Coll. Antropol. 39 (2015) Suppl. 1: 69–76
Original scientific paper

The Relationship between 200 m Performance and Selected Anthropometric Variables and Motor Abilities in Male Sprinters

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ABSTRACT

The goal of this study was the investigation of the relationship between 200 m performance and motor abilities and anthropometric characteristics of different level of male sprinters (200 m performance 23.80±2.16 s – the best results 21.40 s). The physical fitness measures included: 50 m from standing and flying start, standing long jump (SLJ) standing five jump (SFJ), double and single leg countermovement jumps CMJ), flexibility (sit and reach) and 4 kg shot put throwing (over head). The Spearman correlation coefficient was applied to verify the association. The results demonstrated strong relationships (p < 0.05) between 200 m performance and experience (age) and body mass (r=0.85, r=–0.80 respectively.) As for the motor abilities strong relationship exists between 200 m and time of 150 m, 50 m from standing and flying start and CMJ on single leg. Vertical jumping displayed stronger relationship with 200 m performance that horizontal one. From a practical point of view this is very important notice.

Key words: *200 m, physical fitness, anthropometrics, maximum speed, explosive power*

Introduction

The level of performance in both the 100 m and 200 m are highly influenced by sets of motor abilities which include: sprinting speed[1], and power output via jumping ability[2–5]. Performance in 200 m sprint running is mainly determined by the ability to accelerate on the curve, the magnitude of maximal velocity and especially the ability to maintain the peak velocity reached after acceleration, against the onset of fatigue. We cannot forget about the skill or technique of curve running at high speed as a determinant of 200 m performance[6]. Another key factor is executing a well planned and appropriate race strategy.

Investigations carried out to date have shown that the influence of morpho-functional factors on sprinting is not as strong as previously believed. The morphological features which are positively correlated to sprinting performance are those which characterize the strength of body building and muscle strength[7–12]. Longitudinal features, including body height and leg length, as well as, strength of body structure, by themselves are not strong predictors of sprinting performance. However, the largest influence of these features is related to their influence on stride length and stride frequency. Those two variables have a direct impact on maximal running speed[3,13–16]. It is well known that the maximal velocity for individual sprinter is determined by the optimal combination of stride length and stride frequency. There are a number of investigations into how these two variables affect sprint performance[12,17–19].

The aim of the present study was to examine the relationship between 200m performance and anthropometric characteristics and motor abilities in different level of male sprinters. It was hypothesized that horizontal jumping abilities (standing long jump and standing five jumps) will reveal a stronger correlation with 200 m performance than vertical jumping (CMJ and single leg CMJ) regardless the level of performance and age of sprinters. The information will clarify which variables are important in evaluation of 200 m performance.

Materials and Methods

The participants for this study were current competitive eight male sprinters (age = 18.1±4.8 years, height =

Received for publication July 18, 2010

177.5±8.40cm, weight = 61.0±5.09 kg, 200 m performance = 23.80±2.16 s (the best results =21.40 s). They were matched for 200 m sprint performance time and sport category and assigned to 1 of 2 groups: advance – national and regional level (N=4) and beginner sprinters (N=4). The participants were informed of the protocol and procedure of the experiment prior to the exercise. They and their parents signed an informed consent. The study was approved by the Human Ethics Committee of the University School of Physical Education in Wroclaw. None of the sprinters had any physical or physiological limitations that could have affected 200 m performance as determined by special medical certificate necessary for participation in sport competitions.

Maximal 200 m sprint performance time, physical fitness testing and anthropometric measurement was performed on 2 days separated by 48 hours of active rest. Maximal 200 m sprint and anthropometric measurement occurred on day 1. All maximal sprint tests, flexibility and 4 kg shot overhead throw were completed on day 2 in the morning session. The lower extremity explosive power tests occurred on day 2 in the afternoon session. Before the evaluation all participants performed a 20-min warm up, which included: light jogging stretching of the upper and lower limbs and light jumping. The warm–up should maximize the performance and minimize the risks of injuries. One short familiarization session occurred for single leg (RR/LL) countermovement jump (CMJ) in which they practiced and were critiqued on technique. The sprinters were very familiar with the rest of tests because they executed this exercises during their regular sprint training workouts.

Body mass, body height, body mass index (BMI), Rohrer index, leg length and trunk length were measured for each participant. Standing height heels and shoulders touching the wall) was measured to the nearest 0.5 cm using a height meter (110XP Metr, Poland). Leg length was measured from the greater trochanter on the femur to the sole of the foot (medial malleolus). The trunk length in a direct line was considered as the distance from C7 vertebrae to the hip bone known as the iliac crest. All length characteristics were measured using a millimeter tape to the nearest 0.1 cm. Body weight was measured by means of an electronic scale accurate to 0.5 kg. In order to eliminate any errors, measurements were repeated twice. BMI was calculated as the ratio of body mass to the squared standing stature ($kg \cdot m^{-2}$). The Rohrer slenderness index as body mass [g] x 100) / body height [cm]) 3 was also computed.

Timing data for the 200 meter and each 50 meter section therein, was obtained using the Lynx Timing System. Marks were placed for each 50 m interval of the 200m sprint which allowed the measurement of each 50 m time. Basic kinematic parameters of the 200 m run: stride length, stride frequency and time were collected. Each stride length was collected using a custom made manual stride measurement devices – 3 m long metal arm with special type placed on a special rump with a moveable mark that accurately measures distance between two footprints. The manual stride measurement instead of data collection via camera system was used. This choice is related to the problem of detailed calculations of stride length using camera system recording. The accurate measurement from camera were possible only for those sprinters not visually obscured or interfered by other sprinters. This problem occurs in transition phase – movement from the curve to straightway, where the view (placement of the foot on the track) of some sprinters can be blocked by other sprinters.

After a 5 hour rest period (afternoon session), participants completed the lower extremity jumping performance tests. The tests consisted of three vertical jumps: countermovement jump (CMJ) and single leg LL/RL countermovement jump vertical jump (SL-CMJ) and two horizontal jumps: standing long jump and standing five jumps. In vertical jumps the sprinters were instructed to jump as high as possible snapping the horizontal vanes (each 0.5 cm) attached to the wall (Vertical Jump Measuring Device, Polsport, Poland). The height of the jump was calculated as the difference between the height of the highest vane displaced during a vertical jump and standing reach. In single leg CMJ sprinters was landing on one foot. In horizontal jumps participants stand behind a line and jump as far as possible landing on both feet without falling backward using The measurement is taken from the take-off line to the nearest point of contact on the landing (back of the heels) after one jump (SLJ) and after five jumps (SFJ Landing was on a special matt to absorb the shock. The order in which the participants completed the jumping trials was determined: first – standing long jump (SLJ), second – CMJ, third – standing five jumps (SFJ) and fourth single leg (SL-CMJ). The longest or highest of the 3 trials was recorded for statistical analysis. Rest intervals between trials of a given jump were 3 minutes, and 5 minutes between different jumps.

Maximal sprint testing was conducted 48 hours after 200 m performance in the morning session. To determine maximum speed, two tests were performed: 50-m sprint from a standing position and 50 m from a flying start. For both 50-m sprint tests, sprinters executed a 20 min. warm-up, including light jogging, dynamic stretching and followed by 2 sub-maximal intensity 30 m sprints. Each participant performed 1 maximal sprint trial with 5 minutes break between two trials. All times were recorded using two customized electronic photocells The sprinters had to run both 50 m as fast as they were able. The flying zone in 50 m from flying start was about 15 meters for the advanced sprinters, and 10 meters for the beginners, which seemed to allow them to enter the 50 m section at top speed. All participants had sprint training experiences and were familiar with sprint testing.

After a 30 minute rest period of jumping tests, sprinters completed the lower back and hamstring flexibility test: sit and reach was also performed. Lower back and hamstring flexibility was measured with the sit and reach test to the nearest cm. Sprinters were instructed to sit on the floor with their knees extended and to perform a maximal trunk flexion, aiming to reach as far forward as possible. The measurement was to the nearest 1 cm. A 90° angle was kept for ankles. In addition the ballistic (throwing) power of subjects was assessed using a reverse overhead 4 kg shot throw in the supine position. The subjects were instructed to stand behind a line (back) and throw as far as possible. The best performance of 3 trials was selected for analysis. These tests are well documented and recognized in fitness and sport performance research[4].

Statistics included the calculation of Pearson correlation coefficients (level of significance p<0.05), as well as descriptive statistics ($\overline{X}$, SD). All data were analyzed using the statistics package for windows (SPSS 11.5).

Results

As expected, the age difference amounting to nearly 7 years (6.9) confirmed significant differences between the two groups of sprinters in most variables of body parameters. However advanced sprinters did not differ significantly from beginner sprinters in body slenderness (Table 1).

The big differences in advantage for mature sprinters occurred in all kinematic characteristics of 200 m performance including: times (21.90s) and 25.85 s, velocity, stride frequency (4.13 Hz and 3.90 Hz) and in stride length (222.06 cm and 198.40 cm) respectively (Table 2).

Interesting relationships can be found in the analysis of 50 m from the flying and standing start. In both groups, the differences between average time from 50 m flying start, to the 50 m standing sprint were almost on the same level (respectively 0.66 s and 0.45 s). Practice has shown that for high level sprinters the differences should range between 0.85 to 1,0 s, which indicates that all sprinters in our study were well below these standards (Table 3).

Tables 4 and 5 show results of Pearson coefficients of correlation between 200 m performance and anthropometric and physical fitness parameters. It should be noted that 200 m sprint significantly related (p<0.005) to the experience and body mass (r=0.85 and r=–0.80 respectively). As for the physical abilities (p<0.005), 200 m time was found to be correlated to 150 m time (p<0.005), and the 50 m from standing and flying start (r=0.95, p<0.005), single

TABLE 1
MEANS AND STANDARD DEVIATON OF SELECTED ANTHROPOMETRIC CHARACTERISTICS IN THE GROUP OF ADVANCED SPRINTERS (G1, N=4) AND BEGINERS (G2, N=4)

Body parameters	Whole group N=8			Advanced (G1) N=4			Beginners (G2) N=4		
	$\overline{X}$	DS	V	$\overline{X}$	SD	V	$\overline{X}$	SD	V
Age (years)	18.10	4.18	23.13	*21.50	3.00	13.95	14.60	0.48	3.27
Height (cm)	177.50	8.40	4.73	*182.20	5.74	3.15	172.70	8.46	4.89
Weight (kg)	67.25	5.09	7.57	*70.75	4.79	6.67	63.75	2.22	3.48
Trunk length (cm)	65.19	6.50	9.97	*69.50	3.78	5.45	60.87	5.89	9.68
Leg length (cm)	88.31	9.09	10.29	*93.70	3.23	3.44	82.87	10.18	12.29
Leg/height Index	49.91	3.04	6.09	51.40	0.67	1.30	48.42	3.90	8.06
BMI	21.64	1.45	6.73	21.32	1.52	7.15	21.97	1.53	6.98
Rohrer	1.22	0.13	11.02	1.17	0.11	9.26	1.28	0.15	11.48

V – variability
*– A significant difference p<0.05

TABLE 2
NUMERICAL CHARACTERISTICS OF SELECTED KINEMATICS PARAMETERS OF 200 M SPRINT

Kinematics parameters		Whole group N=8			Advanced (G1) N=4			Beginners (G2) N=4		
		$\overline{X}$	SD	V	$\overline{X}$	SD	V	$\overline{X}$	SD	V
Time[s]		23.88	2.16	9.03	*21.90	0.39	1.81	*25.86	0.50	1.95
Velocity[m/s]		8.43	0.76	9.03	*9.13	0.16	1.80	7.72	0.11	1.47
Stride frequency [Hz]		4.02	0.16	3.98	4.13	0.13	3.24	3.90	0.07	1.93
Number of strides	All	95.48	6.31	6.61	*90.10	2.29	2.55	100.88	3.20	3.17
	Take off from LL	47.71	3.35	7.02	44.82	0.57	1.28	50.61	1.88	3.71
	Take –off from RL	47.51	2.95	6.22	44.99	1.41	3.14	50.02	1.23	2.46
Stride length [cm]		210.23	13.84	6.58	*222.06	5.75	2.59	198.40	6.40	3.22
Stride Index		2.51	0.38	15.23	2.61	0.52	19.94	2.41	0.20	8.45

V – variability
*– A significant difference p<0.05

TABLE 3
NUMERICAL CHARACTERISTICS OF SELECTED MOTOR ABILITY MEASURMENTS

Variable	Whole group N=8			Advanced (G1) N=4			Beginners (G2) N=4		
	$\overline{X}$	SD	V	$\overline{X}$	V	SD	$\overline{X}$	SD	V
50 m standing start (s)	5.91	0.51	8.62	*5.45	0.10	1.87	6.35	0.20	0.20
50 m flying (s)	5.35	0.61	11.48	*4.79	0.10	2.21	5.90	0.22	0.22
Standing five jumps (m)	13.53	1.68	12.46	14.97	14.97	6.63	12.08	0.31	2.54
CMJ (cm)	56.00	9.79	9.79	*64.75	3.59	3.59	47.25	2.63	5.57
Single LL CMJ (cm)	44.62	12.11	27.14	*55.80	2.54	4.55	35.57	1.60	4.79
Single LR CMJ (cm)	38.11	12.39	35.53	*49.40	3.81	3.81	26.82	2.10	7.84
Standing long jump (m)	2.56	0.42	16.31	2.94	0.13	4.29	2.18	0.08	3.77
Shot (4 kg) over head (m)	13.35	2.38	17.81	*15.19	1.98	13.02	11.51	0.54	0.54
Flexibility (cm)	17.81	5.84	40.64	13.02	8.45	52.85	12.75	12.75	8.16

V – variability
* A significant difference $p<0.05$

TABLE 4
INTER-RELATIONSHIP (SPEARMAN RANG CORELATION – p <0.05) MATRIX BETWEEN SELECTED ANTHROPOMETRICAL MEASUREMENTS AND 200 M TIME (N=8)

Somatic variables	200 m	Age	Height	Body mass	Trunk length	Leg length	Index: leg/height	BMI	Rohrer Index
200 m	–	0.85	–0.68	–0.80	–0.49	–0.20	–0.08	–0.28	–0.09
Age	0.85	–	0.67	0.88	0.63	0.54	0.60	0.00	–0.40
Height	–0.68	0.67	–	0.75	0.93	0.78	0.49	–0.48	–0.80
Body mass	–0.80	0.88	0.75	–	0.64	0.74	0.63	–0.01	–0.40
Trunk length	–0.49	0.63	0.93	0.64	–	0.77	0.50	–0.60	–0.90
Leg length (cm)	–0.20	0.54	0.78	0.74	0.77	–	0.83	–0.57	–0.70
Index: leg/height	–0.08	0.60	0.49	0.63	0.50	0.83	–	–0.37	–0.50
BMI	–0.28	0.00	–0.48	–0.01	–0.60	–0.57	–0.37	–	0.90
Rohrer Index	–0.90	–0.39	–0.80	–0.40	–0.90	–0.74	–0.47	0.88	–

TABLE 5
INTER-RELATIONSHIP (SPEARMAN RANG CORELATION – p <0.05) MATRIX BETWEEN 50 M TIME, 100 M TIME AND 150 M TIME AND 200 M AND SELECTED MOTOR ABILITY MEASURMENTS

Parameters	Whole group N=8				Advanced group N=4				Beginner group N=4			
	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]	[1]	[2]	[3]	[4]
1–50 m time [1]												
1–100 m time [2]	–	–	–	–	–	–	–	–	–	–	–	–
1–150 m time [3]												
200 m time [4]												
50 m standing start [5]	0.92	0.96	1.0	0.95	0.90	0.90	–		–	–	1.0	1.0
50 m flying [6]	0.92	0.96	1.0	0.95	0.90	0.90	–	–	–		0.95	0.95
Standing five jumps [7]	–	–0.92	–	–0.96	1.0	1.0	0.80	–	–	–0.90	–	–0.90
CMJ[8]	–	–	–	–	–	–	–	–	–	–	–	–
Standing long jump [9]	–	–	–	–	–	–	–	–	–	–0.80	–	–0.90

LL and single RR in CMJ (–0.96 and –0.94 respectively), shot put throwing over the head (r=–1.0).

Table 6 presents the analysis of beginner sprinters achievement in all physical ability measurements and

TABLE 6
VALUE IN % OF MOTOR ABILITY MEASUREMENTS AND 200 M SPRINT, INCLUDING 4 OF 50 M SECTIONS ACHIVED BY BEGINNER SPRINTERS (N=4) AND COMPARE TO ACHIVEMENT OF ADVANCED SPRINTERS (N=4)

Descriptive statistic		50 m standing	50 m flying	Standing five jumps	Double legs vertical jump	Standing long jump	Shot (4 kg) over head	Flexibility
		85.83	81.18	80.69	72.97	74.15	75.77	79.70
200m time	84.88	–	–	–	–	–	–	–
1–50 m time	90.41	–	–	–	–	–	–	–
2–50 time	82.50	–	–	–	–	–	–	–
3–50 m time	81.42	–	–	–	–	–	–	–
4–50 m time	83.46	–	–	–	–	–	–	–

200 m performance including four 50 m sections. The value of measurements represents a percentage of advanced sprinters. The biggest differences are in standing 5 jump, CMJ and standing long jump, where beginner athletes reached 80.69%, 72.97% and 81.18 % of advance sprinters potential. We can compare this with 200 m times, where novice sprinters reach all of 84.88 % of the achievement of advanced sprinters. The smallest differences between groups were seen in time of 50 m from standing start and in time of 1–50 m during 200 m sprint (respectively 85.83 and 90.41 %).

All sprinters exhibited a clear trend that they are not able to maintain a high velocity from the first part of the race to the end. Figure 1 demonstrates that advanced sprinters dropped less speed between the second section and the third section, (100–150 m) about 0.22 s (4.26 %) compared with beginners sprinters 0.35 s (5.52 %). However, novice sprinters did not increase velocity during the second 50 m section as much as the advanced sprinters (respectively 0.88 s and 1.27s). It could be that the lower level of maximum speed guarantees better maintenance of it towards the end, and that is what allowed them to perform optimally.

Discussion

The goal of the present study was to examine the relationship between 200m performance and anthropometric characteristics and motor abilities in different levels of male sprinters. Despite limitations as the small sample size (N=8) the authors of this pilot study took a first step towards a complete analysis of the 200 meter performance

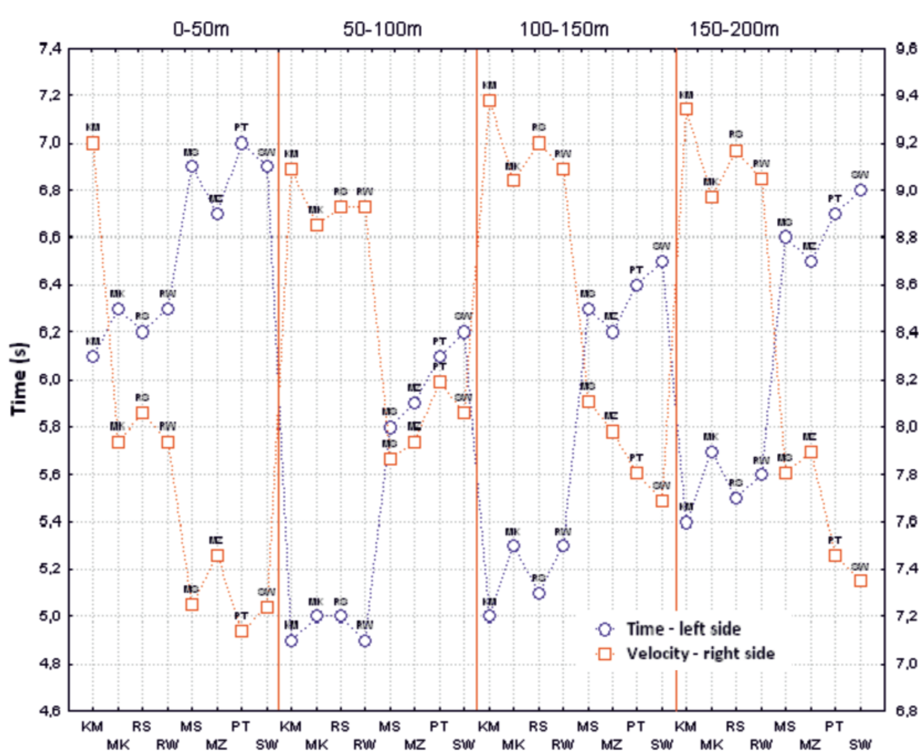

Fig. 1. Comparision of mean time and velocity for each 50 m section (N=8).

and its relationship with physical fitness characteristics and selected anthropometric measurements in beginner sprinters (15 years old) and experienced sprinters (19–23 years old).

Out of the physical abilities, muscular power of the lower extremities and 4 kg over head shot put throw showed the highest correlation with 200 m performance compared to other: standing long jump, CMJ – double and single leg and maximum running speed ability. This may suggests how important muscular power of the lower extremities is in the kinematic chain of sprinting. The highest correlation exists between height and trunk length r =0.93. A strong relationship existed between leg length and the index: trunk/leg it came to r= 0.83. It seems to be adherent to the relationship, because the relationship between leg length is part of height. A relatively low correlation was found between body mass and leg length, (r=0.74) which may show the diversity of muscle mass found in the lower extremities of investigated athletes.

The power qualities required in sprinting are best attained, or assessed, through application of various jumps, often called bounding exercises. The main focus of these types of exercises is power production via speed. Thus one may write: Mero and Komi[2], Bret et al.[10], Chelly and Denis[21] and Cronin Sleiveret[11] have stated that for sprinters to increase the level of power/speed strength they must use different kinds of exercises, including jumping/bounding. A relationship between these indices with sprinting performance was reported[22,23], however their subjects did different sprint distances, i.e., 30, 100, and 300 m. In the present investigation, the main finding is that the strongest relationship with 200 m was the vertical jumping ability rather than horizontal jumping ability. This is evident only for the whole group of sprinters (N=8) and beginners (N=4). The big surprise is the absence of these dependencies in the group of advanced sprinters. In this group, a strong correlation was only in the standing five-jumps. These results indicate that our hypothesis was not proven. In turn, a strong relationship with the 200 m sprint existed with the CMJ, performed on single leg (left or right). It was a big surprise. This leads an interesting observation. We know that only physical differences between straight running (100m) and curve running (200 m) is the effects of centrifugal forces[24–26] which act on the running sprinter. According to Mureika[27] to compensate for the rotational effects (torques), the sprinter needs to lean into the turn. This is not constant during the sprint; greater speed requires greater lean. During running around a curve, at every step the sprinter creates momentum in a particular direction. But every step they need to change that direction, which means they are generating more forward propulsion by developing greater force and leaning more into the turn. However, the degree of lean is limited by the maximum outward angle of flexion of the ankle[27,28]. This put more pressure on the single limb, in this case the left limb which are closer to the turn. To avoid exceptional force we need get the feet off the ground optimally as quick as possible. This assumption proved Beardsley[29] who stated that most studies looking into the relationships between jumping ability and short-distance running performance have focused on vertical jumping. This seems counter-intuitive, as running is a horizontal activity. However, most sprint coaches use a vertical direction of force because they believe that vertical forces are more important for getting on and off the ground quickly. Furthermore, this occurrence could be explained in such a way that horizontal jumping namely standing five-jumps and vertical jumping such as single leg CMJ, exclusively executed by single limb take-off is similarly associated with sprinting. The single leg CMJ can be treated as horizontal jump only with multiple jumps. It might be assumed that the movement patterns are closely related between sprinting (execution of single running step with maximum speed) and the five jump bounding (execution of single bounding step), which suggests that performance on the two should be correlated. Partially this assumption confirmed research done by Hudgins et al.[30]. He found that the correlation between the three-jump test performance and the 100 and 200m times was high (r=1.00 and r=0.97, respectively). In other investigation[9], countermovement jump (plyometric) performance has been shown to have a significant correlation with maximal sprint speed[6], and relationships have been found between maximal sprint speeds of 15 and 30 m in a 30-m sprint. It is generally accepted that the more specific a training and evaluation exercise (bounding and hopping exercises) to a competitive movement (sprinting) the better transfer of the training effect on performance[10,28]. It is clearly evident in sprinting where athletes require a high level of power for moving in the horizontal plane[31].

The absence of a statistically significant relationship between dynamic leg strength and 200 m performance in the advanced group of sprinters (N=4) is difficult to explain. Intuitively, the results can be interpreted in several ways. It is unclear whether the reported high (N=8) and lower (N=4) significance in the relationships from this study were the result of a low number of investigated subjects, physical abilities differences between the two investigated groups, or a combination of both. Firstly, it may be correct to state that value of maximum speed (50 m from standing start and 50 m from flying start) developed by beginner sprinters was better transferred toward the accomplishment of an optimal time in 200 m performance, than value of advanced sprinters. Secondly, we can conduct that the beginner athlete better utilizes the dynamic strength value represented by several jumping tests in relation to their 200 m time, than the advanced group, which allows them to reach optimal performanceTo better determine the level of speed ability of sprinters and its impact on 200 meter performance we compared the relationship between 50 m from standing and 50 m from flying with the other motor ability measurements. There was, a high correlation (r=1.0) between the 4 kg shot over head throw and the 50 m sprint from standing and flying start. A relationship between these indices with sprinting performance have been reported[26,17], however their subjects did different sprint distances, i.e., 30, 100, and 300 m. In turn, flexibility is highly associated with the 50 m standing start and the 50 flying start in the advanced group (respectively r=–0,80). It may be a problem of functionality, because the differences in flexibility measurement are expected in relation to competitive status and age.

Finally, when we compared beginner and advanced sprinters, the advanced appear to be deficient in both maximal running speed and dynamic strength qualities that are important to maximizing the 200 m performance, even if the difference between advance and novice athletes in 200 m time are significant. From observation of both groups we can suppose that beginner sprinters would not be highly proficient at doing these jumping tests due to lack of training experience. Therefore it can be assumed that lack of training experience in performing bounding and jumping activities by novice sprinters will decrease the relevance of these tests toward 200 m performance evaluation. The correlation coefficient showed that young sprinters, despite low amounts of training experience, apply sufficient technique to reach optimal levels in their jumps. This factor, combined with level of running speed, showed that beginner sprinters optimally used their potential to perform well. This may be evidence that advanced athletes, in spite of their dominance in all physical fitness measurements, demonstrate a relative lack of ability to use their potential to perform optimally. This surprising correlation coefficient can have great value in practical application, and is worth further investigation, but more subjects are needed to participate in the study.

Conclusion

The present investigation's main finding was that the stronger relationship with 200 m presented with the vertical jumping ability than horizontal jumping ability This is evident only for whole group of sprinters (N=8) and for beginners (N=4). The big surprise is the absence of these dependencies in the group of advanced sprinters. In this group, a strong correlation existed only for the standing five-jumps. These results indicate that our hypothesis was not proven. This demonstrated that below the age of 16, the power of lower extremities evaluated via horizontal and vertical jumping is the most significant factor determining running speed, with body size also being a key factor.

From practical point of view it might be indicated that the sprint movement patterns (single running stride) are very closely related with five jump bounding and multiply single leg CMJ, which indicates that coaches should take into account these characteristics during speed development and sprint talent identification.

The result of this investigation cannot be generalized because of the certain limitations. These limitations are associated with the relatively small samples of subjects. However, the study pointed to out some trends that may be important for additional research regarding selection and training of young athletes especially in the 200 m sprint.

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VEZA IZMEĐU REZULTATA NA 200 M I ODABRANIH ANTROPOMETRIJSKIH VARIJABLI I MOTORIČKIH SPOSOBNOSTI U MUŠKIH SPRINTERA

S A Ž E T A K

Cilj ove studije bilo je istraživanje veze između rezultata na 200 m i motoričkih sposobnosti te antropometrijskih karakteristika u muških sprintera na različitim razinama (rezultati na 200 m su 23,80±2,16 s – najbolji rezultat je 21,40 s). Mjere fizičke kondicije uključivale su: 50 m sa startom iz mjesta i s letećim startom, skok u dalj iz mjesta, petokorak iz mjesta, dvonožni i jednonožni skokovi s pripremom, fleksibilnost (sjed i dohvat) i izvedba bacanja kugle od 4 kg (iznad glave). Spearmanov koeficijent korelacije je primijenjen radi verifikacije povezanosti. Rezultati pokazuju snažne veze ($p<0,05$) između rezultata na 200 m i iskustva (dobi) te indeksa mase ($r=0,85$ odnosno $r=-0,80$). Što se tiče motoričkih sposobnosti, postoji snažna veza između vremena na 200 m i 150 m, 50 m iz starta s mjesta i letećega starta te CMJ na jednoj nozi. Vertikalni skok pokazao je snažniju povezanost s rezultatima na 200 m nego horizontalni. Ovo je vrlo važno iz perspektive praktične primjene.