

PERFECTION OF COORDINATION WITH THE HELP OF JUMP EXERCISES ON TRAMPOLINE

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Abstract. *Purpose:* to work out methodic of sportsmen's coordination perfection with the help of jumps on trampoline. *Material:* in the research 259 1st and 2nd year students (age 17-19 years) participated. The students were representatives of game and cyclic kinds of sports, sport gymnastic and martial arts. Among them there were 99 sportsmen with sport degrees. *Results:* we gave the definition of the term – coordination training. The students' sensor-motor coordination was confidently improved by means of the worked out methodic realization. The methodic included program of jump exercises on trampoline. We achieved positive dynamic of static-kinetic and static-dynamic balance as well as increased the quality of mastering of exercises with complex coordination. *Conclusions:* the methodic of sportsmen's coordination training with the help of jump exercises on trampoline was worked out, considering specificity of kinds of sports and sportsmen's qualification. This methodic improves sensor-motor coordination and is the basis of technical training and technical fitness.

Key words: sportsmen, sensor-motor abilities, methodic, coordination training, exercises, jumps on trampoline, testing, technical fitness.

Introduction

In kinds of sports with complex coordination structure competition exercises are fulfilled in difficult conditions of static-kinetic and static-dynamic balance [9, 11, 15]. Such kinds of sports include: sport kinds of gymnastic [1, 4, and 6], mountain skiing [11], sport wrestling [12], basketball [17], football [15] and other. Sportsmen have to solve motor tasks of body positions' control on supports and without support. They achieve coordination accuracy of motor actions in complex phase structure of sport exercises. Scientists conclude that decisive role in effective motor actions' control is played by sensor-motor coordination [2, 4, 18]. As it is shown by practice and experimental-methodic researches in some cases sensor-motor coordination is not sufficiently effective in demonstration of sports exercises. It is expressed in disordering of: body and bodies' system balance; space-time orientation of body on support and without support; temp-rhythm; differentiation of motor parameters. When fulfilling program reconstructions of competition exercises' motor structure, technical mistakes were found. Analysis of sport training modern state witnesses, that *coordination training* (CT) shall be an important direction. It shall be regarded as training process, directed at development and perfection of motor coordination with the help of special (specific) coordination exercises. Such exercises improve space, time and power indicators of systemic control over sportsman's movements. Coordination training is built, considering sportsman's indicators of special motor (physical) and special technical fitness. Besides, such training is built considering sensor-motor coordination (SMC), accumulated knowledge about level of perfection and individual sportsman's coordination abilities (CA); presence of valid means (coordination exercises) and methods of their realization in training and competition functioning. Coordination training is an element of system of sportsmen's many years' preparation.

Sensor motor coordination

In monograph by Prof. N.A. Bernstein [2] the following is written: "Coordination indeed is nothing but overcoming excessive degrees of freedom of our motor organs; i.e. transformation them into controlled systems". "We call introduction of continuous corrections in our movements on the base of sensor organs reports, principle of sensor corrections". "Sensor" (translated from Latin) means "related to sensitivity", "based on sensitivity" (p.54). Motor coordination (by N.A. Bernstein) ensures interaction of movements' construction levels at the account of sensor integration of Central nervous system (CNS) structures. Motor coordination abilities are understood as human abilities to quickly, accurately, bio-mechanically purposefully and inventively solve any motor tasks. Results of foreign scientists' works [14, 16, 17] also witness that sensor motor coordination is integral functioning of organism's sensor systems. Motor coordination is directed at development, control and correction

of movements by means of sensor system's functioning: visual, tactile, proprioceptive and interceptive sensor systems and olfaction sensor system.

Sensor motor coordination is rather a complex motor skill. This skill is in the base of control over sportsman's movements. It illustrates motor skills of elite sportsmen and sportsmen of low qualification. Sportsmen-beginners are separate category. At beginning stages of training – movements are included in sensor-motor coordination exercises. They can consist of a number of separate sensor-motor reactions, every of which has own beginning and end. In the process of training separate sensor-motor reactions are combine in flexible, plastic system of sensor-motor corrections of the fulfilled action – movement. Such approach is required for realization of generalized target (for example fulfillment of holistic sports exercise). Further complication of sensor-motor coordination takes place in case if it is necessary to control complex system. It is possible, when general and local coordination abilities are developed properly.

Coordination abilities

Multiple researchers of recent years showed that different manifestations of human coordination in physical education, sports, labor and military activity are rather specific. That is why instead of earlier term “dexterity” (which was rather multivalent) term “coordination abilities (CA) was introduced in theory and practice of sports. Besides, the system of such abilities and demand in differentiated approach to their development, have become relevant [3, 11, and 17]. Term “abilities” is regarded as manifestation of personality's individual qualities, which are subjective conditions of successful realization of motor functioning. They are not reduced to available knowledge, skills and abilities. Person's bents are their base. Abilities are detected by quickness, depth and strength of mastering motor actions' means and techniques. They are ordered psycho-physiological regulators, which condition possibilities of their acquiring and realization. Coordination abilities ensure economic and inventive, i.e. the most perfect, solution of motor tasks (especially difficult and sudden).

Professor Yu.K. Gaverdovskiy [6] regards these abilities as bents, developed by purposeful work. He points that there are the following abilities: to generalized or specialized types (equally important in any kind of activity); local abilities, which express the most brightly individual's bents to certain forms of activity. As a rule, full development of exactly such abilities plays decisive role in human self-realization (in particular sportsmen's).

Professor V.N. Platonov [11] writes: “Sportsman's coordination abilities are variable and specific for every kind of sport. However, they shall be differentiated into separate kinds by specific features of their manifestation, criteria of their assessment and factors, which condition them. Basing on results of special researches... one can mark out the following relatively independent kinds of coordination abilities: assessment and regulation of dynamic and movements' space-time parameters; keeping of balance and stability; sense of rhythm; orientation in space; inter and intra muscular coordination; ability for relaxation; coordination of movements. In actual training and competition functioning all mentioned abilities manifest not purely but in complex interaction. In definite situations some coordination abilities are leading and other are secondary. With it, instant change of different abilities' role is possible, caused by change of external circumstances. Especially noticeable it is in sport gymnastic, acrobatic, sport games, martial arts, mountain skiing: in all kinds of sports, in which result mainly depends on coordination abilities” (2015. – Vol. 2. – Pg.797).

Exercises of sport kinds of gymnastic were created artificially [1, 6]. They practically are not used in everyday life. At the same time, in the world unique competition exercises' systems with complex motor coordination exist and successfully develop. They are also successfully demonstrated in the form of compositions at sport competitions of different levels, Olympic Games including. In this connection requirements to physical, functional (sensor-motor) coordination and technical fitness of sportsmen are being worked out and perfected. Coordination complexity of competition programs remain the key tendency. Their difficulty (according to tables of difficulty of International gymnastic federation) shall be related to it also.

Professor V.N. Boloban [3] studied twelve coordination abilities, which correspond to specific of sport kinds of gymnastic. They characterize quality of sportsman's motor control. These abilities are realized in training and competition functioning differently. They are the basis of technical perfection and technical fitness. They are abilities for the following:

- Static and dynamic balance; balancing in system of interacting bodies;
- Assessment of proprioceptive signals in orthgrade and reverse body positions;

- Vestibular balance and sensitivity;
- Assessment of time and space on support and without it;
- Differentiation of motor parameters;
- Assessment of motor stability and watching object (partner, opponent);
- Manifestation and change of motor rhythm-temp;
- Reactivity of movements by time of motor reaction;
- Movements frequency;
- Movements symmetry and asymmetry;
- Movements' concordance with music.

Many scientific works are devoted to study significant coordination abilities in many kinds of sports. Insignificant discrepancies, existing in them, only prove specific character of one or another ability manifestation and individual distinctions in its domination in relative kind of sports (or in separate kind of sports).

Development and perfection of coordination training programs

Recent years, in the world exercises' programs of general [11] and specific (local) influence on sportsman's motor coordination have been being worked out and perfected [5, 8, 12, 15].

General exercises' programs are directed at formation of solid foundation for motor skills in exercises' fulfillment. In this case, indicators of space, time and power motor parameters are considered. On the base of exercises' programs and algorithms of their realization basic fund of individual sportsman's movements – exercises is created. With it, sportsman's individual indicators of special fitness, specific of kind of sports, stages of training are considered. Exercises' programs with application of new technical means are used: SportKat (diagnostic-exercise); step-platforms Body – Balance (exercises on moving platforms); fit-ball; platforms – semi-spheres of type BOSU Balance Training; water slides with spring board of different height, which push sportsman in free flight with “landing” in water. They permit to develop body movements and perfect their control in space (usually used in freestyle). Means for training static-dynamic balance are used (for example ball throws in basket, standing on moving platform or semi-sphere) and etc. Different by structure exercises are fulfilled: turns, body twisting, forward and backward body bents with support on fit ball, with other subjects [11, 14, 15]. Sportsmen have opportunity to train surface and deeper muscles as well as to form muscular corset; to work at sensor systems' development and perfection of their integrative interaction in process of sports exercises' fulfillment. With it, improvement of vestibular sensor system's functioning, as the base of technical fitness, is accented [4, 13].

Programs of special exercises are worked out and realized for training local manifestation of specific coordination abilities; determination of their functioning characteristics and assessment criteria, as well as factors, which condition them. Such specific and locally manifested CA include: motor control in space; balance in reverse body position; balancing, juggling; temp-rhythm; feeling of time; feeling of sport apparatus; feeling of object; feeling of water; feeling of partner or opponent; muscular-joint feeling; vestibular sensitivity; balance in motion; fine motor abilities; balancing on narrow, mobile or high support; jumping; interaction of music and movements and so on. Special exercises' programs of specific impact actually have the same names in coordination training: program of positions; program of orientation; program of coordination; program of balance or stability; program of “light” acrobatic; program of rhythm; program of “singing” [temp-rhythmic sportsman's boy interactions with support (hanging), without support and with turns around longitudinal axis]; program of mechanic interaction with support; program of landing; program for flexibility, mobility and other. For their realization physical and sport exercises of certain kind of sports are used as well as exercises of other (relative) kinds of sports and technical means [4,13]. *Alongside with it, it should be noted that there nearly no scientific-methodic materials, which would substantiate usage of trampoline jumps. Especially it concerns training and improvement sensor-motor coordination. In this case special importance is acquired by coordination training structure in different kinds of sports.*

Trampoline jumps is an Olympic kind of sports (since 2000). The prospects of this kind of sports are as follows: expansion of geography of countries, in which trampoline jumps are practiced; increase of quantity of trampoline jumpers; development of sport exercises of different groups of difficulty; perfection of sport technique; raising of sportsmanship level in individual and synchronous jumps.

Trampoline jumps exercises are used as mean of motor and functional-technical training in different kinds of sports, physical education and professional functioning (for example in vestibular analyzer training in mountain skiers, astronauts, sailors, drivers and so on). These exercises stimulate visual analyzer that facilitates motor control, avoiding air and sea sickness as well as activate breathing and improve blood circulation and result in positive psychological and emotional state. By effectiveness, trampoline jumps to large extent exceed usual cardio training. Scientists-physiologists from NASA found that usefulness of trampoline jumps significantly exceeds advantages of run (to be more exact by 68%). In contrast to track, trampoline springing jumps compensate up to 80% of loads on joints. By this reason 10 minutes of trampoline jumps have the same effectiveness as 30 minutes of jogging [19].

The purpose of the research: is to work out methodic of sportsmen's coordination training with application trampoline jumps.

The tasks of the research: 1. to study indicators of elite sportsmen's coordination indicators (in kinds of sports with complex motor coordination).

2. To work out coordination training methodic with application elite sportsmen's trampoline jumps as well as to test effectiveness of its application in practical trainings of 1st and 2nd year students of National university of physical education and sports of Ukraine (NUPESU).

Material and methods

Participants: in the research 1st and 2nd year students of NUPESU (n=238) participated. They were (142 boys and 96 girls of 17 – 18 years' age, who specialized in the following kinds of sports: games, cyclic, with complex coordination, martial arts. From them: masters and candidate master of sports – 78; 1st-2nd sports degrees sportsmen - 111 persons; without sport degrees - 49 persons. Besides 2nd year students of NUPESU n=21) (14 girls and 7 boys) of 18 – 19 years age, specializing in sport gymnastic, participated in the research. From them there were 15 masters of sports and 6 candidate masters of sports 13].

Organization of the research: the researches were conducted with 1st year students (September 2014 – May 2015 – 30 training sessions) and with 2nd year students (September 2015 – May 2016 – 30 training sessions). Sportsmen of sport gymnastic fulfilled coordination exercises during 30 sessions at 1st year and 60 training sessions at 2nd years (twice a week).

Statistical analysis: materials of the research were processed with the help of mathematical statistic methods (Excel, Statistika).

Results of the research

We have worked out methodic of sportsmen's coordination training with application of trampoline jumps (see fig. 1). Nine elements are in the base of it. The elements of priority are: individual indicators of students' technical fitness (sportsman, qualification) and program of trampoline jumps. The program included three blocks: elementary exercises on trampoline, combinations of elementary and basic exercises on trampoline.

Methodic and practical recommendations for mastering trampoline jumps' technique: the first practical steps of sportsmen in mastering trampoline jumps are connected with formation of "feeling" of sport apparatus, accurate body positions:

- Walking on trampoline network face or back toward direction of walk; rolls over on trampoline;
- Rocking and jumping on feet at little height on all surface of network (feet at shoulder width, feet apart (left leg, right leg));
- Rocking in the center of trampoline (on "cross", feet joined, arms downward, along torso) – "cross" is the main place of jumps on trampoline.

After acquiring self-confidence, jumps shall be fulfilled with arms raised upward [7, 10]. When training trampoline exercises, it is important to master required elements of *working carriage*. Working carriage permits to control feeling of body postures, body positions on support and without support. Specialists [1, 6, and 13] conventionally mark out the following types of working carriage: closed carriage, half-closed carriage, grouped carriage, half-grouped carriage, bent carriage, straight (arching) carriage. Working carriage is a multiplication of body postures and body positions in phase structure of sport exercise. For example, multiplication of posture

“grouped” with back somersault is a working carriage. Actually working carriage is a signal position of movement – exercise [4]. It orients sportsman for fulfillment of exercise without extra motor reconstructions. It facilitates the trainee not to accumulate technical mistakes in exercise phases. Working carriage shall be stable motor skill.

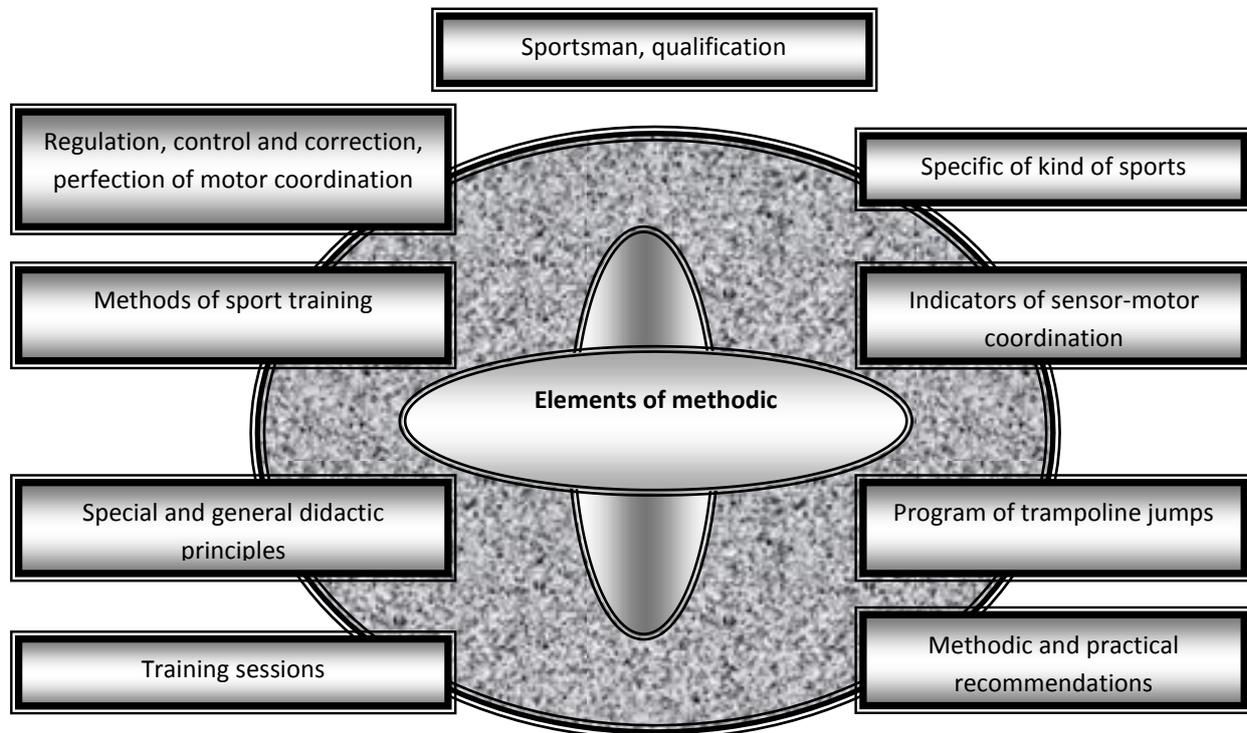


Fig.1. Elements of sportsmen’s coordination training methodic with application of trampoline jumps

To achieve sufficient flight height after pushing off is possible only after 2-3 (sometimes 5-7), depending on exercise’ complexity) jumps on the spot (in the center). In practice such jumps are called “temp jumps”. This, at first sight simple exercise, shall be carefully mastered and perfected at all stages of sport exercises. In initial position legs are in narrow stance (for beginners it is possible to keep feet at shoulder width); torso is straight; arms – a little bit backward; eyes look forward. Pushing off is fulfilled at the account of ankle, knee joints’ bending, agreed with elasticity of network; when legs are straightened and with pushing off arms are driven forward and upward. In flight hip, knee and ankle joints are straightened, toes – are also straitened and feet touch each other. From position arms upward (arms and body make one straight line): in the process of body descend arms move to horizontal position. Then arms start move a little back and downward. Just before touching the network, legs move to closed position (or at shoulder width) to increase stability; elite sportsmen usually keep feet close. *It is important to watch rhythm of arms’ movement.* Jumps are fulfilled standing on legs, from sitting position,; from position on abdomen, on back; from position on knees; without rotation; with rotation forward and backward (around transapical axis) and around (together functioning) longitudinal and transapical axes (pirouettes). Exercises have different forms (compulsory body positions): grouped, half-grouped, bent, bent with feet apart; arching and straightened as well as additional body positions [for example jump “kazak”, half-split, split, split with left (right) leg forward and other].

Helping plays important role in training of exercises of progressing difficulty. The most effective helping is with application of suspended turning belt. Besides, the following is used: manual belt (initial stages of training); helping with arms; foam mats in the place of sportsman’s landing. Then it is possible to used built-in the floor trampoline; complex: trampoline and pit filled with foam polyurethane; in some cases all free trainees shall locate around trampoline for assistance, if required.

Program of jump exercises on trampoline

Block 1. Elementary exercises of trampoline jumps are: body in vertical sitting position; hands are on trampoline network with fingers pointed forward; stand on knees with arms dropped down; standing on knees with

hands on network; grouping in lying on back position; lying position with arms pointed forward; body in lying on abdomen position with feet touching each other and bent arms with hands on network (see fig.2).



Fig. 2. Elementary exercises of trampoline jumps

Block 2. Basic exercises of trampoline jumps are: temp jumps; jump with landing in sitting position; jump with landing on abdomen; jump with landing on knees; jump with landing on knees and hands, touching network; jump with turn by 90° (4 x 90°) in both sides; jump with turn by 180° (2 x 180°) in both sides; jump with turn by 180° and landing in sitting position in both sides; back jump with landing on back, grouping; forward jump with landing on back; forward somersault, grouping; forward somersault, bending; backward somersault, grouping; backward somersault, bending; backward somersault in straightened position ($\frac{3}{4}$ of rotation) with landing on abdomen; jump with turn by 360° in both sides; back somersault, bending, with turn by 360°.

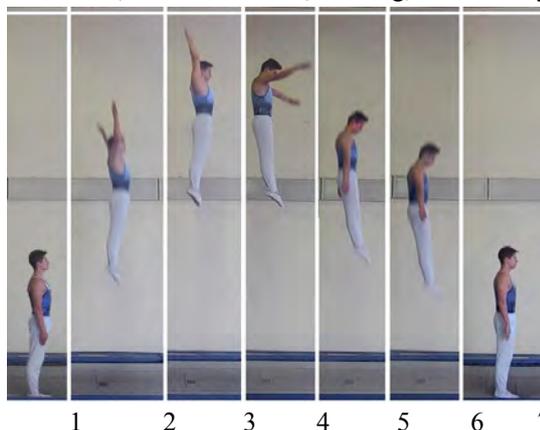


Fig.3. Temp jumps

Recommendations: keep vertical position (shots 1 – 3, half-closed working carriage) – head a little bent with chin touching chest and shoulder and hip joints bent (shots 4-5). It permits for sportsman to control straightness of body. Arms are waved from down to upward. Safety measures are: when landing with mistakes (absence of vertical position) it is necessary to relax legs and damp landing on network. Fulfill 5-7 repetitions in 4-5 attempts. In all next exercises technique of temp jumps is the same.

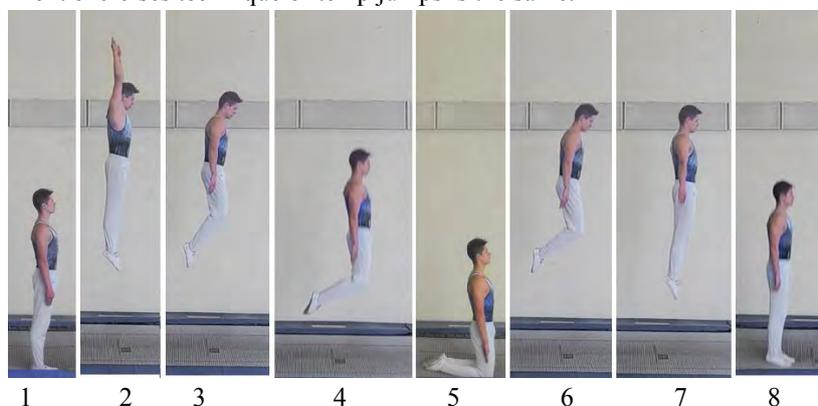


Fig.4. Jump with landing on knees

Recommendations: not high temp jumps (vertical position, shots 1-2); jump with landing on knees with straightened toes and arms dropped (shots 3-5); temp jumps with following stop (shots 6-8). Pay attention to

absence of angle in hip joints; keep buttock muscles tensed with knees at the width of foot, when landing on knees. Repeat exercise 2-4 times in 2-3 attempts.

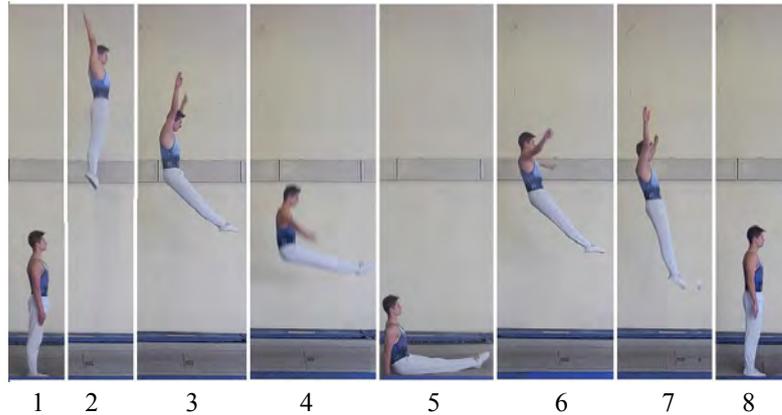


Fig. 5. Jump with landing in sitting position

Recommendations: fulfill temp jumps (vertical position, shots 1-2); when landing, raise legs forward and take sitting position with arms bent behind torso, on network and hands directed forward (shots 3-5); fulfill temp jump and stop (shots 6 – 8). Pay attention to simultaneous touching network with all back surface of legs and hands' position. Repeat exercise 2-4 times in 2-3 attempts.

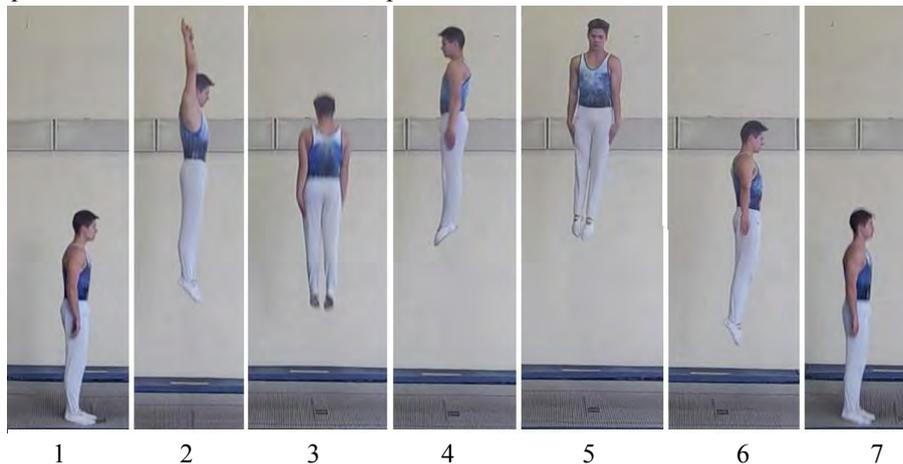


Fig.6. Jump with left turn by 360°

Recommendations: fulfill temp jumps (shots 1-2); then – upward jump with left turn by 360° (shots 3 – 6), with following temp jump and stoppage (shot 7). Turn shall be fulfilled in ascending part of jump in vertical position with arms pressed to torso. Fulfill exercise 2-4 times in 2-3 attempts.

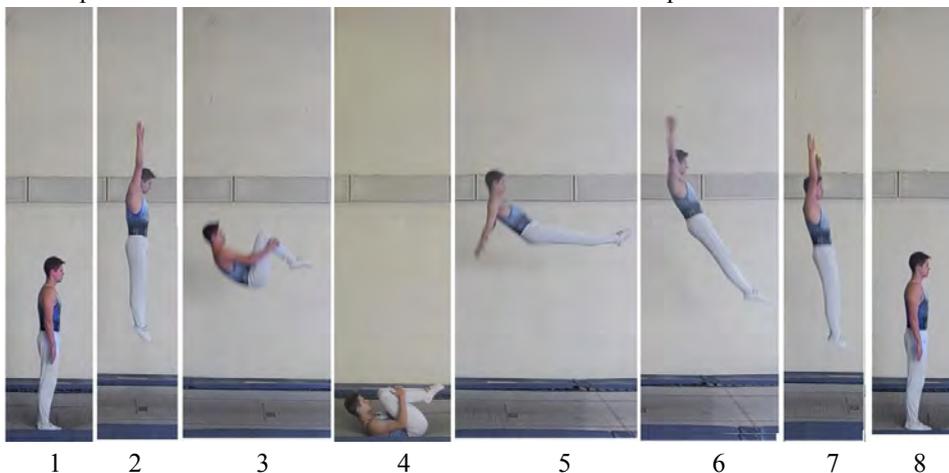


Fig.7. Backward jump with landing on back, grouping

Recommendations: fulfill not high temp jumps (shots 1-2); bending legs and grouping fulfill jump backward, landing on back, grouping (shots 3-4); unbending legs forward-upward land on network And stop (shots 5-8). Fulfill exercise 3-4 times in 2-3 attempts.

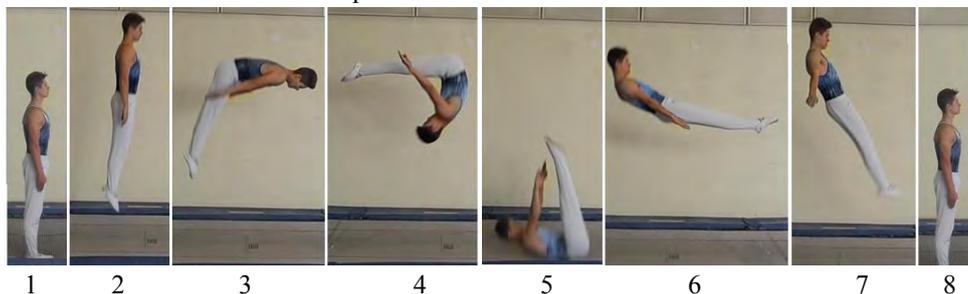


Fig.8. Forward jump with landing on back, bending with arms, directed forward

Recommendations: fulfill not high temp jumps (shots 1-2); bending shoulders forward and bnding in hip joints fulfill forward jump with landing on back in bent position with arms directed forward (shots 3 – 5); unbending elgs forward-upward, fulfill landing on network and stop (shots 6 – 8). Fulfill exercise 3-4 times in 2-3 attempts.

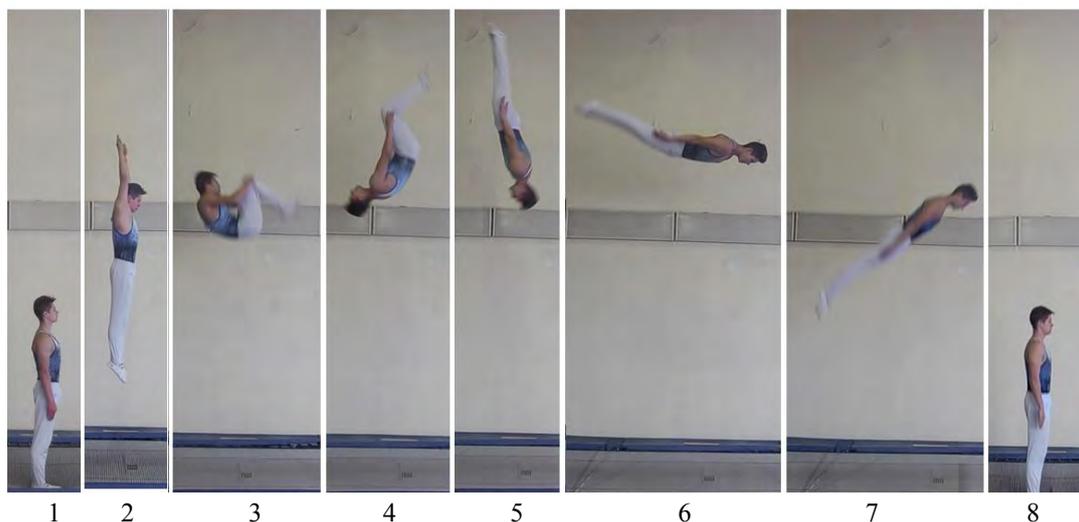


Fig.9. Back somersault

Recommendations: fulfill temp jumps (shots 1-2). In tep jumps create backward rotation and grpup body, bending legs with following quick ungrouping in ascending part of jump (shots 3-5). In descending part of jumps raise shoulders upward, taking vertical position with arms pressed to torso, land and stop (shots 6 – 8). Pay attention to tightness and quickness of grouping. Fulfill exercise 2-4 times in 2-3 attempts.

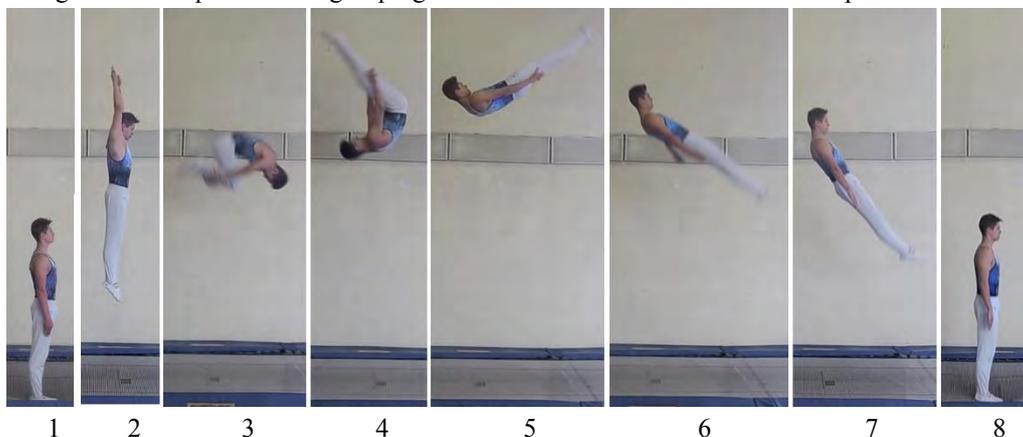


Fig.10. Forward somersault

Recommendations: fulfill temp jumps (shots 1-2); bending torso forward and legs, group body with following quick ungrouping in ascending part of jump (shots 3 – 5). In descending part of jump raise shoulders upward, taking vertical position with arms pressed to torso, then land and stop (shots 6 – 8). Pay attention to tightness and quickness of grouping. Fulfill exercise 2-4 times in 2-3 attempts.

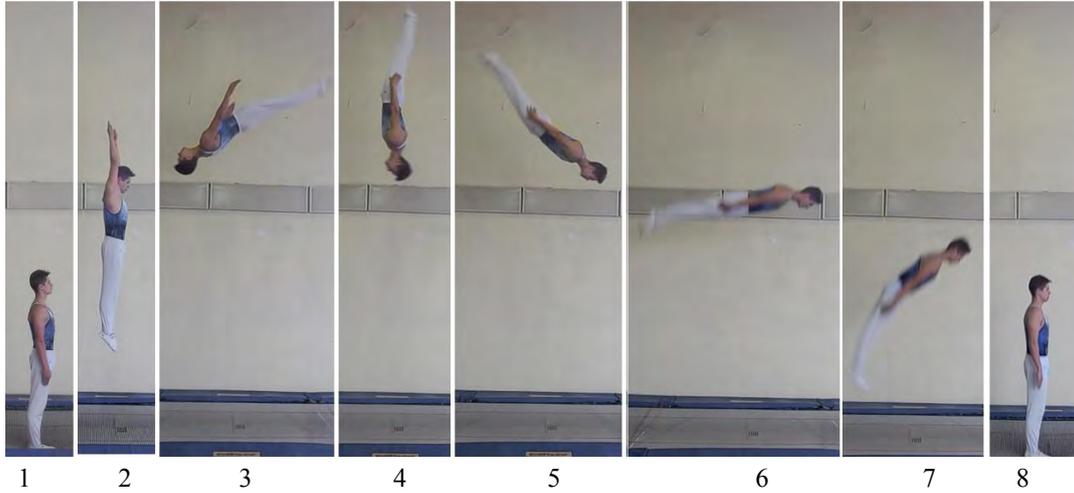


Fig.11. Back somersault, straightening

Recommendations: fulfill temp jumps (shots 1-2); in ascending part of jump, bending backward with insignificant arching raise straightened legs and press arms to torso (shots 3 – 5). In descending part raise shoulder upward, taking vertical position, kand and stop (shots 6 – 8). Pay attention to straightness and tightness of body position in space. Fulfill exercise 2-4 times in 2-3 attempts.

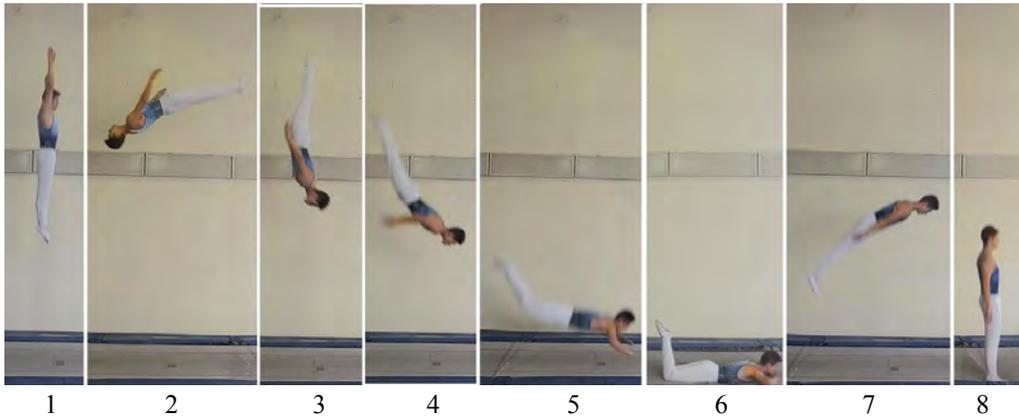


Fig.12. Back somersault, straightening with landing on abdomen

Recommendations: temp jumps (shot 1, three-four temp jumps are also possible); $\frac{3}{4}$ of back somersault straightening (shots 2 – 4)with landing on abdomen (shots 5 – 6) and coming upward to stop (shots 7 – 8).

Block 3. Exemplary combinations of elementary and basic exercises of trampoline jumps program

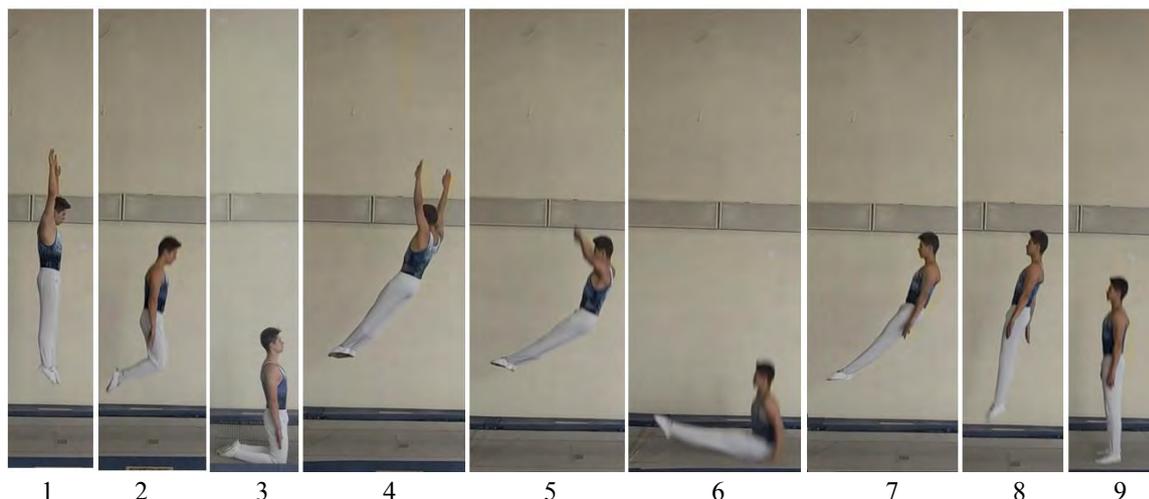


Fig. 13. Combination 1. Temp jumping (shot 1); jump in stance on knees (shots 2 – 3); jump upward with left turn by 180° and landing in sitting position (shots 4 – 6), then stop (shots 7 – 9).

Recommendations: in jump combination it is necessary to coordinate arms movements (in ascending part of trajectory arms go upward and in descending part – downward with accented arm moving to the side of turn (to the left or to the right)). Pay attention to accuracy of turn and taking sitting position with hands on network and fingers directed forward. Fulfill combination 2-4 times to each side.

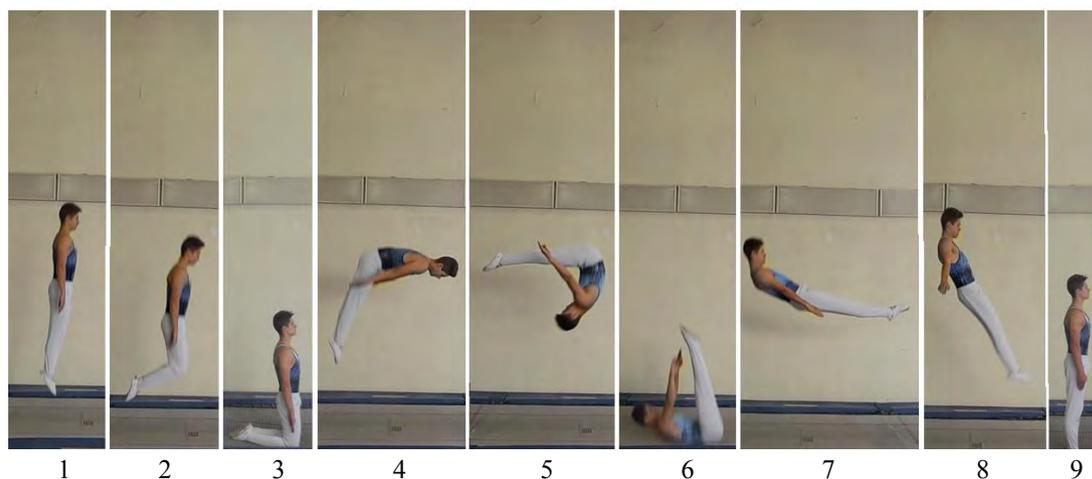


Fig.14. Combination 2. Temp jumping (shot 1); jump in stance on knees (shots 2 – 3); jump forward with landing in position lying on back, bending, arms are directed forward (shots 4 – 6); coming out of lying on back position and stoppage (shots 7 – 8).

Recommendations: Pay attention to creation of forward rotational movement with round back, head, bent on chest and to landing on network by all surface of back. Fulfill 2-3 times in 3-4 attempts.

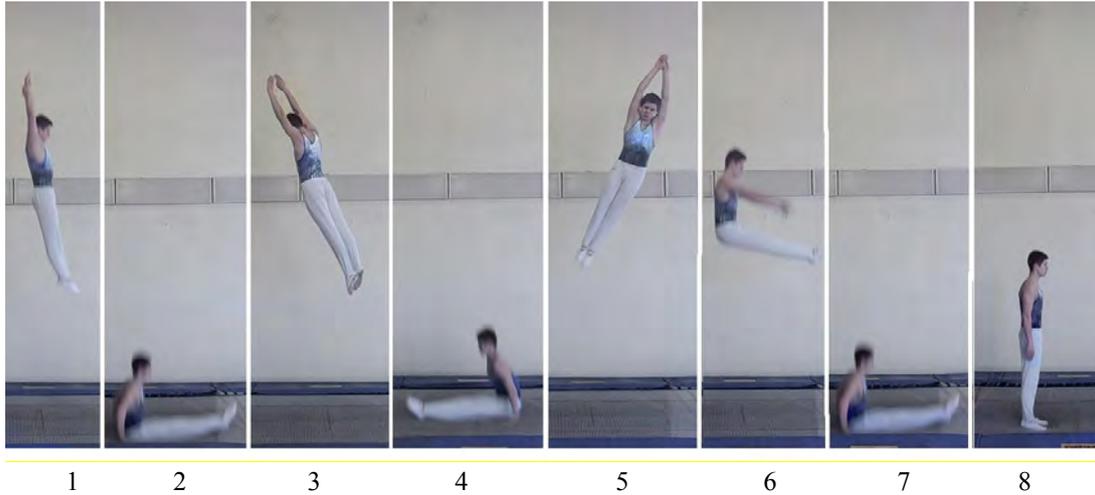


Fig.15. Combination 3. Temp jump (shot 1) and landing in sitting position (shot 2); jump upward with left turn by 180° and landing in sitting position (shots 3 – 4); jump upward with right turn by 180° and landing in sitting position (shots 5 – 7); stoppage (shot 8).

Recommendations: when fulfilling right or left turns body shall be straightened with arms raised upward; landing shall be accurate. Fulfill 2 repetitions in 2-3 attempts.

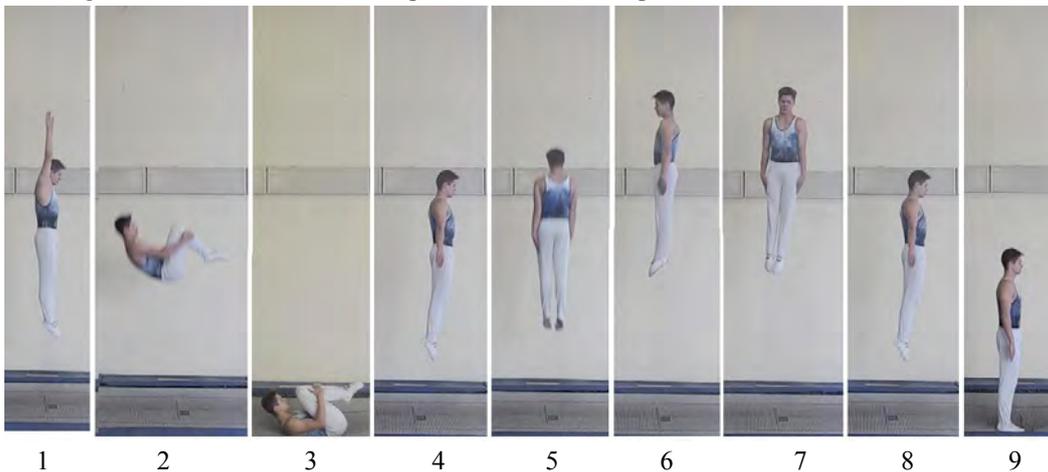


Fig 16. Combination 4. Temp jump (shot 1); jump backward, taking position landing on back and grouping (shots 2 – 3); jump forward and temp jump with turn by 360° (shots 4 – 8); stop (shot 9). 2 repetitions in every attempt, (2-3 attempts).

Recommendations: Pay attention to creation of back rotational movement with accent on taking lying on back position, grouping. Left turn by 360° shall be fulfilled in ascending part of jump, in vertical position with arms, pressed to torso. Fulfill combination 2-4 times in 2-3 attempts to both sides.

The program exercises improved the quality of control over movements in space, regulation of body position on support, when fulfilling tests for static-kinetic and static-dynamic body stability; for coordination of symmetric and asymmetric limbs' movements. The confidentiality of results was at $p \leq 0.05$ (for sportsmen, specializing in game, cyclic sports and kinds of sports with complex coordination and in martial arts) and at $p \leq 0.01$ (sport gymnastic, calisthenics, sport acrobatic).

Discussion

“Coordination training” term in system of sportsmen’s Olympic training has been becoming still more important by its efficiency in separate elements of motor functioning, resulted in appropriate sport results. Coordination training is one of modern training process components and important indicator of results, achieved by sportsmen in competition functioning. We worked at this article in period of Olympic games, 2016. Sportsmen

demonstrated excellent results; they achieved impossible. Alongside with organism's high functional potentials, sportsmen demonstrated excellent motor control, static-dynamic balance and accurate regulation of body and bodies' system: triathlon – bicyclist; gymnast – apparatus; shooter – arm; female gymnast – object; horseman-horse; wrestler- opponent; rower – boat and etc. We are sure that for achievement of target sportsmen need to manifest high potentials of vestibular analyzer; ability to contract and relax actively working muscles; keep balance in orthograde and reverse body position; control and change temp-rhythm of movements – exercises; demonstrated proper coordination. Event at present time, Nikolay Alexandrovich Bernstein, at Olympic games 2016, would have stressed significance of perfection of sportsman's sensor systems, their functioning, depending on dynamic of motor and psycho-physiological tasks. Unfortunately not all Olympic games' participants had the best results. Specialists will have to analyze every separate case of failure; may be there will appear understanding of global work at development and perfection of sensor-motor coordination in coordination training structure in many years' sport training. There are examples to it. First of all they are the works of Professor V.N. Platonov [11], containing new knowledge on this problem as well as the works of other domestic and foreign authors c [4, 13, 17]. For this purpose exercises' programs with application of new technical means are used. It permits to train and perfection motor control in space, static-kinetic and static-dynamic balance. With the help of technical means different by structure exercises are fulfilled: turns, body twists, forward-backward torso bents (for example with support on fit ball; with other objects designed for creation flexible-rigid but plastic muscular corset) [14, 15, 18]. The researches showed that in demonstration of training and competition programs sensor-motor coordination manifests weakly and is insufficient in motor, bio-mechanical and functional structures of the fulfilled exercises. The following technical mistakes are registered: in motor control in space; in landing; in keeping balance of body and bodies' system; body stiffness in movements, requiring plasticity; inaccurate working carriage [4]. In our opinion, alongside with realization of traditional training and competition programs individual work with sportsman is required, which would be directed at sensor-motor coordination's training and perfection; at recognizing coordination abilities of first priority. Such abilities shall reflect specificity of a kind of sports, feeling of sport apparatus, partner, opponent. Besides, they shall be carefully considered by a coach.

Let us also note nearly complete absence of scientific-methodic materials, substantiating usage of trampoline jumps for development and perfection of sportsmen's sensor-motor coordination. One of the most important elements of the methodic is the program of trampoline jumps; methodic recommendations; regulation, control and correction of training process. With it, we found high role of factor "technique-coordination" in sportsmen's motor actions: technical level determines successfulness of control tests' fulfillment. In its turn, sensor-motor coordination is the base of technical fitness. Results of pedagogic experiment proved effectiveness of trampoline jumps exercises for perfection of motor coordination.

Conclusions

1. We registered no high level of sensor-motor coordination as the base of technical fitness of elite sportsmen, specializing in sports with complex coordination.
2. The worked out and implemented in training process methodic with application of trampoline jumps confidently improved sensor-motor coordination. It is the base of sportsmen's technical fitness and shall be of priority in system of sport training.
3. The methodic includes interconnected on the base of factor "technique-coordination" the following elements: sportsmen's technical fitness by individual indicators of sensor-motor coordination; specificity of kind of sports; program of trampoline jumps exercises, including three blocks of exercises: block of elementary trampoline jumps; block of basic trampoline jumps; block of elementary and basic exercises' combinations; methodic and practical recommendations; special and general-didactic principles; forms of trainings; elements of regulation, control and correction of motor actions.

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Conflict of interests

The author declares that there are no conflicts of interests.

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