CORRELATION BETWEEN SPEED, AGILITY AND QUICKNESS (SAQ) IN ELITE YOUNG SOCCER PLAYERS

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Abstract
The purpose of this study was to determine the correlation between the speed, agility and quickness, and to determine the correlation between tests with and without the ball in young soccer players. Research was carried out on a sample of 25 elite soccer players from the Serbian U-16 national team, (aged 15.19±0.32; height176.04±6.00 cm; body mass 65.19±9.41 kg). The participants were tested on a 10-m Sprint (B10S), 30-m Sprint (B30S), Flying 20-m Sprint (B20S), Zigzag test (CC) and Zigzag with the Ball (CCL). Significant relationships were found between test CC and B30S (r=0.560), as well as between test CC and B20S (r=0.603). There were no significant relationships between CC and B10S (r=0.323). The agility test with the ball (CCL) has not shown significant correlation with speed and quickness (r=0.093-0.247). The SAQ training method has made training much more applied than previously although it is mainly represented by the movements during which the control and contact with the ball are at a minimum. This causes the loss of specificity between exercises and demands in the demonstration both during the testing and the game. This study has confirmed that the structure of the agility with the ball is much more complex in comparison with the one without the ball. In addition, this research has shown that the basic skills without the ball have much stronger relation among speed, agility and quickness than the skills with the ball.

Key words*: SAQ, field test, zigzag test, correlation*

Introduction

Soccer is the most popular team game in the world, played and watched by millions of people each year. As soccer has developed at the elite level much research regarding match performance and training has been conducted (Bangsbo, Mohr, & Krustrup, 2006). Athletic performance in soccer is a function of aerobic fitness, anaerobic fitness, speed, muscular strength, muscular power, and agility (Bangsbo, Mohr, Poulsen, Perez-Gomez, & Krustrup, 2006; Stolen, Charmari, Castagna, & Wisloff, 2005). During a match a player frequently performs activities that require rapid development of force, such as sprinting or quickly changing direction (Bangsbo, 1996). Although high-speed actions only contribute to 11% of the total distance covered in soccer, they actually contribute directly to winning possession of the ball and to scoring or conceding of goals (Reilly, Bangsbo & Franks, 2000). High-speed actions in soccer can be categorized into actions requiring acceleration, maximal speed or agility (Gambetta, 1996). Consequently, the SAQ (speed, agility and quickness) method has become dominant in soccer training (Pearson, 2001). Similar morphological and biochemical determinants of acceleration, maximal speed and agility have led to the assumption that these qualities are highly related (Little and Williams, 2005). One way to examine the relationship between linear speed and agility is to determine the degree of correlation. Pauole, Madole, Garhammer, Lacourse, & Rozenek (2000) found significant correlations between performance in an agility t-test and in a 40-yard sprint time in both men and women. Spaniol, Flores, Bonnette, Melrose, & Ocker (2010) investigated the relationship between speed and agility of professional arena league football players and found a significant relationship between 40 yard dash and 20 yard shuttle times. In contrast, Buttifant, Graham, & Cross (1999) and Young, Hawken, & McDonald (1996) reported no significant correlations between straight sprinting and agility speed tests in either Australian soccer or Australian Rules football players. Furthermore, both Draper and Lancaster (1985) and Mayew, Piper, Schwegler & Ball (1989) reported low common variances of 21% between tests for straight sprinting speed and agility. Young, McDowell, & Scarlett (2001) concluded that straight speed and agility training methods are specific and produce limited transfer to the other. The problem with agility is how to define this complex motor activity. At this point, there is no agreement on a clear definition in the community of sports science (Sheppard & Young, 2006). Verstegen & Marcello (2001) stated that agility permits an athlete to react to a stimulus, start quickly and efficiently, move in the correct direction, and be ready to change direction or stop quickly to make a play in a fast, smooth, efficient, and repeatable manner (20, pp. 140–141). One of the main problems for training agility compared to the linear speed is that the player learns to anticipate the next step (Pearson, 2001). The studies of anthropometric dimensions, physical performance, and soccer-specific skills of young players have provided partly consistent findings. For example, elite young players (as compared with the sub-elite ones) could be characterized by high

agility (Gil, Ruiz, Irazusta, Gil & Irazusta, 2007; Reilly, Bangsbo & Franks, 2000) and running speed (Gil, et al., 2007; Reilly, et al., 2000; Rosch, et al., 2000). Furthermore the soccer specific skill could also be distinguished among the elite and non-elite young competitors (Davids, Lees & Burwitz, 2000; Mirkov, Nedeljković, Kukolj, Ugarković & Jarić, 2008; Vaeyens, et al., 2006), although some authors argue that the testing of physical abilities rather than the testing of skills could be more important for early selection (Helsen, Hodges, Van Winckel & Starkes, 2000; Malina, et al., 2005; Malina, et al., 2000). Mirkov, Kukolj, Ugarković, Koprivica & Jarić (2010) recommend for early selection testing the agility and coordination, which could be among the most important factors for later success. Ramos, et al. (2009) investigated performance of youth elite soccer players through physical tests according to positional roles and did not find significant differences between positional roles in the agility test. Some studies show very high specificity of agility and straight speed (Buttifant, et al., 1999; Young, et al., 1996). Young, et al. (2001) concluded that straight speed and agility training methods are specific and produce limited transfer to the other. Sheppard & Young (2006) assume that straight speed would have an even lower transfer rate upon the change of direction speed which requires decision-making. Expected low transfer refers also to a complex action which is specific to the given sport, such as dribbling a ball (Sheppard & Young, 2006). Very few studies concern the correlation of linear speed with agility with the ball, so this research will be one of the first in soccer. The need for agility with the ball is of great importance for dribbling and one-on-one game situations. Therefore, the purpose of this study was to determine the correlation between speed, agility and quickness and to determine the correlation between the tests with and without the ball in young soccer players.

Methods

Subjects

Research was performed on a sample of 25 elite soccer players from the Serbian U-16 national team, (aged 15.19±0.32; height176.04±6.00 cm; body mass 65.19±9.41 kg.). All players and their parents or guardians were fully informed and they signed a consent form. The study protocol was held for every subject. Beside the results, the basic anthropometric parameters (body height-TV and body weight-MT) and the age of the players were registered in the study protocol. Measurements for the speed, quickness and agility were carried out in the same day, during the morning. The protocol of the study was approved by the Ethical Committee of the Faculty of Sport and Physical Education, University of Nis, according to the revised Declaration of Helsinki.

Table 1. Descriptive statistical parameters of U-16 Serbian soccer players

	Mean±SD (n=25)	Goalkeepers (n=3)	Defenders (n=8)	Midfielders (n=10)	Attackers (n=4)
Age (years)	15.2±0.3	15.3±0.2	15.1±0.4	15.2±0.3	15.2±0.2
Body weight (kg)	65.2±9.4	76.4±1.7	66.2±8.1	61.3±9.8	64.5±9.4
Body height (cm)	176±6.0	181.7±2.5	176.3±6.0	173.7±6.5	177.3±4.5
Body mass index	20.9±2.0	23.2±1.1	21.3±2.1	20.2±1.8	20.4±2.0
Body fat (%)	12.4±2.4	15.1±1.3	12.8±2.5	11.5±2.2	11.8±2.4

Table 2. Descriptive statistical parameters for quickness, speed and agility

	Mean±SD (n=25)	Goalkeepers (n=3)	Defenders (n=8)	Midfielders (n=10)	Attackers (n=4)
B10S	1.80±0.08	1.88±0.05	1.80±0.07	1.78±0.08	1.76±0.10
B20S	2.54±0.12	2.62±0.15	2.55±0.11	2.52±0.12	2.48±0.15
B30S	4.34±0.19	4.50±0.19	4.34±0.15	4.32±0.19	4.25±0.23
CC	5.19±0.25	5.23±0.25	5.22±0.25	5.26±0.20	4.95±0.33
CCL	6.72±0.45	6.89±0.15	6.68±0.44	6.84±0.48	6.39±0.46

B10S-10m sprint; B20S- 20m flying; B30S-30m sprint; CC-zig zag agility; CCL-zig zag agility with ball.

Testing procedure

Body height and body weight were measured according to the instructions of the International Biological Program–IBP (Weiner & Lourie, 1969). Body height was measured with a GPM anthropometer (Siber & Hegner, Zurich, Switzerland) to the nearest 0.1 cm. Body weight was obtained by TANITA BC 540 (TANITA Corp., Arlington Heights, IL) to the nearest 0.1 kg. Percentage of body fat (Bfat%) was calculated by the formula: Adult body fat % = (1.20 x BMI) + (0.23 x Age) - (10.8 x gender) - 5.4 (Deurenberg, Weststrate & Seidell, 1991). The tests for the speed, quickness and agility were performed from a standing start and measured by means of infrared photocells Uno Lux (The Republic Institute for Sports, Belgrade, Serbia). The following tests were used for measurement of speed, quickness and agility with and without the ball.

Quickness testing
10-m Sprint. The ability to rapidly accelerate from a standing position was measured over a 10-m dash initiated from a standing position (Chamari, et al, 2004; Cometti, Maffiuletti, Pousson, Chatard & Maffulli, 2001; Little & Williams, 2005).

Speed testing
Flying 20-m Sprint. This test assessed the sprinting ability over a short distance, which should be of particular importance for soccer (Cometti, et al., 2001; Little & Williams, 2005). The running time along 20 m following the 10-m maximal acceleration (see previous test) was measured. As a consequence, the subjects were instructed to run with maximal speed over 30 m, and both the 10-m (i.e., acceleration) and the 20-m (i.e., maximal speed over a short distance) tests were obtained from the same trial. 30-m Sprint. This test allows the assessment of sprinting ability. The player waits for the signal at the starting point. On the signal, he runs at maximum speed. When he reaches the finish point, the time between the starting and finish lines is measured with photocell or chronometer in terms of seconds.

Agility testing
Zigzag Test. This test assessed running agility from changes in direction. A zigzag course consisted of 4-5m sections set out at 100^0 angles. The selection of this test was based on rapid acceleration, deceleration, and balance control required for short running time, which represented the result of the test (Little and Williams, 2005).

Agility with the ball testing
Zigzag With the Ball. The ability to control the ball while changing direction was assessed. Subjects were instructed to run with the ball as fast as possible along the same zigzag path used in the previous test (Mirkov et al., 2008). Time was recorded in 100ths of a second, and the average value from 3 sprint attempts was used as the final result. Before each testing the subjects performed a standard 25 minute warm-up. During the test air temperature ranged from 22°C to 25°C. It began at 10 am and finished by 1 pm. All sprint tests were performed on a grass sports field, and the players wore soccer shoes to replicate actual playing conditions.

Statistical analyses
Data analysis was performed using The Statistical Package for Social Sciences (v17.0, SPSS Inc., Chicago, IL). Descriptive statistics were calculated for all experimental data. In addition, all data were examined by the test of normal distribution (Kolmogorov-Smirnov) before any further analysis. Spearman Product-Moment Correlation was used to determine the relationships among the tested variables. Statistical significance was set at $p<0.05$.

Results

Descriptive statistics showed that goalkeepers were the tallest and also the heaviest players in the team (181.7±2.5cm) and the midfielders were the shortest with a height of 173.7±6.5cm (Table 1). Midfielders had the lowest fat percentage (11.5±2.2%) and goalkeepers the highest (15.1±1.3%). The results demonstrate that soccer players of different positions showed no significant differences in tested variables of speed and agility. Greatest results in the tested variables of speed and quickness was shown by the attackers (B10S= 1.76±0.10; B20S=2.48±0.15; B30S=4.25±0.23) and lowest by the goalkeepers (B10S=1.88±0.05; B20S= 2.62±0.15; B30S= 4.50±0.19). The attackers also showed higher values in the tests of agility with and without the ball (Table 2). The Kolmogorov-Smirnov test showed that data were not normally distributed. Spearman product-moment correlation coefficients shows significant positive correlation between speed (B20S; B30S) and quickness (B10S), values of correlation range from r=0.679 to r=0.962. The test agility without the ball (CC) was significantly correlated with speed (B20S; B30S), while the correlation with the quickness (B10S) was not statistically significant (r=0.323, $p<0.05$). Positive correlation existed between the tests CC and CCL (r=0.479). In contrast, agility with the ball (CCL) showed no significant correlation with speed and quickness (Table 3).

Table 3. Correlation between quickness, speed and agility

	B10S	B20S	B30S	CC	CCL
B10S	1,000				
B20S	**,679****	1,000			
B30S	**,826****	**,962****	1,000		
CC	,323	**,603****	**,560****	1,000	
CCL	,093	,247	,153	**,479***	1,000

B10S-10m sprint; B20S- 20m flying; B30S-30m sprint; CC-zig zag agility; CCL-zig zag agility with ball.

Discussion and conclusions

Descriptive statistics showed that goalkeepers were the tallest and the heaviest players in the team (181.7±2.5cm; 76.4±1.7kg) and that the midfielders were the shortest and with the smallest amount of body fat as compared with the other positional roles, which is in agreement with some previous results (Salgado et al., 2009; Vaeyens, et al., 2006; Wong, Chamari, Dellal & Wisløff, 2009). Greatest results in all the tested variables were shown by the attackers. This was expected because attackers have to be fast if they want to pass defenders (Sporiš, Jukić, Ostojić & Milanović, 2009), and by an extensive familiarization of the attackers with the testing procedures (Sporiš, Milanović, Jukić, Omrčen & Molinuevo, 2010). The goalkeepers had similar results in the agility test (CC) in comparison with the other team positions, while they had the lowest values in the agility test with the ball (CCL). When taking into consideration the goalkeeper's movement on the goal-line, this finding was expected in that they need to possess great lateral agility.

Agility without the ball (CC) had statistically significant correlations with the speed tests B20S-20m flying and B30S-30m sprint (between r=0.560 and r=0.603).The results of the B10S test has shown low correlation with agility (CC) without the ball (r=0.323). This low correlation could be related to the different distances covered in the course of testing speed and agility, which was also concluded by Draper and Lancaster (1985) and Mayhew et al. (1989). In contrast to the results of our research, no significant correlation was found between speed, quickness and agility in several research papers (Buttifant et al., 1999; Young, Hawken & McDonald, 1996; Young, McDowell & Scarlett, 2001). This can be explained partly by several facts. Firstly, the factors of perception and decision making quite often specify an elite soccer player who performs with greater agility on the field than the non-elite ones (Young and Farrow, 2006). Moreover, Vaeyens et al. (2006) indicate that elite and non-elite youth soccer players differ greatly in functional capacities and sport-specific skills. The statement is endorsed by research which implies that better athletes have quicker and more precise reactions due to their ability to choose anticipated information (Abernethy, Wann & Parks, 1998) and is extremely important in the course of the agility test performance. A key factor that contributed to the correlation found herecould be the more frequent use of the SAQ method in current training than in the period of the previous researchstudies (Buttifant, et al., 1999; Young, et al., 1996; Young, et al., 2001).

Thus players have got more familiar with the method since they apply it twice or three times during every microcycle. If we add that this research has been done on high performance players, members of the youth national team, this correlation is understandable. We think that they have managed to master the direction change movement technique and the adjustment of the body posture under time limited conditions similar to game and test situations. This brings us to the conclusion that agility is a motoric skill which is learnable, but it is much more complicated. In order to achieve the connection, we must observe the agility from the point of view of the theory of motor learning (Jeffreys, 2006). The most appropriate means for this is the SAQ method because the exercises represent the moving patterns which appear during the game.

The existence of this correlation could be regarded from the point of view of the agility test which has three directon movement changes under the 100 degree angle. This huge angle enables the players to perform direction movement changes in much greater speed. Sheppard and Young (2006) have assumed that there is not any influence of the straight speed on the change of direction speed which requires decision making or includes a complex task specific for the sport involved, for instance controling the ball. This assumption has been confirmed by our research which shows that agility with the ball has little connection with speed and quickness. The coefficient of the correlation between these variables range from r=0.093 to r=0.247. Making complex movements during agility leads to a lower relationship with the speed in a straight line (Sheppard and Young, 2006). It is quite obvious that the test CCl is much more complex than the CC test, which results in the low correlation. On the other hand, the SAQ method is generally involved with the movements in which controlling and contact with the ball are reduced to a minimum. This causes the loss of specificity between exercises and demands in the demonstration both during the testing and the game. As a result of this research we could consider the application of the tests which actually assess the speed of the direction movement change instead of agility. In future research we need to apply the tests which demand the subjcts to alter the change the direction of the movement as a reaction to a stimuli such as a luminous signal. These tests include reaction time as part of the complete time from the movement of the stimulus appearance until the end of the movement. Moreover, the correlation between speed, quicknes and agility tests could be examined in the situation when they are all performed with the ball. At the development of the agility programme, the coach should not only identify aimed moving patterns and define the aimed movement mechanics, but also evaluate their functions, and thus ensure during the training session the development of the aimed moving patterns in accordance with their aimed functions (Jeffreys, 2006). The SAQ method brought a lot of advantages and innovations in the modern training system of the soccer players. It's use is growing on a daily basis and as a benefit of all this we have a connection between three extremely important motoric activities - speed, quicknes and agility.

Literature

Abernethy, B., Wann, J., & Parks, S. (1998). Training perceptual motor skills for sport. *In B. Elliott (Ed.), Training for Sport: Applying Sport Science*, (pp. 1–68) Chichester: John Wiley.

Bangsbo, J. (1996). *Physiology of training. In T. Reilly (Ed.), Science and Soccer*, (pp. 51-65). London: E & FN Spon.

Bangsbo, J., Mohr, M., & Krustrup, P. (2006). Physical and metabolic demands of training and match-play in the elite football playe. *Journal of Sports Sciences, 24*(7), 665–674.

Bangsbo, J., Mohr, M., Poulsen, A., Perez-Gomez, J., & Krustrup, P. (2006). Training and testing the elite athlete. *Journal of Exercise Science and Fitness, 4*(1), 1-14.

Buttifant, D., Graham, K., & Cross, K. (1999). Agility and speed of soccer players are two different performance parameters. *Journal of Sports Science, 17*, 809-816.

Chamari, K., Hachana, Y., Ahmed, Y.B., Galy, O., Sghaier, F., Chatard, J.C., Hue, O., & Wisloff, T. (2004). Field and laboratory testing in young elite soccer players. *British Journal of Sports Medicine, 38*, 191–196.

Cometti, G., Maffiuletti, N.A., Pousson, M., Chatard, J.C., & Maffulli, N. (2001). Isokinetic strength and anaerobic power of elite, subelite and amateur French soccer players. *International journal of sports medicine, 22*, 45–51.

Davids, K., Lees, A., & Burwitz, L. (2000). Understanding and measuring coordination and control in kicking skills in soccer: Implications for talent identification and skill acquisition. *Journal of Sports Science, 18*, 703–714.

Draper, J.A., & Lancaster, M.G. (1985). The 505 Test: A test for agility in the horizontal plane. Australian *Journal of Science and Medicine in Sport, 17*(1), 15–18.

Deurenberg, P., Weststrate, J.A., & Seidell, J.C. (1991). Body mass index as a measure of body fatness: Age - and sex-specific prediction formulas. *British Journal of Nutrition. 65*, 105-114.

Gambetta, V. (1996). In a blur: How to develop sport-specific speed. *Sports Coach, 19*(3), 22–24.

Gil, S., Ruiz, F., Irazusta, A., Gil, J., & Irazusta, J. (2007). Selection of young soccer players in terms of anthropometric and physiological factors. *Journal of Sports Medicine and Physical Fitness, 47*, 25–32.

Helsen, W.F., Hodges, N.J., Van Winckel, J., & Starkes, J.L. (2000). The roles of talent, physical precocity and practice in the development of soccer expertise. *Journal of Sports Sciences, 18*, 727–736.

Jeffreys, I. (2006a). Motor Learning—Applications for Agility, Part 1. *Strength and Conditioning Journal, 28*(5), 72–76.

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

Malina, R.M., Cumming, S.P., Kontos, A.P., Eisenmann, J.C., Ribeiro, B., & Aroso, J. (2005). Maturity-associated variation in sport-specific skills of youth soccer players aged 13-15 years. *Journal of Sports Sciences, 23*, 515–522.

Malina, R.M., Pena-Reyes, M.E., Eisenmann, J.C., Horta, L., Rodrigues, J., & Miller, R. (2000). Height, mass and skeletal maturity of elite Portuguese soccer players aged 11–16 years. *Journal of Sports Sciences, 18*, 685–693.

Mayew, J., Piper, F., Schwegler, T.M., & Ball T.E. (1989). Contributions of speed, agility and body composition to anaerobic power measurements in college football players. *Journal of Applied Sport Science Research, 3*, 101–106.

Mirkov, D.M., Nedeljković, A., Kukolj, M., Ugarković, D., & Jarić, S. (2008). Evaluation of the reliability of soccer-specific field tests. *Journal of Strength and Conditioning Research, 22*, 1046–1050.

Mirkov, D.M., Kukolj, M., Ugarković, D.J., Koprivica, V., & Jarić, S. (2010). Development of anthropometric and physical performance profiles of young elite male soccer players: a longitudinal study. *Journal of Strength and Conditioning Research, 24*(10), 2677-2682.

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. *Journal of Strength and Conditioning Research, 14*(4), 443-450.

Pearson, A. (2001). *Speed, Agility and Quickness for Soccer*. London: A & C Black.

Ramos, A., Vale, P., Salgado, B., Correia, P., Oliveira, E., Seabra, A., Rebelo, A., & Brito, J. (2009). Physical test performance of elite portuguese junior soccer players according to positional roles. *In B. Drust, T. Reilly & A.M. Williams (Eds.), International Research in Science and Soccer*, (pp. 7-12). London: Routledge.

Reilly, T., Bangsbo, J., & Franks, A. (2000). Anthropometric and physiological predispositions for elite soccer. *Journal of Sports Sciences, 18*, 669-683.

Rosch, D., Hodgson, R., Peterson, T.L., Graf-Baumann, T., Junge, A., Chomiak, J., & Dvorak, J. (2000). Assessment and evaluation of football performance. *American Journal of Sports Medicine, 28*, 29–39.

Salgado, B., Vidal, S., Silva, S., Miranda, R., Deus, R., Garganta, R., Maia, J., Rebelo, A., & Seabra, A. (2009). Somatotype and body composition in Portuguese youth soccer players. *In B. Drust, T. Reilly, & A.M. Williams (Eds.), International Research in Science and Soccer*, (pp. 141-145). London: Routledge.

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

Spaniol, F., Flores, J., Bonnette, R., Melrose, D., Ocker, L. (2010). The relationship between speed and agility of professional arena league football players. *Journal of Strength and Conditioning Research, 24*(1).

Sporiš, G., Jukić., I., Ostojić, S.M., & Milanović, D. (2009). Fitness profiling in soccer: physical and physiologic characteristics of elite players. *Journal of Strength and Conditioning Research, 23*(7), 1947–1953.

Sporiš, G., Milanović, L., Jukić, I., Omrčen, D., & Molinuevo, J.S. (2010). The effect of agility training on athletic power performance. *Kinesiology, 42*(1), 65-72.

Stolen, T., Charmari, K., Castagna, C., & Wisloff, U. (2005). Physiology of soccer: An update. *Sports Medicine, 35*(6), 501-536.

Vaeyens, R., Malina, R., Janssens, M., Renterghem, B., Bourgois, J., Vrijens, J., & Philippaerts, R. (2006). A multidisciplinary selection model for youth soccer: the Ghent Youth Soccer Project. *British Journal of Sports Medicine, 40*, 928-934.

Vaeyens, R., Malina, R.M., Janssens, M., Van Renterghem, B., Bourgois, J., Vrijens, J., & Philippaerts, R.M. (2006). A multidisciplinary selection model for youth soccer: The Ghent Youth Soccer Project. *British Journal of Sports Medicine, 40*, 928–934.

Verstegen, M., Marcello, B. (2001). Agility and coordination. *In B. Foran (Ed.), High Performance Sports Conditioning*, (pp. 139–165). Champaign, IL: Human Kinetics.

Wong, P.L., Chamari, K., Dellal, A., & Wisløff, U. (2009). Relationship between anthropometric and physiological characteristics in youth soccer players. *Journal of Strength and Conditioning Research, 23*(4), 1204–1210.

Weiner, J., & Lourie, E. (1969). *Human Biology - A Guide to Field Metods*. Oxford: Blackwell Scientific Publications.

Young, W., Hawken, M., & McDonald, L. (1996). Relationship between speed, agility and strength qualities in Australian Rules football. *Strength and Conditioning Coach, 4*(4), 3-6.

Young, W.B., McDowell, M.H., & Scarlett, B.J. (2001). Specificity of sprint and agility training methods. *Journal of Strength and Conditioning Research, 15*(3), 315-319.

Young, W., & Farrow, D. (2006). A review of agility: practical application for strength and conditioning. *Strength and Conditioning Journal, 28*(5), 24-29.

KORELACIJE IZMEĐU BRZINE, AGILNOSTI I OKRETNOSTI (SAQ) KOD ELITNIH MLADIH NOGOMETAŠA

Sažetak

Svrha ovog istraživanja je bila utvrđivanje korelacije između brzine, agilnosti i okretnosti, kao i utvrđivanje korelacije između testova sa i bez lopte kod mladih nogometaša. Istraživanuje je provedeno na uzorku od 25 elitnih nogometaša nacionalnog U-16 tima Srbije (uzrasta 15.19±0.32 g.; visine 176.04±6.00 cm; mase 65.19±9.41 kg). Ispitanici su mjereni u 10-m Sprintu (B10S), 30-m Sprintu (B30S), etećem 20-m Sprintu (B20S), Cik-cak testu (CC) i Cik-cak testu s loptom (CCL). Značajne relacije su pronađene između testova CC i B30S (r=0.560), kao i između CC testa i B20S (r=0.603). Nije bilo značajnih relacija između CC testa i B10S (r=0.323). Test agilnosti s loptom (CCL) nije pokazao značajne korelacije s brzinom i reakcijom (r=0.093-0.247). SAQ trenažna metoda pokazala je trening mnogo praktičnijim nege prethodno iako je uglavnom predstavljena kretanjem za vrijeme kojeg su kontakt i kontrola lopte bili minimalni. Ovo je prouzročilo gubitak specificiteta između vježbanja i zahtjeva u demonstraciji, u oba slučaja - za vrijeme testiranja i igre. Istraživanje je potvrdilo da je struktura agilnosti s loptom mnogo složenija od one bez lopte. Nadalje, ovo istraživanje je pokazalo da temeljne vještine bez lopte imaju mnogo snažnije veze s brzinom i agilnošću nego vještine s loptom.

***Ključne riječi**: SAQ, terenski test, cik-cak test, korelacije*

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