

LEVEL OF SPEED ABILITIES OF PUPILS AT SECONDARY SPORT SCHOOL IN NITRA**Jaroslav Brodáni and Jaromír Šimonek***Constantine the Philosopher University in Nitra, Slovakia**Original scientific paper***Abstract**

The article shows the performance level in 50 m sprint of the pupils aged 11 to 19 years of age attending sport classes in Nitra. The level of speed in terms of age is monitored in boys and girls. The athletes achieved better-speed capabilities in comparison with the common population in 84% of cases. Statistically significant differences were observed in both sexes in terms of age.

Key words: speed abilities, selected population, boys, girls

Introduction

The Sport Secondary School in Nitra was established on September 1, 1998 based on the requirements of inhabitants of Nitra. Sports preparation was focusing on individual kinds of sport, such as athletics, artistic gymnastics, tennis, table tennis, swimming and figure skating. However, during the fourth year of existence of the school new sports were introduced in the curricula of the sport preparation (volleyball, handball, ice-hockey and soccer). Speed abilities are an important prerequisite for reaching high level of performance of sportsmen. Speed abilities are genetically determined to a high degree. Borders of the possible development of speed abilities are determined by the quality of training process, the degree of exploitation of objective information during the training and by genetic prerequisites of sportsmen. Prerequisites are connected with intensity and speed of nervous processes, pulsation, and thus also with the prerequisites of the development of coordination abilities (Brodáni & Šimonek, 2010; Kampmiller, 2007; Vanderka, 2008). Increasing speed is often limited by the so-called speed barrier. This barrier is created by genetic prerequisites of a sportsman, insufficient conditions for the realization of movement and inadequate age for the development of speed. It was proved (Vanderka, 2008) that sport training does not change the ratio between types of muscle fibrils, but improves their quality. Besides the structure of muscle tissue also speed of nervous innervation, energy processes are genetically conditioned. The share of speed heritability is approximately as follows: reaction speed 80 %, speed of elementary movements 65 %, and running speed 75 %. Currently the issue of genetic conditionality is very up-to-date, since genetic predispositions allow for mastering the requirements of elite sport. Performances of sportsmen are the result of not only the training process, but also necessary genetic potentials, or genetic limitation of the development of motor abilities (Dovalil, 2002; Kasa, 2006). It is important to make use of the sensible periods (between 9 and 13 years of age) for the tailor-made sport preparation focusing on speed development (Glesk & Harsányi, 1998;

Kuchen et al., 1986; Měkota & Cuberek, 2007). Diagnostics of speed abilities points to a wide range of tests. 50 m dash test is considered the best one for the measuring of reaction speed, acceleration and maximal speed (Kasa, 2006; Měkota & Blahuš, 1983). This test is widely used in all kinds of speed sports. Several researches on speed abilities development on talented youth have been carried out lately, among them: Valová & Vala (2009), Vala - Valová & Litschmannová (2010), and Valová (2010).

Aim

The aim of this contribution is to retrospectively show the level of speed abilities of boys and girls (since 2000 till 2010) attending Sport School in Nitra in terms of age and sex.

Methods

Totally 1559 (745 boys and 814 girls) sportsmen from the Secondary Sport School in Nitra participated in the tests. Speed abilities were observed in sportsmen during regular tests of general motor performance in the month of June 2000 through 2010. The sports specializations included: athletics, basketball, boxing, cycling, soccer, handball, ice-hockey, horse-riding, karate, figure-skating, artistic gymnastics, motocross, swimming, table tennis, sport aerobic, tennis, triathlon, and volleyball. Output values in the 50 m sprinting test were obtained using electronic time-keeping. Distribution of frequencies of sportsmen from the point of view of age, sex and performance in the standard groups are presented in table 1. Performance level in the 50 m sprint test is presented in numerical and graphic form (box graphs). The following statistical characteristics were used: amount, average, maximum and minimum values and percentiles. Normality of distribution in individual groups is evaluated by Shapiro-Wilk test. When statistically evaluating the differences of mean values analysis of variance (One-Way ANOVA) was used. Statistical significance was assessed on 5% level of significance. For the processing of data the statistic programmes Excel and SPSS were used.

Results

Table 1 Distribution of boys' and girls' frequencies in 50 m sprint test in standard population groups according to Moravec (1996)

Points - evaluation	Age of boys (n=745)									Age of girls (n=814)								
	11	12	13	14	15	16	17	18	19	11	12	13	14	15	16	17	18	19
1 insufficient													2					
2 very poor						3						1						
3 poor	1				1		1			3	1			3	2			
4 below average		4	7	2	9	6	3	2		5	6	8	1	2	4	1		
5 average	12	15	16	10	12	15	4	5	1	9	15	12	5	8	11	6	2	
6 above average	17	24	15	26	16	20	33	6		20	27	22	26	26	13	12	9	
7 very good	16	27	30	22	7	40	37	26	1	15	28	29	29	18	33	29	7	1
8 excellent	8	17	17	15	14	38	22	11	3	11	31	30	25	25	34	34	18	3
9 extraordinary		4	7	4	14	29	25	17	8	4	10	11	19	22	24	35	23	4
Total	54	91	92	79	73	151	125	67	13	67	118	113	107	104	121	117	59	8

Table 2 Descriptive statistics and normality of distribution test in 50 m sprint test - boys

Age	N	Mean	Std. Dev.	Min	Max	Percentiles			Shapiro-Wilk	
						25th	50th	75th	Statistic	Sig.
11	54	8,435	0,424	7,59	9,85	8,19	8,39	8,73	0,904	0,153
12	91	8,225	0,486	7,10	9,30	7,90	8,20	8,58	0,944	0,509
13	92	7,860	0,516	6,60	9,00	7,50	7,88	8,22	0,960	0,750
14	79	7,501	0,435	6,60	8,40	7,18	7,50	7,80	0,918	0,233
15	73	7,215	0,494	6,30	8,38	6,83	7,19	7,60	0,913	0,202
16	151	6,900	0,503	5,80	8,60	6,58	6,80	7,10	0,910	0,182
17	125	6,772	0,420	5,80	8,00	6,50	6,80	7,00	0,946	0,542
18	67	6,613	0,409	5,80	7,70	6,30	6,60	6,80	0,860	0,068
19	13	6,385	0,368	6,00	7,41	6,13	6,30	6,44	0,786	0,055

Table 3 Descriptive statistics and normality of distribution test 50 m sprint test - girls

Age	N	Mean	Std. Dev.	Min	Max	Percentiles			Shapiro-Wilk	
						25th	50th	75th	Statistic	Sig.
11	67	8,678	0,611	7,30	10,20	8,30	8,60	9,00	0,935	0,563
12	118	8,307	0,510	7,20	9,80	7,90	8,30	8,70	0,907	0,330
13	113	8,136	0,546	7,10	9,90	7,70	8,10	8,50	0,967	0,877
14	107	7,870	0,536	6,80	10,10	7,50	7,90	8,20	0,903	0,310
15	104	7,801	0,532	6,70	9,20	7,40	7,80	8,20	0,951	0,726
16	121	7,722	0,553	6,40	9,30	7,30	7,70	8,10	0,956	0,774
17	117	7,598	0,491	6,10	8,80	7,20	7,60	7,90	0,835	0,067
18	59	7,481	0,501	6,40	8,70	7,10	7,40	7,80	0,917	0,403
19	8	7,363	0,421	6,70	8,00	7,10	7,30	7,70	0,964	0,846

In the monitored period of 10 years we tested speed abilities in totally 1559 sportsmen of the SSS in Nitra. The measured values were compared with the results of measurements in common population carried out by Moravec et al. (1996), see table 1. 84.9 % (n=1323) share of boys and girls were above the average level of the population. Insufficient to average level was reached by 15.1 % (n=236) of both boys and girls. Approximately identical percentage distribution was recorded in boys, while 82.7 % (n=745) reached above the average level to excellent level and 17.3 % (n=129) reached very poor to average level. Girls reached above average to excellent level 86.9 % (n=707) and in 13.1 % (n=107) cases insufficient to average level of speed abilities. From the long-term point of view, we recorded statistically significant differences in speed abilities among age categories in both sexes (fig. 1, 2 and table 2, 3).

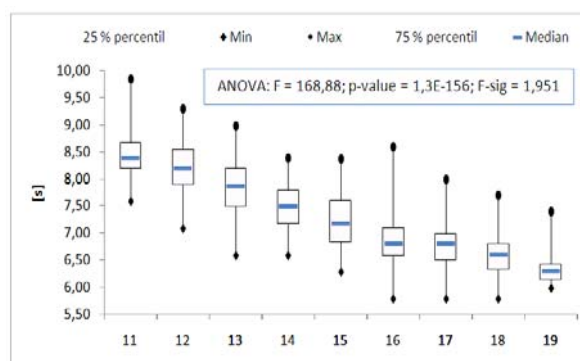


Figure 1 Box graphs of the performance level of boys in the test 50 m sprint

When assessing the significance of differences of mean values single-factor ANOVA was used. Its utilization depends on the normality of distribution of data. Normality of groups in boys and girls was confirmed by Shapiro-Wilk test.

Analysis of variance in both sexes proved differences of mean values among individual age categories on 1 % level of significance, while $p < 0.01$ (see fig. 1 and 2). Mean values of groups in both sexes show regression trend of performance with the increasing age.

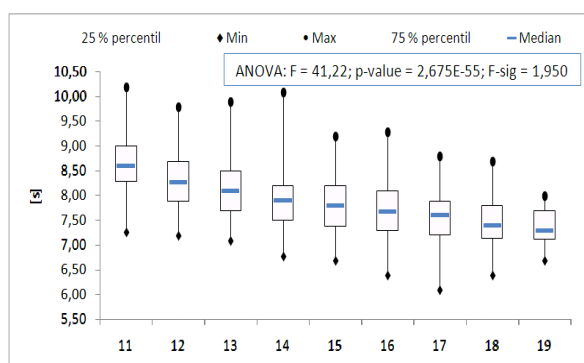


Figure 2 Box graphs of the performance level of girls in the test 50 m sprint

Discussion

Observed period between 11 and 19 years is mostly characterized by three stages of sport preparation, beginning with the pre-preparation at the age of 11, followed by basic sport preparation at the age of 13 and specialized sport preparation according to the sport specialization at the age of 16 years. Conditioning at the first two stages reaches the highest representation thus forming prerequisites for the development of individual motor abilities. Justness of representation up to 50-55 % of conditioning in the stage of pre-preparation and 25-30 % in the stage of basic preparation suggests also to the sensitivity of these periods from the point of view of sensitive periods of development of individual motor abilities. This age is suitable for the acquisition of the correct content of locomotive movements and mainly for the development of speed abilities. Possibility of increasing frequency up to the level of the border genetic prerequisites, increasing the speed of transmission of nervous excitement and application of rhythm in the frequency and structure of steps allows for transformation of prerequisites just in the training process, or the above mentioned stages. Level of speed abilities in boys and girls from the Sport School in Nitra reaches higher level than the common population. It is suggested by 84 % representation in the standard groups with the evaluation – above average to excellent performance. In spite of expectation of the above average level of speed abilities in this selected population we recorded 15 % of boys and girls, who reached insufficient to

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average performance level. In this group, unexpectedly, all the observed sports had their representation (athletics, basketball, boxing, cycling, soccer, handball, ice-hockey, horse-riding, karate, figure-skating, artistic gymnastics, motocross, swimming, table tennis, sport aerobic, tennis, triathlon and volleyball). It is very interesting that in comparison with boys girls had higher representation in the above average group which amounted to 4.2 %. From the point of view of the period of 10 years significant differences between mean values in speed abilities were recorded between age categories in both sexes. Increasing the share of boys and girls in higher standard groups of speed abilities according to Moravec et al. (1996) and the obtained statistically significant differences between age categories in individual sexes suggest of the systematic work of trainers in the sphere of development of speed abilities at the Sport School in Nitra.

Conclusions

1. With the growing age between 11 and 19 years the share of sportsmen from the Sport School in Nitra in the standard groups of speed abilities in the category „above average to excellent level“ increases.
2. In the category of boys and girls aged 11-19 years, there exist significant differences in the level of speed abilities.
3. Girls reach higher representation in above the average groups in comparison with boys.
4. Boys show higher level of speed abilities from the point of view of mean values in comparison with girls
5. Higher level of speed abilities of sportsmen from the Sport School in Nitra than the one of common population suggests good quality of selection in individual kinds of sports.
6. Despite the selection criteria at the Sport School in Nitra some sportsmen do not reach even the average level of speed abilities.
7. Results of measurements point to the methodical work of trainers in the sphere of development of speed abilities at the Sport School in Nitra.
8. Knowledge and experience upon increasing speed abilities point to the utilization of special training means such as: rubber rope, trolley equipment Speedy (pulley), combination of a puller and a vest, a puller and segment weights. Prerequisites for a successful development of speed are correctly implemented intervals of rest between exercises and also between individual training units.

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RAZINA BRZINSKIH SPOSOBNOSTI UČENIKA SREDNJE SPORTSKE ŠKOLE U NITRI

Sažetak

Članak pokazuje razinu izvedbe na 50 m sprinta učenika uzrasta 11 – 19 godina koji pohađaju sportsku nastavu u Nitri. Praćena je razina brzine u odnosu na uzrast kod dječaka i djevojčica. Sportaši su pokazali bolja brzinska postignuća u usporedbi s običnom populacijom u 84% slučajeva. Statistički značajne razlike su pronađene kod oba spola u odnosu na uzrast.

Ključne riječi: brzinske sposobnosti, selektirana populacija, dječaci, djevojčice

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