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Determining the Relationship between Speed and Branch-Specific Tests for Fencers in U 10-12 Age Categories

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Abstract

For success in fencing, it is necessary to make quick decisions and have the physical ability to apply this during the bout. This study aimed to determine the body composition of fencers competing in the U 10-12 age categories and to examine the relationship between the 30-m sprint test (30-m ST) and the 7-m repeat lunge ability test (7-m RLAT). Thirty-eight sabre fencers (female: 13 and male: 25) participated in the study. The anthropometric properties of the participants were determined, then the 30-m ST and the 7-m RLAT, a specific test for fencing, were performed. The differences between sexes were evaluated using the Mann-Whitney U test because the data were not distributed normally, and Spearman correlation analysis was performed to determine the relationship between performance tests. When the results of the study were examined, there was no significant difference between the sexes in the physical characteristics and performance tests of the athletes ($p>0.05$). However, when all fencers were evaluated together, a significant relationship was found between the 30-m ST and the 7-m RLAT ($rs(36)=0.526$, $p=0.001$). When the sexes were examined separately, a significant relationship was found between the 30-m ST and the 7-m RLAT only in the male group ($rs(23)=0.659$, $p<0.001$). This relationship suggests that 7-m RLAT may also give an idea for speed performance evaluation in this group.

Key words: Fencing, speed, branch-specific test

U 10-12 Yaş Kategorisinde Yarışan Eskrimcilerde Sürat ve Branşa Özgü Test Arasındaki İlişkinin Belirlenmesi

Özet

Eskrimde başarı için hızlı kararlar vermek ve maç sırasında bunu uygulayabilecek fiziksel yeterliliğe sahip olmak gereklidir. Bu çalışmanın amacı U 10-12 yaş kategorisinde yarışan eskrimcilerin vücut kompozisyonlarının belirlenmesi ve 30-m sürat testi ile 7-m tekrarlı hamle beceri testi arasındaki ilişkinin incelenmesidir. Çalışmaya 38 kılıççı (kız: 13 ve erkek: 25 katılmıştır. Katılımcıların antropometrik özellikleri belirlenmiş ve ardından 30-m sürat testi ve eskrim branşına yönelik spesifik bir test olan 7- m tekrarlı hamle testi uygulanmıştır. Verilerin normal dağılmaması sebebi ile cinsiyetler arasındaki farklar "Mann Whitney U" testi ile değerlendirilmiş, performans testleri arasındaki ilişkinin belirlenmesi için de Spearman Korelasyon analizi uygulanmıştır. Çalışmanın sonuçları incelendiğinde sporcuların fiziksel özellikleri ve performans testlerinde cinsiyetler arasında anlamlı bir farklılık yoktur ($p>0,05$). Diğer taraftan tüm eskrimciler birlikte değerlendirildiğinde 30-m sürat testi ile 7-m tekrarlı hamle beceri testi arasında anlamlı bir ilişki bulunmuştur ($rs(36)=0,526$, $p=0,001$). Cinsiyetler ayrı ayrı incelendiğinde ise sadece erkek grupta 30-m sürat testi ile 7-m tekrarlı hamle beceri testi arasında anlamlı bir ilişki bulunmuştur ($rs(23)=0,659$, $p<0,001$). Bu ilişki 7-m tekrarlı hamle beceri testinin söz konusu grupta sürat performansı değerlendirmesi için fikir verebileceğini düşündürdü.

Anahtar Kelimeler: Eskrim, sürat, branşa özgü test.

INTRODUCTION

In fencing, a tournament is completed with different rest intervals because group and direct elemination bouts are also played on the same day (18). As in all combat sports, the game progresses with mutual reactions in fencing (4). To score, fencers must be skilled in both attack and defense and be able to practice these moves repeatedly throughout the day. It should be emphasized that for a good fencing performance, the importance of quickly and skillfully applying the change of direction movements (10). The physical infrastructure necessary for the implementation of all these skills is possible by starting special trainings from a young age.

A fencer needs to be able to make their lunge (specific movement for attacking for fencing) quickly and recover from the lunge before the fencer is blocked by the opponent. To gain touches during the bout, every offensive and defensive move must be very fast. Reaction time is also an important property that affects the success in fencing (5) and it has been shown that this feature can be improved by agility training (15).

Body composition measurements are widely used in many studies examining different branches (2,3). For example, in a study investigating the relationships between body composition and speed in amateur football players, no statistically significant relationships were found between body mass index, lean body mass, and speed test results, but it was determined that speed test results were negatively affected as the body fat percentage and body fat mass of the participants increased (1). In terms of anthropometric properties, asymmetry is observed in the limbs as a result of the asymmetric guard position and it is therefore difficult to determine a meaningful relationship between any physical characteristics and performance. It was found that there was a difference of 10 to 12 cm2 between the cross-sectional areas of the dominant and non-dominant arms of fencers in different branches (11). Tsolakis, Bogdanis (12) found that somatotype components were not different between 10-year-old and over 20-year-old fencers. There are some anthropometric properties sought for success in certain sports. Long upper and lower extremities and an athletic structure are the mainly sougtht anthropometric features for fencers. However, fencers who do not have the expected anthropometric characteristics can make up for this deficiency with a high level of mental skills, speed, and technique. Although their height and body types are different, fencers can have a good chance of success when viewed in terms of the development of other performance parameters (12).

For success in fencing, besides the physical performance parameters, technical skills and tactical decision-making skills should also be developed. In addition, although the anaerobic energy system is key in terms of achieving touches, the aerobic energy system also plays an important role in the long-lasting total competition process (11). Competition performance is also affected by age, sex, sports experience, and the techniques and tactical practices used, depending on the opponent. Evaluating game requirements and organizing training programs in this direction are crucial in fencing, as in every branch, to improve competition performance.

The preference of branch-specific tests in measuring and evaluating physical performance may be more understandable for athletes and trainers. In addition, it can provide more accurate and practical information for the performance of the athlete. The aim of this study was to determine the body composition of fencers competing in the U 10-12 age category in Turkey and to examine the relationship between the 30-m sprint test (30-m ST) and the 7-m repeat lunge ability test (7-m RLAT).

METHOD

Thirty-eight licensed sabre fencers (25 male-13 female) competing in the U 10-12 age categories in Turkey participated voluntarily in this study. Approval was obtained from the Local Ethics Committee (Decision No.: 2019/18-33). The fencers were informed about the research and written consents of their parents and themselves were obtained. The fencers' height, body mass and body compositions were determined before performing the 30 m ST and 7-m RLAT. A tape measure was used for height measurements. Body mass and body composition analyses were performed using bioelectrical impedance analysis before breakfast using a body composition analyzer (InBody 270 Segmental Body Composition Analyzer, South Korea). Bioelectric impedance analysis was performed in accordance with the instructions specified by the manufacturer. The fencers performed a standard warm-up protocol before the

tests. This protocol was designed as a special warm-up including 10 minutes of fencing steps after 10 minutes of general warm-up.

30-m sprint test

Photocells (New Test Powertimer 300-Series Portable Mat & Photocells, Finland) were placed at the start and finish points of the fencers by creating a 30-m lane. The back feet of the participants touched the line 1 m behind the starting photocell. When they were ready, they started running. The photocell worked automatically when the participants entered, and when they came to the end zone, the photocell stops automatically. The test was peformed twice and best results were evaluated (sec).

7-m repeat lunge ability test

The 7-m RLAT is a branch-specific test and the validity of the test (ICC r = 0.83) is included in the literature (17). The test starts in the guard position, which constitutes the basic movement of fencing, and is carried out using foot movements, moving forward and backward and lunging at the finish line in each round. At the end of the test, each fencer covers a total distance of 46-m. Electronic photocells were located in the start and finish areas of the test (New Test Powertimer 300-Series Portable Mat & Photocells, Finland). Fencers started the test by advancing in the guard position and the system was activated automatically when they passed through the photocells. They continued, advancing 7-m in the guard position and executing the lunge at the finish line. Then they came back 4-m in the guard position, crossed the front leg from the line here, moved forward again 4-m in the guard position, and executed a lunge at the finish line. The fencers continued this process until five lunges were performed. After the fifth lunge, they stepped back to the starting line 7-m behind them in a guard position. During the test, all movements of the fencers were followed by an experienced trainer. The visual scheme of the test (16) is given in figure 1.

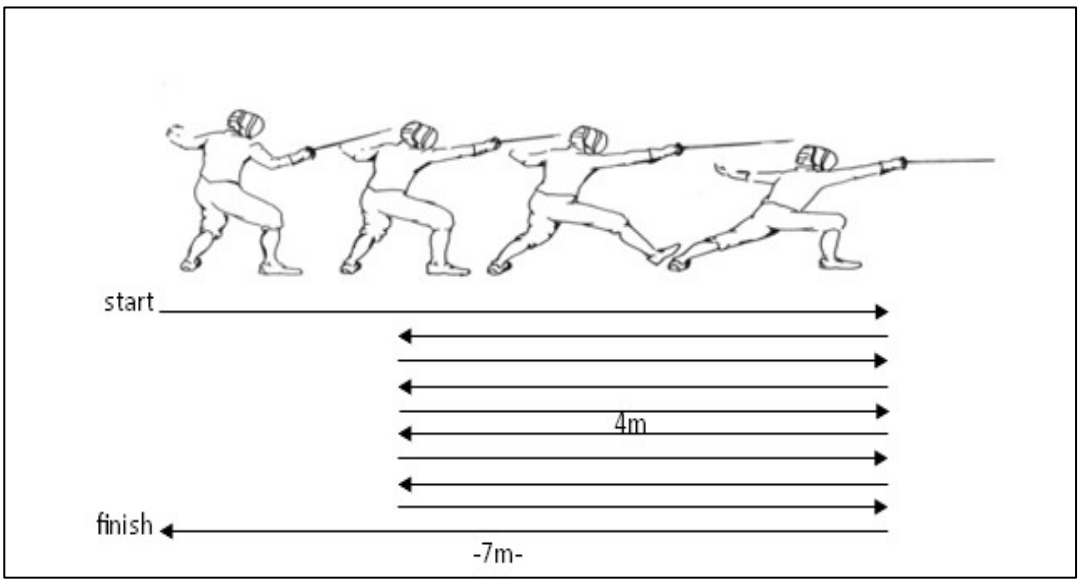

Figure 1. 7-m repeat lunge ability test

Data analysis

Data were evaluated using the SPSS statistical package program (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY). The normality tests (Kolmogorov-Smirnov/Shapiro-Wilk) of the data were performed and non-parametric tests were used in the analysis due to the lack of normal distribution. The differences between the sexes were evaluated using the Mann-Whitney U test, and Spearman correlation analysis was performed to determine the relationship between the performance tests. Data are presented as mean and standard deviation. The value of p is presented as $p<.05$.

RESULTS

The participants consisted of 38 (13 female - 25 male) licensed sabre fencers. Descriptive analyses of all participants are included in Table 1.

Table 1. Fencers' Body Composition, 30-m ST, and 7-m RLAT Results

	n: 38	X̄	SD
Age (year)		11.52	0.93
Height (cm)		150.46	7.86
Weight (kg)		42.52	8.25
Muscle mass (kg)		16.77	3.04
Fat mass (kg)		10.56	4.85
Fat rate (%)		24.10	7.17
Body mass index (kg/m²)		18.71	2.30
30-m ST (sec.)		5.45	0.39
7-m RLAT (sec.)		28.71	0.32

ST: Sprint test, RLAT: Repeat lunge ability test.

There was no statistically significant difference between the measured parameters in the comparison of the male and female groups. Descriptive analyses and comparisons between groups of two groups of 13 female - 25 male fencers are presented in Table 2.

Table 2. Comparison of Body Composition, 30-m ST and 7-m RLAT Results of Male and Female Fencers

	Male X̄±SD (n= 25)	Female X̄±SD (n= 13)	U	z	p
Age (year)	10.10±0.00	11.45±4.59	122.00	-1.246	0.213
Height (cm)	149.12±8.65	153.05±5.45	112.500	-1.539	0.124
Weight (kg)	41.20±8.64	45.06±7.05	119.000	-1.339	0.181
Muscle mass (kg)	16.29±3.40	17.69±2.00	114.000	-1.493	0.136
Fat mass (kg)	10.10±5.01	11.45±4.59	122.000	-1.246	0.213
Fat rate (%)	23.76±7.90	24.74±5.76	142.500	-0.616	0.538
Body mass index (kg/m²)	18.42±2.94	19.28±2.52	120.000	-1.308	0.191
30-m ST (sec.)	5.49±0.43	5.38±0.33	139.500	-0.708	0.479
7-m RLAT (sec.)	28.87±2.14	28.39±1.64	138.500	-0.739	0.460

ST: Sprint test, RLAT: Repeat lunge ability test.

When all participants were evaluated, there was a statistically significant, moderately positive correlation between 7-m RLAT and 30-m ST results according to Spearman correlation analysis. When the group consisting of 25 male fencers was evaluated separately, there was a statistically significant, strong positive correlation between the 7-m RLAT and the 30-m ST results. In the group of 13 female fencers, there was no statistically significant correlation between the 7-m RLAT and the 30-m ST results. All correlations are presented in Table 3.

Table 3. Correlations between 7-m RLAT and 30-m ST

		7-m RLAT	
		r	p
All Participant (n:38)	30-m ST	0.478	**0.002***
Male (n:25)		0.659	**0.001***
Female (n:13)		0.163	0.596

*p<.005, ST: Sprint test, RLAT: Repeat lunge ability test.

DISCUSSION

In this study, the body composition of fencers in the U 10-12 age category, consisting of the youngest athletes who can participate in fencing competitions, was determined and the relationship between 30-m ST and 7-m RLAT was investigated. There were no statistically significant differences between the body composition parameters of the female and male sabre fencers, and body mass indexes were found within normal limits for this age group. The 30-m ST and 7-m RLAT results were also not significantly different between the males and females.

The lack of significant differences between body composition parameters of the male and female fencers can be explained by the fact that the participants were in their last periods of childhood. In this period, it is an expected situation not to encounter significant developmental differences between the sexes, as may occur during adolescence. Similar to our findings, it has been shown in the literature that male and female runners aged 10-13 years have similar physical characteristics (7). On the other hand, in a group of fencers with a mean age above 13, it was observed that there were significant differences between body fat percentage and body mass index of males and females (14).

The main finding of this study was that there was a moderately positive correlation between the 7-m RLAT and the 30-m ST results when the entire group was evaluated together, and a there was strong positive correlation when male fencers were evaluated separately. The 7-m RLAT reflects the nature of the branch due to the use of the steps made in the fencing and the distances covered in the test. Branch-specific tests allow athletes to reflect their performance better because they include the relevant technical skills and movement patterns and can often be performed on the field and with equipment that the athlete is accustomed to. In another branch-specific test developed by Tsolakis, Kostaki (13) fencing steps are performed 5-m forward and backward three times, but this test does not include all the basic movement patterns in the characteristic of fencing because there is no lunge movement. Accordingly, Turner et al. developed the 7-m RLAT that we used in this study, which includes a change of direction in the guard position and lunge. The test includes a total of five lunges and the total distance traveled is 46 m. This loading intensity and time reflects the feature of speed endurance. In this way, information about the speed endurance level of the participants is gained and branch-specific skills are measured.

The relationship between repetitive speed tests and anaerobic power has been shown in the literature (6,9). In anaerobic power-based fencing, there is a relationship between anaerobic power and branch-specific tests. Tsolakis, Kostaki (13) found a relationship between vertical jump and speed endurance tests, which include fencing-specific 5-m shuttles. Turner, Marshall (17) found a relationship between the 7-m RLAT and the vertical jump test and agility. In a study conducted with ice hockey players, no relationship was found between the tests performed off-ice and those performed on-ice. These findings highlight the importance of branch-specific tests (8). In accordance with the literature, in the current study, a relationship was found between the 30-m ST and branch-specific test results, except in the female fencer group. Although the 30-m ST and 7-m RLAT of the females were not statistically different from the males, the absence of a relationship in the female fencer group may be due to the low number of female fencers.

In the present study, we could not reach all licensed sabre fencers in the same age group; therefore, the number of participants can be stated as a limitation of the study. Further research might investigate the relationship between standard tests and branch-specific tests in other fencing branches (foil and epee). Thus, effective performance tests can be recommended to trainers and athletes in each branch to determine fencer performance.

CONCLUSION

Determining the body composition, branch-specific test and 30-m ST data of sabre fencers in the 10-12 age group will contribute to filling the gap in the literature regarding this branch. In addition, the positive correlation between the 7-m RLAT and the 30-m ST in male sabre fencers suggests that this branch-specific test may also give an idea for speed performance evaluation in this group.

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