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The influence of acrobatic gymnastics on physical qualities development among 7-9 year-old schoolchildren

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Abstract: The article considers the results received while studying the influence of acrobatic gymnastics on physical qualities development in 7-9-year-old schoolchildren. Acrobatic gymnastics has a positive influence on the level of flexibility, quickness, strength, speed-strength oriented and coordination abilities development among junior schoolchildren from the experimental group (EG). **Scientific novelty** is in studying the dynamics of physical development and physical readiness under the influence of acrobatic gymnastics. **Practical significance** is in the influence revelation of acrobatic gymnastics lesson on physical qualities development of 7-9 year-old schoolchildren. **Research methods.** Information sources analysis, pedagogical testing, experiment, methods of mathematical statistics, the received data analysis and summarizing. Results. The conducted research made it possible to identify significant changes among schoolchildren from the experimental group, where the educational process included the methodology with acrobatic exercises and elements of highly coordinated motor actions. The schoolchildren from the experimental group had valid ($P < 0,05$) improvement in flexibility, quickness, speed-strength oriented and coordination abilities results. **Conclusion.** The experimental methodology use connected with acrobatic elements introduction into practical physical culture lessons had a significant influence on the results of physical qualities development. At the same time, it should be noted that coordination abilities development was registered almost among all respondents of the experimental group. We saw a valid improvement in coordination based exercises fulfillment. The elements of acrobatic gymnastics can be included into extracurricular physical culture lessons among junior schoolchildren.

Keywords: physical development, physical fitness, physical education, acrobatic gymnastics, general physical training.

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Introduction

Junior school is the main period in a person's life during the attitude formation to physical activities as the important elements of a healthy life style [2,3]. Many research works in different countries prove the effectiveness of a purposeful physical education. It influences psychomotor, mental and spiritual development of junior schoolchildren [1,4,5]. All this proves significance of physical training among children and the necessity to search for the ways of their further improvement in accordance with the main tendencies of education development.

[6,7,8,9].

Materials and methods

The pedagogical research was carried out in the Municipal budgetary general education establishment in Astrakhan "Secondary General School № 4 named after T.G. Shevchenko" (MBEE OF Astrakhan "SGS № 4") during the period since September, 2021 till June, 2022. In order to reveal the influence of acrobatic gymnastics on physical state of junior schoolchildren we planned and realized the pedagogical experiment using

the following research methods: information sources and empirical data study, analysis and summarizing; pedagogical testing, anthropometric (morphofunctional) studies, pedagogical experiment, statistical handling of empirical data [8, 11]. 7-9 year-old schoolboys took part in the experiment (n=84), 40 people in the control group (CG) and 43 people in the experimental group (EG). The respondents from the EG trained according to "Acrobatic gymnastics" program. In the CG children studied according to the general physical training (GPT) program. The training lessons were held 3 times a week during 9 months. The duration of each lesson was 130 minutes.

The aim of the research was to study the dynamics of physical development and physical readiness under the influence of acrobatic gymnastics and general physical orientation lessons. In this connection we studied morphofunctional indices (anthropometry): weight and height; thorax circumference; the ratio of fat and muscle component; vital capacity (VC); heart rate (HR); blood pressure (BP); birth-death ratio (BDR); inspiratory breath holding (IBH) and expiratory breath holding (EBH). We also studied physical qualities indices (pedagogical testing):

passive flexibility, active flexibility, quickness, speed-strength oriented abilities, coordination abilities.

Duration of each lesson was 130 minutes. Statistical handling of the received results was realized using the methods of variation statistics in "StatSoft, Inc." USA program. The indices differences significance between the results of the research was revealed by means of calculating Student's t-test criterion. The presence of significant connections between taken into account indices we stated according to Pearson correlation coefficient.

Results and discussion

In September 2021 and June 2022 we organized physical readiness testing among schoolchildren. Table 1 presents morphofunctional indices. Analyzing the results of the observations we come to the conclusion that anthropometric indices of children from the EG and the CG were within the limits of the norm and didn't have valid differences. After the series of the lessons with acrobatic gymnastics experimental elements use in the experimental group we received the following results (table 2).

Table 1

Morphofunctional indices of the respondents from the experimental and the control groups

Indices	Before the experiment		P	After the experiment		P
	EG(n ₁ =40)	CG (n ₂ =43)		EG(n=40)	CG (n ₂ =43)	
Weight, kg	25,6±1,9	26,5±1,9	p<0,05	25,6±1,9	28,5±1,9	p<0,05
HR, beats/min	80,0±0,15	82,1±0,15	p<0,05	80,0±0,2	78,1±0,2	p<0,05
VC, ml	1710,1±0,1	1700,2±0,2	p<0,05	1710,5±0,2	1740,6±1,3	p<0,05
MVV (maximal voluntary ventilation), l/min	116,1±1,9	118,1±1,9	p<0,05	116,1±1,1	120,1±1,0	p<0,05
IBH, s	43,0±1,5	44,4±1,6	p<0,05	43,0±1,5	47,4±1,6	p<0,05
EBH, s	27,4±1,5	26,9±1,5	p<0,05	27,4±1,5	29,9±1,5	p<0,05
Thorax circumference, cm	49,1±1,6	51,1±1,5	p<0,05	49,1±1,6	52,2±1,5	p<0,05
BDR	66±1,5	64±1,9	p<0,05	66,1±1,1	69,2±0,9	p<0,05

The results of the held research in the EG show positive dynamics of morphofunctional indices among junior schoolchildren, such as VC, MVV, IBH. The average index of Stange's test (inspiratory

breath holding) before the lessons was 43,0±1,5 s, by the end of the experiment it was 47,4±1,6 s. The index increase is statistically valid (with s

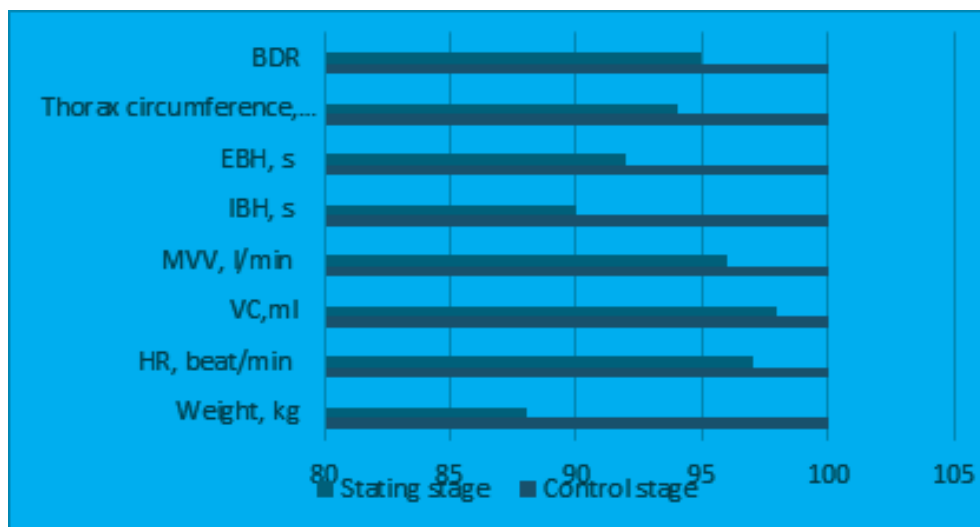


Fig. 1. Dynamics of morphofunctional indices among the respondents from the experimental group

Fig. 1 shows the results of morphofunctional indices development among the respondents from the EG. At the same time the results of the research control stage are accepted as 100% and the results of the stating stage in percentage, proportionally. Picture 1 proves that acrobatics lessons had a positive influence on the studied morphofunctional indices of junior schoolchildren. The most significant dynamics was in weight increase owing to muscle

mass (11±1,9%), in IBH (10±2,1%) and EBH (9±1,5%). Table 2 presents the results of physical readiness testing among the respondents from the EG and the CG. The results show that there were no valid differences between the indices of the respondents from the CG and the EG. During the next stage of the research we studied the dynamics of junior schoolchildren physical qualities from the EG.

Table 2

Results of studying physical qualities among junior schoolchildren during the stating stage of the experiment

Tests	Before the experiment		P	After the experiment		P
	EG (n1=40)	CG (n2=43)		EG (n1=40)	CG (n2=43)	
Forward lean of the body from standing position	77,6±1,2	75,8±1,1	p<0,05	77,6±1,2	87,6±1,2	p<0,05
Dip up in prone position	11,0±0,5	11,2±0,3	p<0,05	11,1±0,5	14,2±0,5	p<0,05
“Walking on a gymnastic bench” test, s	8,7±0,5	8,8±0,6	p<0,05	8,8±0,5	7,9±0,5	p<0,05
“Swallow stand” test, s	3,3±0,6	3,4±0,6	p<0,05	3,4±0,6	4,6±0,6	p<0,05
Romberg’s test, s	12,4±1,1	12,2±1,2	p<0,05	12,2±1,1	15,2±0,9	p<0,05
Straight hands hang, s	12,0±1,2	12,4±1,3	p<0,05	12±1	15±1	p<0,05
30 meters run, s	8,6±0,1	8,7±0,2	p<0,05	8,7±0,1	7,6±0,1	p<0,05
1000 meters run, min	4,2±0,1	4,3±0,1	p<0,05	4,3±0,1	4,0±0,1	p<0,05
Shuttle run 4×10 m	11,3±1,1	11,4±1,2	p<0,05	11,3±0,2	10,4±0,2	p<0,05

Thus, taking into account the results of the research we revealed statistically valid changes in the following tests: “Forward lean of the body from

standing position”, “Dip up in prone position”, “Romberg’s test”, “Straight hands hang”, “30 meters run”, “1000 meters run”, “Shuttle run 4×10 m”. It proves positive influence of acrobatics lessons

on flexibility, quickness, speed-strength oriented and coordination abilities. Picture 2 presents the

dynamics of physical qualities development among the respondents from the EG.

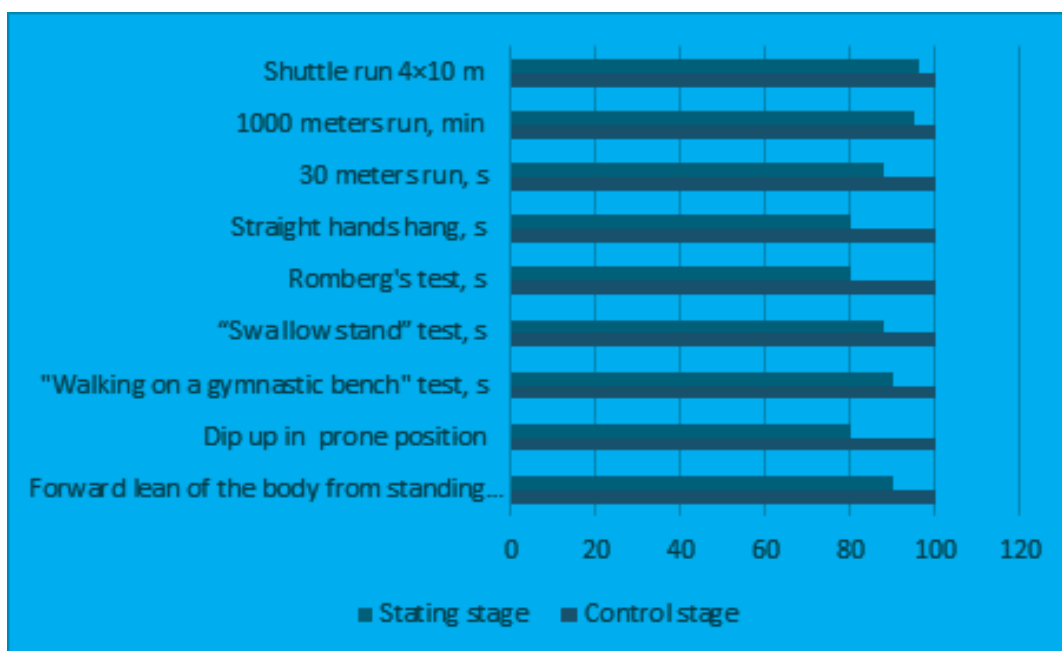


Fig. 2. Physical qualities of junior schoolchildren from the experimental group

Fig. 2 shows that (results of the research control stage are accepted as 100%, the results of the stating stage – in percentage, proportionally) acrobatic gymnastics lessons had a positive influence on all studied physical qualities of the respondents from the EG. The most significant dynamics in percentage was in the following tests: “Dip up in prone position” ($22 \pm 2,6\%$), “Swallow stand” ($22 \pm 2,4\%$), “Romberg's test” ($20 \pm 1,8\%$), “Straight hands hang” ($20 \pm 1,7\%$).

Conclusion

1. According to the results of the carried out research work in the experimental group we revealed positive dynamics of morphofunctional indices of junior schoolchildren, in particular according to such parameters as VC, MVV, IBH. The average index of Stange's test (inspiratory breath holding) at the beginning of the lessons was $43,0 \pm 1,5$ s, by the end of the experiment it was $47,4 \pm 1,6$ s. The index increase is statistically valid (with significance level $p < 0,05$). It proves pulmonary ventilation and respiratory function improvement in general.

2. During acrobatic gymnastics lessons we proved their positive influence on the level of flexibility, quickness, strength and speed-strength oriented and coordination abilities development of junior schoolchildren from the experimental group. The most significant dynamics in percentage was in the following tests: “Dip up in prone position” – $22 \pm 2,6\%$, “Swallow stand” – $22 \pm 2,4\%$, “Romberg's test” – $20 \pm 1,8\%$, “Straight hands hang” – $20 \pm 1,7\%$.

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