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INVESTIGATION OF THE EFFECT OF KINESIO TAPE APPLICATION ON ATHLETES ON PERFORMANCE

SPORCULARA UYGULANAN KİNEZYO BANT UYGULAMASININ PERFORMANSA OLAN ETKİSİNİN İNCELENMESİ

Cigdem Cekmece[1*], Murat Son[2], Ilgin Sade[3]

[1]Section of Occupational Therapy, Department of Therapy and Rehabilitation, Vocational School of Kocaeli Health Services, Kocaeli University, Kocaeli, Türkiye. [2]Sports Science Faculty, Kocaeli University, Kocaeli, Türkiye. [3]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Kocaeli University, Kocaeli, Türkiye.

ABSTRACT

Objective: Kinesio taping (KT), helps athletes move more stably and safely by providing support to muscles and joints. Thus, it allows athletes to develop more strength and speed. It also supports athletes to exercise with higher performance and have a faster recovery process.

This study aims to examine the acute effect of KT applied to athletes on balance and vertical jump strength.

Methods: Tests including vertical jump/leg-back strength and balance parameters of right and left one foot and two feet were applied to 19 male athletes with a mean age of 20.5±1.6 years. After taping was applied to the gluteus maximus, medius, and quadriceps muscles of the athletes, the tests were repeated.

Results: A significant difference was found in all parameters (vertical jump strength p<0.001, leg-back strength p=0.001, right single foot balance p<0.00, left single foot balance p<0.001, and double foot balance p=0.002) in the evaluations.

Conclusion: In our study, positive developments were observed in jumping and balance parameters with the KT applied to the athletes.

Keywords: Kinesio taping, sports physiotherapy, strength training

ÖZ

Amaç: Kinesiyo bantlama (KB), kaslara ve eklemlere destek sağlayarak, sporcuların daha stabil ve güvenli bir şekilde hareket etmelerine yardımcı olmaktadır. Böylece, sporcuların daha fazla kuvvet ve hız geliştirmelerine olanak tanımaktadır. Ayrıca sporcuların daha yüksek performansla egzersiz yapmalarını ve daha hızlı bir iyileşme sürecine sahip olmalarını desteklemektedir. Bu çalışmanın amacı; sporculara uygulanan KB'nin denge ve dikey sıçrama kuvvetine olan akut etkisini incelemektir.

Yöntem: Yaş ortalaması 20,5±1,6 olan 19 erkek sporcuya bantlama öncesi; dikey sıçrama/ bacak-sırt kuvveti ile sağ ve sol tek ayak ve çift ayak denge parametrelerini içeren testler uygulandı. Bantlama, sporcuların gluteus maksimus, medius ve kuadriseps kaslarına yapıldıktan sonra testler tekrarlandı.

Bulgular: Değerlendirmelerde bakılan tüm parametrelerde (dikey sıçrama kuvveti p<0,001, bacak-sırt kuvveti p=0,001, sağ tek ayak denge p<0,001, sol tek ayak denge p<0,001 ve çift ayak denge p=0,002) anlamlı fark elde edildi.

Sonuç: Çalışmamızda sporculara uygulanan KB ile sıçrama ve denge parametrelerinde olumlu gelişmeler olduğu gözlenmiştir.

Anahtar Kelimeler: Kinezyo bantlama, spor fizyoterapisi, kuvvet antremanı

***Corresponding author/İletişim kurulacak yazar:** Cigdem Cekmece; Section of Occupational Therapy, Department of Therapy and Rehabilitation, Vocational School of Kocaeli Health Services, Kocaeli University, Kocaeli, Türkiye.
Phone/Telefon: +90 (262) 303 47 75 **e-mail/e-posta:** cigdemcekmece@yahoo.com
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Introduction

Sporting performance can be defined as the sum of efforts put forth for success during the performance of an athletic task.[1,2] In the field of sports sciences, many studies are carried out to increase performance. These studies aim to enable individuals to achieve better results by completing the given tasks with fewer mistakes and more efficiency.[3] Individuals who are interested in professional or amateur sports are in a constant search to improve their performance and to be more agile, strong, fast, and equipped. Technological developments and physical training in the equipment used in the field of sports can largely meet this demand for performance enhancement in modern sports. However, the search for athletes to increase their sportive performance continues.

Kinesio taping (KT), is considered advantageous in mechanical properties compared to other types of taping that lose their structural support within 20 minutes of exercise.[4] Considering the mechanism of action, it is stated that KT improves proprioceptive sensation through muscle tone, reduces pain, corrects inappropriate positions, and stimulates skin receptors.[5] In addition to many functions, its main aim is to support the joint during movement.[6] It has been reported in the literature that tape application helps to increase proprioceptive sensation and thus reduces the occurrence of motion-related injuries.[6-9] For these reasons, KT is widely used in the rehabilitation of athletes due to the prevention of sports-related injuries, the treatment of these injuries, and its positive contribution to sports performance.[6,10,11] In addition, it is stated that the application of KT can improve the explosive power of the muscle by providing increased sensory input to the neuromuscular system and increasing the activation of the sensorimotor reflex pathway.[12]

The ability to perform a vertical jump is more closely related to strength than any other factors. Most activities that require explosive vertical movements involve a counter-movement pattern, where the muscles are initially contracted and then rapidly shortened to generate acceleration in the body or limbs.[13] The gluteus maximus muscle (GMax) is the most basic mover during a vertical jump.[14,15] In gymnastics sport, besides vertical jump strength, the effect of balance parameters is quite large. Balance is defined as the coordinated working process of the neuromuscular system, which includes the preservation of the center of gravity with continuous feedback from the visual, vestibular, and nervous senses.[16] Balance performance is closely related to a person's muscle tone, muscle strength, and muscular endurance.[17] Hip, knee, and ankle joint movements controlled by coordinated movements along the kinetic chain are important in maintaining balance. In terms of muscular activity, it is stated that the stronger the Hamstring, Quadriceps, GMax, and Gluteus minimus muscles, the easier it will be to stay in balance.[18]

When the current literature is examined, it is seen that KT applied to athletes is done to 1. prevent or reduce sports injuries,[19-21] 2. to contribute to performance.[22-24] When the studies investigating the contribution of KT to performance in athletes are examined, it is seen that publications are related the positive effects of the application.[22-24] In this study, it is aimed to examine the effect of KT applied to the gluteal muscles on the performance (by scanning the recorded data) of volunteer individuals who are students at the Faculty of Sports Sciences of our university and are interested in artistic gymnastics sports to increase their performance in competitions.

Methods

A total of 19 male gymnasts, who were healthy, actively engaged in sports, with a mean age of 20.5±1.6 years, voluntarily participated in the study. After receiving the demographic information of the athletes before taping: Tests including vertical jump strength, leg-back strength, right, and left single-foot balance, and double-foot balance parameters were applied. All these tests were repeated twenty minutes after taping to the appropriate muscles. Those who were allergic to the KT application and those who refused the application were excluded from the study. Moreover, those who had a musculoskeletal injury in the 6 weeks before the study, those who had a medical condition or pathology (fracture or tendon injury) that could have caused a disability in the previous 6 months, and those who had an allergic reaction to the tape were excluded from this study. In order to understand whether there is a KT allergy, a 5x5 cm wide KT piece was glued to the back area and tested before the study. Two athletes who developed allergic reactions were excluded from the study, and one athlete was excluded since he did not agree to participate in the study.

Vertical Jump Strength Test

The vertical jump test is a practical test that gives information about the anaerobic power level of the individual. Jump meters were used in the vertical jump test. The belt was tied at the athlete's belly button. Meanwhile, the athlete stands on the exercise mat. When the arms are free and ready to jump, they sit with their legs parallel to the ground by bending their knees, and the free arms are pulled back and then to the body, jumping forward and upwards with acceleration and falling back onto the mat, the value displayed on the screen was recorded in centimeters.[25]

Back/Leg Strength Measurement

Leg back strength measurement was made using Takei Back and Leg Dynamometer. It was done by asking the athlete to stand on the dynamometer bench with his knees slightly bent and pull the dynamometer bar with maximum force upwards using his legs, with his arms stretched out.[26]

Balance Measurements (Right and Left Single Foot Balance, Double Foot Balance)

Balance measurements were made with an Easy-Tech balance measurement board. Measurements were made by repeating the right foot 3 times, the left foot 3 times, and both feet 3 times and each repetition was 30 seconds. Performance values of 30 seconds taken from the right, left and both feet were recorded. In these measurements, an increase in numerical values for balance means a decrease in the level of balance. Because each numerical increase in the measurement shows each balance deviation within 30 seconds. Before the test started, the participants in our study were informed about the evaluation we would make, and they were told to get on the balance board. First, one leg (right, left) and then both legs were tested 3 times for 30 seconds.[27]

This study was approved by the Clinical Research Ethics Committee with the decision numbered KU GOKAEK-2021/09.18.

KT Application

Before the application, the area where the tape will be adhered was cleaned by shaving. The GMax, gluteus medius (GMed), and quadriceps muscles to be taped were placed in the longest position and tension was given. While taping the GMax, the hip was positioned at a 90-degree flexion angle (Figure 1). The GMed was placed in the side-lying position and the hyperadduction position was given to provide full stretch and taping was performed (Figure 2). For the quadriceps muscle, the knee flexion angle was brought to 90 degrees and KT was applied (Figure 3). All taping was applied from the origin to the insertion with 50% tension to increase performance. Afterward, the athletes rested for 20 minutes. At the end of this period, the initial tests were performed again. KT application was performed by a certified physiotherapist.

Figure 1. Gluteus Max. KT

Figure 2. Gluteus Med. KT

Figure 3. Quadriceps Femoris KT

Statistical Analysis

Statistical analysis was performed with IBM SPSS 20.0 (IBM Corp, Armonk, NY, USA) package program. Descriptive statistics for all variables are shown as Mean ± Standard Deviation. Wilcoxon test was used to determine whether the difference between the evaluation parameters before and after the KT application was significant. In the statistical analysis of the measurements, the level of significance was used as 0.05.

Results

Age, height, weight, body mass index, and lower, and upper extremity length averages of the athletes included in the study are given in Table 1. The results of the comparison between the athletes before and after taping are vertical jump strength $p<0.001$, leg-back strength $p=0.001$, right one-foot balance $p<0.001$, left one-foot balance $p<0.001$, and double foot balance $p=0.002$. When the data obtained before and after banding were compared, it was determined that there was a statistically significant difference in all parameters (Table 2).

Table 1. Demographic information of the athletes

Height Average (cm)	169.1±37.5
Weight (kg)	70.0±9.3
Body mass index (kg/m^2)	22.25±4.9
LE Length (cm)	92.1±8.7
UE Length (cm)	77.6±3.3

Table 2. Average data before and after taping

	Before taping	**After taping**	**p**
Vertical jump (cm)	48.06±7.04	53.68±7.68	<0.001
Leg back strength (kg)	119.78±23.44	135.73±23.06	0.001
Balance right foot average	4.74±1.18	3.31±0.86	<0.001
Balance left foot average	4.30±1.20	3.17±0.88	<0.001
Balance double foot average	6.91±2.64	4.94±3.06	0.002

Discussion

KT is used by physiotherapists to modulate some physiological processes as a supportive method in rehabilitation. In this study, the acute effect of the KT technique applied to the hip and knee circumference of healthy athletes on the performance values of the athletes was investigated. The results of the study: The acute effect of KT applied to the hip and knee circumference muscles in healthy athletes was examined and it was revealed that the KT technique applied had a significant effect on performance values. The main finding of the study was that KT improves short-term muscle strength of the GMax, GMed, and Quadriceps muscles after administration in athletes. The result obtained from the study suggests that the KT application can provide a significant improvement in performance in certain sports. The findings in the literature regarding the effects of taping such as increasing somatosensory information, providing correct positional input, and increasing muscle activation are in line with our study.[5,6]
Since KT was first used in sports, there has been increasing interest due to its wide range of applications. Its creator, Kenzo Kase, believed that the use of tape could relieve pain by stimulating the nervous system, strengthening the muscles, reducing edema, and subcutaneous hemorrhages, and affecting the proper alignment of the joints, thus promoting its use in the field of sports. In recent years, KT, prophylaxis in sports such as swimming, football, handball, volleyball, baseball, or tennis has become an important part of manual therapy and rehabilitation. In sports such as handball and football, speed and muscle strength are considered the basic elements of the game tactic. In the study conducted by Müller and Brandes,[28] which aimed to evaluate the effect of KT application on shooting in football and handball, it has been noted that there is a significant improvement in the ball speed of the players' shots after applying KT. This can be explained by the proprioceptive effect of KT on the athlete's body, which can cause an increase in motor units that contribute to muscle tone.[28] Proprioception, which is defined as position and movement perception, is related to joint position sense, kinesthesia, force sense, and vibration, and has a positive contribution to the performance of athletes.
Studies on KT applications in the literature have been applied for different purposes. Conflicting results have been reported in studies investigating the effects of taping techniques applied to different areas on parameters such as muscular activity and strength. When the studies carried out to determine the changes in muscular activity after KT application are examined, Murray[29] found in their study with 2 patients who were treated after anterior cruciate ligament surgery, that there was an increase in the range of motion and EMG activity of the subjects after KT application.
When the studies evaluating the changes in the strength parameters after the KT application with different application times are examined, as a result of the study conducted by Slupik et al.[5] on 27 healthy individuals, they found that there was no significant change in the isokinetic power values after 10 minutes of KT application, but there was a significant increase 24 hours after the application.[5] In another study, Fu et al.[24] in their study on 14 healthy athletes, looked at whether KT application had any effect on quadriceps and hamstring muscle strength. They found no significant difference in muscle strength in the evaluations made without taping, immediately after taping, and 12 hours after taping, and they reported that KT had no effect on the isokinetic quadriceps and hamstring muscle strength of healthy athletes.[24]
Another study similar to our study was conducted by B Pearce et al.[30] In the study, KT applied to the GMed of 29 amateur golf players and showed that KT applied to the GMed successfully improved hip abduction strength. Researchers in the same study stated that it may be beneficial to use the KT application to improve performance in athletes to facilitate muscle movement.[30]
In a randomized controlled study examining the effect of KT on the explosive muscle strength of the GMax in male athletes, Karien Mostert-Wentzel et al.[11] taped 60 male athletes, when they compared the data before, immediately after, and after 30 minutes, they achieved a statistically significant improvement. Researchers stated that KT was effective in significantly improving the explosive power of the GMax in male athletes immediately after taping and 30 minutes later [11].
In our study, the acute effect of KT applied to the muscles around the hip and knee was examined. According to the results obtained from the study, it was observed that KT application in healthy athletes increased performance and participation in training in individuals. The main limitations of this study are, the absence of a control group and the long-term effects of KT were not followed. Although it is not possible to generalize these positive results obtained from the study, larger scaled randomized controlled studies are needed.

Compliance with Ethical Standards
Thes study was carried out after obtaining the necessary ethics committee permission and institutional approval of Kocaeli University Non-Interventional Clinical Research Ethics Committee with the decision number KÜ GOKAEK-2021/09.18 dated 29/04/2021.

Conflict of Interest
The authors declare that they have no conflict of interest.

Author Contribution
CC, IS, MS: The hypothesis of the study; CC, IS, MS: The Study desing; CC, IS: Project development; CC, IS, MS: Literature search; CC, IS: Analysis; CC, IS, MS: Manuscript writing; CC, IS: Critical review.

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