RELATIVE AGE AND ANAEROBIC CHARACTERISTICS OF YOUNG SOCCER PLAYERS

Željko Sekulić[1], Nemanja Kokanović[1] & Saša Marković[1]

[1] *University of Banja Luka, Faculty of physical education and sport, Bosnia & Herzegovina*

Original scientific paper
10.5550/sgia.191501.en.skm
UDK: 796.332.015.57

Received: 20.09.2019.
Accepted: 28.10.2019.

Correspodance:
Prof.Dr. Željko Sekulić
University of Banja Luka, Faculty of physical education and sport, Bosnia & Herzegovina

Sportlogia 2019, 15 (1), 48-59.
E-ISSN 1986-6119

RELATIVNA STAROST I ANAEROBNE KARAKTERISTIKE MLADIH FUDBALERA

ABSTRACT

The aim of this study was to examine the impact of the relative age on the power, speed and agility of young U13 and U14 players. The study was conducted on a sample of 60 young soccer players born in 2001 and 2002. Within both age groups, players are divided into two categories according to relative age, whether they were born in the first or second half of the year. Anthropometric measurements and measurements of motor abilities were made to assess explosive power, speed and agility using the tests: standing long jump, vertical jump, sprint at 30 meters with passing time at 10 meters, zig-zag running without a ball and Ajax test 5x10m. Statistically significant differences were found in body height and weight, as well as in tests to assess power in a sample of U13 players. In U14 group, differences were found in tests of power and running speed, while there were no statistically significant differences in anthropometric variables. According to the results obtained, it can be said that the relative age is an important factor that leads to the appearance of differences in the test results of motor skills of young U13 and U14 soccer players. Therefore, the effect of relative age must be taken into account when selecting young soccer players during adolescence.

Keywords: *relative age, biological maturity, explosive power, speed, agility, young soccer players, talent selection and identification*

Sekulić, Ž., Kokanović, N., & Marković, Saša. (2019). Relative age and anaerobic characteristics of young soccer players. *Sportlogia 15* (1), 48-59. doi:10.5550/sgia.1915012.en.skm

INTRODUCTION

According to the Rules of Competition of the Football Association of Bosnia and Herzegovina, the competitive selections of young soccer players are formed on the basis of the chronological age of the players, and January 1st is taken as the cut-off date for the selection of players in a particular selection. The same is in other countries whose soccer federations organize competitions according to the regulations of the European Football Association (UEFA). As a consequence of such propositions, it happens that players born in the first part of the selection year are more represented in teams than their peers born in the second half of the year (Cobley et al. 2009; Till et al. 2010; Delorme et al., 2010,Rashner et al., 2012). This difference in chronological age is referred to as relative age, and its immediate and long-term effects on the performance and selection of young athletes are known as the relative age effect (Cobley et al. 2009; Hancock et al. 2013). The relative age effect represents an unequal distribution of birth dates within the age group of athletes by favoring those born at the beginning or in the first months of the selection year, and discriminating against those born at a later date or at the end of the selection year (Mujika et al. 2009; Helsenet al. , 2012). Comparison of the birthdays of professional soccer players in ten European countries in the 2000-2001 competitive seasons and 2010-2011, showed that there is no change in the presence of the relative age effect in professional soccer over the past 10 years, indicating the robust nature of this problem and its actuality (Helsen et al., 2012). Social factors are considered to have the greatest impact on this phenomenon, which include both the influence of the coach as well as the influence of the parents and the athletes themselves on its appearance and representation (Hancock et al., 2013). Research has shown that athletes born earlier during the selection year are taller and more powerful than peers born later (Carling et al., 2009; Hirose, 2009). It has been previously documented that physical characteristics of players play an important role in successful performance in soccer (Stolen et al., 2005). Soccer skills that require a high level of muscle strength, such as sprint, jump, shot, tackle have been shown to significantly discriminate between different groups of football players according to level of competition (Cometti et al. 2001, Vaeyans et al. 2006). The players born at the beginning of the selection year can be biologically more mature and thus have a higher level of ability related to muscle strength (Stratton et al., 2004) In soccer, the combination of relative age and biological maturity increases the possibility for a young footballer to be selected and recognized as talented (Cobley et al., 2009). On the other hand, there is a number of studies that have not found a relationship between the relative age and the level of physical and physiological characteristics of soccer players (Carling et al., 2009; Deprez et al., 2012; Hirose, 2009; Segers et al., 2008).

Due to the insufficient number of studies and the still insufficiently clear role of relative age in the selection of young football players, this research was conducted to determine the impact of the relative age on the anaerobic characteristics (explosive power, speed and agility) of young soccer players aged 13 and 14.

Sekulić, Ž., Kokanović, N., & Marković, Saša. (2019). Relative age and anaerobic characteristics of young soccer players. *Sportlogia 15* (1), 48-59. doi:10.5550/sgia.1915012.en.skm

METHODS

The research was conducted on a sample of 60 young soccer players born in 2001 and 2002 from a club that competes at the highest state level of the competition. The participants were divided into two age categories, U14 (n = 30; M = 13.7 years) and U13 (n = 30; M = 12.4 years. The selection criteria were as follows: (1) born in 2001 and 2002, (2) active members of the club, (3) train football for at least 2 years, (4) regularly train four times a week (5) have a medical examination confirming that they are healthy.

All participants born in 2002 were classified into two categories according to chronological age. The first category consisted of boys born from January 1st to June 30th2002 (n = 14) and the second category of boys born from July 1st to December 31st 2002. The same division into categories was made in boys born in 2001. The first category includes boys born in the first half of the year (n = 19) and boys born in the second half of the year (n = 11).

Anthropometric measurements included estimation of body height and body weight. The selection of the anaerobic tests was made taking into account the results of research of the importance of particular abilities for success in football. A link between the performance of soccer skills, on the one hand, and running speed, explosive power and agility, on the other, has been confirmed (Stolen et al. 2005, Cometti et al. 2001). A sprint test of 30 meters with a 10 meter passing time was used to assess running speed, a vertical jump was used to evaluate power and an Ajax test was used to assess agility.

The data were processed using the SPPS 20 for Windows and descriptive and comparative analyses were conducted. In the first step, basic descriptive statistical parameters were calculated (arithmetic mean, standard deviation, standard error of arithmetic means for all variables). The statistical significance of the normality of the distribution was tested. In the next step, the statistical significance of the arithmetic mean differences between the two groups of participants was tested. A t-test for independent samples was used for this purpose. This analysis was applied to test for differences in both the boys group born in 2002 (U13) and the boys group born in 2001 (U14). All hypotheses were tested at a significance level of 0.05.

THE RESULTS

Table 1 shows the basic descriptive parameters of anthropometric variables, as well as the parameters of power, running speed and agility. The sample of boys born in 2002 was divided into two groups, boys born in the first and second half of the year.

Table 1. *Descriptive statistics of test results for both groups of players born in the first and second half of the year (U13)*

	date of birth	N	M	SD	SEM
body weight (kg)	first half	14	63.89	4.59	1.53
	second half	16	47.12	8.13	2.03
body height (cm)	first half	14	175.22	3.83	1.28
	second half	16	161.06	10.9	2.72
standing long jump (cm)	first half	14	213.78	14.77	4.92
	second half	16	195.19	21.92	5.48
vertical jump (cm)	first half	14	269.33	9.14	3.04
	second half	16	246.12	17.44	4.36
sprint 10 m	first half	14	2.49	0.20	0.07
	second half	16	2.55	0.10	0.02
sprint 30 m	first half	14	5.20	0.36	0.12
	second half	16	5.45	0.26	0.06
zig-zag running	first half	14	5.47	0.32	0.12
	second half	16	5.53	0.26	0.06
ajax test 5x10 m	first half	14	12.91	0.48	0.16
	second half	16	13.26	0.59	0.15

Legend: N-number of participants; M-arithmetic mean; SD standard deviation; SEM- standard error of arithmetic mean

Table 2 shows the results of testing the statistical significance of differences in the arithmetic means of two groups of boys born in 2002. Boys born in the first half of the year were taller and heavier than boys born in the second half of the year.

The difference between the two categories of boys was statistically significant at a significance level of 0.01. Boys born in the first half of the year, therefore chronologically older players, performed statistically significantly better in power tests (long jump and vertical jump) compared to chronologically younger boys.

The difference between the two categories of boys in the power test (long jump) was statistically significant at the significance level of 0.05, while the difference in the other power test (vertical jump) was statistically significant at the significance level of 0.01. The differences in the running speed and the agility tests were not statistically significant; the chronological age of the subjects did not affect the differences in the results of these tests.

Table 2. *Results of the t-test for independent samples; testing for statistical significance of differences in measurement results between two groups of players born in the first and second half of the year (U13)*

	t	df	p
body weight (kg)	6.587	22.98	**0.000**
body height (cm)	4.706	20.47	**0.000**
standing logn jump (cm)	2.261	23	**0.034**
vertical jump (cm)	3.693	23	**0.001**
sprint 10 m (s)	-1.114	23	0.277
sprint 30 m (s)	-2.04	23	0.053
zig-zag running (s)	-0.508	23	0.616
ajax test 5x10 m (s)	-1.541	23	0.137

Legend: t-t statistic; df degrees of freedom; p-level of significance

Table 3 shows the basic descriptive parameters of anthropometric variables, as well as the parameters of the power, speed and agility in a sample of boys born in 2001.

Table 3. *Descriptive statistics of test results for both groups of players born in the first and second half of the year (U14)*

	date of birth	N	M	SD	SEM
body weight (kg)	first half	19	58.26	6.56	1.50
	second half	11	53.67	6.38	2.60
body height (cm)	first half	19	173.11	9.28	2.13
	second half	11	167.00	7.01	2.86
standing long jump (cm)	first half	19	217.21	20.77	4.77
	second half	11	196.50	16.01	6.53
vertical jump (cm)	first half	19	264.79	13.13	3.01
	second half	11	251.50	9.83	4.01
sprint 10 m (s)	first half	19	2.47	0.10	0.02
	second half	11	2.57	0.06	0.02
sprint 30 m (s)	first half	19	5.17	0.24	0.05
	second half	11	5.43	0.16	0.07
zig-zag running (s)	first half	19	5.58	0.26	0.06
	second half	11	5.67	0.14	0.06
ajax test 5x10 m	first half	19	12.89	0.40	0.09
	second half	11	13.19	0.39	0.16

Legend: N-number of participants; M-arithmetic mean; SD standard deviation; SEM- standard error of arithmetic mean

Table 4 shows the results of testing the statistical significance of differences in arithmetic means of two groups of boys born in 2001. The results showed that there was a statistically significant difference between the two categories of boys in tests of power and running speed. Boys born in the first half of the year had better results in both the long jump test and the vertical jump test and the difference was statistically significant at a significance level of 0.05. Chronologically older boys of this age also had better results in the running speed test, a sprint at 30 meters with a passing time at 10 meters. The difference was also statistically significant at the 0.05 level. The results showed no statistically significant difference in anthropometric variables, body height and body weight. In addition, no significant difference was found between the two categories of boys in the results of agility tests.

Table 4. *Results of the t-test for independent samples; testing for statistical significance of differences in measurement results between two groups of players born in the first and second half of the year (U14)*

	t	df	p
body weight (kg)	1.504	29	0.146
body height (cm)	1.475	29	0.154
standing long jump (cm)	2.229	29	**0.036**
vertical jump (cm)	2.272	29	**0.033**
sprint 10 m (s)	-2.278	29	**0.032**
sprint 30 m (s)	-2.496	29	**0.020**
zig-zag running (s)	-0.765	29	0.452
ajax test 5x10 m (s)	-1.631	29	0.116

Legend: t-t statistic; df degrees of freedom; p-level of significance

DISCUSSION

The aim of this study was to determine the impact of relative age on power, sprint speed and agility in young soccer players in two competitive categories, U13 and U14. Within these categories, participants were divided into categories depending on whether they were born in the first or second half of the year. In the group of young soccer players born in 2002 (U13), it was found that there was a statistically significant difference in tests of power, both horizontal and vertical, as well as body height and weight. Research has shown that biological maturity can influence the selection of young athletes and the incidence of relative age in football (Helsen et al. 2000; Cobley et al. 2009). As in some earlier studies, it was shown that young athletes who are chronologically older within the same selection year often have more developed physical characteristics (Gill et al., 2014; Fragoso et al., 2015). Thus, in this study, statistically significant differences were observed in both examined anthropometric characteristics in U13 group, while in U14 group no differences in body

height and weight were observed. This is probably due to the fact that relatively older and therefore heavier boys are more likely to be selected in the younger age categories and continue playing football in the older age categories (Helsen et al. 2000, Malina et al. 2007, Vaeyens et al., 2005). Similarly, Deprez et al. (2012) in their study found no significant differences in anthropometric characteristics between the 4 quarters of the selection year, which was attributed to the fact that players had already undergone a high level of selection that led to sample homogeneity. Borges et al. (2017) have shown that the anthropometric characteristics of young soccer players change according to the level of biological maturity. The results of this study showed that there is a relationship between the relative age of U13 soccer players and the level of power. Players born in the first half of the year performed better on both power tests than players born in the second half of the year. An earlier research also showed that relatively older soccer players may have better power performance during puberty than their younger peers (Malina et al. 2004, Figueiredo et al. 2009). Explosive power is an ability that correlates with anthropometric player growth and development, and changes in explosive power were attributed to weight gain and development of the neuromuscular and neuroendocrine system (Stratton et al., 2004). This is further compounded by metabolic factors and androgenic hormones that affect anaerobic strength production and muscle hypertrophy, whose concentration begins to increase from 13-14 years in boys (Issurin, 2008). The impact of biological maturity is therefore particularly pronounced when it comes to muscle strength abilities. Deprez et al. (2013) showed that, when controlling for age and biological maturity, there are no differences in the examined parameters of anaerobic performance within the birth quarters. No differences in running speed and agility were found in the group of boys born in 2002 (U13), which is consistent with some earlier studies (Deprez et al., 2012; Malina et al., 2007; Hirose, 2009). The assumption is that younger players can chronologically counteract the effect of relative age on motor skills by entering puberty early or with a higher level of biological maturity.

In a group of young soccer players born in 2001 (U14), it was found that there is a statistically significant difference in power and running speed tests in favor of boys born in the first half of the year. No statistically significant difference in body height and weight was observed. Unlike the younger age group (U13) where there was no difference in sprint speed between chronologically older and younger boys, this difference was statistically significant in the group of U14. The influence of biological maturity on running speed is present in older boys, in whom these differences in growth and strength development are most pronounced (Mendez-Villanueva et al., 2011). In a study conducted by McCunn et al. (2016), the association between biological maturity and running speed was very small in the younger age categories, while a large association was shown for the U14 and U15 age categories, which is consistent with the results obtained in this study.

In this study, no statistically significant difference was found in the results of agility tests between boys born in the first half of the year and boys born in the second half of the year. This was the case in both age categories, both U13 and U14. This is consistent with research that has also not found the impact of relative age on agility in young football players (Lovell et al., 2015).

This research has shown that the relative age of young football players may significantly influence the motor skills of young soccer players, such as power and speed in the U13 and U14 age category. Relatively older U13 players showed a higher level of power than relatively younger players. Players born in the first half of the year performed better on both power tests than boys born in the second half.

With regard to the U14 age, differences between the two categories of soccer players of different relative age were found in power and speed tests. It is very important for coaches to take into account the impact of the relative age and maturity of young football players during the selection process in order to objectively select talented boys into youth selections during adolescence.

LITERATURE

Mendez-Villanueva, A., Buchheit, M., Kuitunen, S., Douglas, A., Peltola, E., Bourdon, P. (2011) Age-related differences in acceleration, maximum running speed, and repeated-sprint performance in young soccer players, Journal of Sports Sciences, 29:5, 477-484.
https://doi.org/10.1080/02640414.2010.536248
PMid:21225488

Armstrong, N., McManus, AM. (2011).Physiology of elite young male athletes. Med Sport Sci., 56, 1-22.
https://doi.org/10.1159/000320618
PMid:21178364

Borges, P.H., Rechenchosky, L., Menegassi, V. M., Ciqueira, E.F.L., Avelar, A., Granja de Olivera, J.G., Rinaldi, W. (2017). Peak height velocity in soccer: anthropometric, functional, motor and cognitive implications. Journal of Physical Education and Sport (JPES), 17(2), 821-825.

Carling, C., Le Gall, F., Reilly, T. and Williams, A. M. (2009). Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players?.Scandinavian Journal of Medicine & Science in Sports, 19: 3-9.
https://doi.org/10.1111/j.1600-0838.2008.00867.x
PMid:19000100

Cobley, S. , Baker, J. , Wattie, N. , McKenna, J . (2009). Annual age-grouping and athlete development: a meta-analytical review of relative age effects in sport. Sports Med, 39, 235-56.
https://doi.org/10.2165/00007256-200939030-00005
PMid:19290678

Delorme, N., Boiche, J., Raspaud, M. (2010). Relative age and dropout in French male soccer. J Sports

Sci.,28(7),717-22.
https://doi.org/10.1080/02640411003663276
PMid:20480428

Deprez, D., Vaeyens, R., Coutts, A.J., Lenoir, M., Philippaerts, R. (2012). Relative age effect and Yo-Yo IR1inyouth soccer. Int J Sports Med., 33(12), 987-93.
https://doi.org/10.1055/s-0032-1311654
PMid:22791620

Deprez, D., Coutts, A.J., Fransen, J., Deconinck, F., Lenoir, M., Vaeyens, R., Philippaerts, R. (2013). Relative age, biological maturation and anaerobic characteristics in elite youth soccer players. Int J Sports Med., 34(10), 897-903.
https://doi.org/10.1055/s-0032-1333262
PMid:23700327

Dixon, J., Horton, S., Weir, P. (2011). Relative Age Effects: Implications for Leadership Development. The International Journal of Sport and Society, 2 (2).
https://doi.org/10.18848/2152-7857/CGP/v02i02/54068

Figueiredo, A.J., Gonçalves, C.E., Coelho E Silva, M.J., Malina, R.M. (2009). Youth soccer players, 11-14 years: maturity, size, function, skill and goal orientation. Ann Hum Biol., 36(1), 60-73.
https://doi.org/10.1080/03014460802570584
PMid:19085511

Figueiredo, A.J., Coelho E Silva, M.J., Cumming, S.P., Malina, R.M. (2010). Size and maturity mismatch in youth soccer players 11- to 14-years-old. Pediatr Exerc Sci., 22(4), 596-612.
https://doi.org/10.1123/pes.22.4.596
PMid:21242608

Fragoso, I., Massuca, L.M., Ferreira, J. (2015) Effect of birth month on physical fitness of soccer players (Under-15) according to biological maturity. Int J Sports Med., 36(1), 16-21.
https://doi.org/10.1055/s-0034-1384548
PMid:25144439

Gil, S.M., Badiola, A., Bidaurrazaga-Letona, I., Zabala-Lili, J., Gravina, L., Santos-Concejero, J., Lekue JA., & Granados C. Relationship between the relative age effect and anthropometry, maturity and performance in young soccer players. J sports Sci. 2014;32(5):479-86.
https://doi.org/10.1080/02640414.2013.832355
PMID:24050650

Hancock, D. J., Adler, A. L., Côté, J. (2013). A proposed theoretical model to explain relative age effects in sport. Eur J Sport Sci., 13, 630-7.
https://doi.org/10.1080/17461391.2013.775352
PMid:24251740

Helsen, W.F., van Winckel, J., Williams, A.M. (2005). The relative age effect in youth soccer across Europe. J Sports Sci., 23(6), 629-36.
https://doi.org/10.1080/02640410400021310
PMid:16195011

Helsen, W.F., Baker, J., Michiels, S., Schorer, J., Van Winckel, J., Williams, A.M. (2012). The relative age effect in European professional soccer: did ten years of research make any difference? J Sports Sci., 30(15), 1665-71.
https://doi.org/10.1080/02640414.2012.721929
PMid:23005576

Hirose, N. (2005). Relationship among birth-month distribution, skeletal age and anthropometric characteristics in adolescent elite soccer players. J Sports Sci; 27: 1159-1166
https://doi.org/10.1080/02640410903225145
PMid:19724967

Issurin, V. (2008). Block Periodization: Breakthrough in Sports Training. Michigan, USA: Ultimate Athlete Concepts.

Lovell R, Towlson C, Parkin G, Portas M, Vaeyens R, et al. (2015) Soccer Player Characteristics in English Lower-League Development Programmes: The Relationships between Relative Age, Maturation, Anthropometry and Physical Fitness. PLOS ONE 10(9): e0137238.
https://doi.org/10.1371/journal.pone.0137238
PMid:26331852 PMCid:PMC4558096

Malina, R.M. (2003). Motor Development during Infancy and Early Childhood: Overview and Suggested Directions for Research. International Journal of Sport and Health Science, 2, 50-66.
https://doi.org/10.5432/ijshs.2.50

Malina, R.M., Bouchard, C., Bar-Or, O. (2004). Growth, Maturation, and Physical Activity, 2nd Edition. Champaign, IL: Human Kinetics.

Malina, R.M., Eisenmann, J.C., Cumming, S.P., Ribeiro, B., Aroso, J. (2004). Maturity-associated variation in the growth and functional capacities of youth football (soccer) players 13-15 years. Eur J Appl Physiol., 91(5-6), 555-62.
https://doi.org/10.1007/s00421-003-0995-z
PMid:14648128

Malina R.M., Cumming S.P., Morano P.J., Barron M., Miller S.J. (2005). Maturity status of youth football players: a noninvasive estimate. Med Sci Sports Exerc, 37(6), 1044-52.

Malina R.M., Dompier T.P., Powell J.W., Barron M.J., Moore M.T. (2007). Validation of a noninvasive maturity estimate relative to skeletal age in youth football players. Clin J Sport Med, 17(5), 362-8.
https://doi.org/10.1097/JSM.0b013e31815400f4 PMid:17873548

Malina, R.M., Ribeiro, B., Aroso, J., Cumming, SP. (2007). Characteristics of youth soccer players aged 13-15 years clasified by skill level. Br J Sports Med; 41: 290-295
https://doi.org/10.1136/bjsm.2006.031294
PMid:17224444 PMCid:PMC2659047

McCunn, R., Weston, M., Hill, J. K. A., Johnston, R. D., Gibson, N. V. (2016). Influence of physical maturity status on sprinting speed among youth soccer players. J Strength Cond Res, 31(7), 1795-1801.
https://doi.org/10.1519/JSC.0000000000001654
PMid:27669191

Mujika, I., Vaeyens, R., Matthys, S.P., Santisteban, J., Goiriena, J., Philippaerts, R. (2009). The relative age effect in a professional football club setting. J Sports Sci, 27(11), 1153-8.
https://doi.org/10.1080/02640410903220328
PMid:19714545

Reilly, T., Richardson, D., Stratton, G., Williams, M.A. (2004). Youth Soccer: From Science to Performance. London: Routledge, Taylor & Francis Group.
https://doi.org/10.4324/9780203644133

Stolen, T., Chamari, K., Castagna, C., Wisloff, U. (2005). Physiology of soccer: an update. Sports Med; 51: 170.

Unnithan, V., White, J., Georgiou, A., Iga, J., Drust, B. (2012). Talent identification in youth soccer. J Sports Sci., 30(15), 1719-26.
https://doi.org/10.1080/02640414.2012.731515
PMid:23046427

Vaeyans, R., Malina, RM., Janssens, M., Van Renterghem, B., Bourgois, J., Vrijens, I., Philippaerts, RM., (2006). A multidisciplinary selection model for youth soccer: the Ghent Youth Soccer Project. Br J Sports Med; 40: 928-934.
https://doi.org/10.1136/bjsm.2006.029652
PMid:16980535 PMCid:PMC2465033

SAŽETAK

Cilj ovog rada je bio da se ispita u kojoj mjeri relativna starost ima uticaj na eksplozivnu snagu, brzinu i agilnost mladih fudbalera uzrasta U13 i U14. Istraživanje je provedeno na uzorku 60 mladih fudbalera rođenih 2001. i 2002. godine. Unutar obe starosne grupe igrači su podijeljeni u dvije kategorije prema relativnoj starosti, odnosno prema tome da li su rođeni u prvoj ili drugoj polovini godine. Izvršena su antropometrijska mjerenja i mjerenja za procjenu eksplozivne snage, brzine i agilnosti pomoću testova: skok u dalj iz mjesta, vertikalni skok, sprint na 30 metara sa prolaznim vremenom na 10 metara, cik-cak trčanje bez lopte i Ajaksov test 5x10m. Pronađene su statistički značajne razlike u tjelesnoj visini i težini, kao i u testovima za procjenu eksplozivne snage u uzorku ispitanika uzrasta U13. U uzrastu U14 pronađene su razlike u testovima za procjenu eksplozivne snage i brzine sprinta, dok nije bilo statistički značajnih razlika u antropometrijskim varijablama. Prema dobijenim rezultatima, može se reći da je relativna starost važan faktor koji dovodi do pojave razlika u rezultatima ispitivanja motoričkih sposobnosti mladih fudbalera uzrasta U13 i U14. Zbog toga se efekat relativne starosti mora uzeti u obzir prilikom procjene sposobnosti i selekcije mladih fudbalera u periodu adolescencije.

Ključne riječi: *relativna starost, biološka zrelost, eksplozivna snaga, brzina, agilost mladi fudbaleri, selekcija i identifikacija talenata*

Received: 20.09.2019.
Accepted: 28.10.2019.

Correspodance:
Prof.Dr. **Željko Sekulić**
University of Banja Luka,
Faculty of physical education and sport,
Bul. Vojvode Petra Bojovića 1a,
78000, Banja Luka,
Bosna i Hercegovina
zeljko.sekulic@ffvs.unibl.org

Sekulić, Ž., Kokanović, N., & Marković, Saša. (2019). Relative age and anaerobic characteristics of young soccer players. *Sportlogia 15* (1), 48-59. doi:10.5550/sgia.1915012.en.skm