© Eurasian Journal of Sport Science 2024; 1(2): 189-193
https://eajss.uz

Indicators of development of sensorimotor coordination of rhythmic gymnasts at the stages of preliminary basic and specialised basic training

Sanakulova Zamirajon Bakhtiyorjonovna[1]

[1]Uzbekistan state university of physical education and sport, Chirchik, Uzbekistan

Abstract

Purpose: to study the indicators of sensorimotor coordination of rhythmic gymnasts at the stages of preliminary basic and specialised basic training.

Methods: In order to solve the set goal, theoretical analysis and generalisation of data from scientific and methodological literature, practice experience; pedagogical testing; Opto Jump opto-electronic method; method of expert evaluations; mathematical statistics were carried out. In the process of pedagogical observations an independent thematic observation was conducted. Its purpose is to record and evaluate individual exercises, bundles of exercises performed by gymnasts; possibly new approaches implemented by coaches in the educational and training process in rhythmic gymnastics for the development of sensorimotor coordination in teaching the sports technique of throwing and catching objects.

Results: This means that young gymnasts lack plasticity of movements, flexibility of the whole body, choreographic training, harmony in performing exercises without and with apparatus. When performing test 9 - twine right, the average score of the group is 8.33±0.73 points, V% 8.79; test 10 - twine left, respectively, 7.77±0.86 points, V% - 11.06; test 11 - twine - 8.06±0.96, V% - 11.90; test 12 - bridge - 8.44±0.94 points, V% - 11.09. The analysis of the results of researches testifies that only in 2 young gymnasts the level of mobility in joints approaches to requirements of rules of competitions and sports technique of rhythmic gymnastics.

Indicators (score in points) for the performance of the basic combination - hoop throw - forward somersault over the shoulder - catching the hoop in a stand on half-fingers, hoop in the right, which characterises the level of special technical training were correlated with the indicators of tests 1-12, characterising the level of sensorimotor coordination of the subjects. The correlation connection at the level of 0.12-0.48 was established, indicating a weak connection of the studied indicators. It is possible to draw a preliminary conclusion that the level of development of sensorimotor coordination does not fully provide technical training and technical preparedness of young gymnasts.

Conlcusion: Based on the scientific fact that sensorimotor coordination is the basis of technical fitness and technical training, it became possible to systematise and use motor tests to measure and analyse the indicators of functioning of sensory systems, to assess vestibular stability and sensitivity, spatial orientation, statodynamic stability of the body when performing static and dynamic balances, coordination of movements of the upper and lower limbs, motor reaction time, tempo-rhythm of movement, and to use them in the following ways

Keywords: rhythmic gymnastics, young female athletes, tests, sensorimotor skills, coordination, movement system, technical fitness.

Introduction

Human sensorimotor coordination is a structure and process of coordinated activity of sensory and motor systems, occurring in inseparable connection with the functioning of the central nervous system, integrating and systematising local and global movements - human actions.

In accordance with the studies of N.A. Bernstein - coordination of movements is based on limitation of excessive degrees of freedom of our body, i.e. their ordering and transformation into a controllable system of simple or complex movements on the basis of sensory corrections. BolobanW.N consider human motor skills from the position of integrated activity of sensory systems with certain priority functions, depending on the solved motor tasks. As B.G.Ananyev points out, the lowest level of development, relative to others, has sensorimotor coordination, technical thinking and coordination of movements of both hands. In 2006 - 2009, Professor V.N.Boloban investigated the problem of sensorimotor coordination of sports gymnasts. He systematised twelve coordination abilities, which should positively influence the quality of the athlete's movement control and be the basis of technical preparedness.

During detailed analysis and evaluation of research results it was found that in most cases of training process and participation in competitions the indicators of sensorimotor coordination (for example, vestibular stability and sensitivity, spatial orientation, statodynamic stability of the body and body system, etc.) are weakly manifested and do not ‘work’ effectively enough in the phase structure of sports exercises performed by athletes.

This leads to a large number of technical errors in the form of violations of positional reference points of movements as nodal elements of sports technique, balance of the body and body system, tempo-rhythm of movements, and others. Rational body posture, positional reference points of movements - the first thing that is necessary to perform any type of move-

ment, which is based on the level of development of sensorimotor coordination. The authors V.N. Boloban, E.V. Biryuk; V.N. Boloban attach great importance to the improvement of positional reference points of movements as a methodology and a method of evaluating the sports technique of throwing and catching objects in rhythmic gymnastics.

Results and discussion

The authors write: 'mastering of physical exercises will be effective if, when teaching a specific motor action, the gnoseological aspect (cognition of movement through cognition of specific poses) and didactic aspect (teaching movement through teaching specific poses) are distinguished. At the same time, it is reasonable to consider the structure of the athlete's movement from the position of the starting posture of the body (i.e. the position of the biostems rationally located for interaction with the external environment in the interests of movement), dynamic posture (i.e. following one after another instantaneous static postures without or with an increasing degree of complexity of movements according to the principle of posture multiplication) and the final posture of the body - such a position of the biostems of the body at which a high stability of the body is possible, or in which the programme of further motor action (movement) is laid down. In fact, the authors laid the foundation for the study of sports exercises and their training using the method of positional orientations of movements.

The analysis of scientific and methodical literature testifies that up to the present time technologies of development of sensory systems in combination with indicators of technical, physical, functional and other types of sportsmen training have not been developed and, first of all, it concerns improvement of the motor sensory system and its main source - proprioceptive sensitivity; vestibular sensory system and its functions - stability to adequate stimuli and sensitivity to volumes of linear and rotational load; visual sensory system and its functions - stability to adequate stimuli and sensitivity to volumes of linear and rotational load; visual sensory system and its functions - stability to adequate stimuli and sensitivity to volumes of linear and rotational load

The issues under consideration are extremely important in rhythmic gymnastics, a sport with a complex coordination structure of movements. At present, the complexity and structural diversity of the types of movements performed by gymnasts is increasing. The sports competition of national teams is intensifying and the number of problems is increasing, one of which is the problem of performing technically stable, reliable throws and apparatus catches in competition conditions in combination with difficult, in accordance with the FIG requirements and biomechanically complex body movements of the gymnast.

The beginnings of subject training are born with the beginning of rhythmic gymnastics (even earlier: elementary movements with a ball, jump rope, hoop - in children's games, long before choosing a sport for specialisation). The foundations of the 'school' of subject training are laid at the preliminary basic and specialised basic stages of training. At the same time, methodological approaches to teaching throwing and catching objects by developing and improving sensorimotor coordination as the basis of technical training are not sufficiently developed.

The purpose of pedagogical testing was to measure the development indicators of sensorimotor coordination of rhythmic gymnasts aged 9-11 years using motor tests. The assessment of special technical preparedness of the subjects was carried out by experts. Young gymnasts were offered to perform a basic set of exercises with a hoop: from two to three steps - throw the hoop upwards - forwards - somersault forward over the shoulder - stand up and catch the hoop - fix a vertical stand on high half-fingers, hands to the sides, hoop in the right hand. Two attempts were performed. Score out of *10 points*. Expert judgement method. Technique of research - a commission of sports judges consisting of 4 people: international category judge, national category judge, two judges of the first category. This method was used to assess the basic bundle of exercises with a hoop, quantitative and qualitative indicators of performance of movement tests in accordance with the requirements of the rules of competitions, methodological and organisational standards.

Methods of mathematical statistics: sampling method and method of mean values were implemented using PC programs (**Excel, Statistica-6.0)**. Organisation of research. The research was conducted in the period from 15.12.2022 to 25.12.2023 in Youth sport school № 1, Tashkent city. The research involved rhythmic gymnasts aged 9 -11 years of prelimi-

Table 1. Indicators of special technical readiness of rhythmic gymnastics students at the age of 9-11 years while performing basic exercises with a hoop (description in the text), n =24

Symbols	1st attempt, points	2nd attempt, points	Average of two attempts, points
X	7,04	7,08	7,06
δ	1,33	1,10	1,07
V%	18,83	15,53	15,21

nary basic and specialised basic training stages, in the number of 24 people.

Table 1 shows the results of the young gymnasts' performance of the basic set of exercises with a hoop (control task): from two to three steps - throw the hoop upwards - forwards - somersault forward over the shoulder - stand up and catch the hoop - fix a vertical stance on high half-fingers, hands to the sides, hoop in the right hand. When analysing the indicators characterising the level of special technical readiness, experts note that the majority of subjects have not high hoop throws, releasing the hoop with a bent, relaxed, not high elevated arm, adoption of inaccurate (technically) poses during the throw; there are errors in performing a somersault forward (more often it is performed under oneself with uncontrolled positions of arms and legs during rotation); when catching the hoop there is a loss of orientation in space, errors in adopting a vertical posture of the body in the final phase - catching the hoop. Not enough effective tempo-rhythm. The arithmetic averages of the control task performance in the two samples do not differ significantly: 1st attempt (x±S) 7.04 ±1.33 points; 2nd attempt - 7.08±1.10 points. The mean of the two attempts was 7.06±1.07 points. Different scores (4.0 points - subjects D - ak, P - aya; 9.0 points - P - aya; 6.5 points for the 1st attempt and 9.0 points for the 2nd attempt at T - o) are the evidence of not enough firmly formed motor skills and motor skills of performing the basic bundle of exercises with objects.

When performing this set of exercises by young gymnasts, the deficiencies of sensorimotor coordination were reflected and manifested like in a mirror: violation of body postures, body positions and their multiplications, insufficient orientation in space, uncertain statodynamic stability of the body and body system (gymnast - hoop), weak proprioceptive sensitivity in the interaction of the gymnast with the hoop. In this connection, we made an attempt to study the indicators of sensorimotor coordination of young gymnasts who performed a basic set of exercises with a hoop. Table 2 presents the indices characterising the statodynamic stability of the body, spatial orientation, vestibular stability of the subjects. They are the basis of technical training and technical preparedness of gymnastics athletes [8]. Test 1. Biryuk test. Assessment of static balance. Vertical stance on high half toes, feet closed, hands up, eyes closed. Fix for a long time (s). The average result of performing the sample is 5.32±3.44s. The maximum is 13.75s, subject Ya-k. The minimum is -1.8s, subject Ts-a-ya. Some technical errors registered by experts during fixation of Biryuk's test: visible swaying of the body, bending-extension in hip joints, caused by forward and backward movements of the

Table 2. Indicators of sensorimotor coordination of rhythmic gymnasts aged 9-11 years old

Symbols	Test 1 Biryuk test, s	Test 2 Yarotsky's test, s	Test 3 Boloban's test, cm
X	5,32	15,02	30,07
δ	3,44	8,65	4,88
V%	64,75	57,61	16,22

Table 3. Indicators of sensorimotor coordination (spatial orientation) of rhythmic gymnasts aged 9-11 years performing the Beritov test, test 4; explanations in the text (n=24)

Symbols	Movements of subjects on a 12 x 12 m platform when performing the Beritov test (test 4), %		
	1st task Moving around the square	2nd task Moving on a triangle	3rd task Moving in a straight line with turns
X	42,80	39,50	34,04
δ	8,20	7,17	6,15
V%	19,15	18,15	18,06

torso, movements of hands, extensions in ankle joints, leading to lowering of heels. In the work of E.V. Biryuk it is indicated that for gymnasts of the 1st sports category, candidates for master of sports this indicator should be close to 15-20 s. And in masters of sports, who purposefully improve the regulation of body posture, it increases in individual cases up to 60 s. The technical accuracy of fixation of vertical body posture on high half-fingers is noted. We find confirmation of E.V. Biryuk's research results in the later scientific works of V.N. Boloban.

Table 2 shows the sensorimotor coordination indices of the subjects while performing the Yarotsky test (test 2). The gymnast's body stability was assessed. Assessment of vestibular stability by static balance indicators. Vertical stance with closed feet, arms along the torso, eyes closed. Rotation of the head to a convenient side at a pace of 2 rotations for 1s. Fix for a long time (s), without moving from the place. The trainer's medical handbook notes in characterising the Jarotsky test that: 'Balance preservation in rhythmic gymnastics classes exceeds 60 - 80s'. The average result of Yarotsky's test performance by our subjects is equal to 15,02±8,65s. The coefficient of variation is close to 60% (57,61%). This indicates significantly different states of functioning of the vestibular sensory system in young gymnasts. Thus, subject P-o maintains body stability for 33.52s, while subject T-o maintains body stability for 1.03s; subject C-o maintains body stability for 2.59s; subject L-co maintains body stability for 5.65s. The results of test 3, Boloban's test, are presented in Table 2.

Table 4. Indicators of sensorimotor coordination of rhythmic gymnasts at the age of 9-11 years (latent period of motor reaction (LPMR) to a sound signal during a jump from a place with a maximum upwards with a swing of hands; height of a jump from a place with a swing of hands; length of a jump from a place with a swing of hands), n=24

Symbols	Test 5 LPMR, ms	Test 6 jump height cm	Test 7 jump length cm
X	558,50	25,8	139,29
δ	73,58	4,20	16,43
V%	13,18	12,85	11,80

Conclusion

According to expert assessments, the indicators of sensorimotor coordination of rhythmic gymnasts mainly characterise the formed motor skills and motor skills of controlling the movement system of competitive programmes of girls aged 9-11 years. The correlation analysis revealed discrepancies between the indicators of the development level of sensorimotor coordination and the indicators characterising special technical preparedness. The sensory system of the organism of young gymnasts does not fully enough provide movement control when performing the basic exercise - hoop throw - forward somersault over the shoulder - hoop catch.

A promising direction of sports training of rhythmic gymnasts at the age of 9-11 years should be the development and improvement of sensorimotor coordination, including the formation of positional orientations of movements as nodal elements of sports technique of throwing and catching objects by special exercise

programmes.

Vestibular stability was assessed by dynamic balance indicators. Initial position: forward bend, hands down. Execution. Five turns by stepping over to a convenient side in 5s, in a circle with a diameter of 70cm; straighten up and walk in a straight line for 5m, looking forward. The stability of the gymnast's movement while walking in a straight line was evaluated. The six largest deviations of the body to the left and right during walking were analysed. The arithmetic mean was 30.07±4.88 cm; V% = 16.22. Five body rotations in a forward bend by stepping over 5s (the frontal semicircular canals of the vestibular analyser predominantly fall into the plane of irritation) resulted in discoordination of dynamic equilibrium. Body deviations during walking by 30 cm or more were registered in 13 subjects. While walking in a straight line, the largest body deviations (39.4 cm) were registered in subject D; 10 more gymnasts had body deviation values of more than 20 cm; the smallest deviation was registered in subject A-a (15.6 cm).

References

Bernstein, N.A. **(2006)** *About agility and its development* / N.A. Bernstein. - Moscow: Fizkultura i Sport, 1991.-288 p. Boloban, V. Sensomotor coordination as the basis of technical training / V.Boloban // Science in Olympic sport,-№2. - C. 96 -102.

Boloban, V. **(2008)** *Teaching acrobatic exercises of the balance type of body system movements* / V. Boloban // Science in Olympic sport, 2008. - № 1. - C. 24 -31.

Boloban, V.N. **(2009)** *Elements of the theory and practice of sports orientation, selection and staffing of groups in sports acrobatics* / V.N. Boloban //Pedagogy, psychology and medical and biological problems of physical education and sport. - 2009. - № 2. - C. 21-31.

Boloban W.N. **(2009)** *Reaktion time and motor time in an atletie´s movem*ents / W.N. Boloban // Pedagogics, psychology, medical-biological problems of physical training and sports. Boloban // Pedagogics, psychology, medical-biological problems of physical training and sports.- № 10. - P. 295-301.

Haverdovskiy Yu.K. **(2007)** *Training of sports exercises. Biomechanics. Methodology*. Didactics / Yu.K. Gaverdovskiy. - Moscow: Fizkultura i Sport, 2007. - C. 365-776.

Ivanova, E.V.**(2008)** *Structure of the relationship between different types of specific coordination abilities of hands, physical development and physical fitness of young gymnasts* (in Russian) // Scientific Works. Yearbook. - Omsk: SibGUFK Publishing House, - C. 119-122.

Platonov, V.N. **(2015)** *System of preparation of sportsmen in Olympic sport. General theory and its practical applic*ations. textbook [for coaches]: in 2 kn. Kiev: Olympic Literature, Kny. 2., -752 c.

AUTHOR BIOGRAPHY:



Zamirajon Bakhtiyorjonovna SANAKULOVA

Employment
Student of PhD at Uzbekistan state university of physical education and sports

Degree
MD

Research interests
Rhytmic gymnastics, Physical education and sport, Theory of physical education, Analyzing of sport competitions

E-mail:
sanokulova.zamirajon94@gmail.com