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EFFECTIVENESS OF KINESIOLOGIC TAPE APPLICATION IN ROTATOR CUFF INJURIES

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ABSTRACT

Background: In our study, it was aimed to research the effect of kinesiological tape on pain, shoulder movement angles, and daily life activities.

Methods: The control group (n:15) was applied with classical physiotherapy program including ultrasound, tens and exercise. The experiment group (n:15) was applied kinesiological-tape for seven days in addition to classical physiotherapy and rehabilitation program. Pretreatment and post-treatment pains of the patients were measured by using Visual Analog Scale (VAS), the goniometer was used to measure the shoulder ranges, Constant-Murley measured daily life activity levels, and DASH-T measured shoulder disability level.

Results: As the VAS scores of the control group inactivity reduced by 11,21 points, the scores of the experiment group decreased by 24,53 points. The difference in scores between the two groups is significant statistically ($p<0,05$). As the extension and abduction scores increased significantly more in the experiment group, flexion increase is more at the control group. However, the difference between the two groups in shoulder movement angles was not found significant statistically ($p>0,05$). For shoulder movement opening, all records of the experiment group are significantly better than that of the control group, except the flexion increase.

Conclusion: Kinesiological tape application ensuring a reduction in pain for rotator cuff injury in a shorter period is a treatment also providing significantly better results in shoulder movement recovery, increase in functionality, and a decrease in disability.

Keywords: Kinesiologic Tape, Physical Therapy, Constant Murley, Visual Analog Scale, Daily Life Activities, Rotator Cuff.

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INTRODUCTION

Shoulder pain, a musculoskeletal problem, is one of the most common health problems in people. It is in third place after waist and neck ache in common aches in humans. While shoulder pain rates vary from community to community, 7% to 36% of people complain of shoulder pain throughout their lives. The unique nature of shoulder pain and the fact that it is a highly mobile system make it difficult to diagnose the condition [1,2].

Although there are many causes of shoulder pain, the most common cause is compression in lesions including bursa and tendon. The majority of the diagnoses for the shoulder compromise are rotator cuff pathologies and subacromial impingement syndrome. Rotator cuff injuries are associated with impingement [3,4]. Although impingement is a leading cause of rotator cuff injuries, it is not the only reason. Overuse and fatigue, external loading of the rotator sheath muscles, damage to the tendons are also important reasons [5].

95% of the lesions due to rotator cuff injuries are associated with subacromial impingement syndrome (CNS). Also, muscles and nerves in the region may arise from pain. In rotator cuff injuries, rotator cuff ruptures occur due to the age of the patient and other background preparation factors. The supraspinatus and infraspinatus muscles frequently appear as affected muscles. These tears lead to clinical symptoms that affect the shoulder negatively, such as instability, pain, decreased functioning, weakness, rigidity. Rotator cuff appears to be an important variable in age. The partial or complete rupture occurred in 54% of patients over 60 years of age without any symptoms in 4% of patients under 40 years of age. However, depending on the age of the patients, there is an increase in symptoms and an increase in the size of the tears in the region [6,7,8,9].

The treatment of rotator cuff injuries is done both conservatively and surgically. Complicated treatments may be selected for some symptoms, such as the patient's health status, needs, functions, but not every injury may require surgical intervention [10]. Physiotherapy and medical treatments from other treatments used in rotator cuff injuries are often the first prominent treatments. As is known, treatments are categorized into two forms, surgical and non-surgical treatments. Non-surgical treatments; Various medical treatments, hot and cold agents, exercise, manual therapy, acupuncture, transcutaneous electrical stimulation (TENS), nutritional supplements. Non-surgical treatments are mostly non-invasive, with an increase in functionality and a decrease in pain in 50% to 80% of patients. Surgical treatments include repair of tears and subacromial decompression surgery [11,12,13].

The use of kinesiological tape in recent years seems to have been used for protection and treatment. In the researches carried out, kinesiological banding focuses on the effect of motor unit ignition mechanism and cutaneous afferent stimulation. Proprioceptive perception and muscle strength are increased by banding [14,15,16]. The use of kinesiological tape in recent years seems to have been used for protection and treatment. In the researches carried out, kinesiological banding focuses on the effect of motor unit

ignition mechanism and cutaneous afferent stimulation. Proprioceptive perception and muscle strength are increased by banding [14,15,16].

Kinesio taping is a taping technique that improves performance by reducing inflammation and pain, to avoid unwanted situations arising in standard taping and tape applications, improved by Dr. Kenzo Kase in the 1970's. Kinesiology banding, which has a wide indication area, mainly musculoskeletal system, is a technique of taping which is developed every day by sticking to basic forms of application. Musculoskeletal and sports rehabilitation, pediatrics, neurology, vascular problems are also used in the field [17].

This study aims to measure the effectiveness of rotatory cuff injuries of kinesiological banding, which is frequently used in non-invasive physiotherapy and rehabilitation. In the study, 40 participants, two groups of 20 were separated, and standard physiotherapy modalities were applied to both groups. Therapeutic kinesiology banding has been done to only one of these groups in the direction of the research purpose.

The research consists of two parts. In the first part, the data and information compiled from the studies in the literature are given and the second part is tested on the hypothesis of the research by applying for 40 participants. The findings of this study were evaluated in the discussion section while the findings obtained in the findings of the research were presented and the results of the research in the conclusion section were revealed. The resources used in the research have been shown in the text and the welder by the academic writing rules.

METHODS

Quantitative research method based on sampling is used in this research. In the study, the data obtained from 30 patients between 25-65 years who applied to Gaziosmanpaşa Special Reflex Medical Center and rotator cuff injuries with total shoulder pain were used.

Detailed physical assessments and tests were performed before patients were included in the study, and patients were divided into two groups. In the application phase, one group is kinesiotaped while the other group is not.

After the detailed physical evaluations and tests were performed on all patients, a group of the kinesiological band was applied, and the other group was not applied. Then goniometric measurements for both groups and differences in pain levels were found.

Thirteen of the 30 patients (43.33%) were female, and 17 (56.67%) were male. Their ages varied between 25 and 65 years. The mean age was $42,58 \pm 15,89$ years, height was $170,34 \pm 14,56$ cm, body weight was $76,51 \pm 13,72$ kg and body mass index was $28,87 \pm 9,43$ kg / m².

Table 1. Demographic variables

	Mean
Age	42,58 ± 15,89
Height	170,34 ± 14,56
Body Weight	76,51 ± 13,72
Body mass index	28,87 ± 9,43

Patients included in the study were noted to have the following characteristics and patients not carrying these criteria were not included in the study.

- ✓ 25-65 years old total rotator cuff injury such as shoulder pain and tendonitis, sprain, strain
- ✓ Decrease in shoulder motion angles
- ✓ Pain that affects daily life

Patients carrying the following findings were not included in the study;

- ✓ Patients with a shoulder fracture
- ✓ Glenohumeral dislocation and subluxation
- ✓ Symptoms of cervical origin
- ✓ Having surgical operation in the shoulder area before

Evaluation and applications were made in the application part of the research. The patient information was processed, and the data were collected. Data gathered in patient follow-up form includes the patient's name, surname, age, gender, body weight, height, body mass index, medications used, pain story, shoulder assessment, shoulder movement angle, muscle strength measurement, pain assessment tests. Data compiled by the patient follow-up form were evaluated by visual analogue scale (VAS), goniometric measurements, classical muscle test, constant Murley score and arm-hand problems by Dash t-test.

The measurement of the movement angle of all of the participants on the affected side of the shoulder was performed with a goniometer, and the values were recorded in degrees. Participants with a shoulder flexion angle of 100 degrees, an extension angle of 30 degrees and an abduction angle of fewer than 85 degrees were not included in the study. Frequently preferred manual muscle testing (MRC) was used by clinicians to assess muscle strength of patients. Patients with muscle strength less than 3+ were not included in the study.

The Constant score is a practical assessment that is easy to implement in the clinic, easy to do, frequently performed by specialists, very short and informs about the patient's functional status. Literature is the most frequently used evaluation. In our study, we evaluated the kinesiological band and the untreated groups with a constant score at the end of the treatment. The groups were assessed in-house and compared with each other's constant and Murley scores.

The dash-t questionnaire was chosen because it is the Turkish version of the study. It has also been used within the commonly used credibility proven. The Dash-T questionnaire also can assess daily activities in detail.

In our study, daily activities were evaluated with dash-t before and after treatment in both groups. Subsequent evaluations were made both within the group and between the groups to understand the effectiveness of the treatment.

Five different colors kinesiological band (skin color, pink, black, blue and yellow) with same materials are provided, and coloring is done with this band. Several factors have been taken into consideration before the application to change the band's efficiency. The skin structure of the patient has been taken into consideration and care has been

taken to ensure that there are no factors that would prevent band sticking on the surface. Considering the general condition of the patient, physiotherapists who are experienced in kinesiological banding have made the most appropriate banding method as a result of the evaluations made by the physiotherapists.

Therapeutic banding technique proposed by Kenzo is used in rotator cuff tendonitis and impingement [18]. Our work uses a standard 5 cm band of kinesiology. First, the band was made in the shape of Y, without any tension on the insertion from the origin of the supraspinatus muscle.

The first strip is curved from the cervical region and joined together with the opposite side and the part reaching the rear of the arm as if wrapped around the back of the opposite line. The second lane, the Y band, was applied to the origin from the insertion of the deltoid without tension. The second lane (Y) was applied on the arms, while the anterior deltoid arm was in the external rotation and horizontal abduction. The other strip was made in the posterior deltoid, horizontal arm adduction, and internal rotation as if to reach the opposite side from the front.

The tape was I-type or Y-type taping at a length of 20 cm according to the shoulder structure. Coracoid was applied to create posterior deltoid mechanical correction (approximately 50% - 75% tension) from the process region and also by correct pressure reduction where pain and sensitivity were felt. The effect of mechanical correction was made when the upper extremity was in the external rotation.

The Compex Theta MI Pro device applied transcutaneous electrical stimulation (TENS) for one week in both groups. The shoulder was applied to the anterior deltoid for 20 minutes each day before the exercises. The TENS current used is Epicondylitis and Arthralgia program. Ultrasound was applied to 30 patients to take advantage of the heating and therapeutic effects. The shoulder was made to cover the area of the deltoid muscle. US parameters Frequency: 1 MHz Density: 1.5 Watt / cm² Duration: 10 minutes Mode: Discrete.

Since the glenohumeral band is predisposed to contracture and the exercise is important in healing, both groups are given passive and active exercises. Passive exercises are normal joint movement and stretching. During one week, the shoulder was stretched once a day for approximately 8 minutes, and passive exercise to increase joint motion was performed. Thus, it is aimed to reduce the limitation of movement in the joint, to prevent the shortening of the muscles, and to maintain the contraction force of the atomic muscles.

In the active exercises, Codman pendulum exercises and joint motion exercises performed with gravity assistance were given during the painful period. The goal is to increase the joint EHA in all directions, and Codman's pendulum exercises are preferred when this is done. When the patient is standing or sitting, the patient is told to stop at various angles (without active contraction) by hanging the patient's arm in a relaxed state, stopping at a 90° angle to the floor. In addition to this, the patient is asked to repeat at home, giving them some exercises that they can do themselves. The exercises given to the patient at home consist of the

following exercises;

The shoulder belt stretching exercises were given 2 hours after the patient woke up in the morning as ten repetitions per day. After exercising stretching the shoulder girdle, shoulder, turning exercises are given. Flexion exercises are given. Stretching exercises were given with the help of the healthy arm, with the other hand stretching as far as it can come and reaching the top of the head. Contrary body stretching exercise was given. Finger exercises on the face of the face are given. The patient was given ten repetitive stick exercises as the last exercise.

RESULTS

In the dependent groups, according to the t-test results, in the control group, the first measurement value average of the Vas score at rest was 41.53, while the final measurement average was 26.87. The difference between the first and last measurement averages is statistically significant ($p < 0,05$) and the last measurement value is lower at a significant level.

When the change of Vas value in the case of activity is examined, the first measurement average is 77,80; the final measurement average is 53.27. The difference was statistically significant ($p < 0,05$) and the second measurement average was lower than the first measurement average.

Table 2 shows the t-test results of independent groups for determining the mean of control and Kinesio taping group reductions in resting and activity state VAS score values and whether the difference between these means is significant.

According to Table2; In the case of resting, the changing average of the kinesiological band group vas score is 14.67 while the change of the control group vas score is 6.07. In the independent groups, the difference between the two means was significant ($p < 0,05$) and the decrease in the kinesiological banding vas score was significantly higher than the control group without a decrease in the vas score ($p < 0,05$).

Table 2: t-test results in independent groups for comparison of pain changes in the control and Kinesio taping group.

		N	Average	Std. Deviation	t	p
VAS Rest Decrease	Control	14	6,07	7,38	-2,593	0,015
	Kinesio Taping	15	14,67	10,14		
VAS Activity Decrease	Control	14	11,21	9,63	-3,380	0,001
	Kinesio Taping	15	24,53	8,85		

When the change of Vas scores in the case of the activity is examined, the mean decrease amount of the Vas score in the Kinesio taping group is 24.53, whereas the decrease in the control group is on average 11,21. In the independent groups, the difference between the two means according to the t-test results was statistically significant, and the change of the Kinesio taping group was significantly higher than the change of the control group ($p < 0,05$).

The t-test results of dependent groups for determining

whether the difference between the first and last measurement averages of the constant value and the mean of these values in the control and kinesiological banding groups are significant are given in Table 3.

In the control group according to Table 3, the first measurement constant value is 66,21 while the last measurement average value is 70,43. There was a significant difference between the two means according to the t-test results independent groups ($p < 0,05$) and the final measurement average was significantly higher than the first measurement average ($p < 0,05$).

The first measurement constant value in kinesiotaping group is 63,93 whereas the last measurement average value is 73,73. There was a significant difference between the two means according to the t-test results independent groups ($p < 0,05$) and the final measurement average was significantly higher than the first measurement average ($p < 0,05$).

The t-test results in the independent groups for determining the mean values of the change quantities in the constant values and the significance of the differences between the average values of the control group and the Kinesio taping group are given in Table3.

Constant increase average in Kinesio taping group is 9.80, and constant increase average in control group is 4,21. There was a significant difference ($p < 0,05$) between the two means according to the t-test results in the independent groups. The increase in the Kinesio taping group was significantly higher than the increase in the control group ($p < 0,05$).

Table 3: Comparison of t-test independent groups for comparison of first and last constant measure in control and kinesiotaping group

		N	Average	Std. Deviation	t	p
Constant, control	First	14	66,21	13,38	-5,018	0,000
	Last	14	70,43	13,52		
Constant, kinesiotaping	First	15	63,93	8,28	-6,692	0,000
	Last	15	73,73	7,56		

Table 4: Comparison of t-test independent groups for first and last Dash t measurement comparison in control and kinesiotaping group

		N	Average	Std. Deviation	t	p
Dash -T, control Last	First	14	85,86	9,26	5,754	0,000
	Last	14	78,79	9,29		
Dash -T, kinesiotaping Last	First	15	91,73	10,52	13,837	0,000
	Last	15	77,40	10,01		

The t-test results of dependent groups for determining whether the difference between the first and last measurement averages of the Dash-T value in control and Kinesio taping group and the mean of these values are significant are given in Table 4.

According to Table 4, in the control group, the first measurement dash t is 85.86, while the last measurement is 78.79. In the dependent groups, there was a significant difference between the two means according to the t-test results ($p < 0,05$) and the final measurement average was significantly lower than the first measurement average ($p < 0,05$).

The first measurement dash t value in the Kinesio taping group is 91,73 while the final measurement value is 77,40. In the dependent groups, there was a significant difference between the two means according to the t-test results ($p < 0,05$) and the final measurement average was significantly lower than the first measurement average ($p < 0,05$).

The t-test results in the independent groups for determining the difference between the control values and the Kinesio taping groups of Dash-T values and the significance of the differences between these groups are given in Table 5.

According to Table 5, the dash t decreasing average in the Kinesio taping group is 14,33 while the control group dash t decreasing average is 7.07. There was a significant difference between the two means according to the t-test results in independent groups ($p < 0,05$), and the amount of decrease in the Kinesio taping group was significantly higher than the decrease in the control group ($p < 0,05$).

Table 5: t-test results in independent groups for comparison of dash value changes in control and Kinesio taping group

		N	Average	Std. Deviation	t	p
Dash Depending	Control	14	7,07	4,60	-4,540	0,000
	Kinesio Taping	15	14,33	4,01		

The first measurement value of extension was 39.57, while the last measurement average was 40,57; The first measurement of abduction was 127,21, while the final measurement was 130,57; The first measurement average of the flexion is 140,36; while the final measurement average is 144,57. There was a significant difference between first and last measurement averages of abduction and flexion ($p < 0,05$), while there was no significant difference between first and last measurement averages ($p > 0,05$).

In the kinesiological banding group, the first measurement value of extension was 36,87 while the final measurement average was 38,80; the first measurement of abduction was 129,33 while the last measurement was 133,13; the first measurement average of the flexion is 150,67 while the final measurement average is 153,67. Extension, abduction, and flexion differ significantly between first and last measurement averages ($p < 0,05$).

The t-test results in independent groups for determining the mean of control and kinesiological banding and the difference between these means are shown in Table 6.

The average increase in extinction value according to Table 6 is 1,93 in the Kinesio taping group while it is 1 in the control group. The average increase in the abduction was 3,80 in the Kinesio taping group and 3,36 in the control group. The increase in flexion was 3 in the Kinesio taping group

and 4,21 in the control group. In the independent groups, according to the t-test results, the increase in extension, abduction, and flexion was equal in the control and taping groups, and there was no significant difference between them ($p > 0,05$).

Table 6: t-test results in independent groups for comparison of dash t value changes in the control and Kinesio taping group

		N	Average	Std. Deviation	t	p
Extesion Increase	Control	14	1,00	5,84	-0,604	0,551
	Kinesio Taping	15	1,93	1,28		
Abduction Increase	Control	14	3,36	1,78	-0,581	0,566
	Kinesio Taping	15	3,80	2,27		
Flexion Increase	Control	14	4,21	2,97	1,095	0,283
	Kinesio Taping	15	3,00	3,00		

DISCUSSION

Although the kinesiological taping is a new application technique, which is mostly preferred in orthopedic and sports injuries rehabilitation programs, it has been started being used as an additional treatment option in the treatment of other musculoskeletal system diseases. The aim of our study was, to show the superiority of kinesiological taping regarding reducing pain, increasing the shoulder range of motion, providing increased functionality and reducing the rate of injury, compared with conventional physiotherapy methods in the patients diagnosed with the rotator cuff. When the literature was examined, it was seen that there was only a small number of studies concerning the data related to kinesiology tape and shoulder pathology. The only systematic review which was performed in this area by Fanti et al. reported that they reached ten trials, with too low methodological quality and stated that only one of those studies indicated statistically significant results [19]. Thelen et al. performed kinesiology taping and sham taping applications to 42 patients with rotator cuff tendinitis/impingement in another study. Kinesiological tape was applied to the patients twice for three days taking periods. A significant recovery in the painless range of motion was reported compared to the sham control group [20].

Findings of the current study indicate that kinesiological taping might have cause better results to reduce the pain inactivity and rest, increase the range of motion (except shoulder flexion) and increase the functionality compared to only conventional physiotherapy group. These findings might be due to the sensorimotor and proprioceptive effect mechanisms that the Kinesiological tape provides.

Similar to the current study, there are various types of taping procedures which is performed for patients with shoulder problems. Patients report pain relief, better stability, and recovery in the involved joint, just after the taping application due to the sensorimotor feedback the tape causes [21, 22]. Ankle joint proprioception is influenced by athletic taping over the skin [22].

Lack of sham taping group and a small number of patients are the main limitations of the present study. However, it is

needed to study about this type of treatment method which is increasingly being used, easy to applicate and seems to provide quick positive effects to have a better understanding about it, in a controlled design as the current study was performed.

CONCLUSION

As a result, it is considered that kinesiological tape applications might be safely added to the traditional physiotherapy and rehabilitation programs to provide a faster and more comfortable functional recovery.

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