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Examining the relationship between balance, flexibility and power in fences

Examinando la relación entre equilibrio, flexibilidad y potencia en los esgrimistas

Examinando a relação entre equilíbrio, flexibilidade e poder em esgrimistas

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Abstract

The purpose of the present study was to examine the relations between balance, flexibility, and standing long jump performances of 10-13-year-old fencing athletes. A total of 20 male fencers participated in the study voluntarily. The Flamingo Balance Test, Sit-Reach Test, and Standing Long Jump Test were applied in the study to determine the performance of fencers. The SPSS Package Program was used for the analysis of the data obtained in the study. As well as the values obtained as a result of the Shapiro-Wilk Test, it was investigated whether the data showed

normal distribution with Q-Q Plots and histogram graphs and it was determined that they were not normally distributed. For this reason, the Spearman Correlation Analysis was performed to determine the relations between the performance values of the athletes. The significance level was taken as $p<0.05$. As a result of the study, it was found that there were negative relations between balance and flexibility performances in fencing athletes. balance and standing long jump performances in fencing athletes; however, no relation was detected between flexibility and standing long jump performances.
Keywords: Fencing, Balance, Flexibility, Long Jump

Resumen

El propósito del presente estudio fue examinar las relaciones entre el equilibrio, la flexibilidad y el rendimiento en salto de longitud de pie de atletas de esgrima de 10 a 13 años. Un total de 20 esgrimistas varones participaron voluntariamente en el estudio. En el estudio se aplicaron la prueba de equilibrio Flamingo, la prueba Sit-Reach y la prueba de salto de longitud de pie para determinar el desempeño de los esgrimistas. Para el análisis de los datos obtenidos en el estudio se utilizó el programa SPSS Package. Además de los valores obtenidos como resultado de la Prueba de Shapiro-Wilk, se investigó si los datos presentaban una distribución normal con Q-Q Plots y gráficas de histogramas y se determinó que no presentaban una distribución normal. Por esta razón, se realizó el Análisis de Correlación de Spearman para determinar las relaciones entre los valores de rendimiento de los atletas. El nivel de significancia se tomó como $p<0,05$. Como resultado del estudio, se encontró que existían relaciones negativas entre el equilibrio y la flexibilidad en los atletas de esgrima. actuaciones de equilibrio y salto de longitud de pie en atletas de esgrima; sin embargo, no se detectó relación entre la flexibilidad y el rendimiento en salto de longitud de pie.
Palabras clave: Esgrima, Equilibrio, Flexibilidad, Salto de Longitud

Resumo

O objetivo do presente estudo foi examinar as relações entre equilíbrio, flexibilidade e desempenho no salto em distância em pé de atletas de esgrima de 10 a 13 anos de idade. Um total de 20 esgrimistas do sexo masculino participaram voluntariamente do estudo. O Teste de Equilíbrio Flamingo, Teste de Sentar-Alcance e Teste de Salto em Distância em Pé foram aplicados no estudo para determinar o desempenho dos esgrimistas. O Programa Pacote SPSS foi utilizado para a análise dos dados obtidos no estudo. Além dos valores obtidos no teste de Shapiro-Wilk, investigou-se se os dados apresentavam distribuição normal com Q-Q Plots e gráficos de histograma e determinou-se que não apresentavam distribuição normal. Por esse motivo, foi realizada a Análise de Correlação de Spearman para determinar as relações entre os valores de desempenho dos atletas. O nível de significância foi adotado como $p<0,05$. Como resultado do estudo, constatou-se que existiam relações negativas entre desempenhos de equilíbrio e flexibilidade em atletas de esgrima. desempenho de equilíbrio e salto em distância em atletas de esgrima; entretanto, nenhuma relação foi detectada entre flexibilidade e desempenho de salto em distância em pé.

Palavras-chave: Esgrima, Equilíbrio, Flexibilidade, Salto em Distância

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Introducción

Fencing is a sport in which physical characteristics such as balance, flexibility, and quickness are at the forefront. It is performed in closed settings with some special equipment and weapons. It consists of epee, foil, sword branches and is a sport where physical contact is prohibited (Sitbakan, 2010 (Rodríguez-Paz y otros, 2023)).

The fencing sport consists of three branches and is performed with epee, foil, and sword weapons. The foil and epee are used as poking weapons in fencing. The sword, on the other hand, is used both as a pushing and striking weapon (Roi and Bianchedi, 2008).

The "Strike Priority Rule" is applied in foil and sword. In epe, on the other hand, there is no strike priority rule. The whole body is the target in Epe, in foil only the trunk, and in the sword, the trunk, arms, and head are the targeted areas (Barth and Barth, 2008). Besides technical, tactical, and mental factors in the sport are significantly important, (Morales, 2011; Calero-Morales *et al.*, 2023) with emphasis on opposition sports, which include motor characteristics, of equal importance for fencing, and strength exercises are needed to bring the body forward and backward in attack movements and to repeat it (Arseven, 1976). Attacks involve many positions such as long-term and short-term movements based on submaximal performance to touch the opponent (Roi and Pittaiuga, 1997).

Based on all these explanations, physical parameters such as strength, endurance, explosive force, balance flexibility, they are decisive for various sports, (Suratmin *et al.*, 2024; Vargas & Pérez, 2023), and health in general, (Sagarra-Romero *et al*., 2017; Sagarra-Romero y otros, 2018) including fencing. Flexibility is a regular characteristic of many athletes, both in their training programs and in warm-up activities. (Espinosa-Albuja y otros, 2023; Mon-López *et al.*, 2019; Mon-López. *et al.*, 2019) Flexibility is an important component of training programs that can be developed through stretching exercises. The flexibility parameter is one of the criteria determining the distance of the move during hitting the opponent in fencing athletes. (Rodríguez-Paz y otros, 2022; Shao *et al.*, 2020) For this reason, it is considered that flexibility exercises will contribute to the performance of fencers when applied with the right training method (Cornelius and Hands, 1992; Morales. *et al.*, 2023).

Plyometric training is done with bodyweight focusing on revealing the stretch reflex of the muscle to increase strength and speed with power (Booth and Orr, 2016; Prieto *et al.*, 2021; Ojeda-Aravena *et al.*, 2023; Sole *et al.*, 2021; González-Fernández y otros, 2024). In fencing, plyometric training is preferred to develop explosive power. In addition, plyometric training is used in fencing as training that aims to reach the highest strength that the muscle can reach. Another important physical parameter for fencers is balancing, which is thought to be related to improved movement technique and conditioning (Sekulic *et al*., 2013). For fencers, balance includes postural control, neuromuscular control, strength, flexibility, and coordination components of the lower extremity, and maintains postural control while in motion (Arnold *et al*., 2009; Lorca *et al.*, 2020; Moreno y otros, 2022; Nobari *et al.*, 2023), having effects on components such as body composition in direct relation to variations in physical load. (Hu y otros, 2023; Cigarroa y otros, 2021; Lillo Santander *et al.*, 2018; Mon-D *et al.*, 2019) In this sense, it is necessary to establish a control strategy for sports preparation, ensuring effectiveness in measurements, to increase effectiveness in decision-making. (Fernández *et al.*, 2017; Morales., *et al.*, 2017)

The movement patterns of the move made during keystroke are flexibility, balance, and jump in fencing. For this reason, the present study was conducted to examine the relations between physical parameters such as balance, flexibility, and explosive power of fencing athletes.

Materials and Methods

The Study Group

A total of 20 male (Age 12±0.67, Height 142.15±8.68, BMI 19±2.43) fencing athletes with at least 3 years of training age and training 3 days a week participated in this study voluntarily. The participants were given a parent consent form and permission was obtained before the study. Trainer permissions were also obtained for these athletes.

Data Collection Tools

Height, Body Weight, and BMI

The height measurements of the athletes were made in anatomical stance with feet together, bare feet, and heels against the wall and recorded in cm. Bodyweight measurement was taken with the participants wearing shorts and a T-shirt without shoes (Tanita-TBF-300), and BMI values were calculated (Baydemir et al., 2018; Tamer, 2000).

Flexibility Test

A sit-reach bench was used to determine the flexibility performances of the athletes. When the athletes were sitting on the floor with bare feet, they were asked to lean forward with their feet on the bench, lean forward with their arms, and reach a far point. Two replications were made and the best value was recorded in cm (Mackenzie, 2005).

Balance Test

The Flamingo Balance Test in the Eurofit Test Battery was used to determine the balance performances of the athletes, who were asked to balance with the dominant foot on a platform with a length of 50 cm, a width of 3 cm, and a height of 4 cm from the ground. The other foot was asked to be lifted off the ground. When the athletes were ready, 60-second time was measured with a stopwatch during which the number of errors of the athlete was recorded as the score (Eurofit, 1988).

Standing Long Jump Test

The Standing Long Jump Performance of the athletes was measured in the gym on a non-slippery floor. When they felt ready with their feet shoulder-width apart and behind the line, they were asked to jump the furthest with the strength they would apply to the ground and the acceleration they would gain with their arms. The starting line was calculated from the point where the heels had contact with the ground. As a result of two trials, the best value was recorded in cm (Maulder and Cronin, 2005).

Statistical Analysis

The data that were obtained as a result of the study were analyzed in the SPSS Package Program. As well as the values obtained as a result of the Shapiro-Wilk test, whether the data showed normal distribution was checked with Q-Q Plots and Histogram Graphs, and it was determined that they were not normally distributed. For this reason, the Spearman Correlation Analysis was used to determine the relations between the performance values of the athletes. The significance level was taken as $p<0.05$.

Results

Table 1. The Descriptive Characteristics of the Athletes Participating in the Study

Variables	N	X	SS	Min	Max
Age	20	12	0,67	10	13
Height (cm)		142.15	8.68	130	157
Weight (kg)		38.50	6.57	29	50
BKI		19	2.43	14.47	22.61
Flexibility (cm)		29.17	4.41	23.50	39
Balance (sc)		1.60	1.78	0	4
Long jump (cm)		170.30	17.34	140	210

Table 2. The Relations Between Performance Values of the Athletes Participating in the Study

		Balance	Flexibility	Long Jump
Balance	r	1.000	-.554*	-.138
	p	.	.011	.562
Flexibility	r		1.000	.374

	p		.	.104
Long Jump	r			1.000
	p			.

The Spearman Correlation Analysis was used to determine the relations between the performance values of the athletes participating in the study. A Negative relations were detected between the balance, flexibility performances of the athletes in the study ($p<0.05$), and no relation was detected between balance and standing long jump performances ($p<0.05$).

Conclusion

The study was conducted to examine the relations between balance, flexibility, and standing long jump performances of 10-13-year-old fencers. The Spearman Correlation Analysis was used to determine the relations between the performance values of the athletes participating in the study. A Negative relation were detected between the balance, flexibility performances of the athletes in the study ($p<0.05$), and no relation was detected between balance and standing long jump performances ($p<0.05$) performances of athletes in the study.

Gül *et al*. (2006), determined that the standing long jump measurement average of 10-12-age-group children was 130.58±15.69 cm. Bayazıt *et al*. (2020) reported it to be 154.70 ± 22.19 cm in 9-11-year-old swimmers and 152.50 ± 20.34 cm in basketball players. Akşit and Özkol, (2006), on the other hand, reported that the average of the standing long jump test was 154±0.13 cm in their study conducted on male tennis players aged 8-10 years. In another study, Pekel et al. (2006) reported that the standing long jump test measurement average of 10-13-year-old boys was 181.2 ± 16.2 cm. In another study conducted by Hamurcu et al. (2006) on skiers aged 10-13, the average long jump was found to be 143.73±42.27 cm. On the other hand, Arslan *et al*. (2007) reported that the standing long jump test measurement average of 8-13-year-old children was 182±0.21 cm. The standing long jump values were found to be similar to those found in our study.

When previous studies that included physical performance values are examined, it was found that Alikhani *et al*. (2019) reported that the dynamic balance of female badminton players improved significantly after plyometric training. Majeed *et al*. (2016) reported that they found a significant difference in the dynamic balance of male badminton players after 6 weeks of plyometric training. Altay (2001) reported that motoric characteristics such as quickness and endurance affect balance in rhythmic gymnasts. Ford *et al*. (2005) argued that the balance characteristics was effective in maintaining the movement performed during the descent phase of the plyometric jump, and when examined from a biomechanical point of view, argued that there might be a relation between the ability to stay in balance after landing, performing the movements most accurately, and jumping ability.

It is argued that balance is related to quickness performance, which is one of the strength parameters (Sekulic et al., 2013). The ability to balance is important in fencing where a change of direction is required, such as making an explosive attack and being able to switch back to a defensive position. Also, it is an important characteristic in terms of being able to maintain body positions quickly and completely and to apply technical skills correctly (Paillard, 2019).

In another study conducted by Dinçer (2015), the flexibility value of the athletes who were aged 10-12 who had volleyball training for 2 years 2 days a week was reported to be 23.91±5.78 cm. In the study conducted by Kocakulak et al. (2018), the flexibility value of 10-15-year-old volleyball players was reported as 22.58±5.27 cm.

In conclusion, it was found that the basic motoric characteristics of most sports branches were good in children who participated in regular training in explosive strength, flexibility, and balance parameters. The results of the study will contribute to the adaptation of basic motoric characteristics in general and branch-specific and develop sport-specific performance. The effects of different training methods applied to fencing athletes on the parameters must be supported by further studies.

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Conflict of interests

The authors declare that there are no conflicts of interest.

Conflicto de intereses

Los autores declaran no existir conflictos de intereses.