

Full Length Research Paper

Effect of core training on 16 year-old soccer players

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Core trainings have been widely used by trainers recently in order to improve performance of soccer players. In this context, the aim of this study is to examine the effect of core training on some motoric capabilities of 16 years old soccer players. Thirty certified soccer players who were 16 years old from B.B. Bodrumspor Club in 2013-2014 seasons participated voluntarily in the research. Weight and height averages of U-16 experiment and control group players were similar; there was no significant difference between them. Before the trainings, pre-tests of two groups of 15 participants (standing long jump, shuttle, balance, push-up, speed, plank, vertical jump) were recorded. The core trainings were implemented on the experiment group twice a week, 30 to 35 min a day for 12 weeks by trainers plus the regular training program. Only regular trainings within yearly training program were implemented on the control group. After 12 weeks, post-test measurements were taken. The differences between the tests were analyzed statistically, with "t" test at $p < 0.05$. Consequently, it was observed that core trainings implemented on junior level players brought about significant improvements on parameters of standing long jump, shuttle, balance, speed, plank, and vertical jump ($p < 0.05$).

Key words: Core, training, soccer, adult, strength.

INTRODUCTION

Soccer is a team sport of intense tackles. Strong central body area decreases risks of injury and provides explosive power in soccer players, improved higher rate anaerobic energy, and technical movements with and without a ball. There are many training methods for developing anaerobic strength and power. With the development of these, skills such as vertical jump, speed, acceleration, agility development, ball kicking, turning and dribbling can be performed easily (Reilly and Thomas, 1976; Ekblom, 1986; Tumilty, 1993; Bangsbo, 1994a, b; Bompa, 1999; Cometti et al., 2011; Wisloff et al., 2004; Arthur and Bailey, 1998).

Primarily and certainly, it can be stated that the strength training method is more convenient for soccer training, as

it does not only depend on number of units per training done during soccer exercises (Weineck, 2011).

The area named "core" includes the abdominals in the front side of the body, that is, hypochondrium and hypogastric muscles; serratus right next to hypochondrium muscles; oblique right next to hypogastric muscles; and the muscle groups from the waist to neck that help the skeleton have a correct posture (External Oblique, Internal Obliques, Transversus Abdominis, Multifidus Psoas). "Core training" refers to the training of the above abdominal and lumbar regions. Strengthening the core region is not only necessary for sportive endurance, but it also provides a correct posture (Fahey et al., 2011; Akuthoga and Nadler, 2004).

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Core training has been studied by many researchers and is considered to be very important for players' performances, motoric capabilities, balance developments, prevention of injuries and rehabilitation (Thomas and William, 2009; Hessari et al., 2011; Shi et al., 2012; Sadeghi et al., 2013; Sumit and Sohan, 2013; Agostini, 1994; Takanati, 2012).

It was determined by researchers that implementing weight trainings on players who are in their development age affects their developments negatively (Sakalli, 2008; Sevim, 1997). Among 11 to 15 year old players, physical core training and motoric capabilities, especially strength development can be provided more easily with their own body weights. Providing strength development among children of this age with their own body weights is a more appropriate method. Core trainings have been widely used by trainers recently in order to improve game performance of soccer players. These trainings are preferred because they can be done in any field without any need for tools, and they contribute to strength development in a short time (Thomas and William, 2009; Basset and Leach, 2011; Baser, 1996; Cabrid et al., 1988; Okada et al., 2011).

The present research investigates the effects of core trainings conducted on 16 year old soccer players for 12 weeks on motoric capabilities of soccer players.

MATERIALS AND METHODS

In the present research, pre-test and post-test patterned experimental method with control group was implemented: 15 for experiment group (kg $X=56.27\pm5.71$; Height $X=161.46\pm7.17$ cm) and 15 for control group (kg $X=57.07\pm3.90$; Height $X=163.20\pm5.62$ cm). A total of 30 certified soccer players who play in Turkey, Mugla Province, Bodrum District, B.B. Bodrumspor in U-16 age group voluntarily participated in the research with the permission of their parents. Regular yearly training program was implemented on the control group; while specially prepared core trainings of 30 to 35 min twice a week for 12 weeks in addition to the regular training program was implemented on the experiment group. Complete participation was provided.

Measurement tools and application

The measurement of the groups was taken at Physiology Labs, School of Physical Education and Sports, Mugla Sitki Kocman University, and B.B. Bodrumspor synthetic pitch.

Vertical jump measurement

Vertical jump test was conducted with "Jump Meter". Players jumped upwards on a time and distance scaled sensitive surface in force without taking a step and skipping (Tamer, 2000). The distance they jumped was determined on the vehicle in centimeters. After players jumped twice, their best score was recorded as their vertical jump value.

Push-up-shuttle measurements

The measurement of the regular shuttle move was taken with

regular shuttle move. The players lay on their back, in hands on nape, bodies stretched, feet in adjoint position and were asked to straighten their body forward without receiving support; thereafter, the number of shuttles they made was recorded. The measurement of push-up move was done in push-up position. In arms bent on elbows position, the players moved their body toward the ground and up; and the number of push-ups done in 1 min was recorded (Bicer et al., 2004).

Standing long jump

A line was drawn on the field where the standing long jump test was done and from this line forward, a tape measure with a 0.01 sensitivity level was placed on the ground. In standing position, the players were placed in a way that their toe ends touch the line and were asked to jump forward. The players stopped at the place where their feet first touched the ground and the distance between the line and the players' heels was measured and recorded in centimeters. The measurement was done thrice and the best score was recorded.

Flamingo Balance Test

Flamingo Balance Test was used to determine the research group's static balance. In accordance with this test, the player stands on a wooden balance vehicle with 50 cm length, 4 cm height and 3 cm width on their dominant leg and stands in balance. The player bends the other leg on knee, pulls it to the hip and holds it with the hand on the same side. While the player is on balance in this position, the time starts and the player tries to stand in balance for 1 min. When the player is unbalanced (if he drops the held leg, falls down from the board, touches the ground with any part of his body etc), the time stops. The player stands on the balance vehicle again and when he is back on balance the time goes on. The test goes on this way for a minute. When the time is up, each player's attempt to get on balance (after falling) is counted and this number is recorded as the score of the player after the 1-min time is up (Hazar and Tasmektepligil, 2008).

20-meter speed

The players ran on a 20-m field with maximal speed. The time was recorded in seconds with a Casio brand chronometer. The test was repeated twice on the participants and the best score was recorded (Sevim, 1997).

Plank

It refers to maintaining the balance in facedown position, on elbows and feet, and heels are in line with the head position (Handzel, 2006).

Training program

Core area developing moves determined by researchers in the literature (Takatani, 2012; Thomas and William, 2009; Basset and Leach, 2011) were implemented in the present research by certified trainers who did their master degree in Mugla Sitki Kocman University, School of Physical Education and Sports. Before the trainings, general and specific 15 to 20 min warm-ups that are appropriate to the moves in the training were conducted. The moves were conducted with time and repetition methods and rests that are suitable to the loads were given. 30 to 35 min program was

Table a: 12-Week Core Training Program Implemented Within Research

Exercises	1-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks
Side bend	20 sec.	25 sec.	20 sec.	25 sec.
Reverse plank with leg raise	10 rep.	15 rep.	10 rep.	15 rep.
Alternate less jump	15 rep.	20 rep.	15 rep.	20 rep.
Squat	20 rep.	25 rep.	20 rep.	25 rep.
Do crunches	20 rep.	25 rep.	20 rep.	25 rep.

Table b: 12-Week Core Training Program Implemented Within Research

Exercises	1-3 weeks	4-6 weeks	7-9 weeks	10-12 weeks
Lying twist trunk	20 sec.	25 sec.	20 sec.	25 sec.
Twist with medicine ball	20 sec.	25 sec.	20 sec.	25 sec.
Side bridge	25 sec.	30 sec.	25 sec.	35 sec.
Alternate plank	15 sec.	20 sec.	23 sec.	25 sec.
Alternate superman	15 sec.	20 sec.	23 sec.	25 sec.

Table 1. Body weight averages of the groups (kg).

Groups	N	X (kg)	Standard deviation
U-16 Experiment	15	56.27	5.71
U-16 Control	15	57.07	3.9
Total	30		

Table 2. Height averages of the groups (cm).

Groups	N	X(cm)	Standard deviation
U-16 Experiment	15	161.4667	7.17004
U-16 Control	15	163.2000	5.62139
Total	30		

implemented on the experiment group for 12 weeks, twice a week in Bodrumspor synthetic pitch on free days in addition to the regular training (Table a and b). The control group conducted their regular training program without any additions.

The training program presented in the table above was implemented in accordance with the wave method as: 1st-3rd Weeks: 1 Set; 4th-6th Weeks: 2 Sets; 7th-9th Weeks: 3 Sets; 10th-12th Weeks: 2 Sets. Before the training, pre-test measurements of both groups were taken; and after 12-week core training program post-test measurements of groups were taken.

Statistical analysis

Obtained data were analyzed on computer. Arithmetic averages (X), and standard variations (sv) of the experiment and control groups were calculated and Paired Samples t-test was used to detect differences between pre-tests and post-tests. Significance level was taken as $p < 0.05$.

FINDINGS AND DISCUSSION

Findings obtained after 12-week core training program are presented below in tables. Table 1 and 2 show physical features and Table 3 and 4, show the statistics for motoric capabilities. The abbreviations used in the research are as follows; Standing Long Jump (SLJ), Flamingo Balance Test (FBT), Vertical Jump Test (VJT).

Body weight averages of the groups in the research 1 are as follows; U-16 experiment group= 56.27 kg; Control group= 57.07 kg.

Height averages of the groups in the research 2 are as follows; U-16 experiment group= 161.46 cm; control group= 163.20 cm.

Before and after core training parameter measurements of U-16 experiment group of the research, there were significant differences at $p < 0.05$ level between pre-test

Table 3. Core training pre-test, post-test values of U-16 age group players.

U-16 Experiment group	n	Pre-test (X, \pm ss)	Post-test (X, \pm ss)	t	df	p
SLJ	15	86.60 \pm 4.96	114.67 \pm 7.97	-13.03	14	0.000*
Shuttle	15	43.80 \pm 5.97	53.73 \pm 8.17	-7.03	14	0.000*
FBT	15	5.95 \pm 0.75	2.96 \pm 1.16	2.03	14	0.001*
Push-up	15	41.33 \pm 2.22	52.20 \pm 4.39	-11.28	14	0.000*
20 m Speed	15	3.29 \pm 0.155	3.26 \pm .141	5.6	14	0.000*
Plank	15	70.13 \pm 23.74	96.13 \pm 22.71	-10.64	14	0.000*
VJT	15	30.46 \pm 2.69	33.61 \pm 2.31	-14.15	14	0.000*
Total						

p<0.05*.

Table 4. Soccer training pre-test, post-test values of U-16 age group players.

U-16 Control group	n	Pre-test (X, \pm ss)	Post-test (X, \pm ss)	t	df	p
SLJ	15	93.47 \pm 6.70	98.33 \pm 5.56	-4.07	14	0.05
Shuttle	15	42.20 \pm 3.70	45.40 \pm 3.43	-9.39	14	0.000*
FBT	15	5.72 \pm 4.36	4.01 \pm 1.34	2.5	14	0.004*
Push-up	15	40.67 \pm 2.69	43.60 \pm 2.97	-7	14	0.000*
20 m Speed	15	3.29 \pm 0.11	3.25 \pm 0.12	2.63	14	0.020*
Plank	15	75.53 \pm 21.29	96.27 \pm 22.29	-14.15	14	0.06
VJT	15	31.62 \pm 2.26	33.11 \pm 1.99	-9.51	14	0.039*
Total						

p<0.05*.

and post-test measurements of standing long jump, shuttle, balance, push-up, speed, plank, and vertical jump.

Before and after soccer training parameter measurements of U-16 control group of the research, there were no significant differences between pre-test and post-test measures of standing long jump (SLJ), and plank (p>0.05). On the other hand, there were significant differences between pre-test and post-test measurements of shuttle, balance (FBT), push-up, vertical Jump (VJT) at p<0.05 significance level.

After 12-weeks core training, statistically significant differences were observed in 16 year-old players' motoric capabilities of; Standing Long Jump (SLJ), Shuttle, Push-up, Speed, Plank and Vertical Jump (p<0.05). Review of the related literature presented the followings.

Fredericson and Moore (2005) stated in their research conducted on short and long-distance runners that core training has an explosive effect, but it should be implemented with a well-designed program and a trainer. These findings comply with our research.

Kimitake and Monique (2009) emphasized that core training has an important effect on the performances of 5000 m runners. The findings of this research showed improvements in strength parameters and therefore comply with our research.

Thomas and William (2009) found in their research conducted on a female volleyball team that 40 m sprint

speed improved after core trainings; thus, it is in conformity with the findings of our research.

Hessari et al. (2011) implemented core training on hearing-impaired students to observe their balance development, and found significant differences. This improvement in soccer players' balances with core training is in conformity with the findings of our research.

Basset and Leach (2011) found that balance and endurance of elite young gymnasts improved with 8-week core training; therefore, it is parallel to our findings.

Casey et al. (2012) found in their research about the effect of core training on performance that core training contributes to performance positively. These findings share similarities with our findings.

Weston et al. (2013) found that 8-week core training contributes positively to the performance of golfers; which complies with our research.

Jim et al. (2013) found in their research conducted on university students that core and endurance trainings result in improvements in many parameters. However, they did not find any significant differences in vertical jump measurements. In the present research conducted on junior soccer players, significant differences were observed in vertical jump measurements. In this regard, this research differs from our research.

Afyon and Boyaci (2013), found positive findings in the study that investigation of the effects by compositely

edited core-plyometric exercises in sedentary man on some physical and motoric parameters.

Michelle and Jonathan (2013) provided improvement in balance and core endurance with core training implemented on high-school age athletes. In the present research, we observed similar improvements in balance and core endurance of 16 year-old soccer players. These findings are similar with our findings.

Li (2014) determined in the research conducted on Civil Aviation School students who selected soccer class that core training contributes to motoric capabilities positively. The findings of this research comply with the findings of the present research.

Consequently, it was observed that 12-week core training implemented on 16 year-old soccer players in addition to their yearly training program provided improvements in standing, long jump, shuttle, balance, push-up, speed and vertical jump parameters of soccer players. Because core training plays an important part in the development of major and minor muscles, it will contribute to the motoric and physical developments of players positively. With the strengthening of central area muscles, both core strength and core endurance of soccer players will improve. Soccer trainers can use core training as a strength development method, before the season or during the season if they feel a need to do it.

Conflict of Interests

The author has not declared any conflict of interests.

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