

EFFECT OF EXERCISE AND KINESIO TAPING ON ENDURANCE AND JOINT MOVEMENT ANGLE IN ADULT WOMEN

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ABSTRACT

Objectives: The aim of this study was to investigate the effects of exercise and kinesio taping on endurance and joint angle of motion applied to women who are new to sports.

Methods: This study was carried out in the Çorum city. A total of 20 sedentary women with a mean age of 48 ± 6.11 , 10 subjects and 10 controls, voluntarily participated in the study. While the participants in the subject group were exercising with the application of kinesio tape, the control group was exercised with the same content as the subject group.

Results: When we consider the results of the statistical analysis, although the effects of exercise and kinesio taping on the body weight and body mass index (BMI) values of the participant groups, there was no significant difference between the pre-test and post-test values ($p > 0.05$). Besides, a significant difference was found between the right and left foot flat leg lifting test (FFLT) values and the static balance (SB) and dynamic balance (DB) values before and after the subject and control groups ($p < 0.05$).

Conclusion: The application of kinesio tape applied with sedentary women together with the exercise was found to be more effective than the muscle endurance and angle of motion of the exercise group only. It can be said according to the results of this study that kinesio taping, which will be applied alongside exercise, may have positive effects on individuals' performances.

Keywords: muscle endurance, movement angle, Kinesio tape, exercise.

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Introduction

Today, one of the biggest problems of societies is that physical inactivity reaches high levels day by day. With the development of technology, while everyday life has become easier, sedentary life has become increasingly common^(1,2). Sedentary lifestyle causes obesity in women. Obesity increases the negative effects of the menopause period⁽³⁾. Also, the sedentary lifestyle increases the risk of developing conditions such as diabetes, metabolic syndrome and hypertension at an advanced age⁽⁴⁾. One of the most important indicators of physical activity level

and physical fitness is endurance⁽⁵⁾. Individuals with weak muscle endurance cannot continue any work for a long time⁽⁶⁾. In body muscles that are weak in endurance, long-term or repeated loads cause muscle fatigue. This causes difficulties in structures such as ligaments and tendons that form the joint, and injuries and injuries with reduced support to the spine⁽⁷⁾.

Joint range of motion (JRM) is the arc of motion created by one or more joints together⁽⁸⁾. The amount of JRM is directly proportional to the rate of performing daily living activities and the individual's level of functionality.

In clinical and scientific studies, measurement methods such as tape measure, manual goniometer, electrogoniometer, and motion analysis systems that can evaluate kinematic data are used to determine JRM⁽⁹⁾.

Kinesio taping technique is used in both healthy and various ailments thanks to the application of an elastic band that adheres to the skin in harmony with the natural structure and elasticity of the skin without any limiting effect on joint motion⁽⁹⁾. Overuse of a muscle or an injury involving that muscle causes deformations in the elastic structure of the muscle. Kinesio tapes have a structure that is compatible with the elastic tissue of the muscle as a structure, and it adheres to the skin with its adhesive feature, allowing the tissue to rise in the air. Thus, it is reported that there is an intense flow of blood and lymph under the skin that leaves the air^(10,11).

When examined in the literature, kinesio taping method; it is found that by supporting muscle tissue, it improves muscle strength, increases joint stabilization and range of motion^(12,13).

In this study, we aimed to see the possible effects of exercise and kinesio taping on endurance and range of motion in sedentary women.

Materials and methods

Participants

This study was carried out on sedentary women who enrolled in Çorum Municipality Sports Gyms for the first time. A total of 20 women, 10 subjects and 10 control groups, voluntarily participated in the study for 4 weeks. The groups were randomly selected, all women were informed before the study and the voluntary consent form was signed. Kinesio tape application and exercise were applied to the women in the subject group at the same time. The control group only participated in the exercises. After taking the anthropometric measurements (height, weight, body mass index) of the participants, individuals were applied hip flexion joint motion angle measurement, static and dynamic endurance test in the straight leg lifting position.

The present study was approved by the Research Ethics Committee of the Hitit University of Medical Science and All procedures performed in this study on human participants were in accordance with the ethical standards of the institution and the national research committee, as well as with the 1964 Helsinki declaration and its later amendments and comparable ethical standards.

Exercise protocol

Step Aerobics, Pilates and Static Stretching Exercises were applied to all women participating in the study for 4 weeks. Aerobic exercise was applied 2 days a week, 45 minutes in total, with a moderate intensity. Pilates Exercise was applied once a week, 30 minutes in total. Stretching Exercise was applied 3 days a week for 5-10 minutes after Aerobic and Pilates exercises.

Kinesio Taping: Kinesio tape application was applied to 10 subjects in the subject group, 2 days a week for 4 weeks. Kinesio tapes are 20 cm. length and 5 cm. widely glued in the form of I tape according to the muscle technique. Kinesio tapes were applied to the subject group before the exercises when the application area was dry and clean.

Hip Joint Flexion Angle: In the flat leg lift test (FLLT) position, individuals were asked to raise their right legs first and then their left legs to the maximum level by lying on their back on a flat ground and the values observed were measured in degrees before and after the study.

Static Muscular Force and Endurance Test: While the knees were bent in the supine position, the scapula was asked to rise forward enough to lift the lower angle and the individual was asked to maintain this angle for 30 seconds. When the individual breaks the angle, the stopwatch is stopped and the time is recorded in the recording schedule in seconds (sec).

Dynamic Muscular Force and Endurance Test: It is requested from the supine position to lift forward from the back of the scapula to get up from the ground and return to the supine position. Making these two movements complete is recorded as 1 repetition number (ts). The number of repetitions of the patient within 30 seconds is recorded on the recording schedule.

Statistical Methods

Obtained data were analyzed using SPSS Statistics (Version 21; IBM, Armonk, NY, USA). Descriptive statistical data were presented by taking the arithmetic mean (\bar{x}) and standard deviation (SD) values. Shapiro Wilk test was performed to determine whether the data showed normal distribution. Since the data did not show normal distribution, Wilcoxon Signed Rank test protocol was used to compare the pre-test averages before and after the kinesio tape application, using the one-way Anova test protocol to compare the post-test averages. In statistical analysis, significance level was accepted as $p < 0.05$.

Results

The comparison of the experimental and control groups before and after the application data is presented in Table 1 and Table 2

Variable	Group	Pre-test	Post-test	z	p
		X ± SD	X ± SD		
Body Weight (kg)	Experimental	80,80 ± 10,07	80,50 ± 9,90	-1,000	0,31
	Control	81,80 ± 10,67	81,20 ± 10,07	-1,414	0,15
BMI	Experimental	31,11 ± 4,19	31,00 ± 4,16	-,943	0,34
	Control	32,66 ± 4,52	32,41 ± 4,18	-1,483	0,13

Table 1: Comparison of Physical parameters before and after application of control and experimental group.

Variable	Group	Pre-test	Post-test	z	p
		X ± SD	X ± SD		
FLLT Right (°)	Experimental	76,10 ± 9,74	86,70 ± 14,4	-2,403	0,01
	Control	73,10 ± 13,58	85,55 ± 18,4	-2,299	0,02
FLLT Left (°)	Experimental	65,10 ± 12,76	79,75 ± 15,7	-2,395	0,01
	Control	67,10 ± 13,88	79,10 ± 11,9	-2,705	0,00
SE (sn)	Experimental	5,30 ± 1,16	12,00 ± 2,10	-2,816	0,00
	Control	4,30 ± 1,76	9,20 ± 1,87	-2,821	0,00
DE (Rpt.)	Experimental	8,00 ± 1,88	12,10 ± 1,44	-2,809	0,00
	Control	4,80 ± 1,75	9,90 ± 1,91	-2,840	0,00

Table 2: Comparison of the control and experimental group parameters before and after application.

According to the results of statistical analysis, although there was a positive decrease in body weight and BMI pre and post-test averages in the experimental and control groups, there was no statistically significant difference between the pretest and post test values of the groups ($p > 0.05$).

There was a significant difference between the experimental and control groups in terms of the FLLT right, FLLT left, Static Endurance and Dynamic Endurance pretest and posttest mean ($p < 0.05$).

Discussion

It has been shown in studies that the muscles in our body perform their functions in the best way and have a good muscle endurance depends on strong muscles⁽¹⁴⁾. When the literature is examined, many researchers emphasize that pilates exercises have positive effects on muscle endurance⁽¹⁵⁾. In a study conducted with a 50 person aged 25-65 years, Kloubec et al. formed two groups, and stated that pilates exercises, which they applied to the experimental group, for a total of 12 weeks, 2 days a week, improved body composition and also increased muscular endurance⁽¹⁶⁾. In a study conducted by Katayifçi et al. with 35 healthy participants between the ages of 20-50, individuals underwent pilates exercises for 45-60 minutes under the control of a specialist physiotherapist, 3 days a week for a total of 8 weeks. Body composition, muscle strength, flexibility, cardiovascular endurance, muscular endurance and balance measurements were made. They reported that there was a statistically significant increase in muscle

endurance, immediately after pilates exercise, and at 6th and 12th week measurements⁽¹⁷⁾. In another study performed in tennis players, it was observed that 6-week pilates exercises increased significantly in the service speed and abdominal muscle endurance of tennis players⁽¹⁸⁾.

Studies on kinesio banding show that there is an increase in the endurance of the kinesio band applied to the abdominal muscles and abdominal muscle strength⁽¹⁹⁾. Alkan and Yakut reported that kinesio banding applied to the abdominal muscles and back extensor muscles increased the trunk muscle endurance and joint range of motion in a study of disabled table tennis athletes⁽²⁰⁾. In a study conducted by Osorio et al., on different banding techniques, they reported that the kinesio banding technique and endurance of the kinesio banding were significantly significant in individuals with patellofemoral pain⁽²¹⁾. Demirci divided 16 adult muscle patients aged 21-46 into two groups; A program consisting of trunk stabilization and strengthening exercises was applied to one group 3 days a week for 8 weeks, while kinesyolgic banding was applied to the other group. A statistically significant increase was observed in all muscle strengths of the stabilization + banding group; There was also a significant improvement in upper extremity endurance evaluation in both groups⁽²²⁾.

In our study, it was seen that the effects of the exercises applied on static and dynamic endurance caused a significant increase in both groups, while the subject group values with kinesio taping together with the exercise were significantly higher in terms of static and dynamic endurance compared to the control group exercising only. In this regard, our study gave similar results with the literature. It has been proven by the studies conducted that reductions in physical activity have serious health consequences. Flexibility properties of the muscles cannot be preserved and consequently decreases in the range of motion of the joint⁽²³⁾. In the review made by Lange et al., about pilates exercises, they stated that pilates exercises significantly increased flexibility and range of motion⁽²⁴⁾. In a study conducted by Karakaş in sedentary women between the ages of 30-60, the pilates exercises found a statistically significant increase in their range of motion⁽²⁵⁾. Studies have reported that exercises to increase range of motion and stretch shortened muscles increase mobility in the lumbar region and lower extremity⁽²⁶⁾.

It is reported that kinesio banding application increases the active joint motion by stimulating the kuteuousmechanoresuppers together with the physiological changes in the myofascial tissue in the relevant region⁽²⁷⁾. In a study in which kinesio band was applied to lumbal extensor muscles, it was

shown that the range of motion was increased and had positive effects on quality of life⁽¹⁹⁾. Yılmaz et al. Showed that there was a statistically significant increase in shoulder abduction, adduction, flexion, extension active shoulder joint range of motion of the kinesio band application applied to the deltoid and latissimus dorsi muscles of 20 athletes between the ages of 18-26⁽²⁸⁾. In our study, it was observed that the effects of the exercises on hip joint range of motion caused a significant increase in both groups, while the group in which kinesio taping was performed with exercise was significantly higher in terms of joint range of motion than the exercise group alone.

Conclusion

In our study, muscle endurance and range of motion values increased significantly in both groups. However, when the subject group was compared with the control group, a statistically significant difference was found in the subject group. We believe that this difference makes the muscle function more efficiently thanks to the afferent inputs provided by the kinesio band applied to the participants, and the stimulation of the band to the muscles. We think that this is accompanied by increased blood flow and lymph flow in the muscles that are biomechanically difficult with the application of kinesio band, and increased fascia circulation.

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