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Selection of Young Basketball Players: Are Physical Characteristics the Most Important?

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Abstract

Thirty-The aim of the study was to examine whether physical characteristics have influence on the status of 13-year-old basketball players in the team. (First team or substitutions, starters or non-starters). The sample participants was made of 20 basketball players (HT=177.35cm±6.73, BM=61.42kg±8.98, average age 13 years and 7 months ±.28, average basketball training experience 4 years and 6 months ±1.15). The sample was divided into 2 groups: 10 players, 5 players from each of two best regional teams, had status of starters. The other 10 players, from same teams respectively, were not from the first team. Using One-way ANOVA, the differences between starters and nonstarters, were examined in the set of anthropometric variables (body height arm span, standing reach height, body weight and percentage of body fat), motor variables (velocity of neuromuscular reaction time, vertical jump, 5 meters sprint, 10 meters sprint, 20 meters sprint, T-test, Zig-zag test, Ball throw from sitting position, Sit-ups for 30 seconds and standing forward bend) and one functional variable (20-M shuttle run test). Starters had better results in the majority of measured and tested variables. It has been concluded that coaches of these two teams chose, taller players for starters who are more agile, explosive, with stronger arms and shoulder girdle as well. Coaches of younger categories of basketball players could use results of the present study as a certain model of physical characteristics for talented 13-year-old basketball players.

Key words: **puberty/ physical characteristics and abilities/ basketball coaches**

Introduction

One of the basic characteristics of the puberty is child's body accelerated development. Within the first and second year of puberty, annual growth in body height is 8-12 cm (Marković and Bradić, 2009, pp. 80). This period is known as an adolescent accelerated growth. The beginning of the adolescent accelerated growth and the year of the biggest height growth are indicators of biological age or child›s maturation level. Children who enter puberty earlier than average child does are called accelerants. Opposite to them, there are children who enter puberty later than average child does. Among 13-year-olds, there are boys whose height and body weight is entirely adequate to age of 15 or 11. That is a characteristic of their *biological age*, although every one of them is 13 (Karalejić and Jakovljević, 2001, pp. 84). Accelerants, in that period, have significantly more developed motor and functional abilities than their peers have, therefore potential advantage in the selection process. Coaches often give advantage to such children rather than to children who mature late. Even though these advantages will disappear in the adulthood, it can result in loss of certain number of talented basketball players. Namely, favouring of biologically older children leads to their bigger progress compare to biologically younger peers, who consequently leave basketball (Delorme et al., 2011). Just described problem is called Relative age effect (RAE). Barnsley, Thompson and Bamsley (1985) have discovered it during their data analysis of Canadian-American professional hockey league (NHL) – season 1982/1983. During that season, players who where born in the first quarter of the year (32% from January to March), almost two times outnumbered players who were born in the last quarter of the year (16.2% from October - December). Further analysis confirmed that biologically older (mature) children, who were favoured by coaches since their puberty, have been continuously favoured until their senior team promotion! RAE was even more dramatic in Canadian hockey leagues for younger players, where players who were born in the first quarter of the year outnumbered those from the last quarter by three times. There are numerous evidences of the existence of the RAE phenomenon (according to: Malina et al., 2004; Gil et al., 2007; Delorme & Raspaud, 2009; Torres-Unda et al., 2013). Quite interesting for analysis are data of basketball Euro league (http://www.euroleague.net/competition/players). RAE is noticeable in season 2012/2013: analysis of players shorter than 200 cm indicates that more players were born in the first half of the year (113), than in the second half of the year (69). The difference was less evident for players taller than 200 cm: 94 players were born in the first half of the year and 79 in the second half of the year. Hence, RAE is more prevalent among shorter players. Similar results were found in the other studies on the population of young football players

(Musch, & Hay, 1999; Helsen et al., 2005; Carling et al., 2009) and hockey players (Sherar et al., 2007; Bruner et al., 2011).

The second problem in early talent identification is test battery used in that process. There are number of valid tests for assessment of basketball players' motor-functional abilities. However, motor-functional status is being very important segment of required abilities for top class basketball, certainly is not the only one! In prepubertal and pubertal period, careful interpretation of the results of these tests is necessary, regarding players' different biological status at the same age. The lack of sufficiently informative test battery seems to be one of the main problems considering talent identification.

Coaches who prepare team for a competition need to chose "the first team" or starters. The majority of studies involving starters and nonstarters, analyzed statistical parameters from games, and impact of each group of players on the final score was compared. The present study considered influence of "basketball specific" morphological characteristics, motor and functional abilities of young basketball players onto their team status (starter or nonstarter).

The purpose of the study was to examine differences in morphological, motor and functional characteristics of 13-year-old basketball players – starters and nonstarters. It has been assumed that starters would achieve better results in all measured and tested variables. The acquired results were used for exact presentation to colleagues/ coaches of physical characteristics and abilities that have major impact on selection of young basketball players.

Method

Participants

The sample was consisted of 20 basketball players born in the same year (average age 13 years and 7 months ±.28, average basketball practice experience 4 years and 6 months ±1.15). All participants were members of 2 best teams in "pioneer" category (Basketball club "Šampion-Alfom" and Basketball club "Basket 2000") in region ("Areal basketball board Banjaluka") with population of 500.000 inhabitants. Last year and a half they train one hour four times a week on the average. Apart from training sessions, they play around twenty games in season. Coaches of these two teams suggested their 10 best players each and chose starters and nonstarters. Boys gave their formal consent for measuring and testing procedures.

Variables

From anthropometric domain, 5 measures were taken: body height, arm span, standing reach height, body weight and percentage of body fat. Motor abilities were tested by: velocity of neuromuscular reaction time, vertical jump, 5 meters sprint, 10 meters sprint, 20 meters sprint, T-test, Zig-zag test, ball throw from sitting position, Sit-ups for 30 seconds and standing forward bend. Stamina was assessed by 20-M shuttle run test. Relative oxygen consumption was calculated by indirect method.

All measurements and tests were recommended by Reiman and Manske (2009), and body height was measured by body height measuring apparatus (SECA 210), arm span and standing reach height (centimetre tape on wall), body weight and percentage of body fat (TANITA BC 418A), velocity of neuromuscular reaction time, vertical jump, 5 meters sprint, 10 meters sprint, 20 meters sprint, T-test, Zig-zag test (*Physical Ability Test* PAT 02, Uno Lux), ball throw from sitting position (centimetre tape), Sit-ups for 30 seconds (electronic stopwatch) and standing forward bend (Swedish bench with attached ruler).

Procedure

Measurements and testing were performed during two mornings. First day subjects had body height, arm span, standing reach height, body weight and percentage of body fat measured and one-half of motor tests. On the second day, the rest of the motor tests and test of aerobic endurance were finished. Statistical computations were done by statistical software SPSS 11 (SPSS Inc., Chicago, IL, USA). Kolmogorov-Smirnov test was utilized to confirm normal distribution. Descriptive statistics were done after that. At the end, One-way ANOVA was used in order to establish the differences between the groups.

Results

Kolmogorov-Smirnov (K-S) test confirmed that all variables had normal distribution. In Table 1, there are presented means, standard deviation and established significant difference between the groups.

Based on mean values (Mean) it is noticeable that starters (group 1) had better results in most of measured and tested variables (Table 1). Although the difference is statistically significant only in Body height, Arm span, Standing reach height, Vertical jump, T-test and Ball throw from sitting position. The result was identical in test Sit-ups for 30 seconds. Starters had higher values of Body mass and Percentage of body fat.

Quite interesting is comparison of average values for 13-year-olds from 6 European countries (''Physical development and physical abilities of primary school children'', 2009). Table 2 represents that children from Serbia are taller and heavier than children from 5 European countries, while their abdominal repetitive strength was quite poor. On the other hand, basketball players included in this study were taller, heavier and have better abdominal repetitive strength than their peers have from earlier mentioned 6 European countries. That was expected with regard they were subjects actively engaged in sports.

Table 1. Descriptive statistics and differences between the groups

Variable	Group	Mean	SD	Min.	Max.	F	Sig.
Body height (cm)	1 2	181.01 173.68	5.71 5.76	173.10 166.40	189.50 183.30	8.170	.010*
Arm span (cm)	1 2	184.90 177.30	6.87 4.95	175.00 170.00	194.00 183.00	8.060	.011*
Standing reach height (cm)	1 2	235.50 226.60	6.75 7.82	226.00 217.00	244.00 238.00	7.419	.014*
Neuromuscular reaction time (s)	1 2	.50 .52	8.67E-02 6.51E-02	.29 .45	.59 .64	.532	.475
Vertical jump (cm)	1 2	40.12 34.80	5.99 1.57	29.00 32.00	49.00 37.00	7.388	.014*
Sprint 5 meters (s)	1 2	1.77 1.82	6.36E-02 8.59E-02	1.67 1.69	1.90 2.00	1.853	.190
Sprint 10 meters (s)	1 2	2.63 2.69	8.94E-02 9.88E-02	2.50 2.59	2.79 2.94	2.028	.172
Sprint 20 meters (s)	1 2	4.08 4.16	.16 .15	3.83 4.00	4.33 4.54	1.303	.269
T-test (s)	1 2	11.36 12.07	.60 .69	10.37 11.16	12.22 13.32	5.930	.026*
Zig-zag test (s)	1 2	7.40 7.64	.43 .45	6.93 7.24	8.10 8.72	1.499	.237
Ball throw from sitting position (m)	1 2	8.61 7.25	1.04 .49	7.40 6.20	11.10 8.00	14.008	.001**
Sit-ups for 30 seconds (number of repetitions)	1 2	27.60 27.60	4.30 4.12	23.00 21.00	35.00 33.00	.000	1.000
Standing forward bend (cm)	1 2	15.00 11.80	6.77 7.71	1.00 1.00	23.00 22.00	.973	.337
20-M shuttle run test ($ml \cdot min^{-1} \cdot kg^{-1}$)	1 2	42.86 42.74	5.67 5.04	35.12 35.48	52.93 50.55	.003	.960
Body mass (kg)	1 2	64.73 58.11	5.72 10.65	59.70 45.50	77.90 84.20	3.000	.100
Percentage of body fat (%)	1 2	16.18 15.55	2.45 2.84	12.90 11.40	20.00 20.40	.282	.602

Table 2

	Serbia	Belgium	Spain	Slovakia	Lithuania	Estonia
Body height (cm)	166.07	159.50	159.20	163.10	163.20	160.30
Body mass (kg)	56.80	48.60	51.60	50.50	49.40	48.10
Sit-ups for 30 seconds	23.77	24.10	22.80	25.80	25.70	24.50

Discussion

The present study was an effort to explore physical characteristics of 13-year-old basketball players that differentiate starters and nonstarters. Results indicate that starters have better results in all measured and tested variables. However, the difference is statistically significant only at measures Body height, Arm span and Standing reach height and Vertical jump, T-test and Ball throw from sitting position tests. Both groups made identical result in the test Sit-ups for 30 seconds. It seems that Karalejić and Jakovljević (2001, str. 52) were right claiming height was the most important selection factor at this age. It is perfectly clear that body height proportionally determines basketball players› arm span and standing reach height. Evidently, coaches of

these two teams for starters have not only taller but players with more explosiveness, agility, stronger arms and shoulder girdle. Considering physical qualities only, it could be said that coaches made good choice of starters. However, some authors (Jakovljević, 1996; Kioumourtzoglou et al., 1998; Karalejić, Jakovljević and Mandić, 2009; Faubert, & Sidebottom, 2012) state that one of the key differences between good and poor young basketball players is *ability to understand the game*, moreover application of their cognitive skills in finding solutions to complex tasks in all phases of basketball game. Therefore, apart from physical predispositions, good basketball player must have above average "so called" basketball intelligence.

According to the authors, very few articles explore relationships between physical qualities of pubertal basketball players and their team status. Comparing our findings with those from Torres-Unda et al. (2013), it could be said there are some similarities. Spanish authors' analysis showed that selected elite basketball players, aged between 13 and 14, had better scores in all measured and tested variables than their non-elite peers had. Young elite basketball players were taller, heavier, more muscular, faster in 20 meters run, more explosive, agile with better stamina. According to Karalejić and Jakovljević (2009; pp. 88, 91, 105) best 13-year-old basketball players from Serbia had following results in motor tests: Vertical jump – 40.60cm, Sprint on 20 meters – 3.60s, T-test – 11.03s and Zig-zag test – 7.10s. Results of 13-year-olds from Serbia are better than results of basketball players included in the present study. However, in a later study, conducted with the best 13-year-old basketball players from Serbia, results were somewhat different: participants› average body height was 171.06 cm, body mass 56.91 kg, average time on test Sprint on 20m – 3.79s (Jakovljević, Pajić, Gardašević and Višnjić, 2011). In relation to Vučković, Kukrić, Petrović and Dobraš›s (2013) study conducted on the same sample of participants, it is interesting that the present study did not register significant relationship (χ^2=.202; C=.100; p=.653) between the Relative age effect and players› team status (starter or nonstarter).

In general, authors who studied particular characteristics and abilities of young basketball players draw same old common conclusion: the success in basketball depends on multiple factors.

Conclusion

Considering only physical characteristics of basketball players included in the present study, it could be stated that their coaches made right choices of starters for their teams. However, this study represents just one "early indicator of the state" of young basketball players' physical characteristics. Recent scientific studies indicate that an athlete should spend around 10 years of continuous practise in order to fulfil his genetic maximum. It is of great importance to pass this peace of information as a scientific fact to parents and coaches, in the first place, who often their entire coaching philosophy, methods, means and training intensity place in the context of the current results. For the purpose of quality assessment of talented basketball players, it would be useful to apply battery of psychology specific and basketball specific tests! However, such tests practically do not exist due to serious methodological issues concerning standardisation and validity. Direct consequence of this problem goes in coaches' favour – the practise showed that coach's feeling, in segment of basketball players' tactical-cognitive-character traits has higher predictive value than, at this moment, moderate scientifically proven test battery! Nevertheless, it should be emphasised that best results in talent identification are made in interactive efforts of coaches and sport scientists. Based on aforementioned facts it could be concluded that talent identification faces serious problems, firstly at young age selection.

The coaches of younger categories of basketball players could use the results of the present study as an indicative model of physical characteristics of talented 13-year-olds. Comparison of their team members with this model could provide further knowledge they could use in creation of team's development program.

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