EFFECTS OF TRAINING ON THE DEVELOPMENT OF FOOTBALLERS AGILITY

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ABSTRACT: The aim of the systematic review was to determine the effects of training on the development of football agility based on the collected data and analyzed papers published in scientific and professional articles between 2009 and 2018. The electronic databases used in the creation of the review paper are the following: ResearchGate, Google Scholar, PubMed Scopus and SCI. Papers were selected based on several criteria: type of study, results, age group. The results of the research showed that the plyometric training method is most often used for the development of agility. Some research has shown us that agility can also be developed by combining plyometric training with some other training (dynamic stretching, strength exercises). In addition to plyometric training, proprioceptive training and SAQ training (a combination of strength training, endurance and football technique) are increasingly used to developt agility.

Keywords: *motor skills, football, agility, situational motor skills*

INTRODUCTION

Football is a sports game that belongs to the group of polystructural sports, in which the complex structure of the acyclic and cyclic type with the highest degree of complexity dominates. It is a sport based on movements of a complex nature, including cyclic and acyclic movements, in which the result depends on the cooperation of team members. Football is characterized by numerous and varied actions, complex, dynamic activities, which are performed in variable situations, with and without the ball in conditions when the players of the opposing team individually or in cooperation try to hinder the construction of the attack or gain possession of the ball.

Success in any kinesiological activity, and this also applies to the football game, depends on a large number of anthropological characteristics and abilities that are interconnected. The importance of the influence of certain characteristics for achieving success in the game is different. It is certain that the individual with whom these relationships are optimal will achieve better results. Among the factors that improve the anthropological status of a player and significantly influence his success, a special place is certainly occupied by motor and situational-motor abilities, the level of adoption of elements of football game technique, cognitive abilities and conative characteristics, motivation, sociological status, etc. Certainly, training as a transformational process occupies a significant place among these factors.

To be agile in the motor sense means being agile. This ability means performing maximum acceleration on a short distance (in two or three steps), but successfully stopping with a step or landing (one step) or in two steps and maximum acceleration in the other direction.

We can say that agility is an important component of many sports (especially sports games), which is not sufficiently defined compared to other motor skills. The position of agility in the general motor space has so far been considered in various ways. Agility can be seen as an isolated motor ability, but due to its complex and still insufficiently researched structure, and cognitive requirements, agility may be more optimally viewed as a very complex motor skill.

Agility can be defined in several ways:

Ability to quickly change the direction of movement, (Gredelj et al., L975).

Ability to accelerate, decelerate and quickly change direction while maintaining control of movement and without losing speed (Brittenham, 1996; Graham 2000).

Ability to change direction without loss of balance, speed, power and movement control (Pearson, 2001).

Agility is a rapid change of direction. This is related to the ability to accelerate the body, ie to achieve maximum acceleration, and to the ability to stop, ie. achieving the greatest possible deceleration. When repeating the change of direction of movement, it is constantly necessary to achieve maximum acceleration and stopping of movement on the shortest possible path (Milanović, 2013).

METHODS

The subject of this review paper are segments of motor space, agility and situational-motor abilities of football players, which are included in systematic training work.

The aim of this paper is to unite in one place the previous research related to determining the significance and magnitude of the impact of segments of the motor space defined as agility on the performance of situational-motor tests in football.

Literature search

The papers of researchers who have dealt with this issue, and whose results are analyzed in this paper, were collected on the basis of electronic search engines: ResearchGate, Google Scholar, PubMed Scopus and SCI. In addition to the mentioned electronic search engines, literature in the form of textbooks, master's theses, and doctoral theses was also used. The search is limited to papers published from 2009 to 2018 and papers in which the authors explored agility in the football game, as well as the connection with the situational-motor abilities of football players. The search selected works that were selected on the basis of key words: motor skills, football, agility and situational motor skills in football.

Theoretical consideration of the problem

The method used in the preparation of the paper was the collection of scientific and professional papers, descriptive method which was used together with the theoretical analysis. After searching using electronic

search engines (ResearchGate, Google Scholar, PubMed Scopus and SCI), some scientific professional papers were selected that were related to the subject of research and met all the criteria for further consideration.

RESULTS AND DISCUSSION

Most research shows that the effects of programmed training of football players can affect the improvement of agility, which is increasingly playing a crucial role in football. Table 1. highlights research that shows us the positive impact of training. Azmi and Kusnanik (2015) conducted a study where they analyzed the impact of programmed training on the development of speed, agility and acceleration on a sample of 26 respondents aged 18 years. The program lasted 8 weeks where the respondents were divided into 2 groups with 13 respondents each. One group did the SAQ program and the other group did the conventional training program. Both groups were found to have made significant progress in terms of speed, agility and acceleration. In their work, Dragosavljević, Sekulić and Ilić (2018) investigated the validity of 12 football skills tests from the Soccer Tutor Skill Tester battery test on a sample of 80 football players aged 13-16. These were tests to assess the control of the ball in motion, specific agility in football, and one test each of specific ball control and a test to assess the elevation accuracy of the pass. The construct validity of the tests was determined using the method of difference between known groups. In this paper, respondents are grouped into three groups (dominant, good, weak) based on subjective coaching assessment. Based on the results of the analysis of variance, a statistically significant difference between the groups was determined based on the results of 6 tests. These are tests of slalom with the ball, slalom without the ball, eights with the ball, long passes, running with the ball back and juggling the feet. Thomas, Kevin, French, Duncan, Hayes, Philip (2009) determined the influence of two types of plyometric training on the influence of muscle strength and agility in young football players. Respondents were divided into two groups, where it was found that there are no statistically significant differences between these two groups and that both types of training equally affect the development of strength and agility. In his work, Grbović (2013) wanted to determine the intensity and character of the connections between certain morphological characteristics, selected motor abilities and agility. The agility study was performed on a sample of 113 students. A transversal experiment was applied in which the interactions of morphological characteristics and motor abilities in relation to the results in different agility assessment tests were monitored. The most important findings in this study suggest that morphological characteristics directly impede the manifestation of agility. The difficulty in expressing agility is a consequence of the role of body mass, as an inertial factor, in conditions of acceleration, deceleration and change of direction.

CONCLUSION

Motor abilities are an integral part of a person's abilities, and the manifestations of motor abilities, in various ways, indicate his overall abilities. A review of previous research shows that agility as a motor skill is very important in football. We have also seen that with many different types of training we can influence the improvement of agility, for example that plyometric training influences the development of agility by influencing muscle strength. We have also seen that the development of different motor skills also influences the development of agility. Football-specific exercises have in some of the studies had a negative impact on sprint performance and reactive agility, while on the other hand they improve technical performance. There are some morphological characteristics that make it difficult to show agility, some of them are the length of the lever of the athlete, but also the role of body weight on the development of agility. What we can conclude is that monitoring the development and sensitive phases on the body of tested football players is should be monitored and conducted in every type of training, especially in working with young athletes. In today's sport increasingly is dedicated to individual work, as well as situational training, which comprehensively contributes to the development of motor skills, and also agility.

Table 1. Review of scientific research works

Author and year of publication	The aim of the research	Sample of respondents		Agility assessment tests	Statistical analysis	Results
		Number	Age			
Thomas, K., French, D., & Hayes, P.R. (2009)	The effect of two plyometric training techniques on muscle strength and agility in young football players.	15	18	505 agility test	Mean value, Kolmogorov Smirnov test, ANOVA	After 6 weeks of training, the time to perform the agility test improved.

Janjić A., Suzović D., & Janković A. (2010)	Investigate the character of changes in motor skills in the preparation period.	20	Seniors average age 20.83 (± 2.48) years	Running with a change of direction, running the ball with a change of direction	Descriptive and comparative statistics, t-test	The obtained results indicate that during the summer preparation period, the motor abilities of football players change.
Ejup, M., Hodžić, M., Hadžiahmetović, A., & Ferić A. (2010)	To determine the influence of basic motor skills on the results in situational football tests to assess the speed of running the ball and accuracy in the football game.	88	12 -14	MKLSNL - Slalom with two balls - MAGKUS - Steps to the side - MKTOZ - Agility in the air	Regression analysis	Results in motor tests significantly affect (p = .01) the level of achievement in all analyzed situational football tests.
Sporiš, G., Milanović, Z., Trajković, N., & Joksimović, A. (2011)	The aim of the research was to determine the correlation between speed, agility and speed, and to determine the connection between tests with and without the ball in young football players.	25	15.19± 0.32	Zig zag test, zig zag test with the ball	Kolmogorov-Smirnov test, Spirman correlation test	Research has confirmed that the structure of agility with the ball is much more complex compared to that without the ball. In addition, this research showed that basic skills without the ball have a much stronger relationship between speed, agility, and speed than skill with the ball.
Ćeremidžić, D., Kovačević, V. (2012)	The primary goal of this paper is to determine the relationship between motor abilities as a predictor set of variables with situational-motor abilities.	12	14 years ± 6 months	Zigzag test without the ball, MCC	Regression analysis, t-test	The results of the study show that there is a significant correlation only between the effect of sprint ability at 20m and on the Illinois test.

Kutlu, M., Yapıcı, H., Yoncalı,k O., & Çelik, S. (2012)	Comparison of agility and skill test in football with other agility tests	113	21.2 ± 3	T-drill agility, Zig zag test, Ilinois test	ANOVA, T test, Pearson correlatio n test	The correlation coefficient of the new test was 88, with no significant difference (p> 0.01> 0.01) between the test results obtained in the first and second test sessions. The results of the analysis of variance revealed a significant (p <0.01) difference between the results of the agility of the T-test and the results of the strength test for football players. A new agility and skill test is an acceptable and reliable test when the reliability of retesting and reliability among assessors is taken into account. The findings of this study suggest that a new football-specific agility and shooting test can be used to test and identify football talents.
Bullock, W., Panchuk, B., Broatch, J., Christian, R., & Steptoa, N. (2012)	The aim of this study was to evaluate the effect of 45 minutes of football-specific exercise in a reactive motor test (RMST); a new test that measures sprint, pass and reactive agility (RAT) performance.	42	18.5 ± 3.5	RMST tests	Coefficien t of variation T - test	Football-specific exercises reduced sprint performance and reactive agility, but improved technical skills performance on a new, integrative, and reliable football skills performance test. The overall execution time of the RMST has largely not changed.
Hadžić, E., Guzina, B. (2013)	Determining the influence of football / football players' motor abilities (as a predictor set of variables) on the situational-motor readiness of football players / football players (as a criterion set of variables).	64	19-26	Running in a rectangle Envelope test, Steps to the side, Eight with a bend	Multiple regression analysis	A significant influence of basic basic-motor abilities (speed, explosive power and agility) on situational-motor abilities was determined.
Grbović, M. (2013)	Determining the influence of basic motor skills on the results of SMS in boys aged 11-13 years.	113	20 - 25	T-test, 505 test, zigzag running, 4 x 5 m running and 10 x 5 m running.	Factor analysis	Motor abilities directly, through strength and speed, have a positive effect on the manifestation of agility.
Dokić, M., Veselinov, D. (2014)	Determine if there are differences in motor ability depending on age.	40	16 – 18	Slalom 20m without ball	Multivaria te analysis of variance (MANOVA) Univariate analysis of variance (ANOVA)	Agility is at almost the same level in both groups of footballers.

Marinković, D., Pavlović, S., & Božić, V. (2014)	To determine the extent to which the organized treatment implementation of the SAQ training program affects certain motor abilities of children of younger school age.	65	9-10	Slalom with the ball and the back polygon	T-test of paired samples	Significant improvement of certain motor abilities was found in children of younger school age.
Gardašević, J., Bjelica, D., & Ćorluka, S. (2018)	Determine the level of quantitative changes in agility in cadet football players.	120	15– year olds ± 6 months	Running with a change of direction at right angles Curvy running Conical running 10x5m	T-test	It can be concluded that the training program in the preparatory period led to positive transformations in all variables that assessed, according to the structure of the hypothetically set model, agility.
Azmi, K., Kusnanik, N.W. (2019)	The aim of this study was to analyze the effect of speed, agility, and speed training programs to increase speed, agility, and acceleration.	26	18	Speed test 30m, T - test, Acceleration test 10m	T test and t test for independent samples	In short, it can be concluded that a training program for speed, agility and speed can improve the speed, agility and acceleration of football players.
Božić, D., Bajrić, S., Ilić, N., & Goranović S. (2018)	To determine the significance and magnitude of the influence of segments of motor space defined as agility on the results of performing situational-motor tests in football.	52	14 - 16	Test 20 yards Running 4 x 5 meters with a change of direction under 900 and 1800 T– test	Regression analysis	The system of predictor variables represented by agility assessment tests had a statistically significant effect on each specific speed test.
Ćeremidžić, D. (2018)	The aim of this paper is to determine the connection between motor abilities and situational motor abilities of young football players aged 9 to 10 years.	65	9 - 10	Zigzag with and without the ball	Regression analysis	A statistically significant correlation of predictor variables with the criterion was established.
Dragosavljević, P., Sekulić, Ž., & Ilić, N. (2018)	The aim of this research was to determine the validity of tests of specific skills in football.	80	13-16	Slalom without ball, Agility eights ,Agility slalom	Calculation of descriptive statistical indicators. arithmetic means, standard deviations , minimum and maximum score for each test.	The obtained values confirm that there are no statistically significant deviations of the obtained results from the normal distribution and that the data can be analyzed by parametric statistics.

REFERENCES

1. Azmi, K., & Kusnanik, N. W. (2018). Effect of exercise program Speed, Agility, and Quickness (SAQ) in improving speed, agility, and acceleration. *In Journal of Physics: Conference Series* (Vol. 947, No. 1, p. 012043). IOP Publishing.
2. Božić, D., Bajrić, S., Ilić, N., & Goranović, S. (2018) „RELATIONSHIP OF AGILITY WITH TESTS OF SPECIFIC SPEED IN FOOTBALL "*Proceedings Book of XXI Scientific Conference "FIS COMUNICATION 2018" in physical education, sport and recreation,18th - 20th*October 2018, (pp. 131-136). Niš: Faculty of Sport and Physical Education University of Niš.
3. Bullock, W., Panchuk, D., Broatch, J., Christian, R., & Steptoa, N. (2012). An integrative test of agility, speed and skill in soccer: effects of exercise, *Journal of Science and Medicine in Sport*, 15 (5), 431-436.
4. Ćeremidžić, D., & Kovačević, V. (2012). Povezanost motoričkih sposobnosti sa situaciono-motoričkim sposobnostima polaznika škole fudbala „Olimp". *SPORT I ZDRAVLJE*, 13 (2).
5. Ćeremidžić., D. (2018). Povezanost motoričkih sposobnosti sa situacino-motoričkim sposobnostima mladih fudbalera. *SPORT I ZDRAVLJE*, 13 (2).
6. Dragosavljević, S., Sekulić, Ž., & Ilić, N. (2018). Valjanost testova specifičnih vještina u fudbalu i njihova primjena u evaluaciji i kontroli treninga. *SPORT I ZDRAVLJE, 13 (1).*
7. Dokić. M., & Veselinov, D. (2014). Razlike u motoričkim sposobnostima nogometaša uzrasta 16 – 18 godina. 12. *Godišnja međunarodna konferencija KONDICISKA PRIPREMA SPORTAŠA*. Zagreb, 175-178
8. Ejup, M., Hodžić, M., Hadžiahmetović, A., & Ferić, A. (2010). Utjecaj bazično-motoričkih sposobnosti na brzinu vođenja lopte i preciznost u nogometnoj igri njemačkih nogometaša-kadeta uzrasta od 12-14 godina. Crnogorska sportska akademija, *Sport Mont*, 21 (22), 84-93.
9. Graham, J. F. (2000.). Agility training. In: L.E. Brown, V.A. Ferrigno and J.C. Santana (Eds.), Training for speed, agility, and quickeness.(pp. 79 – 144). Champaign, IL: *Human Kinetics*.
10. Gredelj, M., Hošek, A., Metikoš, D., & Momirović, K. (1975). Model hijerarhijske strukture motorickih sposobnosti, Rezultati dobijeni primjenom jednog neoklasičnog postupka za procjenu latentnih dimenzija. *Kineziologija* 5, 1-2, str. 7-82
11. Gardašević, J., Bjelica, D., & Popović, S. (2015). Efekti programiranog rada tokom pripremnog perioda na transformaciju agilnosti kod fudbalera kadetskog uzrasta. *Sport Mont, 43, 44, 45*, 355-360.
12. Grbović, M. (2013). *Merenje agilnosti u različito definisanim uslovima*. Doktorska disertacija. Beograd: Fakultet sporta i fizičkog vaspitanja.
13. Hadžić, E., & Guzina, B. (2013). Utjecaj bazično-motoričkih sposobnosti nogometaša na situaciono-motoričke sposobnosti. *Sportske nauke i zdravlje,* 3(2):137-144
14. Janjić, A., Suzović, D., & Janković, A. (2010). Promena motoričkih sposobnosti fudbalera u letnjem pripremnom periodu. *Fizička kultura*, *64* (1), 35-45.
15. Kutlu, M., Yapıcı, H., Yoncalık, O., & Çelik, S. (2012). Comparison of a New Test For Agility and Skill in Soccer With Other Agility Tests. *Journal on Human Kinetics*, 33, 143–150.
16. Marinković, D., Pavlović, S., & Božić,V. (2014). Primjena treninga brzine, agilnosti i eksplozivnosti kod djece mlađeg školskog uzrasta. 12. *Godišnja međunarodna konferencija KONDICISKA PRIPREMA SPORTAŠA*. Zagreb, 226-229
17. Milanović, D. (2013). Teorija treninga. *Zagreb: Kineziološki fakultet sveučilišta u Zagrebu.*
18. Nićin, Đ., Kalajdžić, J. (1996). Antropomotorika. *Novi Sad: Fakultet fizičke kulture*.
19. Pearson, A. (2001). *Speed, agility and quickness for soccer: SAQ soccer.* A. & C. Black.
20. Sporiš, G., Milanović, Z., Trajković, N., & Joksimović, A. (2011). Correlation between speed, agility and quickness (SAQ) in elite young soccer players. *Acta kinesiologica*, 5(2), 36-41.
21. Thomas, K., French, D., & Hayes, P. R. (2009). The effect of two plyometric training techniques on muscular power and agility in youth soccer players. *The Journal of Strength & Conditioning Research*, 23(1), 332-335.
22. Vänttinen, T., Blomqvist, M., & Häkkinen, K. (2010). Development of Body Composition, Hormone Profile, Physical Fitness, General Perceptual Motor Skills, Soccer Skills and On-The-Ball Performance in Soccer-Specific Laboratory Test Among Adolescent Soccer Players, *Journal of Science and Medicine in Sport,* 9(4): 547–556.

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