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Investigation of the effects of core workouts on selected biomotor and branch specific techniques in 9-10 years aged male handball athletes

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ABSTRACT

The aim of the study is to examine the effects of core training in 9-10 years aged male handball players on selected biomotor and techniques special to the branch. This research is an experimental study in the screening model. The study consists of a total of 26 male volunteer students, including the experimental (n=13) and Control (N=13) group. The data of the study was uploaded to the SPSS program and measured by the Shapiro-Wilk test, Independed Sample T test, Paired Sample t test for normality tests. The level of significance was adopted as α=0.05. The core training has been applied to the experiment group for 25 to 30 min three days a week at the same time for 8 weeks with their own body weights along with handball training whereas only the handball training has just been applied to the control group without any extra work and they have continued to their daily life. Before the study, the pretest measurements of physical (height, weight, bki), biomotor (vertical vault, flexibility, back-leg strength, 20 m speed, balance, agility, clutch power) and the techniques peculiar to the branch (dribbling, quick pass, point shooting) have been taken in the experiment and control groups. According to the pretest measurements, it has been detected that both groups have homogeneous pattern ($p > 0.005$). As a result of the pretest-posttest measurements in the experiment group, statistically remarkable difference has been detected in the parameters of vertical vault (p=0.000*), flexibility (p=0.000*), 20 m speed (p=0.000*), balance (p=0.000*), right hand clutch power (p=0.000*), agility (p=0.000*), back-leg strength (p=0.000*), dribbling (p=0.000*), quick pass is (p=0.000*), and point shooting (p=0.000*). However, statistically significant difference hasn't been detected in the parameter of left hand grasping power ($p > 0.005$). The reason of the difference can be thought that players have used their dominant (right) hand. The core training that has been applied with their own body weights along with handball training for 8 weeks has provided positive improvements on measured biomotor and techniques special to the branch of the handball players.

Keywords: Handball, training, core, physical performance, body mass index.

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INTRODUCTION

Sport is of utmost importance in terms of gaining physical, social, physiological, spiritual and personality for children in the age of growth and development.

Today, as in all sports branches, sports scientists and coaches do many researches on performance development in handball. Purpose in sports is to reach high efficiency level in a short time in a correct and planned way. These developments have created a change in performance and related development in handball athletes as in many sports branches.

Handball, which is a contest struggling (fighting) game, is played according to the principles of fast playing and making very little decisions and fast decisions. Handball, an Olympic team sport, has taken its place in the Olympics with competitions covering the world, continent, big club championships and international tournaments played worldwide since the 1972 Munich games. Handball contributes to the acquisition of features such

as strength, coordination, speed and flexibility, among the motoric features that have an important place in sports, as well as the power of willpower, collective thinking, independence, courage and perseverance (Ghobadi et al., 2013).

In handball, the distribution of the biomotor skills of the athletes such as approximately 10% general strength, 25% speed, 15% flexibility, 15% endurance, 15% coordination, 20% special jump-and-throw is specified numerically (Karadenizli and Karacabey, 2002). The word core is the concept with the meanings of core, central and main region. Core muscles, in the equilibrium position of the body, constitute the parts in the central center region in order to reveal the necessary power ability, and play a bridge between the upper and lower limbs (Gündüz, 1995).

The core is made up of the muscles surrounding the lumbopelvic region. These muscles are directly or indirectly attached to the lower, upper extremities and the spine. The core is made up of approximately 29 different muscles, and these muscles are essentially wrapped around the body in the area between the hip and rib cage. This area connects the upper and lower body so that it functions alone (Nadler et al., 2002). Core strength is the certain resistance of muscle groups in the core region during sports activities. Core strength is that these muscle groups show resistance against this sustainability (Bilgin, 2017). Core training is called the work done to strengthen muscle groups by maintaining body balance by using its own body weight and material (Riewald, 2003).

Considering the main meaning, it is seen that the core training practices on handball players are very limited compared to other branches. Especially in our country, the number of studies examining the effects of core training on physical, motor and technical performance in handball players is very limited. In this study, it was aimed to examine the effects of the core training model applied to handball players on handball players on selected biomotor features and the techniques specific to the branch to pass and shot rate, and this study will contribute positively to the literature since there are almost none in handball branch. From this point of view, this study, which we have carried out, will be an important contribution to the literature, it will provide sportsmen, researchers in this field, will be a resource for new people, new results, new information, new perspectives, and will provide insight to handball and other sports branch coaches. I think there is a fact of working.

MATERIALS AND METHODS

Research model, universe and sample (exampling)

Experimental research model with pretest and posttest control groups was used in the study. In addition to handball training, core training was applied to the experimental group for 8 weeks. The control group, on the other hand, continued its daily life with only handball training and without additional work. The parameters obtained between the study and control groups were interpreted as pretest and posttest. 96 handball licensed athletes constitute the universe of the research. A total of 26 male students, 9-10 years of age with a handball sport history at the school, who were educated in the fourth and fifth grades, 13 of them were experimental and 13 of them were the control group. When alpha = 0.05 and 1-ß (power) = 0.80 in the power analysis performed, the experimental group's branch-specific (shot) score in the experimental group was determined in determining the effect of core training on selected biomotor and branch-specific techniques in male handball athletes. It was calculated that at least 12 subjects from each group should be taken in order for the average difference to be 2 points. Necessary permissions were obtained from both the parents and the institution of the athletes participating in the study.

Training protocol

The training program consists of a total of 26 male athletes aged 9-10, 13 experimental and 13 control groups. The total duration of a workout is 80 min. Athletes trained 3 days a week (Monday-Wednesday-Friday) at the same time for 8 weeks. The athletes in the experimental group of 13 people were predetermined with their own body weights for 25 to 30 min within a total of 80 min of training hours; Prone Plank, Reverse Crunch, Bird Dog, Pres-Up, Flutter Kick, Superman, Slide Board Mountain Climber 7 static and dynamic core exercises were applied. Core movements with body weight; the core exercises are 2 sets from easy to difficult, 20 to 30 s repeated, the principle of complete rest between repetitions, rest between sets is applied as 2 to 3 min. Different alternative movements, which operate the front, side and back muscles of the trunk and abdominal region of the plank position, which is the basic movement of core training, have been implemented by creating a station. On the other hand, the 13-person control group has continued the pre-determined handball training. Except for the training done for the athletes, they were told that they should not engage in activities that could physically tire themselves or spend too much effort, and they should have a very good rest. Before the training and experimental group started, and after 8 weeks, 2 measurements were made as pretest and posttest.

While creating core training program in this research, it was prepared based on Jeffrey M. Willardson's book "Core Development" from the National Strength and Conditioning Association (NSCA) "Sports Performance Series" books (Willardson, 2018).

Collection of data

The athletes participating in the study were shown in general both theoretically and practically about what should be done and what should not be done before, during and after the test. The characteristics of the measurements to be applied in the pretest and posttest to the athletes are given in Table 1. Measurements were made on the rest days of athlete students.

Dribbling applied specific to the branch, pass and pointed shoouting skill tests scoring scales; it was rated as very bad, bad, medium, good and very good (Mülazımoğlu, 2007).

RESULTS

When Table 2 is examined, there was no statistically significant difference between the experimental and control groups ($p > 0.05$).

When Table 3 is examined, there was no statistically significant difference between the experimental and control groups in height, kg, bki, vertical jump, 20 m surat, claw (right-left hand) force, back-leg force and dribbling parameters ($p > 0.05$). There was a significant difference between flexibility, right and left foot balance, agility, fast passing and hit shots parameters ($p < 0.05$).

When Table 4 is examined; in the experimental group pre- and post-test measurements, a significant difference was determined between vertical jump, flexibility, 20 m speed, right and left foot balance, agility, right hand claw force, back-leg strength, dribbling, fast passing and hit shots parameters ($p < 0.05$). No statistically significant difference was detected in left hand claw force parameter ($p > 0.05$).

When Table 5 is examined; there was a significant difference between the pretest and posttest measurements of the control group between the parameters of flexibility, 20 m surate, right and left foot balance, agility, right hand claw force, dribbling, fast passing and hit shots ($p < 0.05$). There was no significant difference between vertical jump, left hand paw and back-leg strength parameters ($p > 0.05$).

Table 1. Characteristics of the measurements.

Physical and anthropometric tests	Performance tests	Branch specific skill tests
Age	Vertical splash measurement	Dribbling
Height	Hand (claw) force measurement	Pass shot
Body weight	Solve flamingo balance test	Point shooting
Determination of body composition	Agility test	
	Back-leg force measurement	
	Flexibility measurement	
	20 meter speed measurement	

DISCUSSION

With the increasing need for sports, the need for exercise is increasing day by day in the light of the studies and researches in which science is progressing rapidly. When we look at the main point, it is seen that core training studies on handball branch are very limited.

This study aimed to examine the effects of the core training model applied to handball players on selected biomotor features and branch-specific techniques in handball players. Movement series, especially performed in core training, are suitable for the age and readiness levels of the athletes and are made with their own body weights without using any materials. Within the scope of the studies to be carried out, core exercises should be performed with correct and athletic training models. Exercises performed at the right angles work out the desired muscle groups. Therefore, the strong core region protects the spine and ensures the body to be smooth (Mcgıll, 2010).

As a result of the studies, in the experimental and control groups; there was no significant difference in height, weight and BMI variables ($p > 0.05$). When the pre- and post-test measurement results of the athletes participating in the research are analyzed, statistically in vertical jump, flexibility, speed, balance (right-left foot), agility, right hand claw force, back and leg strength, dribbling, rust and shot shot variables. There was a significant difference ($p < 0.05$). There was no significant difference in only left hand paw force variable ($p < 0.05$). The reason for this is that it can be said that the athletes in the experimental group were due to using their right hand as the dominant hand. Considering the pretest and posttest measurement results of the control group athletes; There was a statistically significant difference in flexibility, speed, balance (right-left foot), agility, right hand claw force, dribbling, pass and short shots ($p < 0.05$). Considering these values, it can be said that there are differences due to the continuous jump movements, speed and quickness exercises, fast return exercises and

Table 2. Comparison of pretest measurements of physical, biomotor and branch specific techniques of experimental and control croups.

Variable	Group	N	X̄	SS	T-test	P
Height (cm)	Experiment	13	139.76	6.58	-1.480	0.152
	Control	13	143.07	4.64		
Weight (kg)	Experiment	13	37.38	7.83	-1.518	0.142
	Control	13	42.38	8.92		
BMI	Experiment	13	17.56	3.54	-1.948	0.063
	Control	13	20.32	3.67		
Vertical jump (cm)	Experiment	13	38.88	8.83	-1.819	0.081
	Control	13	44.94	8.14		
Flexibility (cm)	Experiment	13	16.84	3.64	-1.750	0.093
	Control	13	13.69	5.37		
20 m speed (sec)	Experiment	13	4.38	.342	-.746	0.463
	Control	13	4.47	.280		
Balance Right Foot	Experiment	13	11.23	3.49	-1.202	0.240
	Control	13	12.92	3.68		
Balance Left Foot	Experiment	13	10.69	5.96	-1.225	0.240
	Control	13	14.30	4.57		
Agility (sec)	Experiment	13	16.14	1.01	-1.953	0.063
	Control	13	16.92	1.01		
Claw Right Hand	Experiment	13	14.88	3.66	-.160	0.874
	Control	13	15.09	2.90		
Claw Left Hand	Experiment	13	13.67	4.04	-1.231	0.230
	Control	13	15.53	3.62		
Back-Leg	Experiment	13	40.38	10.50	.496	0.624
	Control	13	38.46	9.21		
Dribbling (sec)	Experiment	13	13.81	2.01	-.402	0.691
	Control	13	14.13	2.08		
Fast Pass	Experiment	13	17.38	3.20	-1.518	0.142
	Control	13	15.69	2.85		
Shots on Target	Experiment	13	5.84	0.688	1.336	0.194
	Control	13	5.46	0.776		

(P < 0.05 *), N: Number of people, BMI: Body Mass Index, X̄: Arithmetic Mean, SD: Standard Deviation, Sn: Seconds, Hs: Number of Errors, Cm: Centimeter, Kg: Kilogram, M. Meter.

ball exercises in handball training. There was no significant difference in the vertical jump, back and leg strength and left hand paw strength variables of the control group athletes ($p < 0.05$).

In addition, when the "mean differences" are examined, the experimental group is at the highest level desired as

Table 3. Comparison of pre and post-tests of experimental group biomotor and branch specific technical measurements.

Variable	Group	N	X̄	SS	T-test	P
Height (cm)	Experiment	13	140.92	140.92	-1.325	0.198
	Control	13	143.92	143.92		
Weight (kg)	Experiment	13	37.76	7.73	-1.668	0.108
	Control	13	43.38	9.35		
BMI	Experiment	13	17.46	3.43	-1.963	0.061
	Control	13	20.16	3.55		
Vertical Jump (cm)	Experiment	13	42.48	9.54	-0.810	0.426
	Control	13	45.33	8.35		
Flexibility (cm)	Experiment	13	19.69	3.56	2.678	0.013*
	Control	13	14.53	5.95		
20 m Speed (sec)	Experiment	13	4.24	0.35	1.156	0.259
	Control	13	4.39	0.28		
Balance Right Foot	Experiment	13	7.23	3.56	-3.282	0.003*
	Control	13	11.23	4.00		
Balance Left Foot	Experiment	13	9.00	4.69	-2.319	0.029*
	Control	13	13.46	5.10		
Agility (sec)	Experiment	13	15.27	1.07	-2.385	0.025*
	Control	13	16.30	1.13		
Claw Right Hand	Experiment	13	16.29	3.85	-0.383	0.705
	Control	13	16.80	2.81		
Claw Left Hand	Experiment	13	13.96	4.35	-1.186	0.247
	Control	13	15.82	3.61		
Back-Leg	Experiment	13	47.30	12.35	1.725	0.97
	Control	13	39.61	10.29		
Dribbling (sec)	Experiment	13	12.63	2.08	-1.041	0.308
	Control	13	13.45	1.94		
Fast Pass	Experiment	13	23.00	3.26	3.627	0.001*
	Control	13	18.76	2.65		
Shots on Target	Experiment	13	7.92	0.64	3.357	0.003*
	Control	13	6.92	0.86		

($p < 0.05$*), N: Number of people, BMI: Body Mass Index, X̄: Arithmetic Mean, SD: Standard Deviation, Sn: Seconds, Hs: Number of Errors, Cm: Centimeter, Kg: Kilogram, M: Meter.

numerical data compared to the control group. When looking at the numerical values of the data statistically, it can be said that core exercises performed in the experimental group are very important, and the core

Table 4. Comparison of pre and post-tests of experimental group biomotor and branch specific technical measurements.

Variable	Group	N	X̄	SS	Averages difference between	T-test	P
Vertical Jump (cm)	Pre test	13	38.88	8.83	4.40	-13.923	0.000*
	Post test	13	42.48	9.54			
Flexibility (cm)	Pre test	13	16.84	3.64	2.85	-14.900	0.000*
	Post test	13	19.69	3.56			
20 m Speed (sec)	Pre test	13	4.38	0.34	0.14	-7.436	0.000*
	Post test	13	4.24	0.35			
Balance Right Foot	Pre test	13	11.23	3.49	4	13.352	0.000*
	Post test	13	7.23	3.56			
Balance Left Foot	Pre test	13	12.07	4.71	3.07	14.606	0.000*
	Post test	13	9.00	4.69			
Agility (sec)	Pre test	13	16.14	1.01	0.87	14.519	0.000*
	Post test	13	15.27	1.07			
Claw Right Hand	Pre test	13	14.88	3.66	1.41	-20.589	0.000*
	Post test	13	16.29	3.85			
Claw Left Hand	Pre test	13	13.67	4.04	0.29	-2.047	0.063
	Post test	13	13.96	4.35			
Back-Leg	Pre test	13	40.38	10.50	6.92	-9.859	0.000*
	Post test	13	47.30	12.35			
Dribbling (sec)	Pre test	13	13.81	2.01	1.18	25.489	0.000*
	Post test	13	12.63	2.08			
Fast Pass	Pre test	13	17.38	3.20	5.62	-15.277	0.000*
	Post test	13	23.00	3.26			
Shots On Target	Pre test	13	5.84	0.68	2.08	-15.173	0.000*
	Post test	13	7.92	0.64			

(P < 0.05*), N: Number of people, BMI: Body Mass Index, X̄: Arithmetic Mean, SS: Standard Deviation, Sn: Seconds, Hs: Number of Errors, Cm: Centimeter, Kg: Kilogram; M: Meter.

training performed with their own body weights is beneficial.

Looking at the main point, it has been reported that core training contributes positively to vertical jump performance (Sato and Mokha, 2009), balance development (Aggarwal et al., 2010; Balaji and Murugavel, 2013) and performances. It has been stated that football players develop more positively with the speed performance they need during the match and the central zone training that has been applied (İmai et al., 2014). Sekendiz et al. (2010) reported that balance parameters can be improved with core training applied to sedentary individuals and athletes. In Urlu's study of 10-12 age group children investigating the physical activity levels, he did not find a significant difference in height variable as in our study (Urlu, 2014).

Gunay, in his study on swimmers with the same age groups, found a significant difference between the research group and the control group. As a result of the study, when there is a statistically significant difference between the motor parameter values between the groups, it supports the main point (Gunay, 2007). Afyon (2014) reported that the selected biomotor abilities showed statistically significant differences as a result of

Table 5. Comparison of preliminary and post-tests of control group biomotor and branch specific technical measurements.

Variable	Group	N	X̄	SS	Averages difference between	T-test	P
Vertical Jump (cm)	Pre test	13	44.94	8.14	0.39	-2.065	0.61
	Post test	13	45.33	8.35			
Flexibility (cm)	Pre test	13	13.69	5.37	0.84	-3.395	0.005*
	Post test	13	14.53	5.95			
Speed (sec)	Pre test	13	4.47	0.28	0.08	15.057	0.000*
	Post test	13	4.39	0.28			
Balance Right Foot	Pre test	13	12.92	3.68	1.69	6.441	0.000*
	Post test	13	11.23	4.00			
Balance Left Foot	Pre test	13	14.30	4.57	0.84	2.856	0.014*
	Post test	13	13.46	5.10			
Agility (sec)	Pre test	13	16.92	1.01	0.62	7.223	0.000*
	Post Test	13	16.30	1.13			
Claw Right Hand	Pre test	13	15.09	2.90	1.71	-26.889	0.000*
	Post test	13	16.80	2.81			
Claw Left Hand	Pre test	13	15.53	3.62	0.29	-1.512	0.156
	Post test	13	15.82	3.61			
Back-Leg	Pre test	13	38.46	9.21	1.15	-1.000	0.337
	Post test	13	39.61	10.29			
Dribbling (sec)	Pre test	13	14.13	2.08	0.68	4.714	0.001*
	Post test	13	13.45	1.94			
Fast Pass	Pre test	13	15.69	2.42	3.07	-8.402	0.000*
	Post test	13	18.76	2.65			
Shots On Target	Pre test	13	5.46	0.77	1.46	-7.982	0.000*
	Post test	13	6.92	0.86			

(P < 0.05*), N: Number of people, BMI: Body Mass Index, X̄: Arithmetic Mean, SD: Standard Deviation, Sn: Seconds, Hs: Number of Errors, Cm: Centimeter, Kg: Kilogram, M: Meter.

core training on young athletes.

In our study, as a result of the core training applied in addition to handball training, it was reported that the biomotor abilities also improved in child handball athletes. These results support the studies in the main point (the main understanding) (Koz and Ersöz, 2010). The core region must be strong in order to prevent sports injuries, control and balance of the body and the posture to be smooth. It is used both to improve muscular endurance and to measure muscular endurance on the basis of the plate movement, which is a static posture posture (Handzel, 2003). Many plank movements that we use in our core work confirm the exercises we do to this extent. Core strength exercises in addition to swimming training have been shown to improve motoric features and swimming performances (Boyacı, 2016).

When main review is made in the field of sports activities, it is seen that there are numerous scientific studies. However, core exercise exercises on handball are very limited. The main goal and starting point in this study is that the core studies in the handball branch are almost non-existent, and by applying the training methods according to both the branch and the age groups of the children, applying the core exercise

exercises in a proper and planned manner and in accordance with the training objectives, It is aimed to contribute to the development of many biomotor properties and to carry the performance development to the upper levels.

As a result, the core training applied to male handball athletes aged 9-10 years has a statistically significant performance in vertical bounce, speed, flexibility, right hand claw strength, balance, agility, back-leg strength, dribbling, fast passing and shot shooting performances, caused an increase. There was no statistically significant increase in "left hand claw force" performance alone. In the control group, a significant difference was found between the parameters of flexibility, 20 m surat, balance, agility, right hand claw force, dribbling, fast passing and shot shots. No significant difference was found between vertical jump, left hand paw and back-leg strength parameters.

When the statistical data are compared at the end of the studies, it can be said that the experimental group athletes performing core force studies are statistically superior in all parameters by numerical data compared to the control group athletes.

Handball is used as a training model and is used as a training model, where the athletes perform meaningful improvements in performance parameters such as anaerobic power, balance, back leg strength and agility when it is applied correctly and planned in line with the desired goals and objectives related to core exercises applied to handball athletes. It shows that it is an effective form of training. However, it can be said that it has an effect on other parameters such as flexibility, speed, hand claw force. I think that our study will be a resource for individuals who will do research in this field, that it will provide new information and documents, new perspectives and new results, an important contribution to the main point for scientific studies, and presentations to coaches in all sports branches.

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