

THE LEVEL OF GENERAL PHYSICAL PERFORMANCE AND PHYSICAL DEVELOPMENT OF 7-YEARS OLD PUPILS IN BANSKÁ BYSTRICA

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NIVO OPŠTIH FIZIČKIH PERFORMANSI I FIZIČKOG RAZVOJA UČENIKA UZRASTA OD 7 GODINA U BANSKOJ BISTRICI (BANSKÁ BYSTRICA)

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Abstract: This study presents the level of general physical performance and physical development of 7 years old pupils from all public primary schools in Banská Bystrica (n = 492, boys n = 252, age = 7.39, ± 0.43 years, girls n = 240, age = 7.24, ± 0.34) and findings about the after-school physical activity of pupils. The following indicators of physical development were monitored: body height, body weight and BMI. The following indicators of general physical performance were monitored: sit-and-reach test, standing long jump, sit-ups, flexed arm hang, shuttle run 4 x 10 m and endurance shuttle run. Body height and body weight of the boys was higher (p < 0.05) than those of the girls. The boys reached higher BMI, but the difference was not significant (p > 0.05). Statistical analysis of the results of the level of physical performance showed that the boys reached higher level (p < 0.05) in the tests of standing long jump, sit-ups and shuttle run 4 x 10 m to compare them with the girls. We noticed that the boys reached higher level in the tests of flexed arm hang and endurance shuttle run, but the difference was not significant (p > 0.05). The girls reached higher level (p < 0.05) in the sit-and-reach test. Achieved results of this study are diverse in confrontation with the results of other authors. 63.1 % of the boys stated the after-school physical activity within 1-3 times in a week. 56.7 % of the girls stated the after-school physical activity within 1-3 times in a week.

Key words: physical education, primary schools, first-grade pupils, general physical performance, somatic characteristics.

Apstrakt: Ova studija predstavlja analizu nivoa opštih fizičkih performansi i fizičkog razvoja učenika uzrasta od 7 godina iz svih javnih osnovnih škola u Banskjoj Bistrici (n = 492, dječaci n = 252, uzrast = 7.39, ± 0.43 godina, djevojčice n = 240, uzrast = 7.24, ± 0.34), te rezultate o vanškolskim fizičkim aktivnostima učenika. Praćeni su sljedeći pokazatelji fizičkog razvoja: visina, težina i BMI. Pokazatelji opštih fizičkih performansi bili su: test gipkosti dubokim pretklonom sjedeći, skok u dalj iz mjesta, trbušnjaci, izdržaj u zgibu, test agilnosti 4x10m i test izdržljivosti. Visina i težina dječaka je bila veća (p < 0.05) u odnosu na djevojčice. Dječaci su pokazali veći BMI, ali razlika nije bila statistički značajna (p > 0.05). Statistička analiza rezultata nivoa fizičkih performansi je pokazala da su dječaci dostigli viši nivo (p < 0.05) u testovima skoka u dalj iz mjesta, trbušnjacima i testovima agilnosti 4x10m u odnosu na djevojčice. Primijećeno je da su dječaci dostigli viši nivo i u testovima izdržaja u zgibu i testovima izdržljivosti, ali razlika nije bila statistički značajna (p > 0.05). Djevojčice su dostigle viši nivo (p < 0.05) u testovima gipkosti dubokim pretklonom sjedeći. Dobijeni rezultati ove studije se razlikuju od rezultata drugih autora. 63,1% dječaka je izjavilo da imaju vanškolske fizičke aktivnosti 1-3 puta sedmično. 56,7% djevojčica je izjavilo da ima isto toliko vanškolskih fizičkih aktivnosti.

Ključne riječi: fizičko vaspitanje, osnovne škole, učenici prvog razreda, opšte fizičke performanse, somatske karakteristike.

INTRODUCTION

Generally, an unsatisfactory level of physical activities, general physical performance as well as the health of children is evident during the last period. In the past, but not long ago a number of measurements and testing of the level of general physical performance of school population was performed. For evaluation of physical performance of school population are currently used mainly 3 standardized test batteries: the European Test EUROFIT (Council of Europe, 1988), Czech Test UNIFIT (Měkota, Kovář and others, 1995; Chytráčková, 2002) and test batteries for the selection of talented individuals in sport, e.g. Brown (2001). The author Šimonek (2012) mentions other test batteries as well. These mentioned test batteries are, by their nature and normative way to evaluate results of test, focused on the performance component of a physical fitness.

Based on the findings of the previous reviews of a physical fitness and physical performance of children, we conclude that the innovation of motor tests and its verification should lead to a simplification of diagnosis and increase the overall motivation of teachers and pupils for the physical activity. Our work is at the beginning of this process which is focused on a group of children from Banská Bystrica. The aim of this study is to find out and compare the level of general physical performance, the level of physical development and to find out the after-school activity of first-grade pupils in Banská Bystrica. The project is an agreement on cooperation between the town Banská Bystrica and Matej Bel University. This project was organized by Department of Physical Education and Sports, Faculty of Humanities. This contribution was written with the support of grant project VEGA 1/1158/12.

METHOD

The sample of respondents

Overall, we tested 492 pupils out of 572 first-grade pupils in Banská Bystrica and this is 86 %. Remaining 14 % were not tested because of the absence on teaching process or they could not exercise mainly because of the health reasons. One of the school is without a gym, therefore these pupils were not tested as well (10). Tested pupils were from eleven public schools. They were from all classes of first grades of public schools in the number of 252 boys and 240 girls. During the measuring the average age of tested boys was 7.39 decimal years, ± 0.43 years and the average age of tested girls was 7.24 decimal years, ± 0.34 years. So, the group of tested boys was older about 0.14 years.

A SAMPLE OF MEASURING INSTRUMENTS

Measurements were made by teachers and PhD students, students of Master and Bachelor degree in April-June 2013. These measurements were always performed, in accordance with daily biorhythms (Jančoková, 2000), in the morning from 8 o'clock to 12 o'clock under the standard conditions of a gym. As a rule, one class was tested during one lesson.

Measuring process:

1. After arriving to the gym pupils received race numbers and they became familiar with the aim of the research.
2. Basic identification data were provided by classroom teachers: name, date of birth, the information about the after-school physical activity.
3. Warming-up 3 + 5 min.
4. Measuring of the level of physical development: body height, body weight. BMI was calculated on the basis of body height and body weight.

Body height – measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002) with the accuracy of 0.5 cm.

Body weight – measuring using a digital scale, with the accuracy of 0.1 kg.

5. Measuring of the level general physical performance: sit-and-reach, standing long jump, sit-ups, flexed arm hang, shuttle run 4 x 10 meters, and endurance shuttle run.

1. **Sit-and-reach test (SRT)** - measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002). Better of two attempts is counted with the accuracy of 1cm.

2. **Standing long jump (SLJ)** - measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002). The best attempt out of three is counted with the accuracy of 1cm.

3. **Sit-ups in 30 s (SUT)** - measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002). The number of correctly performed exercises during 30 s is recorded.

4. **Flexed arm hang (FAH)** - measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002). Flexed arm hang is measured with the accuracy of 0.1 s.

5. Shuttle run 4 x 10 meters (4 x 10) – the task was always to cross the opposite or starting line by one foot. The time required to overcome four 10 m sections with the accuracy of 0.1s is measured.

6. **Endurance shuttle run (ESR)** - measuring according to the methodology Moravec, Kampmiller, Sedláček and others (2002). The number of overcame 20 m sections is recorded.

The order of the tests was not strictly followed due to time, but endurance shuttle run was always performed as the last one.

We used a parametric unpaired T-test for statistical evaluation of the results. Statistical analysis was processed in the software IBM SPSS Statistic 17. We used a parametric unpaired T-test as the test of significance of the difference between medium values of the group of boys and the group of girls. Significance was detected at the standardly used 5% level of significance. For evaluation of the results we used basic statistical characteristics of central tendency and dispersion such as: average (\bar{x}), standard deviation (SD), minimum measured values (min) and maximum measured values (max) and percentage (%). We used basic logical methods to evaluate and interpret the results.

RESULTS

Results show a different level of monitored parameters considering boys and girls (Table 1, 2). The girls achieve on average better level of a trunk flexibility which was determined using a sit-and-reach test. Contrary, boys achieve better average values in explosive power of lower limbs (standing long jump), in dynamic endurance strength of abdominal and hip-thigh muscles (sit-ups), running speed with changes of direction (shuttle run 4 x 10 meters) and running endurance capacity (endurance shuttle run). We recorded statistically significant difference ($p < 0.05$) in the following tests: standing long jump, sit-ups and shuttle run 4 x 10 m in favor of boys and in the sit-and-reach test in favor of girls.

Referring to the level of minimum and maximum performance, differences in used tests are not as clear as the average values. The girls achieved the highest level in the sit-and-reach test, flexed arm hang and endurance shuttle run (Table 1, 2). The boys achieved the best performance in the following tests: standing long jump, sit-ups and shuttle run 4 x 10 m. The girls achieved the worst performance in the standing long jump. The worst level achieved boys in the sit-and-reach test and shuttle run 4 x 10 m. There are three tests in which the girls and boys achieved the same worst performance: sit-ups, flexed arm hang and endurance shuttle run. In two of these tests, sit-ups and flexed arm hang, we recorded zero values. It means, in both groups were individuals who had not done one cycle in the sit-ups test and did not maintain the desired position in the flexed arm hang test.

Table 1 Monitored indicators of general physical performance and physical development in group of boys (Boys)

Boys	Age	SRT (cm)	SLJ (cm)	SUT (n)	FAH (s)	4 x 10 (s)	ESR (n)	Height (cm)	Weight (kg)	BMI (l)
X	7.39	17.57	121.27	15.23	16.88	14.13	21.47	127.33	26.84	16.38
SD	0.43	5.81	18.95	4.90	17.07	1.29	11.79	5.82	5.30	2.22
Min	6.68	2	68	0	0	11.4	3	111.00	17.90	12.40
Max	9.28	31	179	31	89	19.7	66	143.50	48.00	26.30

Table 2 Monitored indicators of general physical performance and physical development in group of girls (Girls)

Girls	Age	SRT (cm)	SLJ (cm)	SUT (n)	FAH (s)	4 x 10 (s)	ESR (n)	Height (cm)	Weight (kg)	BMI (l)
X	7.25	20.83	111.49	13.07	16	14.54	19.87	125.62	25.72	16.16
SD	0.34	5.08	18.39	5.59	14.43	1.14	10.2	6.22	5.81	2.57
Min	6.14	5	57	0	0	12.0	3	111.50	14.30	11.60
Max	8.45	35	165	29	90	18.7	67	143.00	55.90	33.10

We also recorded higher average of somatic indicators in the group of boys – body height (boys were on average higher about 1.71 cm), body weight (boys were on average heavier about 1.12 kg) and in BMI about 0.22. Statisti-

cally significant difference ($p < 0.05$) was found in body height and weight in favor of boys. Statistically significant difference ($p < 0.05$) was not recorded in BMI.

DISCUSSION

We compare the results of our groups with the group from Slovakia (1993) according to Moravec, Kampmiller, Sedláček and others (2002) and with the group of children from eastern Slovakia according to Turek (1999) and Ružbarská & Turek (2007).

When comparing the group of boys from Banská Bystrica (2013) with the group from Slovakia (1993), we conclude lower level in all the tests, except the flexed arm hang test (Table 3). The boys from Banská Bystrica mostly lag behind in explosive power of lower limbs and in running endurance capacity. The comparison of our group with the boys from eastern Slovakia (Turek, 1999; Ružbarská & Turek 2007) shows bigger equality of groups. The boys from Banská Bystrica are better in the following tests: standing long jump, flexed arm hang and endurance shuttle run. The boys from eastern Slovakia are better in the following tests: the sit-and-reach test and one group is better in the sit-up test (Turek, 1999) and one of them is worse (Ružbarská & Turek 2007) than our group.

Table 3 Comparison of average results of our group with other researches – boys

Boys	Age	SRT (cm)	SLJ (cm)	SUT (n)	FAH (s)	4 x 10 (s)	ESR (n)	Height (cm)	Weight (kg)	BMI (l)
BB (2013) n = 252	7.39	17.57	121.27	15.23	16.88	14.13	21.47	127.33	26.84	16.38
SR (1993) n = 73	7.37	19.85	132.52	19.01	9.90	-	31.70	127.67	26.29	-
East SR (1999) n = 446	7	20.56	115.13	15.60	12.66	-	20.80	126.11	25.39	18.20
East SR (2007) n = 195	7	20.75	116.37	11.67	16.36	-	20.83	125.23	24.84	-

Comparison in the group of girls from Banská Bystrica (2013) and the group of girls from Slovakia (1993) shows to be in favor of the girls of Slovak population in three indicators: standing long jump, sit-ups and endurance shuttle run (Table 4). The girls from Banská Bystrica are better in the flexed arm hang and in the indicator sit-and-reach are the same average values in both groups. In comparison with the group of girls from eastern Slovakia (Turek, 1999; Ružbarská & Turek 2007) our girls are worse in a trunk flexibility, dynamic and endurance strength of abdominal and hip-thigh muscles. They are better in the following tests: standing long jump, flexed arm hang and endurance shuttle run.

Referring to the explosive power of lower limbs and the results of Slovak population of boys and girls at the age of 7 years, our groups lag behind as mentioned by Zapletalová (2002).

In comparison with the group from east (1999) we have recorded significantly lower BMI of our groups of boys and girls to compare them with the group of children from eastern Slovakia. However, recorded data are higher than national standards stated by Medeková & Šelingerová (2007) for Slovak children who do a sport and the one who do not.

Table 4 Comparison of average results of our group with other researches – girls

Girls	Age	SRT (cm)	SLJ (cm)	SUT (n)	FAH (n)	4 x 10 (s)	ESR (n)	Height (cm)	Weight (kg)	BMI (i)
BB (2013) n = 240	7.25	20.83	111.49	13.07	16	14.54	19.87	125.62	25.72	16.16
SR (1993) n = 71	7.29	20.83	123.46	17.61	8.92	-	27.31	125.83	25.40	-
East SR (1999) n = 452	7	21.65	108.73	14.59	10.12	-	18.91	125.02	24.82	18.91
East SR (2007) n = 195	7	21.68	104.69	13.12	11.50	-	17.93	124.77	24.11	-

When selecting a test battery, we used two test batteries – EUROFIT and UNIFIT. Based on analysis of numerically limited files, it was concluded that the diagnosis of motor skills of children younger school age is characteri-

zed by excessive width of “diagnostic coverage”, e.g. Turek (1996, 1999). Therefore, we had applied a battery that covered the whole range of general physical performance, but through a reducing of the number of test items when comparing it with the mentioned test batteries. We have omitted the test “flamingo” because of its lack of validity and questionable implementation in younger school age as the author Turek (1999) claims. Whereas speed capabilities were investigated using another test (Shuttle run 4 x 10 m), we omitted plate tapping which is used to measure frequency speed of arm. We also omitted a hand dynamometer because we used the flexed arm hang test to find out a static strength of upper limbs. Instead of 10 x 5 m we used shuttle run test 4 x 10 m, considering its duration and easier implementation. Although, the test 4 x 10 m can be found in the battery UNIFIT, we simplified it considering the age of children. Our test battery is nearly identical to Brown’s battery (2001) for talent identification.

The organized after-school physical activity of the boys and girls is not very different. 63.1 % of the boys at the age of 7 stated the after-school physical activity within 1-3 times in a week. 56.7 % of the girls stated the after-school physical activity within 1-3 times in a week. Differences in the after-school physical activity are increasing with age in favor of boys and generally, mainly the interest of girls decreases (e.g. Antala et al. 2012).

The organized after-school physical activity of children from Banská Bystrica is at the average level because only just over half of the surveyed children state participation in any of them.

During the performance of all the tests for 7years old children, it is necessary to give the correct demonstration and to teach children basic forms of test implementation. Otherwise, at a low level of coordination abilities, the items are not sufficiently valid and their implementation is questionable.

Taking the level of abilities of 7 years old children into consideration, the flexed arm hang test and endurance shuttle run test are not valid enough, in which values of the standard deviation reach average values or more than half of the average.

CONCLUSION

Seven year old boys from Banská Bystrica achieve better level in five tests of general physical performance than girls: standing long jump, sit-ups, flexed arm hang, shuttle run 4 x 10 m and endurance shuttle run. In three of them there are statistically significant differences ($p < 0.05$). The girls achieve statistically better level of trunk flexibility ($p < 0.05$). Referring to a general physical performance, the group of boys from Banská Bystrica lag behind the group of boys of Slovak population in all the tests, except the flexed arm hang test. The comparison of the boys from eastern Slovakia shows bigger equality of both groups. What refers to a general physical performance, the group of girls from Banská Bystrica lag behind the group of girls of Slovak population in three tests, in one indicator they are at the same level and they are the best in one of them. The comparison of the girls from eastern Slovakia shows bigger equality of both groups, three times in favor of our group and two times in favor of the group of girls from eastern Slovakia. Both our groups are significantly better in the flexed arm hang test when comparing them with a group of Slovak population and eastern Slovak population. In indicators of physical development has been recorded statistically significant difference ($p < 0.05$) in body height and weight in favor of boys. Then, BMI of boys is also slightly higher but not statistically significant ($p < 0.05$). In the comparison of the group from eastern Slovakia (1999), we recorded significantly lower BMI of our groups of boys and girls to compare it with the group of children from eastern Slovakia.

Authorship statement

The authors have contributed equally.

Financial disclosure

We declare that we have no conflicts of interest.

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