OPEN ACCESS

https://dergipark.org.tr/en/pub/turkjkin

ORIGINAL RESEARCH

Evaluation of agility and acceleration levels in male and female futsal players

Samet Aktaş

Batman University School of Physical Education and Sports Batman, Türkiye.

Received: February 28, 2023

Accepted: March 25, 2023

Published: March 30, 2023

Abstract

The aim of this study is to reveal the direction and level of the relationship between acceleration and agility in university student female and male futsal players who play futsal as amateurs. The subject group of the research consists of 15 male and 15 female university students who play futsal in the amateur league and practice futsal at least 3 days a week. The mean age of the participants was 19.80 ± 1.056 years in men, 20.33 ± 2.49 years in women, mean height in men 175.80±2.45 cm, in women 164.26 ± 4.39 cm, mean body weight in men 67.60 ± 6.05 and 54.20 ± 5.10 kg for women. The T-test was used to determine the agility performances of the subjects, and the acceleration measurements were applied with a photocell placed at 5 m, 10 m, and 20 m intervals. In both parameter measurements, the values were recorded in seconds. Measured values were given as mean and standard deviation and correlation analyses were applied to the relationship between agility and acceleration. In the relationship between agility and acceleration, it was determined that there was a positive relationship between agility and 5 m, 10 m, and 20m acceleration values in males and that there was a strong positive correlation between agility and 10m acceleration (r=0.848; p=0.00). On the other hand, it is seen that there is a negative and insignificant relationship between agility and acceleration parameters in females. While there was a difference in men's agility levels in height grouping, a significant difference was found in 10m and 20m acceleration levels in female futsal players It shows that it has a negative effect on female futsal players, albeit at a low level. Since the planning of speed and acceleration exercises together with agility in training will be effective in increasing the performance of the athlete, it is recommended to include such training in training programs.

Keywords: Acceleration, agility, futsal.

Introduction

The game of futsal has grown in popularity over the past two decades and has grown into a global sport with a large TV audience (Roxburgh, 2008). Futsal is a fast-paced sport similar to football. Compared to 11-player football, the game is played with five players on each side, on hard surfaces, in a smaller area, usually indoors (Nauright, 2012). The game of futsal consists of two equal periods of 20 minutes, with no limit to the number of substitutions that can be made during a match. Although the scheduled duration of the game is 40 minutes, the game can last longer than 40 minutes (Naser et al., 2017).

Futsal has muscular strength and agility as the main physical abilities required for its practice, which are defined respectively as the ability to overcome considerable external resistance with large muscular effort and the ability to change direction and/or movement in the shortest time. However, there are few studies involving these physical abilities as well as their integration (Picanco et al., 2012). Performance during agility is determined by the ability to identify cues in the athlete's environment, make the right decision, and quickly get out of a change of direction (Spiteri et al., 2013).

✉ S. Aktaş, e-mail: samet.aktas@batman.edu.tr

To Cite: Aktaş, S. (2023). Evaluation of agility and acceleration levels in male and female futsal players. *Turk J Kinesiol*, 9(1), 35-40.
DOI: 10.31459/turkjkin.1257457

Speed and acceleration are very important basic abilities in athletes. The concept defined as acceleration is defined as reaching the highest speed in the shortest possible time and changes in the athlete's speed during movement (Eniseler, 2010). A very good ascent and acceleration technique is required in order for the acceleration ability to develop in accordance with the purpose. Speed and acceleration data are needed to customize the design of the training program for athletes (Herman et al., 2020).

Speed and agility are accepted as important skills that affect performance in many sports branches (Çakır, 2019). In one study, it was emphasized that high-speed movements during the game can be classified as straight sprint components (acceleration and maximum speed) and movements that require agility (Little & Williams, 2005). Research from the past to the present has focused on football (Ali et al., 2007: Bekesi et al., 2020; Cloak et al., 2014; Rampinini et al., 2009; Matlat et al., 2014; Negro et al., 2016; Ortega et al., 2020; Pavillon et al., 2021) rather than futsal. In this context, the aim of the study was to reveal the direction and level of the relationship between acceleration and agility in amateur male and female futsal players.

Method

Participants and Process

In this study, a total of 30 undergraduate women (n=15) and men (n=15) futsal players from university teams participated voluntarily. The measurements were taken at 11:00 a.m. on the day that the athletes did not train, they were asked to have breakfast at least 90 minutes before the measurements, and then the athletes were included in the test. Agility and acceleration measurements were made one day apart. Before the study, each of the subjects was given detailed information about the study. All participants gave their written consent prior to taking part in the study.

Agility Test

For the measurement of agility, the T-Test with inter-class reliability of 0.98 (Pauole et al., 2000) was used. The T-test, conducted using two electronic timing sensors (Fusion Sport, Smartspeed, Manchester, UK), consists of 4 contact points formed in a T-shape in an area 10 yards long and 10 yards wide. It is aimed to complete a series that requires the subject to move in different directions and in different ways between these contact points as soon as possible. The test was concluded with a total distance of 40 yards. With this test, the speed of the athletes to cover the distance by changing direction such as forward sprinting, right-left sliding, and back-and-forth running were determined. After the warm-up, the test was introduced to the participants and they were given 1 low-intensity trial. Each subject repeated the test twice and the best time was recorded in seconds as the person's rating.

Acceleration Test

Subjects were asked to be ready with their bodies bent forward and 1 m behind the starting line. The athlete was asked to start running at maximum speed after holding the position for at least 3 seconds. In order not to be affected by fatigue, the participants were given full rest and an acceleration run was made at 5-10-20 m distances. The test was carried out with a photocell placed in a straight direction of 5 m, 10 m, and 20 m in an indoor futsal hall. For data analysis, the best time from two trials was recorded as an indicator of acceleration and maximum running speed.

Analysis of Data

In the statistical analysis, descriptive statistics (mean and standard deviation) were applied to all data. Pearson Correlation Analysis was used to determine the relationship between agility and acceleration in futsal players. Correlation coefficient values; It was evaluated according to the coefficients of 0.00-0.40 unreliable, 0.41-0.60 low reliability, 0.61-0.80 moderately reliable, 0.81-1.00 highly reliable (Tabachnick & Fidell, 2013). In order to reveal the effect of height on agility and acceleration in futsal, the height of the participants was grouped, the median value was calculated for this, and the participants were divided into two groups. Results according to height groups were tested with an independent sample t-test. Statistical analyses were performed in SPSS 22.0 program for Windows and the level of statistical significance was set at $p< 0.05$.

Results

As shown in Table 3, it has been determined that there is no significant relationship between agility and 5 m and 20 m acceleration in male futsal players, on the other hand, it is seen that there is a significant relationship between agility and 10m acceleration ($p<0.01$; r: 0.848). There was no significant relationship between agility and acceleration in female futsal players (Table 4).

Table 1
Demographic data of the participants.

	Age[Year]		Height[cm]		Weight[kg]	
Variables	Male (15)	Female (15)	Male (15)	Female (15)	Male (15)	Female (15)
Mean	19.80	20.33	175.80	164.27	67.60	54.20
Standard Deviation	1.57	2.50	2.46	4.40	6.06	5.10
Minimum	18.00	17.00	172.00	158.00	57.00	45.00
Maximum	22.00	24.00	180.00	175.00	79.00	67.00

Table 2
Results of agility and speed tests.

	Agility[sec]		5m[sec]		10m[sec]		20m[sec]	
Variables	Male	Female	Male	Female	Male	Female	Male	Female
Mean	10.141	12.171	1.025	1.205	1.649	2.301	2.957	3.777
Standard Deviation	0.408	0.738	0.076	0.091	0.191	0.257	0.277	0.255
Minimum	9.570	10.800	0.880	1.060	1.340	2.020	2.190	3.400
Maximum	10.720	13.350	1.120	1.370	1.970	2.940	3.310	4.280

Table 3
The relationship between agility and acceleration of male futsal players.

		5 m	10 m	20 m
Agility[sec]	r	0.094	0.848**	0.391
	p	0.739	0.000	0.149

**. p> 0.01

Table 4
The relationship between agility and acceleration of female futsal players.

		5 m	10 m	20 m
Agility[sec]	r	-0.232	-0.232	-0.039
	p	0.405	0.406	0.890

Table 5
The results of male futsal players according to their height.

	Groups	N	Mean	SD	Mean Difference	t	p
Agility[sec]	<176cm	8	10.341	0.373	0.428	2.323	0.04*
	>177cm	7	9.913	0.336			
5m[sec]	<176cm	8	1.011	0.085	-0.029	-0.718	0.49
	>177cm	7	1.040	0.068			
10m[sec]	<176cm	8	1.706	0.177	0.122	1.263	0.23
	>177cm	7	1.584	0.197			
20m[sec]	<176cm	8	2.979	0.181	0.046	0.310	0.76
	>177cm	7	2.933	0.374			

* p<0.05

Table 6.
The results of female futsal players according to their height.

	Group	N	Mean	SD	Mean Difference	t	p
Agility^{sec}	<163 cm	7	12.163	0.846	-0.015	-.037	0.97
	>164 cm	8	12.178	0.690			
5m^{sec}	<163 cm	7	1.237	0.122	0.061	1.320	0.21
	>164 cm	8	1.176	0.044			
10m^{sec}	<163 cm	7	2.436	0.277	0.252	2.120	0.05*
	>164 cm	8	2.184	0.179			
20m^{sec}	<163 cm	7	3.917	0.269	0.263	2.275	0.04*
	>164 cm	8	3.654	0.175			

*p<0.05

In the results of the height grouping according to the agility levels of the futsal players participating in the research; The agility levels of those <177 cm shorter were found to be significantly lower than those of >176 cm taller, on the other hand, there was no difference between the groups in the acceleration levels of 5 m, 10 m, and 20 m (Table 5).

In the results of the agility performances according to the height groups of the futsal players, 10 m and 20 m levels of those <164 cm shorter were statistically significant than those of >163 cm taller, on the other hand, there was no difference between the groups in 5 m acceleration and agility levels (Table 6).

Discussion

Futsal players experience rapid fatigue in the game due to the high intensity of the game, and the capacity to repeat maximum sprint efforts and resist fatigue is very important for the player's match performance (Naser et al., 2017) The study aimed to reveal the relationship between acceleration ability and agility in futsal players (male and female). The measurement results of male futsal players were found as agility, 10.1141 ± 0.408, 5m 1.025 ± 0.076, 10m 1.649 ± 0.191, 20m 2.957 ± 0.277, respectively. The results showed that the relationship between agility and acceleration was significant in men at 10m, showing us that it was associated with agility in the second stage of acceleration. Lockie et al. (2013) reported that 5, 10, 20 meters values are highly correlated with agility and acceleration variables in Australian football players. Matos et al. (2008) compared the acceleration skills of football players and futsal players in their study and reported that futsal players accelerate more agile and in a shorter time. In another study, Markovic et al. (2007) determined that 10 weeks of sprint and plyometric training provided a significant 4.3% improvement in agility ability in young male individuals. Güven & Aktaş (2021), in their study examining the relationship between agility and acceleration in amateur male football players, determined that the correlation between agility and acceleration was low and that acceleration did not affect agility. They reported that different factors were effective in the development of agility.

The measurement results of female futsal players were found as agility, 12.171 ± 0.738, 5m 1.205 ± 0.091, 10m 2.301 ± 0.257, 20m 3.777 ± 0.255, respectively. In the study examining the performances of female futsal players, the 10 m sprint test results were determined as 2.18 ± 0.12 seconds and 2.13±0.13 seconds respectively (Galy et al., 2015). It was determined to be low according to our findings, but there was not enough research in the literature. In another study comparing the motor performance characteristics of female futsal players, they found female futsal players 10 m 1.62 ± 0.08 seconds and reported higher data than the data obtained in our study (Başkaya et al., 2018).

In the literature, studies emphasize that the development of agility depends on the development of acceleration, deceleration, and change of direction (Brown, 2009; Lockie et al., 2013). The ability to quickly change the direction of the whole body represents a fundamental movement in sports (Sheppard et al., 2006). Milanovic et al. (2011) reported that there was no difference in agility performance between futsal players and football players in their study in which they looked at the agility performances of elite futsal and football players. In another study, it was found that there is a moderate relationship between acceleration and agility (Arı, 2020). Futsal players are expected to

make more turns with and without the ball than football players, which reflects higher time on the ball. The technical proficiency of futsal players is affected by the small ball as well as the reduced pitch size, which puts players under constant pressure from opposing players and regularly produces frequent turnovers. Therefore, players need to move accurately and faster to catch or retrieve the ball, and they need fast sprinting and decision-making abilities (Goncalves, 1998). For these reasons, futsal players may need superior agility than soccer players to score, move and score goals.

In the results of the height grouping according to the agility levels of the futsal players participating in the research; While the average agility of those shorter than 177 cm was lower than those taller than 176 cm, it was observed that the groups were similar at 5m, 10m, and 20m acceleration levels. It was determined that the groups were similar according to the 5m acceleration and agility averages. The findings showed that height had a positive effect on agility in male futsal players. In women, it shows that height is more effective in the second stage of acceleration. In a study, they reported that female futsal players have higher speed and acceleration than football players (Herman, et al., 2020), which makes us think that leg length and stride length are positive indicators.

A futsal player must have endurance, sprinting ability, acceleration, power, and agility to show high performance during the competition and ensure its continuity. In order to compare classical training programs in sports with exercises suitable for the branch and to increase performance, original training models should be developed. Research shows that many performance components, including sprint ability, agility, and coordination, need to be developed at a professional level. However, the available literature is limited, making it difficult to compare studies and draw detailed conclusions. The weakness of the study is the absence of a control group. Given the results of the research, more research on agility and acceleration could improve knowledge in the sport and help coaches develop more tailored training for futsal performance and skill.

Acknowledgments

The author would like to acknowledge players who participated in this study.

Author Contributions

Study Design: SA; Data Collection: SA; Statistical Analysis: SA; Manuscript Preparation: SA.

Ethical Approval

Ethics committee approval of the study was obtained by the decision of the ethics committee of Batman University, dated 03.03.2023, and numbered 2023/02-06. The study was carried out in accordance with the Code of Ethics of the World Medical Association also known as a declaration of Helsinki.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest

There are no conflicts of interest related to this research.

References

Ali, A., Williams, C., Hulse, M., Strudwick, A., Reddin, J., Howarth, L., & McGregor, S. (2007). Reliability and validity of two tests of soccer skill. *J Sport Sci*, *25*(13), 1461-1470.

Başkaya, G., Ünveren, A., & Karavelioğlu, M. B. (2018). Comparison of some physiological and motoric characteristics of female soccer and futsal players. *Niğde University Journal of Physical Education and Sport Sciences*, 12(1), 12-20.

Bekesi, A., Szalay, B., Bakos, C. Z., Oláh, A., Boncz, I., Kiss, N., & Pakai, A. (2020). PMS58 The examination and development of the agility skills in county first-class soccer players. *Value in Health*, *23*, S602.

Brown T. (2009). Speed and agility: what defines them and how to train for both. *Performance Training Journal*. 8(4), 12.

Çakır, E. (2019). Investigation of female soccer players performance values based on ambient temperature. *Universal Journal of Educational Research*, 7(1), 239-243.

Cloak, R., Nevill, A., Smith, J., & Wyon, M. (2014). The acute effects of vibration stimulus following FIFA 11+ on agility and reactive strength in collegiate soccer players. *J Sport Health Sci*, 3(4), 293-298.

Eniseler N. (2010). *Bilimin ışığında futbol antrenmanı*. (6. Edition). İzmir: Birleşik Matbaacılık. (In Turkish).

Galy, O., Zongo, P., Chamari, K., Chaouachi, A., Michalak, E., Dellal, A., Castagna, C., & Hue, O. (2015). Anthropometric and physiological characteristics of Melanesian futsal players: A first approach to talent identification in Oceania. *Biol Sport*, 32(2), 135-141.

Goncalves, J. T. (1998). *The principles of Brazilian soccer*. Reedswain Inc..

Güven, F., Aktas, S., & Kocaoglu, Y. (2022). The relationship between agility and acceleration in football. *National Journal of Kinesiology*, *2*(2), 21-26.

Herman, I., Hasan, M. F., Hidayat, I. I., & Apriantono, T. (2020). *Analysis of speed and acceleration on 60-meters running test between women soccer and futsal players.*

In *4th* International Conference on Sport Science, Health, and Physical Education (ICSSHPE 2019) (pp. 345-347). Atlantis Press.

Little, T., & Williams, A. G. (2005). Specificity of acceleration, maximum speed, and agility in professional soccer players. *J Strength Cond Res*, 19(1), 76–78.

Lockie, R. G., Schultz, A. B., Callaghan, S. J., Jeffriess, M. D., & Berry, S. P. (2013). Reliability and validity of a new test of change-of-direction speed for field-based sports: the change-of direction and acceleration test (CODAT). *J Sports Sci Med.* 12(1), 88.

Markovic, G., Jukic, I., Milanovic, D., Metikos, D. (2007). Effects of sprint and plyometric training on muscle function and athletic performance. *J Strength Cond Res*, 21(2), 543-549.

Matos, J. A. B., Aidar, F. J., Mendes, R. R., Lômeu, L. M., Santos, C. A, Pains, R., Silva, C. A., & Reis, V. M. (2008). Acceleration capacity in futsal and soccer players. *Fitness & Performance Journal*, 7(4), 224-228.

Milanović, Z., Sporiš, G., Trajković, N., & Fiorentini, F. (2011). Differences in agility performance between futsal and soccer players. *Sport Sci*, *4*(2), 55-59.

Naser, N., Ali, A., & Macadam, P. (2017). Physical and physiological demands of futsal. *J Exerc Sci Fit*, 15(2), 76-80.

Nauright, J. (Ed.). (2012). *Sports around the World: History, Culture, and Practice* [4 volumes]. Retrieved from http://publisher.abc-clio.com/9781598843019

Ortega, J. A. F., De los Reyes, Y. G., & Pena, F. R. G. (2020). Effects of strength training based on velocity versus traditional training on muscle mass, neuromuscular activation, and indicators of maximal power and strength in girls soccer players. *Apunts Sports Medicine*, *55*(206), 53-61.

Pauole, K., Madole, K., Garhammer, J., Lacourse, M., & Rozenek, R. (2000). Reliability and validity of the T-test as a measure of agility, leg power, and leg speed in college-aged men and women. *J Strength Cond Res*, *14*(4), 443-450.

Pavillon, T., Tourny, C., Aabderrahman, A. B., Salhi, I., Zouita, S., Rouissi, M., ... Zouhal, H. (2021). Sprint and jump performances in highly trained young soccer players of different chronological age: Effects of linear. Change–of–direction sprint training. *J Exerc Sci Fit*, *19*(2), 81-90.

Picanco, L. M., Rodrigues Silva, J. J., & Del Vecchio, F. B. (2012). Relationship between strength and agility in futsal players. *Revista Brasileira de Futsal e Futebol*, *4*(12).

Rampinini, E., Impellizzeri, FM., Castagna, C., Coutts, AJ., Wisløff, U. (2001) Technical performance during soccer matches of the Italian Serie A league: effect of fatigue and competitive level. *J Sci Med Sport*. 2(1):227-33.

Roxburgh, A. (2008). *The Technician Futsal*: Newsletter for Coaches. *Nyon: UEFA*.

Sheppard, J. M., & Young, W. B. (2006). Agility literature review: Classifications, training and testing. *J Sport Sci*, *24*(9), 919-932.

Spiteri, T., Cochrane, J. L., Hart, N. H., Haff, G. G., & Nimphius, S. (2013). Effect of strength on plant foot kinetics and kinematics during a change of direction task. *European journal of sport science*, *13*(6), 646-652.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.), Boston: Allyn and Bacon.