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CHRONIC EFFECT OF DYNAMIC AND STATIC CORE TRAINING ON TAEKWONDO BANDAL-TCHAGUI KICK FATIGUE[i]

Ömer Faruk Bulak[ii],
Mustafa Özdal
Gaziantep University,
Faculty of Sport Science, Physical Education and Sport Science,
Gaziantep, Turkey

Abstract:
In our study, the effect of dynamic and static core training on taekwondo Bandal-Tchagui kick fatigue was investigated. For this purpose, 21 athletes participated in the study and they were divided into two as dynamic and static core groups. Both groups participated in the core training program for 6 weeks and fatigue was determined by measuring the kick impact pressure one day before and after the program. As a result of the data obtained, it was observed that fatigue was not affected both between the pre-post tests of the groups and between the groups ($p>0.05$). As a result, it can be said that dynamic and static core training has no effect on taekwondo Bandal-Tchagui kick fatigue.

Keywords: Bandal-Tchagui, fatigue, Taekwondo

1. Introduction

Taekwondo athletes are required to earn points by effectively performing technical and tactical actions in a match, including kicking, punching, blocking, pushing, and footwork. To achieve this and to ensure its continuity, muscle strength, power and endurance are required (1). In this sport, which requires a high level of strength and speed and is associated with fast and high kicks, it is very important to protect the neuro-muscular units that control the lower extremities, such as explosive kicking, jumping, foot movements and postures (2). The explosive force that occurs at the beginning of the movement and during the movement period is among the important factors for performance along with speed. As strength, speed and speed increase, the opponent's decision-making time will decrease and the probability of making a mistake will increase (3).

[i] This study was produced from Ömer Faruk Bulak's master's thesis.
[ii] Correspondence: email omerfarukbulak@hotmail.com

The importance of core exercises is undeniable for a sport where strength and explosive power are so important. However, the evaluation of the effect of these exercises on the fatigue that occurs when applying a sport-specific technique will be a first in the literature. It is thought that our study is important in this respect.

2. Method

21 taekwondo athletes aged 15-20 years participated in the study voluntarily (Table 1). Athletes with similar physical characteristics were randomly assigned to dynamic and static core training groups. While the dynamic core training group participated in the dynamic core training program (6 weeks, 3 days a week and 60 minutes a day) in addition to taekwondo training, the static core training group participated in the static core training program (6 weeks, 3 days a week and 60 minutes a day) in addition to taekwondo training. Subjects were also not given a nutritional program and were informed about the study procedure one week before the study. It was ensured that the subjects were selected from competitive taekwondo athletes who had been doing taekwondo training regularly for at least 3 years and did not have any history of trunk, hip or knee injuries.

Table 1: Descriptive values

	Static Core Group (n=10)		**Dynamic Core Group (n=11)**	
	Mean	Std. Dev.	Mean	Std. Dev.
Age (year)	15.60	1.78	13.55	1.86
Height (cm)	163.50	6.74	157.82	12.11
Weight (kg)	49.10	5.51	42.45	11.00

2.1 Core training

The training program was applied for 6 weeks, 3 days a week and 60 minutes a day, and the core exercises to be selected followed a sequence from easy to difficult (2, 3). In order to affect the kicking performance, movements that could affect the entire region between the distal and proximal ends of the anterior and posterior abdominal region and the hip region were selected. For dynamic core training, static stabilization movements were selected from dynamic movements for static core training, 8 movements were applied in each unit, and 4 repetitions were performed for each movement. In order to realize the principle of progressively increasing loading, the intensity was increased by increasing the number of movements in repetitions in the dynamic group every week, and by increasing the time in the repetitions in the static group (ie, by increasing the scope) (4).

2.2 Bandal-Tchagui fatigue test

TAIKT (taekwondo anaerobic intermittent kick test) test, which is based on the athlete performing the maximum number of bandal-tchagui (roundhouse) kicks alternately with the right and left legs for 6 sets of 5 seconds between each set, which includes 10 seconds of active recovery between each set, was performed throughout the test. The average

pressure of the strokes was taken. Kicking pressures were obtained by means of an electronic body protector (TKStrike Protector, Daedo, Barcelona, Spain) placed on the dummy. In the TAIKT (taekwondo anaerobic intermittent kick test) test, the difference between the average blows of the first 5 and the last 5 kicks was evaluated as the fatigue index. Our study also has the feature of determining a new method in this respect (5, 6).

2.3 Statistical method

SPSS 22.0 program was used for statistical operations. After testing for normality and homogeneity, paired samples t-test was used to analyze the difference between pre-test and post-test, and independent samples t-test was used for difference between groups. Values will be presented as mean and standard deviation and analyzed at 0.05 significance level.

3. Results

Table 2: Comparison of the pre-test and post-test results of the static core group

		Mean	SD	SE	t	p
Bandal-Tchagui fatigue (psi)	Pre	-0.71	3.53	1.12	1.03	0.33
	Post	-3.82	8.70	2.75		

In Table 2, the comparison of the pre-test and post-test measurements of the static core group is given. Looking at the table, there was no significant change in kick fatigue of the equivalents as a result of the trainings (p>0.05).

Table 3: Comparison of pre-test and post-test results of dynamic core group

		Mean	SD	SE	t	p
Bandal-Tchagui fatigue (psi)	Pre	2.31	6.26	1.89	1.14	0.28
	Post	0.95	5.67	1.71		

Table 3 shows the comparison of pre-test and post-test measurements of the dynamic core group. Looking at the table, there was no significant change in kick fatigue of the equivalents as a result of the trainings (p>0.05).

Table 4: Comparison of pre-post test differences between dynamic and static core groups

	Group	Mean	SD	SE	t	p
Bandal-Tchagui fatigue (psi)	Static	-3.11	9.55	3.02	-0.54	0.60
	Dynamic	-1.35	3.95	1.19		

In Table 4, the comparison of the differences between the pre-test and post-test averages of the subjects (static and dynamic groups) participating in the study between the groups is given. There was no significant difference between the groups (p>0.05).

4. Discussion

The purpose of this research; the aim of this study is to examine the effect of core training on the fatigue that occurs when the bandal-tchagui technique applied in Taekwondo is applied. When the data obtained were examined, it was determined that there was no change in the kick fatigue of the participants with dynamic and static core training.

Yilmaz (2015), in their study named the effect of 10-week core stabilization exercises performed on balanced and unstable surfaces on static-dynamic balance, functional movement analysis scores and Yopchagi technical performance in taekwondo players aged 14-17, it was determined that the changes in the experimental group on unstable surfaces in the static balance test results were statistically significant ($p<0.05$). While statistically significant differences were observed in some test axes in comparisons between groups in dynamic balance tests, this significant difference could not be detected in some axes ($p<0.05$). In the comparison between the groups in FMS tests, there were significant differences in the special tests that appealed to the core region muscles, but this significant difference could not be detected especially in the mobility tests. As seen in the Yopchagi technical analysis findings, no significant difference was found in the right-left knee flexion and left trunk rotation parameters in the comparisons between the groups ($p<0.05$). (7)

Yoon et al., (2015), they investigated the effects of 8-week core exercises on balance skills using "slings and togus" on 13 male taekwondo players at Deagu University in South Korea. In the study, they found statistical significance in the number of sit-up tests used to measure abdominal muscle endurance, flexibility test and balance test results (8).

Ipekoglu et al. (2018), adolescent taekwondo players also investigated the effect of core exercises using an empty ball on static and dynamic balance. Twenty-four elite taekwondo athletes were randomly divided into 2 groups. They had routine taekwondo training to one group and core exercises to the other group 3 times a week for twelve weeks. As a result of the study, they found that both the static and dynamic balance error scores of the non-dominant leg decreased by 40.33% (9).

Yang Dae-seung (2016) had taekwondo and non-taekwondo athletes perform 12-week core exercises to compare their physical fitness and balance. Muscle strength, muscular endurance, flexibility, agility and balance tests were applied to the athletes. As a result, statistically significant differences were observed in the muscle strength, muscle endurance, flexibility, agility, general balance of both feet, and anterior and posterior balance of both feet in the core exercise group both within and between the groups (10).

Snyder et al. (2013), in a study, 18 recreationally active young adults (7 men and 11 women (20.3±1.1 years)) applied a 5-week (30 min, 2 days/week) dynamic core training program. The agility performance of the subjects before and after the training It was evaluated by hexagon test and t-test. As a result of the study, they reported that dynamic core training performed on a fixed surface can improve agility (11).

Tayshete et al. (2020), in their study, they formed a control group, proprioceptive training group and core training group to compare the Y-Balance Test and Single Leg

Jump results in their study with 45 adolescent taekwondo players in the 11-20 age group. After the taekwondo training, the core training group had 3 sets of 10 repetitions, 1 minute break between 2 sets, 3 days a week for 6 weeks. As a result of the study, they stated that there was a significant improvement in the Y-balance and single leg jump test scores of the proprioceptive training and core training group (12)

As a result, although the importance of core training in terms of trunk strength is known, it can be said that it does not affect the reduction of kick fatigue.

Conflict of interest

There are no potential conflicts of interest on this article.

About the Authors

Mr. Bulak has Master of Science degree in sport science research field. Dr. Özdal is Associate Professor Doctor at Gaziantep University.

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