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THE EFFECT OF TRAINING PROGRAMS APPLIED TO FENCING ATHLETES ON BALANCE AND REACTION LEVEL

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ABSTRACT

Fencing is a complex sport in which bio-motoric and cognitive features are at a high level, and attention, focus, balance and coordination skills are kept at the forefront. In fencing, a high level of reaction time, quick decision making and skills such as balance are needed in order to understand the opponent's move and to counterattack. While the reaction time is directly related to the decision-making speed of the individual, balance in fencing is related to maintaining the body position while in motion. Bio-motor skills such as reaction time and balance are important for fencing athletes to reach high performance. In line with this information, the aim of the study is to examine the effects of the training programs applied to the fencing athletes on the level of balance and reaction. In the study, 41.7% female and 58.3% male fencing participants with a mean age of 8.16±.577 were included in the experimental group, and the control group included a total of 24 participants, 50% female and 50% male, with a mean age of 8.16±.389 years. "Personal Information Form", "Body Composition Measurement", "Reaction Time Measurement" and "Balance Measurement" were used as data collection tools in the research. Study data were analyzed with the Descriptive Sample T Test for intra-group pre-post-test comparisons, and the Independent Sample T Test for pre-post-test comparisons between groups. As a result, while fencing training positively affected the reaction time, static and dynamic balance pretest and posttest results of the experimental group, it did not cause a significant difference in the control group. At the same time, significant differences were determined between the reaction time, static and dynamic balance pretest and posttest results between the experimental and control groups.

Keywords: Reaction time, balance, Fencing training.

INTRODUCTION

Sports is a phenomenon that contributes to the physical, mental, spiritual and social development of the individual and is very important especially for children in the developmental age. However, sports have a great role in group work, development of the spirit of solidarity, socialization of the individual and gaining a place in the society (Çolakoğlu et al., 2020). Today, sports attract the attention of many people as a great social dynamic and appear as a structured game in the childhood of human life (Turan et al., 2022). Sport, which has taken an important place in the minds of individuals since childhood, has become a phenomenon that spreads to large masses and affects the whole universe we live in, causing a huge economic environment, and this has brought with it a constantly developing and struggle (Kalkan & Zekioğlu, 2017).

Fencing, which is a combat sport in which attention, focus, balance and coordination skills are prioritized, is a defense art. In addition to being a sport based on physical strength, it is a sport that develops intelligence in which mental activities are mostly involved. Fencing is a martial art that displays the perfect harmony of grace, strategy and skill. Fencing, which has its origins in the medieval period, has developed in different regions over time and has various styles and techniques (Smith, 2010). Fencing has been played in various ways in different societies throughout the historical ages and it was seen for the first time in an international sports organization by taking part in the Athens Olympic Games held in 1896 (Sütbakan, 2010).

In fencing, hits made in 3 different branches are used as “epee, foil and saber”. The guard position is a squat position with the feet shoulder-width apart and perpendicular to each other (Gümüş et al., 2020). Due to their nature, epee and foil are time-dependent and additional times may be needed, but saber is a more dynamic and offensive branch. These features add movements such as fast and long attacks and dynamic change of direction along the piste (Aquili et al., 2013).

In fencing competitions, electronic devices called "apparatus" are used that show the time, the number of keys and whether the keys are made in the valid area. These devices have a total of four lamps, green (1), red (1) and white (2). Colored lamps show the keys to the valid area, and white lamps indicate the keys to the invalid area. All matches are moderated by the referee. In line with the decisions made by the referee, the points won are reflected on the apparatus. In the pool matches, the fencer who reaches 5 keys first or finishes 3 minutes ahead wins the match in the U14, U17, junior and senior classifications, while in the qualifying matches, the fencer who reaches 15 keys earlier or completes the 9-minute match period consisting of 3 periods wins the match (Ilıkkan, 2021).

The aim of the fencing sport, which is based on defense and attack, is to eliminate the opponent's attacks, to press against the counter attack, and to make contact with the opponent's body with the weapon. The techniques in fencing, which is an asymmetrical sport, are basically in the form of attack and defense (Baş et al., 2021). While fencing focuses on the ability to use defense and attack together, it also contributes to the development of mental focus, reflex development and strategic thinking skills (Ziemke & Herold, 2014).

As in different sports branches, technical, tactical and mental factors are also important in fencing, as well as motoric features. In order to bring the body, which is quite heavy in the whole lunge, forward, bring it back and repeat it, it is necessary to do great muscle work (Çınar, 2019). In addition, fencing is a skill sport that requires the synchronized application of effective game strategies and body movements. Some motoric features such as agility, explosiveness and anaerobic endurance are also of great importance in the branch (Böge et al., 2022). Fencing is a branch that includes explosive attack movements, helps recovery with low-intensity movements, and is generally dominated by alactic anaerobic metabolism. There is significant asymmetry in the lower and upper extremities (Roi & Pittaluga, 1997). Moves and changes of direction occupy an important place in fencing. In addition, strength and power support these features (Turner et al., 2014). The physical demands of fencing competitions are high, involving aerobic and anaerobic alactic and lactic metabolisms, but also influenced by age, gender, training level. The anthropometric characteristics of fencers show a typical asymmetry of the legs as a result of practicing asymmetrical sports activity. Fencing causes typical functional asymmetry, which highlights that the sport of fencing requires a high level of specific function, strength and control (Altinok, 2011).

The study investigating the effect of fencing on balance and reaction is limited in the literature. For this reason, there are regressions in attention, focus and basic motor skills, especially during the development of technology and the pandemic that we have survived. For this reason, it is very important that children are directed to sports branches that require focus and attention, especially fencing. The aim of this study is to investigate the effects of training applied to fencing athletes on the level of balance and reaction.

METHOD

Research Model

Approval was obtained for the conduct of the research with the 2023/4 Faculty Ethics Committee Decision dated 25.04.2023 and numbered 050.02.04-2300134107 of Atatürk University Faculty of Sport Sciences. In the study, the comparison model used in quantitative research was used. This model is applied to determine the causes or affecting factors of an existing phenomenon and it is aimed to reveal the relationship between the variables by comparing the groups that change according to different variables (Sayım, 2017).

Universe and Sample

The sample of the study consisted of individuals who did not have any health problems, did not use regular medication and nutritional support, and voluntarily agreed to participate in the study. The criteria for exclusion from the study were: a) not acting in accordance with the training program, b) being injured while applying the training program, c) having heart and respiratory system diseases. In the study, 41.7% female and 58.3% male participants, whose mean age is 8.16±.577, weight is 27.16± 6.01, and height is 129.33±7.38 participated in the experimental group, while in the control group, there are a total of 24 participants, 50% female and 50% male, with a mean age of 8.16±.389, weight 27.33±3.33 and height 130.50±6.52.

Data Collection

The students who participated in the tests were informed about the tests and it was stated that they were on a voluntary basis. Information on test applications and voluntary participation consent forms were signed. Before starting the study, the students' height and body weight, flamingo balance test, star balance test and simple motor reaction test were taken. While the experimental group was given activities to improve their fencing skills 3 days a week during the 8-week period, no activity was done to the control group. At the end of 8 weeks, the final measurement of the students in the experimental group who received fencing training and the control group students who did not receive any training was taken. The students who participated during the tests warmed up for 15 minutes with the same warm-up procedures, accompanied by the coaches, before the group tests were applied. In order to participate in the study, the students were asked to go to the toilet 30 minutes before the test, not to consume solid and heavy food for 3 hours before the test, and not to do intense training for 12 hours before the test.

Data Collection Tools

"Personal Information Form", "Body Composition Measurement", "Reaction Time Measurement" and "Balance Measurement" were used as data collection tools in the research.

Personal Information Form

It is created by researchers to collect identifying information such as age, height, weight, gender.

Body Composition Measurement

A measuring tape was used to determine the height. The body weights of the participants were obtained with a scale with a precision of 0.1 kg.

Reaction Time Measurement

The simple motor reaction times of the participants were evaluated with the Human Benchmark computer test. The Human Benchmark test consists of 5 replicates/2 trials and the arithmetic average of the times obtained for each trial was recorded.

Balance Measurement

The star balance test was used to gauge the participants' dynamic balance. Assessing balance and stance control is the goal of this test. The lower extremity is tested, which is done in eight different directions. Range of motion, strength, and control of posture are assessed during this test. With one leg balanced (fixed) with the other in 45 degree increments from the center of the circle, the participant attempts to reach the points in eight different directions while standing in the center of the star. Reaching distances are measured on both legs (Reiman and Robert, 2009).

The flamingo balance test was used to assess each participant's static balance. The test's tools included a stopwatch and a 50 cm long, 4 cm high, and 3 cm wide board. The participant was instructed to stand on the board using the non-dominant foot, lift the other foot off the floor, flex the knee to its fullest position, and grasp the same side hand. The participant was instructed to fixate on an object at eye level for the duration of the measurement. The stopwatch and measurement began as soon as the participants released the trainer's hand from which they had been receiving assistance. When the participants let go of their hand or any part of their body contacted the ground, the timer was stopped. After each disruption of balance, the trainer assisted the participant in getting back into the proper position. Three tests in total were run, and the average result was noted. The number of errors made in a minute was counted and recorded as scoring (Çakır & Özbar, 2019).

Data Analysis

Statistical analysis of the data obtained in the study was analyzed using the SPSS 26.0 package program. The normal distribution assumptions of the data were determined using the Test of Normality, and it was determined that the data showed normal distribution. Descriptive statistics methods were used to determine the means and standard deviations of the age and gender values of the participants, Dependent Sample T test was used for intra-group pre-post test comparisons, and Independent Sample T test was used for pre-post test comparisons between groups. Significance level was accepted as p<05.

FINDINGS

Table 1. Pre-Test and Post-Test Results of the Experimental Group

		N	X̄	Sd	t	p
Body weight	Pre-test	12	27.16	6.01	1.361	.201
	Post-test	12	25.83	3.58		
Height	Pre-test	12	129.33	7.38	-5.933	.000*
	Post-test	12	130.66	7.46		
Reaction	Pre-test	12	422.08	69.68	3.069	.011*
	Post-test	12	381.75	58.07		
Flamingo Balance	Pre-test	12	2.41	1.44	3.463	.005*
	Post-test	12	1.33	1.72		
Anterior Right	Pre-test	12	64.33	9.59	-4.690	.001*
	Post-test	12	69.00	8.00		
Anterolateral Right	Pre-test	12	67.91	8.60	-4.832	.001*
	Post-test	12	73.41	8.63		
Lateral Right	Pre-test	12	69.58	9.08	-4.278	.001*
	Post-test	12	73.83	8.44		
Posterolateral Right	Pre-test	12	65.58	9.78	-1.987	.072
	Post-test	12	69.33	6.78		
Posterior Right	Pre-test	12	60.00	9.84	-1.682	.121
	Post-test	12	63.41	7.97		
Posteromedial Right	Pre-test	12	54.08	10.14	-5.241	.000*
	Post-test	12	59.41	10.37		
Medial Right	Pre-test	12	45.25	9.24	-2.930	.014*
	Post-test	12	49.25	9.17		
Anteromedial Right	Pre-test	12	60.66	6.77	-3.906	.002*
	Post-test	12	64.91	7.69		
Anterior Left	Pre-test	12	64.25	7.16	-5.451	.000*
	Post-test	12	68.50	7.62		
Anterolateral Left	Pre-test	12	65.91	8.01	-6.321	.000*
	Post-test	12	71.33	6.99		
Lateral Left	Pre-test	12	67.08	10.03	-3.873	.003*
	Post-test	12	72.08	6.74		
Posterolateral Left	Pre-test	12	67.66	12.11	-3.272	.007*
	Post-test	12	71.16	12.06		
Posterior Left	Pre-test	12	60.08	9.89	-6.350	.000*
	Post-test	12	65.83	9.38		

Posteromedial Left	Pre-test	12	50.66	8.65	-3.351	.006*
	Post-test	12	55.25	7.88		
Medial Left	Pre-test	12	44.16	12.71	-2.560	.027*
	Post-test	12	48.33	8.48		
Anteromedial Left	Pre-test	12	60.25	12.39	-.165	.872
	Post-test	12	60.75	8.26		

X: Mean, **Sd:** Standard Deviation, **N:** Number of participants

*; p<0.05

In Table 1, the pre-test and post-test results of the measurements were compared as the experimental group. According to the pre-test and post-test measurements of the experimental group, no significant difference was found between body weight, posterolateral right, posterior right and anteromedial left scores (p>05). A significant difference was found between the measurement scores of height, reaction, flamingo balance, Star balance test anterior right, anterolateral right, lateral right, posteromedial right, medial right, anteromedial right, anterior left, anterolateral left, lateral left, posterolateral left, posterior left, posteromedial left and medial left (p<05).

Table 2. Pre-Test and Post-Test Results of the Control Group

		N	X̄	Sd	t	p
Body weight	Pre-test	12	27.33	3.33	-3.023	.012*
	Post-test	12	37.91	3.52		
Height	Pre-test	12	130.50	6.52	-5.000	.000*
	Post-test	12	131.75	6.78		
Reaction	Pre-test	12	434.91	59.61	-.998	.340
	Post-test	12	447.58	61.40		
Flamingo Balance	Pre-test	12	4.25	3.41	.394	.701
	Post-test	12	4.08	3.14		
Anterior Right	Pre-test	12	65.66	5.28	-.172	.866
	Post-test	12	65.83	4.76		
Anterolateral Right	Pre-test	12	68.66	5.43	.484	.638
	Post-test	12	68.16	3.97		
Lateral Right	Pre-test	12	69.66	6.28	.240	.815
	Post-test	12	69.50	6.12		
Posterolateral Right	Pre-test	12	60.75	9.83	-.581	.573
	Post-test	12	61.33	7.49		
Posterior Right	Pre-test	12	57.83	9.35	.439	.669
	Post-test	12	57.41	9.30		
Posteromedial Right	Pre-test	12	52.91	6.35	1.246	.239
	Post-test	12	48.91	7.79		
Medial Right	Pre-test	12	41.75	4.09	.861	.408
	Post-test	12	40.75	3.38		
Anteromedial Right	Pre-test	12	53.00	5.83	-.705	.495
	Post-test	12	54.50	5.16		
Anterior Left	Pre-test	12	66.00	6.42	-6.751	.000*
	Post-test	12	68.41	6.28		
Anterolateral Left	Pre-test	12	68.50	7.01	-.199	.846
	Post-test	12	68.75	7.32		
Lateral Left	Pre-test	12	66.58	8.15	.333	.745
	Post-test	12	66.33	8.04		
Posterolateral Left	Pre-test	12	63.75	8.60	.553	.591
	Post-test	12	63.33	7.65		
Posterior Left	Pre-test	12	58.00	10.85	1.672	.123
	Post-test	12	55.91	10.19		
Posteromedial Left	Pre-test	12	52.91	6.35	1.462	.172
	Post-test	12	51.41	5.03		
Medial Left	Pre-test	12	42.91	7.73	-.377	.713
	Post-test	12	43.33	7.42		
Anteromedial Left	Pre-test	12	56.66	6.41	.494	.631
	Post-test	12	55.83	7.91		

X: Mean, **Sd:** Standard Deviation, **N:** Number of participants

*; p<0.05

In Table 2, the pre-test and post-test results of the measurements were compared as the control group. According to the pre-test and post-test measurements of the control group, there was no significant difference between the measurement scores of reaction, flamingo balance, star balance test anterior right, anterolateral right, lateral right, posterolateral right, posterior right, posteromedial right, medial right, anteromedial right, anterolateral left, lateral left, posterolateral left, posterior left, posteromedial left, medial left and anteromedial left (p>05). A significant difference was found between body weight, height and star balance anterior left measurement scores (p<05).

Table 3. Pre-Test Results of Experimental and Control Group

		N	X̄	Sd	t	p
Body weight	Experimental group	12	27.16	6.01	-.084	.934
	Control Group	12	27.33	3.33		
Height	Experimental group	12	129.33	7.38	-.410	.686
	Control Group	12	130.50	6.52		
Reaction	Experimental group	12	422.08	69.68	-.485	.633
	Control Group	12	434.91	59.61		
Flamingo Balance	Experimental group	12	2.41	1.44	-1.713	.101
	Control Group	12	4.25	3.41		
Anterior Right	Experimental group	12	64.33	9.59	-.422	.677
	Control Group	12	65.66	5.28		
Anterolateral Right	Experimental group	12	67.91	8.60	-.255	.801
	Control Group	12	68.66	5.43		
Lateral Right	Experimental group	12	69.58	9.08	-.026	.979
	Control Group	12	69.66	6.28		
Posterolateral Right	Experimental group	12	65.58	9.78	1.207	.240
	Control Group	12	60.75	9.83		
Posterior Right	Experimental group	12	60.00	9.84	.533	.586
	Control Group	12	57.83	9.35		
Posteromedial Right	Experimental group	12	54.08	10.14	1.262	.220
	Control Group	12	49.41	7.80		
Medial Right	Experimental group	12	45.25	9.24	1.199	.243
	Control Group	12	41.75	4.09		
Anteromedial Right	Experimental group	12	60.66	6.77	2.972	.007*
	Control Group	12	53.00	5.83		
Anterior Left	Experimental group	12	64.25	7.16	-.630	.535
	Control Group	12	66.00	6.42		
Anterolateral Left	Experimental group	12	65.91	8.01	-.840	.410
	Control Group	12	68.50	7.01		
Lateral Left	Experimental group	12	67.08	10.03	.134	.895
	Control Group	12	66.58	8.15		
Posterolateral Left	Experimental group	12	67.66	12.11	.913	.371
	Control Group	12	63.75	8.60		
Posterior Left	Experimental group	12	60.08	9.89	.491	.628
	Control Group	12	58.00	10.85		
Posteromedial Left	Experimental group	12	50.66	8.65	-.726	.476
	Control Group	12	52.91	6.35		
Medial Left	Experimental group	12	44.16	12.71	.291	.774
	Control Group	12	42.91	7.73		
Anteromedial Left	Experimental group	12	60.25	12.39	.889	.383
	Control Group	12	56.66	6.41		

X: Mean, **Sd:** Standard Deviation, **N:** Number of participants

*; p<0.05

In Table 3, the pre-test results of the measurements as the experimental and control groups were compared. According to the experimental and control group pre-test measurements, there was no significant difference between the measurement scores of body weight, height, reaction, flamingo balance, star balance test anterior right, anterolateral right, lateral right, posterolateral right, posterior right, posteromedial right, medial right, anterior left, anterolateral left, lateral left, posterolateral left, posterior left, posteromedial left, medial left and anteromedial left (p>05). A significant difference was found between the star balance test anteromedial right measurement scores (p<05).

Table 4. Post-Test Results of Experimental and Control Groups

		N	X̄	Sd	t	p
Body weight	Experimental group	12	25.83	3.58	-1.434	.166
	Control Group	12	27.91	3.52		
Height	Experimental group	12	130.66	7.46	-.372	.713
	Control Group	12	131.75	6.78		
Reaction	Experimental group	12	381.75	58.07	-2.698	.013*
	Control Group	12	447.58	61.40		
Flamingo Balance	Experimental group	12	1.33	1.72	-2.655	.014*
	Control Group	12	4.08	3.14		
Anterior Right	Experimental group	12	69.00	8.00	1.178	.251
	Control Group	12	65.83	4.76		
Anterolateral Right	Experimental group	12	73.41	8.63	1.913	.069
	Control Group	12	68.16	3.97		
Lateral Right	Experimental group	12	73.83	8.44	1.439	.164
	Control Group	12	69.50	6.12		
Posterolateral Right	Experimental group	12	69.33	6.78	2.740	.012*
	Control Group	12	31.33	7.49		
Posterior Right	Experimental group	12	63.41	7.97	1.696	.104
	Control Group	12	57.41	9.30		
Posteromedial Right	Experimental group	12	59.41	10.37	2.803	.010*
	Control Group	12	48.91	7.79		
Medial Right	Experimental group	12	49.25	9.17	3.010	.006*
	Control Group	12	40.75	3.38		
Anteromedial Right	Experimental group	12	64.91	7.69	3.895	.001*
	Control Group	12	54.50	5.16		
Anterior Left	Experimental group	12	68.50	7.62	.029	.977
	Control Group	12	68.41	6.28		
Anterolateral Left	Experimental group	12	71.33	6.99	.883	.387
	Control Group	12	68.75	7.32		
Lateral Left	Experimental group	12	72.08	6.74	1.896	.071
	Control Group	12	66.33	8.04		
Posterolateral Left	Experimental group	12	71.16	12.06	1.899	.071
	Control Group	12	63.33	7.65		
Posterior Left	Experimental group	12	65.83	9.38	2.479	.021*
	Control Group	12	55.91	10.19		
Posteromedial Left	Experimental group	12	55.25	7.88	1.419	.170
	Control Group	12	51.41	5.03		
Medial Left	Experimental group	12	48.33	8.48	1.536	.139
	Control Group	12	43.33	7.42		
Anteromedial Left	Experimental group	12	60.75	8.26	1.488	.151
	Control Group	12	55.83	7.91		

X: Mean, **Sd:** Standard Deviation, **N:** Number of participants

*; p<0.05

In Table 4, the post-test results of the measurements as the experimental and control groups were compared. According to the experimental and control group pre-test measurements, no significant difference was found between the measurement scores of body weight, height, star balance test anterior right, anterolateral right, lateral right, posterior right, anterior left, anterolateral left, lateral left, posterolateral left, posteromedial left, medial left and anteromedial left scores (p>05). A significant difference was found between the measurement scores of reaction, flamingo balance, and star balance test posterolateral right, posteromedial right, medial right, anteromedial right and posterior left (p<05).

DISCUSSION AND CONCLUSION

In fencing, it is very important to perceive and respond quickly to opponent movements, offensive and defensive strategies in order to be successful in competitions and compete at elite levels (Gümüş et al., 2020). At the same time, today, sports scientists and technical experts have focused on the determination and development of the optimum physical, physiological and motoric characteristics of fencing athletes required for success (Duvan et al., 2010). Balance disorders can negatively affect performance, deteriorate motor abilities and increase the risk of injury (Paul, 2019). In line with this information, it can be said that biomotor skills such as reaction time and balance are important for fencing athletes to reach high performance. From this point of view, the aim of the study is to investigate the effects of training applied to fencing athletes on balance and reaction time.

According to the results of the research, fencing training had a positive effect on the reaction time of the experimental group on the pre-test and post-test results, but did not cause a significant difference in the control group. When the studies on reaction times in the literature are examined, a significant difference was found in other parameters except balance in the study by Kocahan et al. (2018) on the relationship between anaerobic power, balance measurements and visual response values of the visual response simulation test applied to male and female athletes specific to fencing. When the relationship between the tests is examined, it is assumed that the reaction time will improve with the increase in balance performance (Kocahan et al., 2018). In a study by Johne (2021), it was reported that the fencing symmetry training of the experimental group had a positive effect on the movement time and reaction time metrics (Johne, 2021). In another study, it was determined that a multi-program consisting of a basic fencing training program and a speed training program helped improve the reaction times of 9–12-year-old children who have just started fencing (Torun et al., 2012). In research by Yao (2022), it was determined that the fencers in the experimental group showed significant differences in the selective response to the foot movement after different trainings, while the simple response time of the fencers in the control group improved a little after the training, but it was not statistically significant.

Atan and Akyol (2014) revealed that athletes with high performance levels have better reaction times than other athletes. In a study by Montes et al., (2000), it was reported that the reaction times of the athletes who train are better than those who do not train. In addition, Ando et al. (2001) in a study examining the visual reaction times of football players and non-football players, found that football players had better visual reaction times than non-football players (Ando et al., 2001). These studies show that athletes who train have better reaction times than those who do not train. These findings support the results of the study. These studies show that reaction time can be improved with the help of training and that reaction time plays a decisive role in performance in sports that involve a combination of attention and sudden movements, such as fencing. Reaction time is one of the important elements of neuromuscular performance and it is known to be an important skill accepted as the standard of sports science.

According to the findings of the study, fencing training had a significant effect on the pre-test and post-test results of the static (flamingo) and dynamic (Star) balance of the experimental and control groups. In the literature, there are studies showing that balance performance increases in studies using different training methods. In a study, after 6 weeks of training, the balance scores of the experimental group differed significantly between the pre-test and the post-test, while there was no significant change in the balance scores of the control group (Paul, 2019). Zhou et al (2016) showed that eight weeks of motor function training had positive effects on balance in 24 elite fencing athletes with patellar tendinopathy. In a different study, it was found that there is a positive relationship between balance and leg strength characteristics, and as leg strength increases, balance values increase (Gülaç, 2019). In a study conducted on fencers, shooters and healthy sedentary individuals, it was determined that fencers and shooters provide more effective balance control than sedentary individuals (Herpin et al., 2010). Improved postural ability can also improve athletic performance (Paillard, 2017). It was found that 10-week (BOSU ball) training increased static and dynamic balance and improved fencing performance levels (Aisha, 2016). It is also known that fencing has the potential to improve balance due to posture and foot movements (Gökmen et al., 1995). There were also findings in the literature that contradicted the research findings. In a study examining the effects of plyometric training and resistance training on static and dynamic balance and agility performance in young fencers, no significant difference was found in static and dynamic balance tests (Kosova, 2020). As seen in the literature, studies examining the relationship between fencing training and balance are limited. In this case, it prevents generalization with the existing findings in the literature. Based on this information, it is thought that it is necessary to increase fencing and balance studies.

As a result, fencing training positively affected the reaction time, static and dynamic balance pre-test and post-test results of the experimental group, but did not cause a significant difference in the control group. At the same time, significant differences were found between the experimental and control groups in terms of reaction time, static and dynamic balance pretest and posttest results. The study is limited to the number and performance of the participants. Considering that balance performance positively affects reaction time in line with the findings in the literature, it is recommended to add studies to improve balance and reaction time in trainers' training programs. Through such a program, it is expected that the sportive performance of the fencing branch will increase.

SUGGESTIONS

In the light of the results of the research, the following recommendations can be made to field practitioners and researchers:

- Due to the fact that children spend a lot of time at home due to pandemics and natural disasters in recent years, they should be directed to branches such as fencing etc. for attention and focus.
- Since children who are directed to specific branches such as fencing will progress more quickly at the national team level if they are successful because there is a great demand in team sports such as

football, basketball, and volleyball, it is thought that it will be beneficial for families to direct them to such specific branches.

- Since the fencing branch carries the spirit of high-level discipline, respect for the opponent and Olympics, it will contribute positively to the social and academic development of individuals.
- Directing adults as well as children to fencing will ensure that they stay away from the stress and tense environment caused by the intense work schedule.
- Due to the positive contributions of fencing branch to basic motor skills and the lack of studies in the literature on comparison with other branches, it would be beneficial to direct them to more academic studies.

ETHICAL TEXT

ETHICAL PRINCIPLES

In this article, journal writing rules, publication principles, research and publication ethics rules, journal ethics rules were followed. Responsibility for all kinds of violations related to the article belongs to the authors. Ethics committee approval was obtained from the ethics committee of Ataturk University sports sciences with the date 25.04.2023 and numbered E-70400699- 050.02.04-2300134107.

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