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CHRONIC EFFECT OF CORE STABILIZATION TRAINING FIELD HOCKEY DRAG-FLICK AND SHOOTING PERFORMANCE[i]

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Abstract:
The aim of this study is to examine the effect of core stabilization training on drag-flick and shot performance in young hockey players. For this purpose, 20 super league level hockey players participated in the study as subjects. The subjects were divided into two equal groups as experimental and control. While core training and hockey training were applied together for 8 weeks to the experimental group; the control group only continued their routine hockey training. Shot and drag flick tests were applied to the groups one day before and one day after the 8-week period. The obtained data were analyzed in SPSS 22.0 program. After testing for normality and homogeneity, independent samples t-test was performed for between groups, and paired samples t-test was performed for pre-post-tests of each group. When the results were examined, there were significant changes in the hit and drag flick parameters in favor of the post-tests between the pre-post tests in the experimental group in which core training was applied ($p<0.05$), while the significant changes in the control group were not evaluated because they were in favor of the pre test. Despite these results, there was no significant difference in the measured features between the groups ($p>0.05$) As a result, it can be said that core training has positive effects on drag flick and shot performance in hockey players.

Keywords: hockey, core, drag-flick, shot

1. Introduction

With the development of sports science, even the smallest details are examined, existing programs are renewed or new training methods emerge. One of the programs that aim to increase sports performance and gain importance today is the core training method. In this training method, the area from the bottom of the rib cage to the bottom of the hip is

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called the core region (1). Core training exercises contribute to the lower and upper extremities of the body during the movements of the athletes. After a good core work, efficient results are obtained in studies such as balance, acceleration, acceleration and deceleration. The fact that these studies are good is also important in reducing injuries, improving the musculoskeletal system and increasing performance. It can be said that planned core training not only provides functional performance but also works in coordination with movement (2). It is thought that by strengthening the core region, there will be an increase in the features such as balance, agility, speed and jump needed while playing hockey. However, it is known that holding the breath, trunk strength, and trunk oscillation stability are important in the shooting performance needed in hockey. In this direction, we think that this thesis study is important in terms of revealing the extent to which shooting performance will improve with core training. When we look at it in this direction, it is aimed to determine the effect of the 8-week core stabilization training program applied regularly on the drag flick and shooting performance of hockey players in our study, which was carried out within the framework of this subject, which was emphasized as important.

2. Method

20 super league level male hockey players participated in the study. The subjects were randomly divided into two groups. 10 hockey players were in the experimental group (age 17.50±2.22 years, height 173.30±7.35 cm, weight 66.90±12.78 kg) and 10 hockey players were in the control group (age 16.20±1.48 years, height 170.60±5.50 cm, weight 63.30±5.01 kg). As the criteria for participation in the study, it was determined that the subjects did not have a disease, did not have a history of injury that would prevent them from performing shooting techniques, and played hockey at the super league level.

Our study was designed according to the pre-test post-test experimental research design with a control group. Applied core training was evaluated as an independent variable and hockey skills were considered as dependent variables. The hockey players in the experimental group participated in core training with 8-week hockey training, while the hockey players in the control group only continued their routine hockey training. Shot and drag flick tests were applied to the hockey players the day before and the day after the 8-week training process, and the effect of core training on hockey skills was tried to be determined between the groups.

2.1 Core training program

The training program was applied for 8 weeks, 3 days a week and 60 minutes a day, and selected core stabilization exercises were applied in a sequence from easy to difficult (3, 4). In order to affect the shooting performance, movements that can affect the entire region between the distal and proximal ends of the anterior and posterior of the abdominal region were selected. In order to apply the gradually increasing load principle throughout the training, the rest periods were reduced and the number of sets and repetitions was increased.

Table 1: Core training program

Week	Exercise	Set x Repetition	Rest
1	1. breakdance	3x20	40 sec
2	2. Russian twist	3x20	30 sec
3	3. butterfly sit-up	3x30	40 sec
4	4. half-kneeling wood chop	3x30	30 sec
5	5. high boat low boat	4x25	40 sec
6	6. body saw	4x25	30 sec
7	7. jack-knife	4x30	40 sec
8	8. leg raise 9. body rolling	4x30	30 sec

2.2 Drag flick test

Before the test, the subjects were given the right to make a sighting shot. Five sighting shots are allowed. From the dashed line 9 meters in front of the center of the goal line, each subject was asked to shoot twenty shots using the drag flick shot technique towards the hockey goal. Each shot on target, two flags denoting the boundaries of the designated scoring areas were placed on the goal line, 40 centimeters from both posts. If the ball entered the goal between the goalpost and the flag, the participant received two points. If the ball entered the goal between the two flags, the participant received one point. No points are awarded if the ball did not enter the goal or if it went beyond the goalposts from any point. Thus, each participant was given points out of a maximum of forty points. The subjects applied the drag flick shot technique, one of the basic hockey techniques, after warming up (5).

2.3 Hit shot test

Before the test, the subjects were given the right to make a sighting shot. Five sighting shots are allowed. From the dashed line, which is 9 meters in front of the center of the goal line, each subject was asked to shoot twenty shots towards the hockey goal using the hit shot technique. Each shot on target, two flags denoting the boundaries of the designated scoring areas were placed on the goal line, 40 centimeters from both posts. If the ball entered the goal between the goalpost and the flag, the participant received two points. If the ball entered the goal between the two flags, the participant received one point. No points are awarded if the ball did not enter the goal or if it went beyond the goalposts from any point. Thus, each participant was given points out of a maximum of forty points. The subjects applied the hit shot technique, one of the basic hockey techniques, after warming up (5).

2.4 Statistical method

SPSS 22.0 program was used for statistical operations. After testing for normality and homogeneity (the kurtosis and skewness of the data that did not show normal distribution were evaluated, and those in the +/- 2.00 score range were assumed to have normal distribution), the t-test was applied to independent groups to analyze the difference between the paired groups. Values were presented as mean and standard deviation and were analyzed at the 0.05 significance level.

3. Results

Table 2: Pre-test and post-test comparison of the control group's total score in drag flick and hit test

	Test	Mean	SD	p
Drag flick	Pre-test	19,2000	5,32917	0,003
	Post-test	3,7000	7,18099	
Hit	Pre-test	16,2000	1,98886	0,001
	Post-test	25,8000	4,41714	

In Table 2, the pre-test and post-test comparison of the control group's total score in the drag flick and hit test is given. There was a significant difference in favor of the pre-test in the control group ($p<0.05$).

Table 3: Pre-test and post-test comparison of the experimental group's total score in drag flick and hit test

	Test	Mean	SD	p
Drag flick	Pre-test	15,9000	3,24722	0,043
	Post-test	22,6000	4,35125	
Hit	Pre-test	17,4000	2,67499	0,039
	Post-test	21,9000	4,67737	

In Table 3, the pre-test and post-test comparison of the experimental group's total score in the drag flick and hit test is given. There was a significant difference in favor of the post-test in the experimental group ($p<0.05$).

Table 4: Comparison of the pre-test and post-test differences of the total score of the groups in the drag flick and hit test

	Group	Mean	SD	p
Drag flick	Experimental	6,7000	5,14350	0,297
	Control	3,7000	7,18099	
Hit	Experimental	4,5000	5,89256	0,075
	Control	9,6000	4,62361	

In Table 4, the comparison of the pre-test and post-test differences of the total scores of the groups in the drag flick and hit test is given. There was no significant change in the pre-post test differences between the groups (p>0.05).

4. Discussion

When the results obtained were examined, it was seen that there were significant differences in the experimental group and the control group when the pre-test and post-tests were compared. However, it should be known that the significant changes in the control group will not be taken into consideration, considering that they are generally in favor of the pre-test. It is obvious that the significant changes in the experimental group were obtained after the 8-week core training program, and therefore it is noteworthy. In addition, when the groups are compared with the pre-post test differences, it is clear that there is no significant difference between them.

Considering the general effects of core training, it is known that physical fitness has positive effects on both health and performance components. Improvements in body composition as a result of burning a high amount of calories with core exercises (6, 7, 8, 9, 10, 11, 12); positive changes in back strength (13, 14, 15, 16, 17, 18), grip strength (19, 20, 21, 22, 23, 24, 25), leg strength (26), trunk and extremity strength (27); Anaerobic (28, 29, 30, 31) and aerobic power (32, 33) improvement has been proven by previous research.

A study similar to our study was conducted on ice hockey players and focused on the effect of core stabilization levels of ice hockey players on their shooting skills. When the data they obtained were examined, it was determined that there was a significant relationship between core stabilization and shooting accuracy and performance (34).

Active control of spine stability is then provided by the regulation of this force in the surrounding muscles (35). When instability is present, there is a failure to maintain correct vertebral alignment, or in other words, a failure to exert sufficient force in the musculature to stabilize the spine. Therefore, stability defines the body's ability to control the entire range of motion of a joint (36). In general, the purpose of the core musculature is to stabilize the spine during functional demands because the body wants to maximize this stability (35). This stability and kinematic response of the trunk is determined by the level of mechanical stability of the spine and the reflex response of the trunk muscles before force is applied to the trunk (35). Cholewicki et al. stated that active control of spine stability is achieved through regulation of the force in the region muscles. Therefore, co-activation of agonistic and antagonistic trunk muscles stabilizes the lumbar spine. Increases in muscle activation potentially lead to greater spinal stability (37). In this way, we think that the affected spine stability provides a trunk position that affects the kinematic chain without loss during the shot in hockey.

5. Conclusion

As a result, it can be said that core training has positive effects on drag flick and shooting performance in hockey players, and these positive effects occur with more stable body control due to the strengthening of the core region.

Conflict of Interest Statement
There are no potential conflicts of interest on this article.

About the Authors
Mr. Bostancı has Master of Science degree in sport science research field. Dr. Özdal is Associate Professor Doctor at Gaziantep University, Turkey.

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