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Investigation Of The Effects Of Teaching Core Exerciseson Young Soccer Players

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ABSTRACT

The objective of this study is to investigate the effects of teaching core exercises on some motoric parameters in young soccer players.32amateur male football players from Afjet Afyonspor and Muğlaspor football team; 16 experimental group (average age 13.75 ± 0.46 years; mean body height 1.65.±0.09 cm; mean body mass 52.88 ± 8.04kg) and 16 control group (average age 13.71 ± 0.34 years; mean body height 1.59±0.08 cm; mean body mass 45.63 ± 6.25kg) participated in this study voluntarily. For each player, flexibility, agility, sprintability and standing long jump performance was measured. Core exercises were done 6 weeks to the subjects located in experimental group in addition to football training. Before starting the core training program, experimental group were applied core exercises during 2 weeks. Explainations on the correct teaching of the core training techniques and the attainments to be achieved during the se exercises were provided. The subjects located in control group were asked to continue their normal training and any additional program was not applied. Control group wasn't provided with the explanations on the correct teaching of core training technique sand the attainments to be achieved. Mann Whitney U test for paired comparison of the groups and Wilcoxcon test for the comparison of pre- and post-tests of the groups were used. The significance level was taken as $p<0.05$. As for the statistical results between the pre-test values of the groups, no significant difference was found in any of the variables ($p>0.05$). At the beginning of the study, groups divided into the homogeneous. The experimental groups howed a 11.62%, 6.8%, 7.5%, 3% improvement in standing long jump, agility, 10-m sprint performance and 20-m sprint performance (respectively) ($p<0.05$).A significant differences was found agility performance ($Z= -2.38$; $p<0.05$), standing long jump ($Z= -1.4$; $p<0.05$), 10-m sprint performance($Z= -1.26$; $p<0.05$)and20-m sprint performance ($Z= -0.56$; $p<0.05$)between the pre-and post-test in experimental group. A significant differences was found agility performance ($Z=-2.52$, $p=0.01$) and 10-m sprint performance ($Z=-2.53$, $p=0.01$) between the pre-and post-test in control group. There were statistically significant difference between of post-test 10-m sprint performance in experimental and control groups ($U=13.0$ $p=0.04$).In conclusion, it was observed that 6 week core exercises implemented on young soccer players brought about significant improvement on parameters of standing long jump, agility, 10-m sprint performance and 20-m sprint performance ($p<0.05$).The necessary motor skills can be improved by core exercises and a football coach who teaches his or her players correct techniques using and executing these exercises in their training programs.

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Introduction

Team sport activities are comprised of varying explosive movements like forward and backward shuffles, runs at different intensities and sustained forceful contractions to control ball against defensive pressure. Soccer is a highly demanding game in which the players are subjected to numerous actions that require high aerobic and repeated sprint capacity, muscular strength and endurance, speed, agility, quickness, and flexibility.

Muscular strength is a factor that is generally thought to have a great influence on athletic performance. Generation of explosive strength depends on the ratio between velocity of movement and the strength developed by the specific muscle groups (Castagna et al., 2007). Explosive strength, take-off power, speed, and agility are abilities that make an important contribution to efficient movement with and without the ball, thus play an important role in football technique and tactics (Forthomme et al., 2005).

Core exercises are suggested to healthy individuals in order to increase their functional capacity and to improve athletic skills (Willardson, 2007;Jim et al., 2013). Core training has been getting tremendous attention in recent years and have become a major element of training plans (Riewald, 2003). Core training is a kind of exercises done with the individual's own body weight and aiming to strengthen the lumbopelvic muscles and deep muscles that keep the spine balanced (Atan, 2013).

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. For young players, learning the correct physical techniques and executing them with confidence during game time is crucial for long term success and enjoyment in their game. Providing strength development among children of this age with their own body weights is a more appropriate method. Core stability training can provide significant benefits for players and teams, and is easy to incorporate into any training session. If the players follow the exercises above, they'll hopefully be building a solid base from which they can use to improve their physical performances and lessen injuries.

Core 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 (Basset and Leach, 2011; Okada et al., 2011).Motor skills can be improved by core exercises. The coach esplays a key role in assessing, supporting and teaching players with special theorical and practice needs in core training. Coaches need to become skilled at observing players movement and identifying which components of a particular skill have been mastered and which components need further practice (Bayansalduz et al., 2014).Coaches have to create appropriate learning methods and use visual demonstrations during core training. Demonstrations help communicate the key components of a fundamental motor skill of players. Coaches provide cues or tips during the practical training. Also they have to give their players encour agement and feedback. Feedback should be specific and given as soon as possible. Coaches can give easy to follow explanatory information (Afyon et al, 2014). They use words and phrases that are easily understood and repeated practice is needed for players to master skills (muscular strength, endurance, speed, agility, quickness, and flexibility).

The purpose of this study is to investigate the effects of teaching core exercises on some motoric properties in young soccer players. All coaches should include these vital exercises in their training programs, teaches his or her players correct techniques using and knowing that the benefits to the players later in life will be well worth it.

Material and Methods

Participants

32 amateur male football players from Afjet Afyonspor and Muğlaspor football team; 16 experimental group (average age 13.75 ± 0.46 years; mean body height 1.65.±0.09 cm; mean body mass 52.88 ± 8.04kg) and 16 control group (average age 13.71 ± 0.34 years; mean body height 1.59±0.08 cm; mean body mass 45.63 ± 6.25kg) participated in this study voluntarily. They were all nonsmokers. The study protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki. The soccer players were informed of the experimental procedures and signed an informed consent form. All the procedures were conducted in accordance with the standards of the Institutional Ethics Committee.

Procedures

Anthropometric Measurements

The body height of the soccer players was measured using a stadiometer with an accuracy ± 1 cm (SECA, Germany), and an electronic scale (Tanita BC 418, Japon) with an accuracy of ± 0.1 kg was used to measure body mass.

10-20m Sprint Test

The subjects performed 2 maximal 20 m sprints (with 10 m split times also recorded). There was a recovery period of 3 minutes between the 20 m sprints. Prior to each sprint test, players performed a thorough warm-up consisting of 10 minutes of jogging at 60-70% of heart rate max and then 5 minutes of exercise involving fast leg movements (e.g., skipping, cariocas) over short distances of 5 to 10 m and 3-5 single 15 m shuttle sprints with 2 minutes of passive recovery. Times were measured using an electronic timing system (Prosport TMR ESC 2100, Tumer Engineering, Ankara, Turkey).

Flexibility Measurement

Flexibility measurements of the subjects were performed by sit-and-reach test on the flexibility stand. The subjects were applied to this test after warming. When the subjects rested their naked soles of feet on the test stand while sitting on the ground, they pushed forward ruler on the table extending forward without bending the knees and the stretching distance was recorded by standing 2 sec at the farthest point to extend (Özer, 2001, Sporis et al., 2011).

Zigzag Agility Test

The athlete warms up for 10 minutes. This test requires the athlete to run a course in the shortest possible time. The participants begin at cone 1 with their hand in contact with the cone and feet behind the baseline. Then, they sprint to cones 2, 3 and 4, and then back to cone 1 (each cone must be touched). The best time of two trials was recorded (Bloomfield et al., 1994).

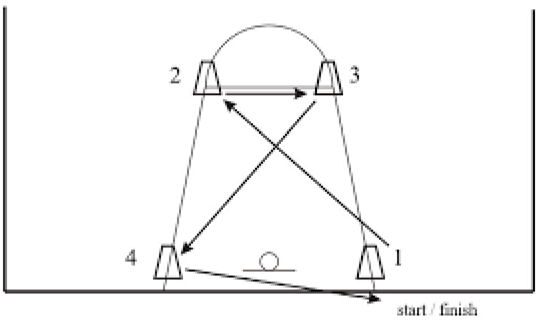

Figure 1 Zigzag test

Times were measured using an electronic timing system (Prosport TMR ESC 2100, Tumer Engineering, Ankara, Turkey).

Standing long jump

A line was drawn on the field where the standing long jump test was done and from 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 twice and the best score was recorded.

Core Training

For the study, 8 exercise movements selected according to their own body weights were applied as two sets for 15 seconds for the first 3 weeks (Table 1), three sets for 15 seconds next 3 weeks (Table 2). Core exercises were done 6 weeks to the subjects located in experimental group in addition to football training. Each movement was applied for 15 seconds with 60 seconds rest between movements and complete rest between sets. Before starting the core training program, experimental group were applied core exercises during 2 weeks. Experienced conditioning coaches demonstrated proper exercise technique throughout the study period. Coaches consistently encouraged the subjects to maintain proper technique performance. If a player fatigued and could not perform an exercise correctly, the exercise was stopped. Explainations on the correct teaching of the core training techniques and the attainments to be achieved during the seexercises were provided. The subjects located in control group were asked to continue their normal training and any additional program was not applied. Control group wasn't provided with the explainations on the correct teaching of core training techniques and the attainments to be achieved. As motoric parameters of the subjects in both of the groups flexibility, agility, sprint performance (10-20 m) and standing long jump measurements were taken. Measurements were performed twice, including before and after trainings.

Table 1. 1st, 2ndand 3rdweekcoretraining program

Exercises	Sets	Time (Secs)	Rest(Secs)
Plank	2	15	60
Side Plank	2	15	60
Crunch	2	15	60
Bird Dog	2	15	60
Shoulder Bridge with Roller	2	15	60
Ball Abductor Crunch	2	15	60
Squat	2	15	60
Lunge	2	15	60

Table 2. 4th, 5thand 6thweekcoretraining program

Exercises	Sets	Time (Secs)	Rest (Secs)
Plank	3	15	60
Side Plank	3	15	60
Crunch	3	15	60
Bird Dog	3	15	60
Shoulder Bridge with Roller	3	15	60
Ball Abductor Crunch	3	15	60
Squat	3	15	60
Lunge	3	15	60

Statistical Analyses

The data are reported as means and standard deviations. Mann Whitney U test for paired comparison of the groups and Wilcoxcon test for the comparison of pre- and post-tests of the groups were used.All analysis was executed in SPSS for Windows version 17.0 and the statistical significance was set at $p < 0.05$.

Results

The players' physical characteristics are shown in Table 3.

Table 3. Soccer players' experimental (n=16) ve control (n=16) physical characteristics

		Min	Max	$\bar{X}$	Ss
Experimental	Age (Years)	13	14	13.75	0.46
	Height(m)	1.5	1.77	1.65	0.09
	Weight(kg)	42	65	52.88	8.04
Control	Age (Years)	13	14	13.75	0.46
	Height (m)	1.45	1.69	1.59	0.08
	Weight (kg)	38	57	45.63	6.25

The pre-test analysis of sprint, agility, standing long jump and flexibility measurements of the experimental and control groups in the study are displayed in Tables 4.

Table 4. The Mann Whitney U analysis of pre-test sprint, agility, standing long jump and flexibility measurements of the experimental and control groups

	Flexibility	Standin glong jump	Agility	10-m Sprint	20-m Sprint
	$\bar{X}$±Ss	**$\bar{X}$±Ss**	**$\bar{X}$±Ss**	**$\bar{X}$±Ss**	**$\bar{X}$±Ss**
Experimental	20.88±7.40	1.77±0.22	9.30±0.77	1.99±0.13	3.43±0.27
Control	18.5±4.28	1.67±0.24	9.74±0.49	2.11±0.15	3.74±0.33
U	27.5	22.5	24	22	14.5
p	0.64	0.32	0.40	0.29	0.07

*$p<0.05$

As for the statistical results between the pre-test values of the groups, no significant difference was found in any of the variables ($p>0.05$). At the beginning of the study, groups divided into the homogeneous. Table 5 shows the pre-test and post-test analysis of sprint, agility, standing long jump and flexibility measurements of the experimental groups.

Table5. Wilcoxonanalysis of pre-test and post-test sprint, agility, standing long jump and flexibility measurements of the experimental groups

		$\bar{X}$	Ss	Z	p
Flexibility	Pre-test	20.88	7.4	-2.25	-2.25
	Post-test	22.75	8.05		
Standing long jump	Pre-test	1.72	0.22	-1.4	0.04*
	Post-test	1.9	0.28		
Agility	Pre-test	9.29	0.78	-2.38	0.02*
	Post-test	8.7	0.7		
10-m Sprint	Pre-test	1.99	0.13	-1.26	0.01*
	Post-test	1.85	0.13		
20-m Sprint	Pre-test	3.43	0.28	-0.56	0.02*
	Post-test	3.33	0.28		

*p<0.05

The experimental group showed a 11.62%, 6.8%, 7.5%, 3% improvement in standing long jump, agility, 10-m sprint performance and 20-m sprint performance (respectively) (p<0.05).A significant differences was found agility performance (Z= -2.38; p<0.05), standing long jump (Z= -1.4; p<0.05), 10-m sprint performance (Z= -1.26; p<0.05) and20-m sprint performance (Z= -0.56; p<0.05) between the pre-and post-test in experimental group. The pre-test and post-test analysis of sprint, agility, standing long jump and flexibility measurements of the control groups, as it can be seen in Table 6.

Table6. Wilcoxon analysis of pre-test and post-test sprint, agility, standing long jump and flexibility measurements of the control groups

		$\bar{X}$	Ss	Z	p
Flexibility	Pre-test	18.5	4.28	-1.28	0.2
	Post-test	19.375	0.24		
Standing long jump	Pre-test	1.6725	0.5	-1.26	0.21
	Post-test	1.73875	0.33		
Agility	Pre-test	9.73375	4.31	-2.52	0.01*
	Post-test	9.0025	0.26		
10-m Sprint	Pre-test	2.11	0.15	-2.53	0.01*
	Post-test	2.22	0.13		
20-m Sprint	Pre-test	3.73625	0.56	-0.85	0.39
	Post-test	3.8025	0.25		

*p<0.05

A significant differences was found agility performance (Z=-2.52, p=0.01) and 10-m sprint performance (Z=-2.53, p=0.01) between the pre-and post-test in control group. There were statistically significant difference between of post-test 10-m sprint performance in experimental and control groups (U=13,0 p=0,04) (Table 7).

Table 7. TheMann Whitney U analysis of post-test sprint, agility, standing long jump and flexibility measurements of experimental and control groups

		$\bar{X}$	Ss	U	p
Flexibility	Experimental	22.75	8.05		
	Control	19.38	0.24	27,0	0,60
Standing long jump	Experimental	1.80	0.28		
	Control	1.74	0.33	27,0	0,60
Agility	Experimental	8.70	0.7		
	Control	9.00	0.26	21,0	0,25
10-m Sprint	Experimental	2.07	0.13		
	Control	2.22	0.13	13,0	0.04*
20-m Sprint	Experimental	3.53	3.53		
	Control	3.80	0.25	14,50	0,07

*p<0.05

Discussion

The purpose of this study is to investigate the effects of teaching core exercises on some motoric properties in young soccer players. There is no significant difference was found in any of the variables of pre-test values of the groups. At the beginning of the study, groups divided into the homogeneous. The experimental group showed 11.62%, 6.8%, 7.5%, 3% improvement in standing long jump, agility, 10-m sprint performance and 20-m sprint performance (respectively).A significant differences was found agility performance, standing long jump, 10-m sprint performance and 20-m sprint performance between the pre-and post-test in experimental group.

As examined the researches related to core training, a study by Nesser et al. (2008), which investigates the relations among core stability, strength, and power of the 1. League American soccer players, shows that there is some significant correlations among vertical jump leap, 10 yard shuttle running test, agility (pro-agility), power clean test values, and core stability values. In a similar study conducted on young players, besides of regular training program the implementation of core exercises has been reported to cause positive changes to the players' performance levels of 10 and 20 m (Prieska et al., 2015).Mendeş (2016)'s in a study done, 6 weeks of core training program was investigated the effect on anaerobic power, speed and agility in soccer and the end of the study, the players was observed to 10 m and 20 m sprint performance value significant changes as compared to the week however ıt wasn't observe to anaerobic power and agility performance a significant changes.

For young players, learning the correct physical techniques and executing them with confidence during game time is crucial for long term success and enjoyment in their game. Understandably this can be a very challenging process for some young players, particularly given the inconsistencies related to growth-maturity within these prime player development years. Among 11 to 15 year old players, physical core training and motoric capabilities, especially strength development is important. The coaches also plays a key role in assessing, supportingandteachingplayerswithspecialtheoricalandpracticeneeds in core training. Coaches have to use visual demonstrations during core training. Coaches use words and phrases that are easily understood and repeated practice is needed for players to master skills (muscular strength, endurance, speed, agility, quickness, and flexibility).Motor skills can be improved by core exercises. Improved core stability can translate into improved speed, balance and agility. This is because players with enhanced core stability means are able to apply force more efficiently when running and jumping, generate more power when kicking a ball, and stand up better when being tackled. The age span 12-15 years is characterized as the second phase of running speed development (Rowland, 2005; Reilly et al., 2000). The improvement in sprint performance is related to the maturation of the neural system and improved muscle/neural coordination, in addition to the increase in muscle mass.

In our study, a significant differences was found agility performance and 10-m sprint performance between the pre-and post-test in control group. There were statistically significant difference between of post-test 10-m sprint performance in experimental and control groups. Experienced conditioning coaches demonstrated proper exercise technique throughout the study period in experimental groups. Coaches consistently encouraged the subjects to maintain proper technique performance. Explainations on the correct teaching of the core training techniques and the attainments to be achieved during these exercises were provided. If a player fatigued and could not perform an exercise correctly, the exercise was stopped. The subjects located in control group were asked to continue their normal training and any additional program was not applied. Control group wasn't provided with the explainations on the correct teaching of core training techniques and the attainments to be achieved. In our findings, it is possible to say that giving explanations is important during proper technical teaching in young soccer players.

Sprint, acceleration, and agility are among the most important performance variables in youth soccer (Gil et al., 2007; Castagna 2003). Youth soccer players who are advanced in age and/or maturation have shown better performance in field tests in 10 m and 40 m sprint (Buchheit and Mendez, 2014; le Gall et al., 2010). However, there are limited data about sprint and agility performances, and there is a lack of results for distances shorter than 30 m (Papaiakovou et al., 2009).It is possible to conclude that the core strength training may contribute to the speed performance. However, it would not be sufficient to consider only core strength training for anaerobic power and agility measurements. The relationship between linear sprinting and agility performance have been examined by few studies (Little and Williams, 2005; Paoule et al., 2000; Vescovi and McGuigan, 2008). A correlation was reported between zigzag test performance and 37 m sprint times in a group of college-aged women by Paoule et al. (2000). In contrast, Little and Williams (2005) found a weak correlation between acceleration (10 m) and maximum speed in a zigzag agility test in a group of professional male soccer players. The association between agility and speed increases with longer distances and when examining agility with flying sprint times (Vescovi and McGuigan, 2008).Furthermore, Weineck (2004) suggested that agility along with quickness and speed represent the most significant motor ability of a soccer player. An interesting finding is that the variable forearm circumference has a positive effect on the expression of the agility test zigzag agility drill.

High-intensity movements during soccer games can be categorized into actions requiring rapid acceleration (10-m sprint), actions at maximum speed (30-m sprint), or actions requiring agility (Little and Williams, 2005). Jones et al(2009) suggest that, at early stages of athlete development, a basic improvement in sprint may lead to an improvement in agility performance. Agility is a key requirement for optimal performance in many sports and one of the most discriminating factors among young soccer players (Oliver et al., 2013; Reilly et al., 2000). The peak rate of development of agility performance occurs at approximately the age of 13-14 years in male youths. These results are supported by previous reports among young males aged 10-14 years (Pettersen and Mathisen, 2012; Jakovljevicet al., 2012; Mathisen and Pettersen, 2015).

Core trainings have been widely used by trainers recently in order to improve game performance of soccer players. Core strength training was emphasized to benefit lower extremity strength balance in young football players in the case of application in addition to the basic training (DeloLucano et al., 2015). In a similar study, 9-week core exercises applied additionally to the trainings was informed to contribute positively to 10-20-meter sprint performance (Prieska et al., 2015). It was reported that 12-week core trainings applied to 16-age group football players on 20-m speed parameter, 12-week combined strength and power trainings of U-14 young football players on 10-m and 30-m sprint times (Wong et al., 2010) and 6-week static core exercises on 20-m sprint performance (Kelly et al., 2011) made a positive contribution. The obtained results showed a significant effect of core stability exercises on the performance of athletes.

In conclusion, it was observed that teaching core exercises implemented on young soccer players brought about significant improvement on parameters of standing long jump, agility, 10-m sprint and 20-m sprint performance. The necessary motor skills can be improved by core exercises and a football coach who teaches his or her players correct techniques using and executing these exercises in their training programs.

The data are reported as means and standard deviations. Mann Whitney U test for paired comparison of the groups and Wilcoxcon test for the comparison of pre- and post-tests of the groups were used. All analysis was executed in SPSS for Windows version 17.0 and the statistical significance was set at $p < 0.05$.

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