EFFECTS OF KINESIO TAPING ON ANAEROBIC POWER AND CAPACITY RESULTS

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ABSTRACT

Background: Kinesio taping is a therapeutic method used by physiotherapists during musculoskeletal and neuromuscular disorders. Efficacy of the kinesio taping implementation on sport performance is inconsistent. **Research question:** The purpose of this study was to determine the effects of kinesio taping on 30 second-repeated jump power, wingate anaerobic power and wingate anaerobic capacity results. **Type of study:** Randomised controlled study. **Methods:** 31 healthy male athletes volunteered to participate in this study. The subjects were randomly assigned to one of two groups: a kinesio taping group (16 subjects; $\overline{X}$ age: 21,87±2,02 years) and a without kinesio taping group (15 subjects; $\overline{X}$ age: 21,66±1,67 years). The Kinesio taping group was taped with a Y-shaped kinesio tape at the quadriceps muscles according to the Kenzo Kase's Kinesio taping manual. **Results:** A dependent t test was used to compare the anaerobic power and capacity measurements before and after the kinesio taping application. No significant differences were found for absolute wingate anaerobic power, relative wingate anaerobic power, absolute wingate anaerobic capacity, relative wingate anaerobic capacity and 30 second-repeated jump power outputs after the kinesio taping application ($p>0,05$). **Key Words:** Kinesio tape, wingate anaerobic test, 30 second-repeated jump test.

INTRODUCTION

In 1996, Kenzo Kase implemented the first Kinesio taping as a new taping application[1]. Compared with the traditional tape, kinezio tape can be extended 140% of its original length[1,2].

Kinesio taping is a therapeutic method that is used in the treatment of musculoskeletal and neuromuscular disorders[3] and the prevention of sports injuries[4,5]. It can be applied for reducing pain[1,2] and to support joints and muscles[2,6,7]. Furthermore, Kinesio taping is accepted by physiotherapists as a method to support rehabilitation and selected physiological processes[8]. The physiological effects of kinesio taping consist of enhancing the activity of the lymphatic system, improving microcirculation, and regulating the nervous system[8,9].

The main function of kinesio taping is to provide protection and to support the muscle and joint during movement[4]. To support muscle function is extremely important for athletes who often require additional interventions before a competition[8]. The Kinesio tape may play important role in increasing the stability of extremities, supporting and protecting the joint, and correcting the body alignment, in order to promote sensor motor function[10,11,12]. The Kinesio tape application can also cause proprioceptive stimulation such as the enhancement of improved joint range of motion, and thigh muscle function, during exercise[10,13]. But, studies examining the efficacy of the kinesio taping application on sport performance are inconsistent. For this reason, the purpose of this study was to determine the effects of kinesio taping on 30 second-repeated jump power, wingate anaerobic power and wingate anaerobic capacity results.

METHODS

Subjects: 31 healthy, male athletes volunteered to participate in this study. The subjects were randomly assigned to either a kinesio taping group (KT) (16 subjects; $\overline{X}$ age: 21,87±2,02 years) or without kinesio taping group (WKT) (15 subjects; $\overline{X}$ age: 21,66±1,67 years). Subjects were informed about the study and signed informed consent form. Before the data were collected, participant were familiarized with test procedures. The study was approved by the local Ethics Committee.

Collection of Data:

Firstly, all subjects were informed in detail about the all measurement procedures. Prior to the start of the study, the subjects were randomly divided into two groups, a kinesio taping group and without taping group. Performance measurements of the subjects were performed before and after the taping periods. Each subject visits the laboratory 4 times. The first visit consisted of the wingate anaerobic power and capacity testing trials

and the second visit performed one day later and consisted of 30 sec. repetitive vertical jumping testing trials. After the 1 and 2 days later of the second visit, Y-shape kinesio tape was applied for each quadriceps muscles according to Kenzo Kase's kinesio tape manual. The subjects were laying in the supine position with the knee flexed at ~60^{o}. The tape was started at 10 cm inferior to the anterior superior iliac spine, divided into two equal parts from quadric femoris tendon and ended at turning around the patella[1]. There was no tape applied to control group. After the taping periods, subjects visit the laboratory to perform wingate anaerobic power and capacity and 30 sec. repetitive vertical jumping testing trials one day apart.

Wingate Test

Anaerobic power output was measured by 30-second wingate anaerobic test (Monark 894 E Peak Bike, Sweden). Wingate test consists of 30 seconds cycle pedaling as fast as possible against a specific external resistance. Prior to the wingate test, 5 minutes warm-up durations at pace of 60-70 RPM were applied, respectively. 5 minutes passive recovery was applied after each warm-up durations. Seat and handlebar adjustment is made for each subject. The test was started after the external resistance applied was equivalent to 7.5 % of each subject's body mass. Subjects were asked to reach a maximal pace of unloaded sprinting as fast as possible. When the pedal speed reaches 150 rev / min, the weight basket automatically fell down and the test was started. The subjects were instructed to pedal as fast as possible from the onset of the test. The subjects were encouraged verbally during the test. Knowledge of the power parameters during the test transferred to computer software program via RS 232 connection. All the power parameters were calculated by the software program.

Repetitive Vertical Jumping Test

30 sec. repetitive vertical jumping test was measured on the force platform (Newtest Powertimer, Finland). Before the test starts, subjects were administered a 10-minute fixed warm-up protocol. All participants performed knee flexion up to 110° angle, having it justified by an optimum angle for the application of strength[14]. All participants were instructed to perform continuous vertical jumps during a work performed at maximal effort with no pause between jumps. Subjects asked to keep their trunk in a vertical position with no excessive forward move. 30 sec. repetitive vertical jumping test was performed according to the Bosco method[15].

Analysis of Data: Descriptive statistics for all variables were expressed as mean ± SD in the table. A dependent t test was used to determine wingate anaerobic power and capacity and 30 sec. repetitive vertical jump power differences before and after the kinesio taping application. Statistical analysis of the measurements was performed by using SPSS 15.0 for Windows and $P<0.05$ was used to determine statistical significance.

RESULTS

The descriptive characteristics of the subjects are presented in table 1. The mean age, stature and body mass of the kinesiotape group (KT) were 21.87 (2.02) years, 177.66 (8.99) cm., 77.03 (11.98) kg. and without kinesio tape group (WKT) were 21.66 (1.67) years, 184.86 (9.46) cm., 85.88 (15.89) kg., respectively (See Table 1).

Anaerobic power and capacity results of the subjects before and after the kinesio taping application are presented in table 2. A dependent T test was used to determine whether there is a significant performance differences in before and after the kinesio taping application.

Test results show that no significant differences were found for 30 sec. repetitive vertical jump power, relative wingate anaerobic power, relative wingate anaerobic capacity, absolute wingate anaerobic power and absolute wingate anaerobic capacity after the kinesio taping application ($p<0,05$) (Table 2).

DISCUSSION

The results of this study demonstrate that kinesio taping application produced no significant improvements in 30 sec. repetitive vertical jump power, absolute wingate anaerobic power, absolute wingate anaerobic capacity, relative wingate anaerobic power and relative wingate anaerobic capacity of the subjects. However, all the power values of the kinesio tape group showed a small improvement after the kinesio taping implementation. Effects of kinesio taping implementation on muscle performance are inconsistent among previous studies. Some studies reported that kinesio tape has significant effect on muscle performance[4,8,16,17] while others did not[18,19,20,21,22]. This discrepancy might be explained by characteristics of the sample, shape of taping technique used, applied to body region and implementation duration of the tape.

The studies assessing the effect of kinesio tape implementation on muscle performance with regard to duration of muscle taping produce different results. Slupik et

al.[8] examined the effect of kinesio taping implementation on bioelectrical activity of vastus medialis muscle during isokinetic contractions following 24 h and 72 h of kinesio taping implementation and 48 h following removal of tape. The results showed significant increases in bioelectric activity of the vastus medialis following 24 h and 72 h of kinesio taping and maintenance of this effect for 48 h following removal of the kinesio tape implementation. Although there was a significant increase in the bioelectric activity of the muscle in a part of the EMG study, the increase in the bioelectrical activity of muscle may not expressed in force output to change the muscle strength[23,24]. Contrary to this view, Fu et al.[1] examined the effect of kinesio taping on muscle strength of healthy athletes. They stated that no significant change in muscle strength was found immediately after taping and 12 hours after taping. In addition, some studies also reported that kinesio tape does no effect on muscle excitability[11,21,23,25]. Besides, it is stated the elasticity of athletic tapes may decrease by sports activities and can loses much of its function after about 20 min of exercise[16]. As a result, it can be expressed that the effect of kinesio tape on muscle contractibility can be reduced by increasing with exercise duration.

Another important issue in determining the effects of the kinesio tape on muscle performance is applied to the body region and shape of the tape. Several bandage implication techniques can be used in patients and athletes according to direction and structure of the muscle. The most common configurations are X, Y and I-shape kinesio tape implementation methods[26]. Despite the efficiency of different shape of kinesio tape are varied depending on the body region and muscle structure, Yoshida and Kahanov[27] stated that Y- shape kinesio tape implementation method provide large exposure to taping and stimulating a great number of cutaneous mechanoreceptors. On the other hand; body region where the kinesio tape was applied may also an important factor in the effectiveness of kinesio tape. The effect of the taping techniques applied to different parts of the body on muscle performance can be different. For example, Huang et al.[10] was investigated the effect of elastic taping applied to triceps surae muscle on maximal vertical jump and failed to report a significant changes in vertical jump height. On the contrary, Mostert-Wentzel[16] was found significant change in counter-movement jump height after the kinesio tape implementation applied to gluteus maximus muscle. There is widespread belief that ankle, knee and hip muscles are quite effective during vertical jump movement[28]. However, there isn't consensus among researchers regarding which muscle to be more effective during the vertical jump. Similar to reported by Huang et al.[10] we didn't found a significant change in

30 sec. repetitive vertical jump power after the kinesio taping application. Therefore, additional studies should be applied to incorporate ankle, knee and hip muscle groups.

Characteristics of the sample may be one of the important factors to determine the effect of the kinesio tape implementation on muscle performance. Our study sample was consisted of athletes who compete in various sports that require high power and strength skills and their muscle functions were very high. Impact of the kinesio tape implementation on athletes' muscle performance may be less than nonathletes. Similary, Nunes et al.[22] stated that muscle functions of the elite athletes are already close to the maximum limits so possible gains achieved by the kinesio tape implementation were not significant. Furthermore, they suggested kinesio tape could have a more significant influence on nonathletes with weak strength.

There are some limitations to this study. Lack of randomization is a factor that weakens the power of this study. We applied kinesio tape a minimum of 30 minutes prior to the start of the test. The effects of kinesio tape application with different time periods can be investigated in a similar sample group.

As a result, our findings indicated that there was no significant change in anaerobic power and capacity results. But all values of jump height showed a trend of minor improvement after the kinesio tape implementation. A small improvement on muscle performance may be even an important factor for an elite athlete to gain a medal. This research study can be conducted by both athletes and nonathletes groups so as to determine the effect of the kinesio tape implementation in collaboration with workout levels on muscle performance.

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Tablo 1: Physical characteristics of subjects.

	Kinesiotape Group		Without Kinesiotape Group	
Variables	**Mean**	**SD (±)**	**Mean**	**SD (±)**
Age (years)	21,87	2,02	21,66	1,67
Stature (cm)	177,66	8,99	184,86	9,46
Body mass (kg)	77,03	11,98	85,88	15,89

Tablo 2: Anaerobic power and capacity results of the subjects before and after the kinesio tape application.

Variables	**Pretest (X±Sd)**	**Posttest (X±Sd)**	**t**
Kinesio Taping Group (KT)			
Absolute Wingate Anaerobic power (Watt)	842,42±127,91	856,29±114,90	-0,971
Relative Wingate Anaerobic power (Watt/kg)	11,01±1,06	11,20±0,95	-1,136
Absolute Wingate Anaerobic capacity (Watt)	607,92±85,16	616,64±89,19	-2,080
Relative Wingate Anaerobic capacity (Watt/kg)	7,94±0,59	8,05±0,59	-1,905
30 second-repeated jump power (Watt)	2529,80±694,66	2623,39±498,98	-0,446
Without Kinesio Taping Group (WKT)			
Absolute Wingate Anaerobic power (Watt)	886,79±95,80	917,10±121,11	-2,104
Relative Wingate Anaerobic power (Watt/kg)	10,51±1,31	10,79±1,10	-1,397
Absolute Wingate Anaerobic capacity (Watt)	635,27±65,50	632,52±60,84	0,280
Relative Wingate Anaerobic capacity (Watt/kg)	7,54±1,01	7,48±0,89	0,497
30 second-repeated jump power (Watt)	2863,43±619,42	2909,02±637,11	-0,322

P<0,05*

Figure 1 Kinesio taping application.