



Comparison of The Efficiency of ESWT and ESWT with Kinesio Taping Treatments in Lateral Epicondylitis

Lateral Epikondilitte ESWT ve ESWT ile Kinesio Bantlama Tedavilerinin Etkinliğinin Karşılaştırılması

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Abstract

Aim: To determine the effect of only ESWT (Extracorporeal shock wave therapy) method to the combined use of ESWT method with kinesio taping method on lateral epicondylitis and determine the superiority of these methods.

Material and Methods: 96 patients (69 females, 27 males) between 27-65 age diagnosed with lateral epicondylitis were included in the study. The patients were divided in two groups. In Method 1 group, ESWT was applied on lateral epicondyle in each of the three sessions. Following this, kinesio taping was applied to the forearm of the patient. In Method 2 group applied only ESWT on lateral epicondyle. VAS (Visual analogue scale) was used to assessment of pain with rest, resistant wrist extension, and palpation. HAQ (health assessment questionnaire) was used for the assessment of general health condition.

Results: Method 1 showed that the reduction of pain in the wrist extension was more effective in the treatment of male patients compared to method 2 and also there was a significant difference in the evaluation of pain with palpation in the treatment of female patients compared to method 2. Significant healing was found in all other parameters however, no statistically significant difference was found.

Conclusion: The result of the effects of taping method with ESWT technique in increasing proprioceptive healing in females and decreasing pain with resistant wrist extension in males, was concluded that "the combined use of kinesio taping method with ESWT method is effective than using only ESWT method".

Keywords: Lateral epicondylitis, tennis elbow, ESWT, kinesio taping

Öz

Amaç: Fizik tedavi uygulamalarında sıkça kullanılan sadece ESWT yönteminin lateral epikondilitte etkisi ile kinesio bantlama yöntemiyle kombine kullanılmasının etkisini ve bu yöntemlerin birbirlerine üstünlüğünü belirlemektir.

Materyal ve Metod: Çalışmaya lateral epikondilit tanılı 27-65 yaş arası 96 hasta (69 kadın, 27 erkek) dahil edildi. Hastalar iki gruba ayrıldı. Grup 1 grubunda lateral epikondil'e ESWT (Ekstracorporeal şok dalga tedavisi) ile her üç seansta uygulandı. Ardından hastanın önkol bölgesine, kinesio bantlama uygulandı. Sadece ESWT uygulanan grup 2 grubunda, lateral epikondile ESWT uygulandı. Hastaların tümüne istirahat halinde, dirençli elbileği ekstansiyonu, palpasyon ile ağrı değerlendirilmelerinde VAS (visual analog scala), genel sağlık durumu değerlendirmesinde HAQ (health assessment questionnaire) değerlendirmeleri uygulandı.

Bulgular: Grup 1 ile erkek hastaların tedavisinde, dirençli elbileği ekstansiyonda ağrı azalmasında grup 2'ye göre daha etkili olduğu belirlendi. Aynı zamanda Grup 1 ile kadın hastaların tedavisinde palpasyon ile ağrı azalması değerlendirilmesinde, grup 2'ye göre anlamlı fark olduğu belirlendi. Diğer tüm parametrelerde anlamlı iyileşmeler belirlendi fakat istatistiksel olarak anlamlı bir fark tespit edilemedi.

Sonuç: Lateral epikondilitte yaygın olarak kullanılan ESWT yöntemi iyileşmede etkili bulundu. Bantlama yönteminin de kadınlarda proprioseptif iyileşmeyi artırma etkisi ve erkeklerde dirençli elbileği ekstansiyonu ile ağrıyı azaltması sonucu, bu yöntemin ESWT yöntemiyle birlikte destekleyici bir tedavi olarak uygulanmasının etkili olacağını göstermektedir.

Anahtar Kelimeler: Lateral epikondilit, tenisçi dirseği, ESWT, Kinesyo bantlama

INTRODUCTION

Lateral epicondylitis is a syndrome defined with pain in extensor muscles in the region of the lateral epicondyle

and its pathogenesis is still not known completely (1). Its etiology includes regional injury, mechanical imbalance, aging, vascular and hereditary functions (2). Inflammatory changes occur in the acute phase and studies conducted

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with ultrasonography (USG) tendinitis, peridentinitis, bursitis and inflammatory hematoma have been defined in the extensor region. Experts diagnose lateral epicondylitis with pain with wrist extension, pain with palpation to extensor region and with diagnostic provocative tests. Recurrent uses should also be looked for in the history (3). Lateral epicondylitis is 4 times more widespread in the fourth decade of life; however, it is also seen in other decades of life, too (4). Although this problem is called tennis elbow, it is seen in people who are not tennis players with a rate of 95% (5). Although it is not easy to diagnose lateral epicondylitis, it does not have a standard protocol and more than 40 treatment methods have been defined. Conservative, medical and surgical procedures are applied in the treatment. Conservative treatment is the most preferred type of treatment and the purpose is to decrease the pain and increase the function (6). Experts use progressive strengthening technique the most, also ultrasound (US), manipulation, cyrax, lateral glide, extracorporeal shock wave therapy (ESWT), splinting, resting, hot-cold, electrotherapy and massage are applied (3).

Eisenmenger defined the physical characteristics of ESWT waves in 1959 for the first time and stated that high intensity sound waves were applied in the treatment method (7). Shock waves were first applied in 1980s to break kidney stones. While breaking lower ureteral stones, studies started in bone tissues also as a result of realizing the changes in ilium. Since 1990, studies have been conducted about the use of this method in orthopedic diseases (8). ESWT method has also begun to be used in the locomotor system since the acute impedance value of the bone tissue is close to the urinary system stones. In orthopedics, it is primarily used in non-uniting fractures, lateral humeral epicondylitis, plantar fasciitis, shoulder calcified tendinitis and revision plasty (9, 10).

Kinesio tape is an elastic tape found by Dr. KenzoKase in 1973. Kinesio tape's general effect is to stimulate the subdermal lymph and blood circulation and enable the tissue to work easily physically by sticking to the upper layer of the skin and collecting together the elastic fibers here (11). Kinesio tape is also very effective on joints. The idea that taping method decreases the protection mechanism of the muscles and eases the tendon and ligament movement by developing the biomechanics and line of the joint is at the forefront (12). The opinion that the tension in these tissues can be decreased with inhibition and an increase can be seen in proprioception by relieving the pressure on structures such as muscle, tendon, nerve and ligaments is also supported (13-16).

We aimed to compare the use of kinesio taping in combination with ESWT in the treatment of lateral epicondylitis with using only ESWT method in this study.

MATERIAL and METHODS

This study was conducted on a total of 96 volunteer patients 69 females (71.8%) and 27 males (28.2%)

between the ages of 27 and 65 who referred to Private Sevgi Medical Center Physiotherapy outpatient clinic and who were diagnosed with lateral epicondylitis as a result of clinical assessment between the dates 01.03.2015 and 30.10.2015. The average age of the patients was 47 ± 8 . While the average age of the female patients was 47 ± 9 , the average age of the male patients was 46 ± 6 . While the average age of the male patients treated with Method 1 (11 patients) was 49 ± 7 , the average age of the male patients treated with Method 2 (16 patients) was 44 ± 6 . While the average age of the female patients treated with Method 1 (37 patients) was 45 ± 8 , the average age of the female patients treated with Method 2 (32 patients) was 49 ± 10 . This study was conducted with the 2015/90 numbered permission of Malatya Clinical Researches Ethical Board.

A total of 96 patients (69 women (71.8%) and 27 men (28.2%)) were treated and evaluated for at least 1 month of conservative treatment (splint, analgesic, resting, antiinflammatory, ice, us, electrotherapy) due to complaints of at least 1 lateral epicondylitis.

The patients who had bilateral symptom, tendon rupture and tumoral disease, those who had undergone wrist joint operation, patients with neurogenic activation, the pregnant and those who did not cooperate as a result of cognitive disorder were not included in the study.

Treatment

1st group: ESWT with Kinesio taping with Method 1

2nd group: Only ESWT with method 2

In our first group, kinesio taping method was applied with ESWT. ESWT technique was applied with 2000 shock wave 2.0 bar pressure with a speed of 8-10 br. by EMS Swiss Dolorcast ESWT device to the target area with the help of gel in a vertical and circular way. Following the ESWT application, the first taping was applied to the forearm of the patient by clinicians with inhibition technique, which is the commonly used taping method in lateral epicondylitis, with a stretch of 15-25%, when the wrist was in full flexion and the elbow was in extension, in a longitudinal direction, ending past the lateral epicondyle (Figure 1-A),



Figure 1. A-Longitudinal taping, B-oblique taping.

Later, the second taping was applied when the wrist was again in full flexion and the elbow was in extension, with a stretch of 15-25%, crossing the lateral epicondyle and the first tape in oblique direction from ulna 1/3 proximal and ending at humerus lateral supracondylar region (Figure 1-B).

We explained the patient that the tape's property was water resistance and the tape had to stay until the next treatment. This taping method was applied after the first session, after the second session and after the third session, the tape was taken off 4 days after the third session and the patient was informed about avoiding activities that forced the elbow until the control session. Only control session was performed 4 weeks later. The same assessments in the first three sessions were performed in the control session; however, ESWT and taping technique were not applied. In the second group, 2000 shock wave was applied with 2.0 bar pressure with a speed of 8-0 unit with EMS Swiss Dolorcast ESWT device to the target area with the help of gel in a vertical and circular way to the patients. The sessions were performed once every four days. The patient was informed about avoiding activities that forced the elbow. The same assessments in the first three sessions were performed but ESWT technique was not applied in control session. Assessment of Pain: Visual Analog Scale (VAS) was used to assess pain. The patient was informed that 0 showed that there was no pain, 5 showed that there was mild pain, 10 showed that there was unbearable pain and the values in-between; in each session, the patients were told about the value they got in the previous session and as a conclusion, they were questioned precisely how their pain changed in relation to the previous pain. VAS assessment method was used in the assessment of pain with resistant wrist extension, palpation of lateral epicondyle and resting time. HAQ: This questionnaire which includes a large scale general health assessment includes 8 categories about disability index. Each category has 2 or 3 questions and each question is scored between 0 and 3, there are a total of 20 questions. With these questionnaire, self-care and dressing oneself, eating, sitting, walking, hygiene, laying down and other activities were assessed in each session (once every four days) and 4 weeks after the sessions ended. During statistical assessment, total scores were divided in 8 and assessed like the original text of the questionnaire.

Statistical Analysis

The data were given in median (minimum-maximum), average (standard deviation) and number (percentage). Shapiro-Wilk test was conducted for normality assumption. Mann-Whitney U test, independent samples t test, Wilcoxon test and Friedman test were used for statistical analyses. $p < 0.05$ value was considered as statistically significant. IBM SPSS Statistics 22.0 program was used for analyses.

RESULTS

This study consists of two groups as ESWT with kinesio

taping (Method 1) and only ESWT (Method 2). There are 48 patients in each group (11 males and 37 females in group method 1 and 16 males and 32 females in method 2). In both groups before treatment, before the second session, before the third session and a month later after the sessions ended, pain while resting (VAS), pain with resistant wrist extension (VAS), pain with lateral epicondyle palpation (VAS) and HAQ were assessed.

In the assessment of pain while resting with VAS, it was found that the median values in the VAS changes of male patients during rest in Method 1 were 4 points in the first session, 2 points in the second session and 0 in the third and control sessions (< 0.001). The VAS changes of male patients during rest in Method 2 were 4.5 points in the first session, 3.5 points in the second session, 3 points in the third session and 1.5 in the control session ($p = 0.041$) (Table 1).

The VAS changes of female patients during rest in Method 1 were 5 points in the first session, 4 points in the second session, 4 points in the third session and 1 point in the control session ($p < 0.001$). The VAS changes of female patients during rest in Method 2 were 5 points in the first session, 5 points in the second session, 4 points in the third session and 3 in the control session ($p = 0.001$) (Table 1).

Friedman analysis was conducted to find out whether there was statistically significant difference between the first, second, third and control sessions. Friedman analysis results showed significant difference between the scores of males and females in the Method 1 and Method 2 groups ($p < 0.05$) (Table 1).

In the assessment of pain with resistant wrist extension with VAS, it was found that the median values in the VAS changes of male patients in resistant wrist extension test in Method 1 were 5 points in the first session, 2 points in the second session, 1 point in the third session and 0 in the control session ($p = 0.004$). The median values in the VAS changes of male patients in resistant wrist extension test in Method 2 were 4.5 points in the first session, 4 points in the second session, 4.5 points in the third session and 2 points in the control sessions ($p = 0.204$) (Table 1).

The median values in the VAS changes of female patients in resistant wrist extension test in Method 1 were 6 points in the first session, 4 points in the second session, 2 points in the third session and 1 point in the control session ($p < 0.001$). The median values in the VAS changes of female patients in resistant wrist extension test in Method 2 were 4.5 points in the first session, 4 points in the second session, 4 points in the third session and 1.5 in the control session ($p < 0.001$) (Table 1).

Friedman analysis was conducted to find out whether there was statistically significant difference between the first, second, third and control sessions. While significant difference was found in the scores of males and females between sessions in resistant wrist extension test with Method 1, significant difference was found only in the

scores of females between sessions with Method 2 ($p < 0.05$) (Table 1).

In the assessment of pain with palpation with VAS, it was found that the median values in the VAS changes of male patients in pain with palpation in Method 1 were 5 points in the first session, 3 points in the second session, 1 point in the third session and 0 in the control session ($p = 0.005$).

The median values in the VAS changes of male patients in pain with palpation in Method 2 were 5 points in the first session, 4.5 points in the second session, 4.5 points in the third session and 2.5 in the control session ($p = 0.021$) (Table 1).

The median values in the VAS changes of female patients in pain with palpation in Method 1 were 6 points in the first session, 5 points in the second session, 4 points in the third session and 2 points in the control session ($p < 0.001$). The median values in the VAS changes of female patients in pain with palpation in Method 2 were 5 points in the first session, 4 points in the second session, 3 points in the third session and 2 points in the control session ($p < 0.001$) (Table 1).

Friedman analysis was conducted to find out whether there was statistically significant difference between

the first, second, third and control sessions. Friedman analysis results showed significant difference between the scores of males and females in the Method 1 and Method 2 groups ($p < 0.05$) (Table 1).

In HAQ score changes, the median values of male patients in Method 1 were 0.75 points in the first session, 0.38 points in the second session, 0.25 points in the third session and 0.13 points in the control session ($p < 0.001$). The median values of HAQ changes of male patients in Method 2 were 0.88 points in the first session, 0.75 points in the second session, 0.69 points in the third session and 0.38 points in the control session ($p = 0.005$) (Table 1).

The median values of HAQ changes of female patients in Method 1 were 1.5 points in the first session, 1.25 points in the second session, 1 point in the third session and 0.63 points in the control session ($p < 0.001$). The median values of HAQ changes of female patients in Method 2 were 1.44 points in the first session, 1.25 points in the second session, 1.19 points in the third session and 0.81 points in the control session ($p < 0.001$) (Table 1).

Friedman analysis was conducted to find out whether there was statistically significant difference between the first, second, third and control sessions. Friedman

Table 2. Median, minimum and maximum and p values of VAS during rest, VAS with resistant wrist extension (RAE), VAS in pain with palpation and change in HAQ scores of the first, second, third and control sessions of male and female patients in Method 1 and Method 2 groups

VAS	Session	Male		Female	
		Method 1	Method 2	Method 1	Method 2
Rest	First	4 (0-7)	4.5 (0-8)	5 (0-10)	5 (0-9)
	Second	2 (0-6)	3.5 (0-7)	4 (0-9)	5 (0-9)
	Third	0 (0-5)	3 (0-7)	4 (0-10)	4 (0-10)
	Control	0 (0-5)	1.5 (0-8)	1 (0-10)	3 (0-10)
	p	<0.001	0.041	<0.001	0.001
Palpation	First	5 (0-10)	5 (2-8)	6 (2-10)	5 (0-9)
	Second	3 (0-5)	4.5 (0-8)	5 (0-10)	4 (0-9)
	Third	1 (0-6)	4.5 (0-8)	4 (0-10)	3 (0-10)
	Control	0 (0-5)	2.5 (0-8)	2 (0-10)	2 (0-10)
	p	0.005	0.021	<0.001	<0.001
RAE	First	5 (0-10)	4.5 (0-8)	6 (0-10)	4.5 (0-9)
	Second	2 (0-8)	4 (0-8)	4 (0-10)	4 (0-9)
	Third	1 (0-8)	4.5 (0-8)	2 (0-10)	4 (0-9)
	Control	0 (0-8)	2 (0-8)	1 (0-10)	1.5 (0-8)
	p	0.004	0.204	<0.001	<0.001
HAQ scores	First	0.75 (0.38-1.25)	0.88 (0-2.38)	1.5 (0.25-2.63)	1.44 (0.38-2.5)
	Second	0.38 (0-1.13)	0.75 (0-2.13)	1.25 (0-2.38)	1.25 (0.38-2.38)
	Third	0.25 (0-1.13)	0.69 (0-1.75)	1 (0-2.38)	1.19 (0-2.63)
	Control	0.13 (0-1)	0.38 (0-1.50)	0.63 (0-2)	0.81 (0-2.38)
	p	<0.001	0.005	<0.001	<0.001

analysis results showed significant difference between the scores of males and females in the Method 1 and Method 2 groups ($p < 0.05$) (Table 1).

To compare Method 1 and 2 in terms of VAS during rest, independent samples t test was conducted for male patients, while Mann-Whitney U Analysis was conducted for female patients. According to the analysis results, no statistically significant difference was found between Method 1 and 2 in male and female patients ($p > 0.05$), (Table 2).

Since statistically significant differences were found between Method 1 and 2 in resistant wrist extension of male patients, method 1 was found to be effective and superiority differences were compared only between male patients. Independent samples t test was applied on the data to compare Method 1 and 2 in female patients. According to the results of independent samples t test analysis, no statistically significant difference was found in female patients between these two methods ($p > 0.05$), (Table 2).

In order to compare Method 1 and 2 in female and male

patients in terms of VAS change in pain with palpation, independent samples t test was used in male patients, while Mann-Whitney U test Analysis was used in female patients.

While statistically significant difference was found between Method 1 and 2 in female patients ($p < 0.05$), no statistically significant difference was found between Method 1 and 2 in male patients ($p > 0.05$), (Table 2). Independent samples t test was used to compare Method 1 and 2 in female and male patients in terms of HAQ assessment. No statistically significant difference was found between Method 1 and 2 in male and female patients according to independent samples t test analysis results ($p > 0.05$), (Table 2).

While Method 1 was found to be more effective when compared with Method 2 in resistant wrist extension in male patients and more effective pain with palpation in female patients with method 1, both methods were found to be significant in VAS change with pain during rest and HAQ assessment; however, these methods are not superior to each other statistically.

Table 2. Median, minimum and maximum and p values of VAS during rest, VAS with resistant wrist extension (RAE), VAS in pain with palpation and change in HAQ scores of the first, second, third and control sessions of male and female patients in Method 1 and Method 2 groups

VAS	Method	Male		Female	
		Med (Min-Max)	p	Med (Min-Max)	p
Rest	1	4 (0-5)	0.17	1 (0-8)	0.797
	2	2 ((-3)-6)		2 ((-5)-8)	
Palpation	1	5 (0-9)	0.112	4 (0-9)	0.003
	2	1.5 ((-1)-7)		2 ((-6)-8)	
RAE	1	-	-	2 ((-5) - 8)	0.596
	2	-		2 ((-5) - 7)	
HAQ scores	1	0.38 (0-1.13)	0.67	0.63 ((-0.25)-2.25)	0.278
	2	0.38 ((-0.38)-1.38)		0.44 ((-0.75)-1.38)	

DISCUSSION

The results of our study showed that the combined use of the kinesio taping method with ESWT in the clinics was effective in the treatment of lateral epicondylitis in the scientific sense. Wang and Chen applied 1000 shock wave ESWT to 57 patients with an average age of 46 for 12 months and concluded that using shock waves in the treatment of patients with lateral epicondyle was a relative and effective modality (2). Lebrun compared active ESWT once a week as 3 weeks 2000 beats with placebo ESWT and concluded that active ESWT was effective in middle aged patients in terms of the assessment of increasing life quality and decreasing the pain (17). The studies of Wang and Lebrun support the result that the ESWT method reported in our study is effective and the application of 2000 beat frequency and

3 sessions in Lebrun's study were applied in our study too ($p < 0.05$).

sixth and twelfth months. ESWT technique and the number of sessions were found to be effective similar our study (18).

Chung and Wiley conducted on 60 patients, applied active ESWT (2000 beats) and stretching exercises on one group and placebo ESWT and stretching exercises on the other group; they assessed rest with VAS as a result of 3 week and 12 month applications and found no difference in 8-week-long period and reported that ESWT was not an effective treatment (19). Unlike the results of these studies, it was found in our study that active ESWT method and VAS assessment during rest were found to be effective in both groups. ($p = 0.041$ (male), $p = 0.001$ (female))

Pettrone et al. compared ESWT application with placebo group in lateral epicondylitis in patients with an average age of 47 and found that the active group which received treatment for 3 weeks with 2000 beats had significant recovery when compared with the placebo group in weeks 1, 4, 8 and 12 in terms of decrease in pain with palpation with VAS (21). Haupt et al. applied active ESWT to 61 patients with lateral epicondylitis and placebo ESWT to 55 randomized patients in weeks 1, 4 and 12. At the end of assessment 52 weeks later, it was found that active ESWT application was obviously superior in pain with palpation and resting pain (22).

Radwan et al. applied 1500 beat high energy ESWT to one group and widespread extensor tendon tenotomy to another group and assessed resting pain, pain and pain with palpation and reported that both groups showed significant progress in weeks 3, 6 and 12 and in month 12 (23). The results in Pettrone, Haupt and Radwan's studies that the decrease in VAS values in pain with palpation with ESWT application was significant ($p=0.021$ (male), $p<0.001$ (female)) and the result that resting pain with VAS were significant as in our study ($p=0.041$ (male), $p=0.001$ (female)) and it was found that these studies supported the results of our study.

Our ESWT (method 2) result on male patients are VAS during rest ($p=0.041$), VAS in pain with palpation ($p=0.021$), VAS with RAE ($p=0.204$), Change in HAQ scores ($p=0.005$).

Our ESWT (method 2) result on female patients are VAS during rest ($p=0.001$), VAS in pain with palpation ($p<0.001$), VAS with RAE ($p<0.001$), Change in HAQ scores ($p<0.001$). So all the result of ESWT method (except resistant elbow extension on male) on male and female patients are significantly effective.

Coonrad and Hooper reported that lateral epicondylitis was 4 times more common in the fourth decade of life, while it was also seen in other decades of life (4). Garg et al. reported that the risk of lateral epicondylitis increased linearly until the age of 47 and the risk of lateral epicondylitis increased with age (24). In our study, the average age of male patients was found as 46 ± 6 , while the average age of female patients was found as 47 ± 9 and as a conclusion, Coonrad and Garg's view support our study about age average.

In their study they defined different treatment modalities and researched these methods, Luk et al. made VAS assessment and mentioned 40 treatment methods. They also reported that ESWT was accepted by national drug and food institutions only in plantar fasciitis and lateral epicondylitis and was not found to be effective by some studies, the use of taping was contradictive in lateral epicondylitis and no clear results were found so far, palpation with pressure was found to be effective; however, no other uses were found. In our study, taping was found to be effective in female patients on palpation with pressure ($p<0.001$) (25). In their study Gonzalez et al. reported that kinesio taping increased local circulation

and facilitated muscles and inhibitory mechanism (26). Similarly, it was shown in our study that taping which was applied longitudinally inhibited the extreme movement of muscles and was effective inhibitory mechanism. Liu et al. made observations with tape and without tape in kinesio taping application in patients with lateral epicondylitis and reported that kinesio taping method had magnifying effect, which in turn developed muscle movement (13). In our study, significant increase was found in resistance to wrist extension in male patients and it was concluded that taping contributed to the development of movement in muscles ($p=0.004$).

In a study conducted on 16 patients, Vicenzino assessed pain with palpation before treatment, right after treatment and 30 minutes after treatment and treatment group was found to be significantly effective when compared with the placebo and control group, decrease was found in pain with palpation, which was not found to be statistically significant. As a conclusion, it was recorded that taping had a therapeutical effect and could be used as a supplement to treatment (27). In another study in which kinesio taping method was used for the treatment of patients with lateral epicondylitis, 31 patients with lateral epicondylitis were included and taping was performed twice a week for two weeks. Resting pain and pain with palpation were assessed with VAS and functional assessment questionnaire were made in weeks 2 and 6. Lateral epicondylitis recovered significantly after taping and it was concluded that this method was effective in decreasing pain and functional recovery in lateral epicondylitis (28). Studies by Vicenzo and Dilek support the results of our study that taping method is effective in female patients in VAS decrease in pain with palpation ($p<0.001$).

In Shamsoddini's study in which taping technique was applied, VAS scale was applied in 30 patients in minutes 5 and 10 after taping. Significant recovery was seen in the affected wrist extension and VAS scale assessments and it was concluded that taping had an increasing effect on wrist extension and decreased pain. The fact that these results were found significant and taping method was found effective supports the results of our study on wrist extension ($p=0.004$ (male), $p<0.001$ (female)) (29).

Our kinesio taping with ESWT (method 1) result on male patients are VAS during rest ($p<0.001$), VAS in pain with palpation ($p=0.005$), VAS with RAE ($p=0.004$), Change in HAQ scores ($p<0.001$).

Our kinesio taping with ESWT (method 1) result on female patients are VAS during rest ($p<0.001$), VAS in pain with palpation ($p<0.001$), VAS with RAE ($p<0.001$), change in HAQ scores ($p<0.001$). So all the result of kinesio taping with ESWT method on male and female patients are significantly effective.

This study shows the effects of ESWT and kinesio taping application in male and female patients with lateral epicondylitis on the recovery process of the disease.

The results that taping method increased proprioceptive recovery in female patients, decreased pain in resistant wrist extension in male patients, increased muscle function and helped regional recovery in lateral epicondylitis show that the application of this method as a supportive treatment with ESWT method will be more effective than application only ESWT method. We believe that our study will be a resource for future studies and will form a new perspective for clinicians working in this area.

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