RESEARCH

Acute Effects of Dynamic Taping on Pain, Range of Motion and Proprioception in Patients with Subacromial Impingement Syndrome

Hanım Eda Göktaş[1], Seyit Çitaker[2], Ecem Demir Yurtsever[1]

[1] Sivas Cumhuriyet University, Healthy Sciences Faculty, Physiotherapy And Rehabilitation Department,Sivas, Turkey
[2] Gazi University, Healthy Sciences Faculty, Physiotherapy And Rehabilitation Department, Ankara, Turkey
[3] Sivas Cumhuriyet University, Training and Research Hospital, Sivas, Turkey

Abstract: The aim of the study is investigate to examine the acute effect of dynamic tape application on pain in patients with subacromial impingement syndrome. Thirty-one patients (21 females, 10 males) between the ages of 23 and 70 who were diagnosed with subacromial impingement syndrome and had pain for the last 3 months were included in the study. In the study, the patients were divided into 2 groups as dynamic taping and sham taping in a randomized controlled manner. In the evaluations made; patient history and demographic information were obtained. Pain, shoulder joint range of motion and proprioception were evaluated. Pain was evaluated with VAS; shoulder flexion, abduction, internal and external rotation range of motion of the patients were measured with a universal goniometer; shoulder proprioception was evaluated an isokinetic dynamometer. In the DT technique, the indirect method of upper extremity load-bearing was applied. The bandwidth used was 5 cm. Sham tape application; 10 cm long dynamic band was applied horizontally, without tension. When the DTG and STG groups were compared in terms of rest, activity, night pain levels and proprioception before and after the taping application, no statistically significant difference was found between the groups except for passive flexion ROM. There was no statistical difference in the DTG group in terms of VAS resting pain, passive flexion, abduction, internal rotation ROM and proprioception within the group after taping. VAS activity and night pain levels, active flexion, abduction, internal rotation, external rotation and passive external rotation statistically significant difference was found. We predict that DT can support and facilitate movements while performing active exercises as an acute effect. We do not think that DT has a short-term effect on proprioception. However, we recommend investigating the long-term effects.

INTRODUCTION

Subacromial impingement syndrome (SIS) is often associated with narrowing of the subacromial space as a result of damage to the subacromial bursa or compression of the supraspinatus tendon[1-2]. The subacromial space is approximately 1.5 cm wide and contains the rotator cuff tendons, the long head of the biceps brachial muscle, the subacromial bursa, and the coracoacromial ligament. Any situation that causes disruption of the interaction between these structures can lead to SIS[2].

Patients with SIS typically have a history of anterior and lateral shoulder pain that worsens with movement or when lying on the shoulder[2]. It has been reported in the literature that the supraspinatus tendon may be compressed during overhead movements[1]. The pathomechanics of the glenohumeral joint may further disrupt the normal muscle balance and cause excessive activation of the deltoid muscle[3]. It has also been suggested that proprioception deficiencies of the rotator cuff and deltoid muscles play a very important role in SIS[4], and pain and proprioception deficits increase, especially at high elevation levels[5].

Pain in the subacromial joint in SIS may lead to changes in normal biomechanics during sports activities or activities of daily living. Pain and worsening of upper extremity functions in SIS cause deterioration in daily life activities of the person and therefore decrease in functional capacity[6].

Conservative treatment of SIS can be done with many methods, from electrotherapy applications to taping. Kinesio taping (KT) is the most widely used and researched taping method. Studies have shown that KT application increases range of motion in musculoskeletal disorders[7], relieves pain and muscle strength imbalance, and improves functional capacity[8-10]. At the same time, it has been shown histologically that it increases the epidermal-dermal distance after soft tissue trauma and can reduce the feeling of pain, edema and inflammation[11]. However, there are studies that argue the opposite[12,13]. Studies investigating the effect of KT on proprioception with an isokinetic device argue that KT has no effect on proprioception[14-16].

Received : 12/22/2021
Received in revised form : 02/20/2022
Accepted : 03/15/2022
Available online : 06/21/2022

Keywords:

Subacromial impingement syndrome
Dynamic tape
Pain
Range of motion

Corresponding Author:
Hanım Eda Göktaş
E-mail; hedasel@hotmail.com
ORCID: 0000-0002-0550-0595
http://dx.doi.org/10.47009/jamp.2022.4.2.8

Int J Acad Med Pharm,
2022; 4(2); 35-41

Another type of taping that has been used in physiotherapy for the last 10 years is dynamic taping (DT). In 2009 Ryan Kendrick, an Australian physical therapist, developed the DT, a functionalbandage. DT is a biomechanical tape that has an elongation capacity of more than 200% due to its elasticity and has the ability to stretch in all di rections. In addition to assisting movement, which is its primary function, DT also has features such as deceleration and absorption of loads[17]. DT has high resilience, good resistance and strong retraction. It does not have a rigid endpoint like the KT and is more flexible. Thanks to its visco-elastic structure, it creates deceleration force just like bungee cord, absorbs loads and reduces the workload on injured, overloaded or tired tissues. The way DT is applied to the body is different from KT. In order to maximize the tissue lifting effect of KT, the area to be treated is placed in an extended position. Thus, the bending effect of the tape is utilized. After the KT is applied and the body posture returns to normal, it is expected that there will be folds in the skin where the tape is applied. In the application technique of DT, in order to fully benefit from the load absorption, the area to be applied is placed in a shortened position and the desired tension is applied to the band. The fact that the band is already taut and provides support when the musculotendinous structure elongates indicates that the band is used functionally. According to Kendrick, when the target muscle starts to work eccentrically, it should start in tension in the band[17].

There are very few studies in the literature with DT, which is a new tape type. In a study, it was shown that DT reduces pain in female patients with greater trochanter pain syndrome[18]. In another study, it was shown that the use of DT did not increase gluteus medius activation in functional activities and did not improve functional performance[19]. There are few studies in the literature examining the effects of DT on pain and range of motion in SIS[18,20]. There was a few study examining the effect of DT on proprioception in SIS. Therefore, this study was conducted to examine the acute effect of DT application on pain, range of motion and proprioception in SIS.

MATERIAL and METHOD

The necessary permission and approval were obtained from the Gazi University Faculty of Medicine Clinical Research Ethics Committee (Date: 31.01.2019 Number: E.13169) for the study to be carried out. and Rehabilitation Departments, diagnosed with SIS by a specialist physician, met the inclusion criteria and accepted to participate in the study. As a result of the power analysis, the number of cases was calculated as 15 patients for each group, with a power of 90% and a type 1 error of 5%. Thirty-one patients (21 females, 10 males) between the ages of 23 and 70 who were diagnosed with SIS and had pain for the last 3 months were included in the study.

Allergic skin disease, adhesive capsulitis, cervical radiculopathy, neurological, severe dementia or psychiatric disease that may affect the shoulder girdle, shoulder instability, surgery involving the shoulder joint, local steroid injection to the shoulder region in the last 3 months, total rupture of the rotator cuff or supraspinatus muscle, Patients with shoulder pain greater than 7 according to VAS and open wounds in the area to be treated were excluded from the study.

The patients were divided into dynamic taping group (DTG) and sham taping group (STG) according to banding type using computer-assisted randomization system. The same evaluations were made in all patients, in the same order, before taping and within one week after taping. In the evaluations made; patient history and demographic information were obtained. Pain, shoulder joint range of motion and proprioception were evaluated.

Pain assessment: Pain was evaluated subjectively with the Visual Analogue Scale (VAS). Subjects were asked to mark the degree of pain they felt at rest, during activity, and at night on a 10 cm line, and this point was then measured with a ruler and recorded in cm[21].

Evaluation of shoulder joint range of motion: Shoulder flexion, abduction, internal and external rotation range of motion of the patients were measured with a universal goniometer in the supine position. Measurements were made actively and passively[22].

Proprioception evaluation: An isokinetic dynamometer (Cybex NORM®, Humac, CA, USA) was used for shoulder proprioception evaluation. Evaluation was done with the patient in the sitting position with the eyes closed. 30° internal and 30° external rotation positions were determined as the target angle[23]. The target angle was felt by the patients 3 times. The patients were asked to find the target angle, and this measurement was repeated 3 times for each movement. The difference between the target angle felt by the patients and the angle found again by the patients was recorded by calculating the arithmetic mean[24].

Dynamic tape application technique: In the DT technique, the indirect method of upper extremity load-bearing was applied. The bandwidth used was 5 cm. The glenohumeral joint of the patient was placed in the 45°-70° abduction position as the starting position for taping. For the first step of taping, 20° horizontal extension of the shoulder and 30°-45° horizontal flexion was performed for the second step. While the shoulder was in 20° horizontal extension, the DT was applied 5 cm above the olecranon at the elbow, 5 cm without tension. Then, when the shoulder was brought to 30°-45° horizontal flexion, the band was stretched and a force vector was created in the superior direction. While the shoulder was moved to flexion, the band was stretched while maintaining the upward rotation of the scapula. It was then placed anteriorly to prevent anterior translation of the humeral head. The physiotherapist's hands were positioned to provide posterior glide and scapular correction to the humeral head, and a lift was created by placing the arm in external rotation. Finally, a tensionless 5 cm DT was applied obliquely down the scapula[17,25] (Figure 1).

Sham tape application: The affected shoulders of the patients were applied. Ten centimeter long dynamic band; It was applied horizontally, without tension, 10 cm below the acromion (Figure 2).

Statistical Analysis

The “Statistical Package for Social Sciences” (SPSS) Version 22.0 (SPSS inc., Chicago, IL, USA) program was used for statistical analysis. The distribution of continuous variables in the study was evaluated by examining the Kolmogorov-Smirnov test, kurtosis and skewness values, and box-plot graphics. Descriptive statistics frequency and percentage values for discrete variables; for continuous variables, they were given as mean ± standard deviation or median ± interquartile range according to distribution characteristics. In the analysis, the statistical threshold value was accepted as $p<0.05$.

Figure 1. Dynamic banding application

Figure 2. Sham taping application

RESULTS

When the age, height, body weight, body mass index (BMI) and gender distributions of the groups were compared, it was determined that only the BMI of the patients in the STG group was significantly higher than that of the DTG group (p=0.041) (Tablo 2). It was observed that the patients in both groups were similar in terms of gender, dominant side, trauma history and exercise habits (p>0.05) (Table 1).

When the DTG and STG groups were compared in terms of rest, activity, night pain levels and proprioception before and after the taping application, no statistically significant difference was found between the groups except for flexion passive ROM (p=0.031) (p>0.05) (Table 3). There was no statistical difference in the DTG group in terms of VAS resting pain, passive flexion, passive abduction, passive internal rotation ROM and proprioception within the group after taping (p>0.05). VAS activity (p=0.029) and night (p=0.013) pain levels, active flexion (p=0.026), active abduction (p=0.043), active internal rotation (p=0.042), active external rotation (p=0.026) and passive external rotation (p=0.018) statistically significant difference was found (Tablo 4). There was no statistical difference in the STG group in terms of VAS restin, activity and night pain, passive abduction, passive external rotation and proprioception within the group after taping (p>0.05). Active flexion (p=0.007), active abduction (p=0.003), active internal rotation (p=0.017), passive internal rotation (p=0.041) and active external rotation (p=0.027) statistically significant difference was found (Tablo 5). However, when comparing the differences between the groups, there was only a statistically significant difference between passive (p=0.020) and active abduction (p=0.047).

Table 1. Demographic and characteristic features of the groups

	Group	Sham		Dynamic		Test	p
		n	%	n	%		
Gender	Female	10	66.7	11	68.8	X^2 =0.015	.901
	Male	5	33.3	5	31.3		
Affected Party Dominant	Same	6	40.0	7	43.8	X^2 =0.045	.833
	Different	9	60.0	9	56.3		
Trauma History	Yes	3	20.0	4	25.0	LR=0.111	.739
	No	12	80.0	12	75.0		
Exercise Habit	Yes	2	13.3	1	6.3	LR=0.451	.502
	No	13	86.7	15	93.8		

X^2 = Chi square, LR: Likelihood Ratio

Table 2. Physically features of the groups

Variable	Grup	n	$\bar{X}$	s.d.	Test	p
Age (year)	Sham	15	50.66	8.03	t=-0.144	.887
	Dynamic	16	51.18	11.67		
Height (cm)	Sham	15	163.66	5.96	t=-1.235	.227
	Dynamic	16	167.68	11.20		
Body weight (kg)	Sham	15	78.33	10.13	t=0.971	.340
	Dynamic	16	74.25	13.00		
BMI (kg/m^2)	Sham	15	29.26	3.72	t=2.140	.041*
	Dynamic	16	26.41	3.67		
Pain time	Sham	15	13.73	13.84	z=1.134	.270
	Dynamic	16	9.25	6.76		

*p<0,05; t: bağımsız örneklem t testi, z:Mann Whitney U

Table 3. Comparison of Primary Measures by Groups

Variable	Group	n	$\bar{X}$	s.d.	Test	p
VASrest	Sham	15	1.23	2.40	z=-0.563	.573
	Dynamic	16	1.50	1.86		
VASactivity	Sham	15	6.76	2.23	t=-1.859	.073
	Dynamik	16	5.29	2.17		
VASnight	Sham	15	4.19	3.38	z=-0.396	.692
	Dynamic	16	4.50	3.17		
Flexionaktive	Sham	15	165.60	14.25	z=-1.580	.114
	Dynamic	16	172.87	6.15		
Flexionpassive	Sham	15	172.60	11.95	z=-2.160	.031*
	Dynamic	16	178.68	2.79		
Abductionaktive	Sham	15	160.26	21.13	z=-1.889	.060
	Dynamic	16	171.68	10.09		
Abductionpassive	Sham	15	169.53	19.01	z=-1.781	.129
	Dynamic	16	177.00	6.73		
Internalrotationactive	Sham	15	79.46	12.61	z=-1.179	.238
	Dynamic	16	84.18	7.06		
Internalrotationpassive	Sham	15	86.53	9.22	z=-0.152	.879
	Dynamic	16	88.25	4.93		
Externalrotationaktive	Sham	15	77.60	20.24	z=-0.441	.659
	Dynamic	16	82.00	10.41		
Externalrotationpassive	Sham	15	82.73	18.66	z=-0.041	.967
	Dynamic	16	87.56	7.50		
Proprioception	Sham	15	5.12	3.90	t=-0.756	.456
	Dynamic	16	6.18	3.94		
*p<0,05						

Table 4. Analysis of Difference Between First and Second Measurement Values of Dynamic Taping Group

	Measurement	n	Mean Ranks	Sum of Ranks	z	p
VASrest	Negative Ranks	3[a]	3.00	9.00	-1.461	.144
	Positive Ranks	1[b]	1.00	1.00		
	Ties	12[c]				
Flexionactive	Negative Ranks	0[a]	.00	.00	-2.226	.026*
	Positive Ranks	6b	3.50	21.00		
	Ties	10[c]				
Flexionpassive	Negative Ranks	0[a]	.00	.00	-1.342	.180
	Positive Ranks	2[b]	1.50	3.00		
	Ties	14[c]				
Abductionactive	Negative Ranks	0[a]	.00	.00	-2.023	.043*
	Positive Ranks	5[b]	3.00	15.00		
	Ties	11[c]				
Abductionpassive	Negative Ranks	0[a]	.00	.00	-1.604	.109
	Positive Ranks	3[b]	2.00	6.00		
	Ties	13[c]				
Internalrotationactive	Negative Ranks	0[a]	.00	.00	-2.032	.042*
	Positive Ranks	5[b]	3.00	15.00		
	Ties	11[c]				
Internalrotationpassive	Negative Ranks	0[a]	.00	.00	-1.342	.180
	Positive Ranks	2[b]	1.50	3.00		
	Ties	14[c]				
Externalrotationonactive	Negative Ranks	0[a]	.00	.00	-2.226	.026*
	Positive Ranks	6[b]	3.50	21.00		
	Ties	10[c]				
Externalrotationpassive	Negative Ranks	0[a]	.00	.00	-2.375	.018*
	Positive Ranks	7[b]	4.00	28.00		
	Ties	9[c]				
Proprioception	Negative Ranks	6[a]	8.67	52.00	-.828	.408
	Positive Ranks	10[b]	8.40	84.00		
	Ties	0[c]				
	Grup	n	$\bar{X}$	s.d.	t	p
VASactivity	VASaktivity1	16	5.29	2.17	2.410	.029*
	VASaktivity2	16	4.38	2.25		
VASnight	VASnight1	16	4.50	3.17	2.804	.013*
	VASnight2	16	3.60	3.10		
*p<0,05						
a. Second Measurement < First Measurement						
b. Second Measurement > First Measurement						
c. Second Measurement = First Measurement						

Table 5. Analysis of Difference Between First and Second Measurement Values of Sham Taping Group

	Measurement	n	Mean Ranks	Sum of Ranks	z	p
VASrest	Negative Ranks	6[a]	4.17	25.00	-.296	.767
	Positive Ranks	3[b]	6.67	20.00		
	Ties	6[c]				
Flexionactive	Negative Ranks	0[a]	.00	.00	-2.684	.007*
	Positive Ranks	9[b]	5.00	45.00		
	Ties	6[c]				
Flexionpassive	Negative Ranks	0[a]	.00	.00	-2.032	.042*
	Positive Ranks	5[b]	3.00	15.00		
	Ties	10[c]				
Abductionactive	Negative Ranks	0[a]	.00	,00	-2.946	.003*
	Positive Ranks	11[b]	6.00	66.00		
	Ties	4[c]				
Abductionpassive	Negative Ranks	0[a]	,00	.00	-1.604	.109
	Positive Ranks	3[b]	2.00	6.00		
	Ties	12[c]				
Internalrotationactive	Negative Ranks	0[a]	.00	.00	-2.388	.017*
	Positive Ranks	7[b]	4.00	28.00		
	Ties	8[c]				
Internalrotationpassive	Negative Ranks	0[a]	.00	.00	-2.041	.041*
	Positive Ranks	5[b]	3.00	15.00		
	Ties	10[c]				
Externalrotationactive	Negative Ranks	0[a]	.00	.00	-2.207	.027*
	Positive Ranks	6[b]	3.50	21.00		
	Ties	9[c]				
Externalrotationpassive	Negative Ranks	0[a]	.00	.00	-1.342	.180
	Positive Ranks	2[b]	1.50	3.00		
	Ties	13[c]				
Proprioception	Negative Ranks	5[a]	8.00	40.00	-.384	.701
	Positive Ranks	8[b]	6.38	51.00		
	Ties	2[c]				
	Group	n	$\bar{X}$	S.S.	t	p
VASactivity	VASactivity1	15	6.76	2.23	1.816	.091
	VASactivity2	15	5.59	2.68		
VASnight	VASnight1	15	4.19	3.38	-.139	.892
	VASnight2	15	4.22	3.64		

*p<0,05

a. Second Measurement < First Measurement

b. Second Measurement > First Measurement

c. Second Measurement = First Measurement

DISCUSSION

The result of this study, which was carried out with the aim of examining the acute effect of DT application on pain, range of motion and proprioception in SIS patients; While DT application provides a significant increase in active and passive abduction of the shoulder and passive flexion of the shoulder in SIS patients, it does not provide any gain in shoulder pain and proprioception.

When the literature was examined, few studies were found that investigated the effect of DT on pain. Park et al. in a study they conducted, they divided 22 patients undergoing acromioplasty and rotator cuff repair surgery into two groups. While exercise, manual therapy and scapular DT were applied to the experimental group, only exercise and manual therapy were applied to the control group for 6 weeks. Statistically significant improvements were observed in pain, glenohumeral joint flexion, abduction, internal and external rotation range of motion, forward shoulder angle and upper body posture in both groups. In conclusion, they stated that adding DT to therapy after surgery was effective in improving the level of shoulder disability, range of motion, and upper extremity posture[20]. Robinson et al. investigated the immediate effect of DT and ST on walking and pain in their study on 50 women with greater trochanteric pain syndrome. They revealed that there was a significant reduction in pain in both groups. They concluded that it is not clear whether the reduction in pain was due to the sensory effect of the tape. The researcher named Silva divided the individuals into 4 groups as no tape (control), placebo, lateral and medial shift taping in his research on patients with patella femoral pain syndrome. In this study, the acute effect of taping was investigated. McConnell technique was applied by using leukote tape in the taping application. They reported a statistically significant reduction in pain in the medial shift banding group and the placebo group[19]. Having the same effect on pain in both groups; They suggested that the band may be due to the pain modulation effect through cutaneous stimulation. In this study, although DT application significantly reduced activity and night pain intensity, it did not give different results from sham taping in reducing pain. One of the studies in the literature investigating the effect of DT on pain, in a long-term follow-up study[20], it was found that when basic treatments such as exercise and manual therapy are given for the patient's pathology and the time required for tissue healing is applied (6 weeks), the effect of the tape is not needed, and No effect on pain has been demonstrated. Studies examining the immediate effect of DT on pain[19]; They found that the DT application did not give different results than the sham application. The researchers predicted that the effect of DT application in reducing pain, even if it is applied in the sham, may be caused by giving sensory stimuli. In this study, the instantaneous effect of DT on pain was examined; Although activity and night pain decreased with DT application, this reduction in pain did not give a different result than sham application. This situation supports the results of previous studies. In other words, the sensory stimulation of the DT application may reduce the pain. A similar histological study supporting this result was performed by Kafa et al. on experimental animals on kinesio tape. Histological research by Kafa et al.; showed that KT applied after injury increased the dermal and epidermal distance. Thus, they concluded that inflammation, edema, and pain sensation could be reduced by KT[11]. In order to shed light on this issue, it may

be useful to examine the effect of long-term isolated DT application on pain in the future. When we look at the studies examining the effect of kt on the range of motion, there is a study on this subject. Park et al. found that 6 weeks of exercise and DT application in addition to manual therapy provided a significant increase in the flexion abduction, internal and external rotation range of motion of the glenohumeral joint in patients who had undergone acromioplasty and rotator cuff repair surgery. In this study, the instantaneous effect of DT on pain was examined; Although activity and night pain decreased with DT application, this reduction in pain did not give a different result than sham application. This situation supports the results of previous studies. In other words, the sensory stimulation of the DT application may reduce the pain. A similar histological study supporting this result was performed by Kafa et al. on experimental animals on kinesio tape. Histological research by Kafa et al.; showed that KT applied after injury increased the dermal and epidermal distance. Thus, they concluded that inflammation, edema, and pain sensation could be reduced by KT[11]. In order to shed light on this issue, it may be useful to examine the effect of long-term isolated DT application on pain in the future. When we look at the studies examining the effect of KT on the range of motion, there is a study on this subject. Park et al. found that 6 weeks of exercise and DT application in addition to manual therapy provided a significant increase in the flexion abduction, internal and external rotation range of motion of the glenohumeral joint in patients who had undergone acromioplasty and rotator cuff repair surgery. In our study active shoulder flexion, abduction, internal rotation, external rotation and passive external rotation statistically significant difference was found.

Anderson et al. evaluated acute effects and similar to this study, a difference was found between DTG and STG in glenohumeral abduction and flexion ROM. Proprioception deficit of the shoulder may be associated with glenohumeral instability. It has been suggested that this decrease in ability may be due to physical laxity and separation of the capsular ligamentous ligaments[5]. Şahin et al. showed that proprioception was impaired in the affected or even unaffected shoulders of SIS patients in their study conducted with 61 individuals, 30 of whom were healthy controls and 31 of whom had SIS[4]. The continuous shear force produced by KT application, which is one of the taping types, against the skin, leads to increased stimulation of cutaneous mechanoreceptors. Thus, the idea that taping can improve proprioception has been discussed in different studies. In the literature, there are studies on proprioception with bands with different properties other than DT, and studies with KT are frequently encountered. In the study of Shih et al. in which they compared the efficacy of KT with placebo tape in individuals with SIS, a significant decrease was observed in the anterior-posterior tilt and up-down rotation repositioning deficit during scapular protraction in the LT group. At the same time, improvement in scapular kinematics was observed in the KT group during scapion[26]. In a study conducted by Aarseth et al. on 27 healthy athletes who do not engage in overhead sports, they showed that while short-term KT application did not affect the proprioception of the shoulder at 50 º and 110º, it could impair proprioception at 90º. Keenan et al. 30 active individuals were included in their study. Of these, 10 individuals were healthy people who did not have shoulder problems before, and KT was applied to this group. The other 20 people consisted of people with shoulder pain and symptoms of shoulder impingement for the last two weeks. KT was applied to 10 people from this group, and placebo taping was applied to the other 10 people. They demonstrated that KT did not have superiority in shoulder proprioception, strength, and scapular kinematics between the groups[27]. In this study, no difference was found between and within the groups in terms of proproception. Although the results obtained in our study are similar, we can say that DT application does not affect proprioception. However, more research is needed on the effect of DT application on proprioception with long-term and different application methods.

Conclusion

We predict that DT can support and facilitate movements while performing active exercises as an acute effect. We do not think that DT has a short-term effect on proprioception. However, we recommend investigating the long-term effects.

Conflict of interest

The authors declare that there are no conflict of interests.

Financial disclosure

The authors declared that this study has received no financial support.

REFERENCES

1. Luque-Suarez A, Navarro-Ledesma S, Petocz P, Hancock M J & Hush J. Short term effects of kinesiotaping on acromiohumeral distance in asymptomatic subjects: a randomised controlled trial. *Manual therapy*. 2013; 18(6): 573-577
2. Subaşı V, Çakır T, Arıca Z, Sarıer RN, Bilgilisoy Filiz M, Koldaş Doğan Ş & Toraman NF. Comparison of efficacy of kinesiological taping and subacromial injection therapy in subacromial impingement syndrome. *Clinical rheumatology*. 2016; 35(3): 741-746.
3. Kaya E, Zinnuroglu M & Tugcu I. Kinesio taping compared to physical therapy modalities for the treatment of shoulder impingement syndrome. *Clinical rheumatology*. 2011; 30(2): 201-207.
4. Sahin E, Dilek B, Baydar M, Gundogdu M, Ergin B, Manisali M, et al. Shoulder proprioception in patients with subacromial impingement syndrome. *Journal of back and musculoskeletal rehabilitation*. 2017; 30 (4): 857-862.
5. Anderson VB & Wee E. Impaired joint proprioception at higher shoulder elevations in chronic rotator cuff pathology. *Arch ves of phys cal medicine and rehabilitation*. 2011; 92(7): 1146-1151.
6. Baltacı, Gül. Omuz Yaralanmalarında Rehabilitasyon. *Pelikan Publishing*, 2015.
7. Gulpinar D, Ozer S T & Yesilyaprak S S. Effects of rigid and kinesio taping on shoulder rotation motions, posterior shoulder tightness, and posture in overhead athletes: a randomized controlled trial. *Journal of sport rehabilitation*. 2019; 28(3): 256-265.
8. AKTas E, Ahmet A & Yuksel I. The effects of additional kinesio taping over exercise in the treatment of patellofemoral pain syndrome. *Acta orthopaedica et traumatologica turcica*. 2011; 45(5): 335-341.
9. Nakajima MA & Baldridge C. The effect of kinesio® tape on vertical jump and dynamic postural control. *Internat onal journal of sports physical therapy*. 2013; 8(4): 393.
10. Celiker R, Guven Z, Aydog T, Bagis S, Atalay A, Yagci, HC, et al. The kinesiologic taping technique and its applications/Kinezyolojik bantloma teknigi ve uygulama alanlari. *Turkish Journal of Physical Medicine and Rehabilitation*. 2011; 57(4): 225-236.
11. Kafa N, Citaker S, Omeroglu S, Peker T, Coskun N & Diker S. Effects of kinesiologic taping on epidermal–dermal distance, pain, edema and inflammation after experimentally induced soft tissue trauma. *Physiotherapy theory and practice*. 2015; 31(8): 556-561.
12. Thelen MD, Dauber JA & Stoneman PD. The clinical efficacy of kinesio tape for shoulder pain: a randomized, double-blinded, clinical trial. *Journal of orthopaedic & sports physical therapy*. 2008; 38(7): 389-395.
13. Celik D, Karaborklu Argut S, Coban O & Eren I. The clinical efficacy of kinesio taping in shoulder disorders: a systematic review and meta analysis. *Clinical Rehabilitation*. 2020; 34(6): 723-740.
14. Karatosun HS, Demir HM, Atalay YB & Cetin C. Does KinesioTape application to thigh muscles affect muscle strength, proprioception and jumping on the following days?. *Sports Medicine Journal/Medicina Sportivâ*. 2019; 15(2).
15. Lins CADA, Locks Neto F, Amorin ABCD, Borges DT, Macedo LDT & Brasileiro J S. Kinesio taping® does not alter joint position sense in healthy subjects: randomized, clinical trial. *Manual Therapy, Posturology & Rehabilitation Journal*. 2015; 12: 286-290.
16. Aarseth LM, Suprak DN, Chalmers GR, Lyon L & Dahlquist DT. Kinesio tape and shoulder-joint position sense. *Journal of Athletic Training*. 2015; 50(8): 785-791.
17. McNeill W & Pedersen C. Dynamic tape. Is it all about controlling load?. *Journal of bodywork and movement therapies*. 2016; 20(1): 179-188.
18. Robinson NA, Spratford W, Welvaert M, Gaida J & Fearon AM. Does Dynamic Tape change the walking biomechanics of women with greater trochanteric pain syndrome? A blinded randomised controlled crossover trial. *Gait & posture*. 2019; 70: 275-283.
19. Silva RO, Carlos FR, Morales MC, Emerick VDS, Teruyu AI, Valadão

VM, et al. Effect of two Dynamic Tape™ applications on the electromyographic activity of the gluteus medius and functional performance in women: A randomized, controlled, clinical trial. *Journal of Bodywork and Movement Therapies*. 2021 25: 212-217.
20. Park S-J & Kim S-Y. The effect of scapular dynamic taping on pain, disability, upper body posture and range of motion in the postoperative shoulder. *Journal of the Korean Soc ety of Phys cal Med c ne*. 2018; 13 (4): 149-162.
21. Lin JJ, Hanten WP, Olson SL, Roddey TS, Soto-Quijano DA, Lim HK, et al. Shoulder dysfunction assessment: self-report and impaired scapular movements. *Physical therapy*. 2006; 86(8): 1065-1074.
22. Otman AS, Demirel H & Sade A. Tedavi hareketlerinde temel değerlendirme prensipleri. *Pel kan Publ sh ng*. 2014
23. Ellenbecker TS & Davies GJ. The application of isokinetics in testing and rehabilitation of the shoulder complex. *Journal of athlet c tra n ng*. 2000; 35(3): 338.
24. Nasseri N, Hadian MR, Bagheri H & Olyaei STG. Reliability and accuracy of joint position sense measurement in the laboratory and clinic; utilising a new system. *Acta Medica Iranica*. 2007: 395-404.
25. Kendrick R. Shoulder external rotation dynamic tape. [Internet]; [cited 2021 september 20]. Available from: https://www.youtube.com/watch?v=y2_INjp37v0&list=PL7VopBXj_mKfMhQjb69ZCoU9p_ghEoFgE&index=3.
26. Shih Y-F, Lee Y-F & Chen W-Y. Effects of kinesiology taping on scapular reposition accuracy, kinematics, and muscle activity in athletes with shoulder impingement syndrome: a randomized controlled study. *Journal of sport rehabilitation*. 2008; 27(6): 560-569.
27. Keenan KA, Akins JS, Varnell M, Abt J, Lovalekar M, Lephart S & Sell TC. Kinesiology taping does not alter shoulder strength, shoulder proprioception, or scapular kinematics in healthy, physically active subjects and subjects with Subacromial Impingement Syndrome. *Physical Therapy in Sport*. 2017; 24: 60-66.