consistently demonstrates symptom relief superior to rest, nonsteroidal anti–inflammatory drug use, steroid injections, or simple bracing in 6 weeks to 1 year after initiating treatment (10). Given its simplicity, proven effectiveness, and minimal potential to cause harm, however, physical therapy emphasising wrist extensor strengthening and stretching is the cornerstone of LE treatment (1).

The use of KT has recently become quite popular. It seems that the growing use of KT is due to massive marketing campaigns rather than high–quality scientific evidence with clinically relevant outcomes (11). KT was introduced in the 1970s by a Japanese chiropractor, and is based on the use of elastic tapes. KT was designed to mimic the qualities of human skin. Kinesio tape has roughly the same thickness as the epidermis, and can be stretched between 30% and 40% above its resting longitudinal length (12). Kase et al. have proposed that KT can provide a positional stimulus through the skin, align fascia tissues, create more space by lifting fascia and soft tissue above the area of pain and inflammation, provide sensory stimulation to assist or limit motion, and assist in the removal of oedema by directing exudates toward a lymph duct, depending on the amount of stretch applied to the tape during application (13). Although KT is widely used in clinical practice, there is little evidence about the efficacy of this intervention (11). Many authors of case series and pilot studies describe the effectiveness of KT, but such studies have been proven unreliable because they were based on healthy patients or the number of patients testedwas small (11, 1418). In contrast, despite the questionable effectiveness of KT, patients and athletes often seek this type of treatment, most often as an addition to other forms of therapy. Thelen et al. reported that there is some merit to the use of KT as a treatment adjunct; however, there are no published randomised clinical trials that have evaluated the effects of KT for musculoskeletal complaints (12).

In our institution, we often use KT and have obtained good clinical results in treating patients with LE. Considering the controversial reports in the literature regarding the effectiveness of KT in the treatment of LE, as well as the fact there are no reports on LE in review studies, we conducted a retrospective analysis of treatment outcomes in patients with LE. Specifically, the purpose of this study was to compare the short–term effect of KT on reducing pain in subjects with LE treated with physiotherapy alone compared to physiotherapy with KT.

MATERIALS AND METHODS

We reviewed the medical documentation of 188 patients who were diagnosed with LE and treated at the Maribor University Medical Centre between January 2012 and December 2013.Ninety–five patients treated with the same multi–modality physiotherapy with or without KT were included in our analysis. The exclusion criteria were bilateral LE, different form of physiotherapy, KT treatment alone, and a history of elbow surgery. The subjects were divided into two groups, as follows: the T0 group received physical therapy with no KT; and the T1 group received physical therapy and KT. All of the patients underwent 3 weeks of treatment with kinesiotherapy (stretching and strengthening exercises with emphasis on eccentric contraction), electroanalgesic therapy (TENS), and dynamic ultrasound (1MHz). Forty random patients also received KT treatment. The T1 group received a standardised therapeutic KT application consistent with the protocol for LE, which we use in our institution and is similar to a protocol described in the literature (19). Thus, all of the patients in the T1 group had KT applied in the same way and the standard 5 cm KT was used for all applications (Figure 1). KT was applied threetimes, with each application3 days before the beginning of therapy, during the weekend, and after the last treatment. KT was not applied during the therapeutic procedures.

Pain intensity was measured using a 10–cm visual analogue scale (VAS) before therapy (VAS1) and after therapy was concluded (VAS2). On the VAS, "0" represented no pain and "10" represented unbearable pain.

Figure 1. *Kinesio tape application*

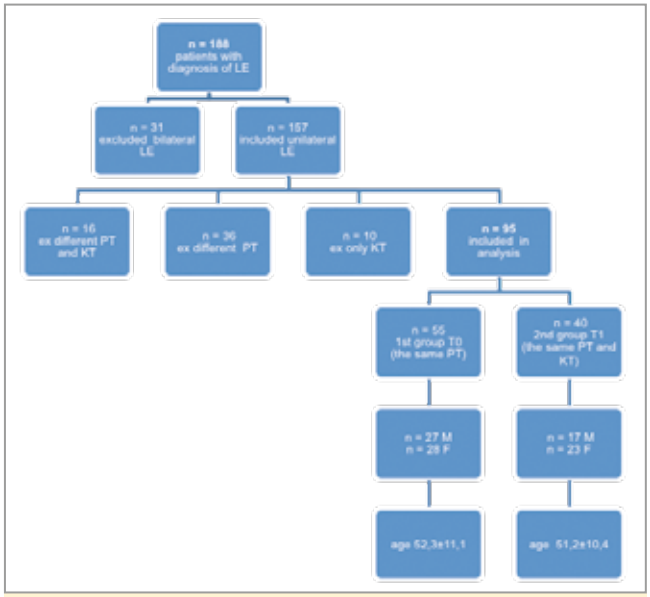

Figure 2. *The flow diagram of the study and patients included in analysis Physical therapy (PT), lateral epicondylitis (LE), excluded (ex).*

Statistical analysis was performed using IBM SPSS Statistics for Windows (version 19.0; IBM Corp., Armonk, NY). Descriptive statistics was used to describe the main features of our data. When comparing groups of patients, we used a χ^2–test to compare frequency counts, a Student's t–test was used to compare the means of continuous variables, and the Mann–Whitney U–test was used to compare the median values of non–normally distributed data. The Kolmogorov–Smirnov test was used for assessing the normality of data. A mixed ANOVA was used to compare VAS scores between and within groups. Statistical significance was set at $p<0.05$.

RESULTS

Having considered the exclusion criteria, we included a total of 95 LE patients in the analysis, as follows: 44 males (n=27 [T0] and n=17 [T1]) and 51 females (n=28 [T0] and n=23 [T1]). The mean age of the patients in the T0 and T1 groups was 52.3±11.1 years (range, 15–81 years) and 51.2±10.4 years (range, 26–78 years), respectively. There was no statistically significant difference between groups with respect to gender (p=0.525) or age (p=0.627; Figure 2).

The mean VAS score prior to treatment (VAS1) in the T0 and T1 groups was 6.3±1.5 (range, 4–9; median, 6) and 6.4±1.8 (range, 3–10; median, 6.5), respectively. The mean VAS score after treatment (VAS2) in the T0 and T1 groups was 2.1±1.7 (range, 0–7; median, 2) and 1.4±1.6 (range, 0–6; median, 1), respectively.

The pain in both groups was significantly reduced ($p<0.001$), whereas the difference between the two groups was only marginally significant (p=0.056; Figure 3).

DISCUSSION

Despite the popularity of KT in the treatment of musculoskeletal system disorders, there is currently insufficient evidence to support the use of KT over other modalities in clinical practice (20). Moreover, based on a systematic review, Mostafavifar et al. found insufficient evidence to support the use of KT following musculoskeletal injuries, although a perceived benefit could not be discounted (21). Finally, the most recent review has confirmed that the current evidence does not support the use of KT for musculoskeletal conditions, specifically stressing that KT either provided no significant benefit or the effect was too small to be clinically meaningful (11). Several reviewshave revealed that there is a multi-

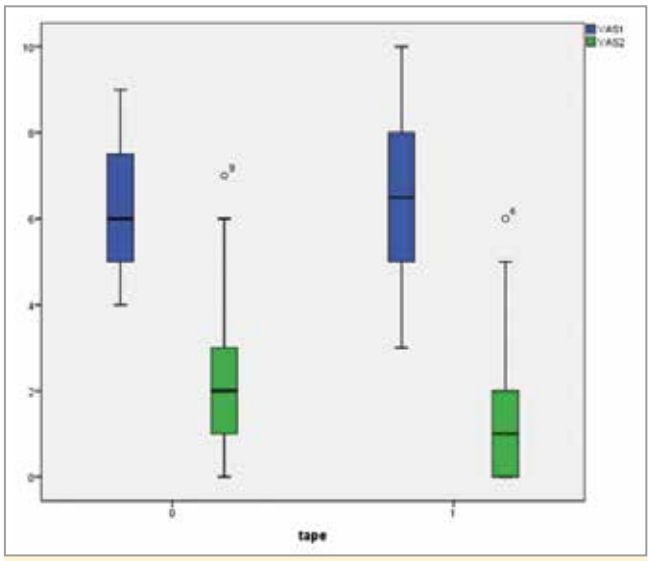

Figure 3. *VAS Box plot diagram of the VAS scores in T0 and T1 before (VAS1) and after treatment (VAS2).*

tude of research papers published on the use of KT; however, due to the risk of bias and low quality of evidence, only a fraction of those papers were included in the final analysis. Furthermore, no LE–based cases were included.

Morris et al. only included eight studies in their review; six studies concentrated on musculoskeletal conditions and no studies involved LE (20). In the review by Mostafavifar et al., only six studies met the criteria and were included; two of the studies examined musculoskeletal injuries in the lower extremity, two involved the shoulder, and two studies involved the spine (21). Again, no study included patients with LE. Even Parriera et al., in their most recent systematic review regarding the effectiveness of KT that exclusively included patients with musculoskeletal difficulties from 12 different studies, did not have any patients with LE (11). The effectiveness of KT was tested in participants with shoulder pain in two trials, knee pain in three trials, chronic low back pain in two trials, neck pain in three trials, plantar fasciitis in one trial, and multiple musculoskeletal conditions in one trial. Thelen et al. performed a randomised, double–blind study that included 42 patients with confirmed rotator cuff tendinitis (12). Thelen et al. studied the short–term effect of KT on mobility of the shoulder joint and reduction of pain. Patients treated with KT had a statistically significant increase in abduction after the first day of therapy; however, 3 days after the use of KT there was no statistically significant difference between the two groups. No statistically significant difference in pain existed between the two groups (12). Evermann reported significantly more rapid resolution of symptoms with KT than multi–modality physiotherapy (22). The experiment included a group of 35 KT–treated patients, and a control group of 30 patients. The treatment was aimed exclusively at acute functional disorders diagnosed as lower back pain, cervical spine syndrome, pes anserinus syndrome, and tibialis anterior syndrome (22).

There are few publications regarding the effectiveness of KT use for elbow LE (compared to other musculoskeletal conditions treated with KT that are widely documented).

Schneider et al. determined whether or not the use of KT affects the maintenance of strength of the extensor muscles of the forearm and consequentially their fatigue, all of which may decrease the occurrence of LE (23). Fourteen active tennis players (who had no LE issues in the recent 4 months) were included in the study. The results showed that using KT helps maintain the strength of wrist extensors (23). In a recent study, Chang et al. studied the effectiveness of KT for athletes with medial elbow epicondylartendinopathy (24). The purpose of the study was to determine the clinical effectiveness of KT on maximal grip strength, as well as absolute and relative force sense in athletes with medial elbow epicondylartendinopathy. Twenty–seven male athletes participated in the study, and were assessed for maximal grip strength and grip force sense under three conditions (without taping, with placebo KT, and with KT). Both groups with absolute force sense measurements had significantly decreased errors in the placebo KT and KT conditions. Taping may enhance discrimination of the magnitude of grip force control in both groups when applied to the forearm; however, KT did not change the maximal grip

strength in either group (24). In contrast, Vicenzino et al. in a single–blind, placebo, randomised experimental study demonstrated an initial effect of a taping technique for lateral epicondylalgia (25). Vicenzino et al. reported that KT improved pain–free grip strength immediately and 30 minutes after application in participants with chronic lateral epicondylalgia (25). Shamsoddini and Hollisaz investigated the effect of the taping technique on pain, grip strength, and wrist extension force in the treatment of tennis elbow (26). The taping technique demonstrated an impressive effect, not only on wrist extension force and grip strength, but also on pain relief (26). Also Gonzales–Iglesias et al. in a prospective study, concluded that rock climbers with LE who were conservatively treated with multimodal management, including KT, exhibited clinical improvement, but the exact mechanisms of KT have yet to be determined (27).

We have noted a gap between what evidence–based research suggests (that there is scarce or no data on the effectiveness of KT in treating LE) and what occurs in the day–to–day clinical environment (patients actively seeking KT and many physicians prescribing it). This is why we conducted a retrospective analysis of our own data involving the treatment of LE patients with KT. The main disadvantage of such a research approach is that it was not planned in advance. Treatment was prescribed randomly by different physicians, and we could not influence the entry parameters and measurement methods. The majority of patients treated with KT were also prescribed multimodal physiotherapy (exercises, TENS, and ultrasound). Nevertheless, our findings are in agreement with the findings of many others (11, 20, 21, 25, 28) who have acknowledged the shortcomings of existing studies, i.e., they were performed on healthy patients and/or that there was a lack of a control group. Therefore, we decided to compare the effect of KT and other interventions (T1 group) versus other interventions administered separately (T0 group). We used the perceived pain level measured using VAS before and after treatment as a verifiable parameter. After 3 weeks of treatment, the pain in both groups was significantly reduced ($p<0.001$). Unfortunately the difference between the two groups was not statistically significant (at the 0.05 level, while $p=0.056$ had to be considered when interpreting the results).

Parriera et al. compared the addition of KT to other interventions and other separately administered interventions in five studies (11, 29–33). Based on the evaluated outcomes, KT was no better than other separately administered interventions for participants with rotator cuff lesionsand/or impingement shoulder syndrome, chronic neck pain, patellafemoral pain syndrome, and plantar fasciitis (11). In our retrospective study, we also failed to detect a significant difference between the group treated with KT and the group not treated with KT; however, due to the low probability of obtaining our results by chance (<6%), there is, in our opinion, a reasonable likelihood that the use of KT may be effective in treating LE.

Considering the results of our retrospective study, as well as the extant literature, we can conclude that the effectiveness of KT in patients with LE is not known, and thus remains questionable. Well–designed, randomised control trials regarding this subject are warranted.

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