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CONTENTS

DEVELOPMENT OF ELITE SPORTSMEN'S TRAINING SYSTEM

Yesentayev T.K.
Sport Energy

Abstract. *Purpose:* to study conditions and organizational management forms of material-technical and personnel potential's realization in modern system of elite sportsmen's training. *Material:* publications on the topic of the article were used as sources of information. *Results:* approaches to optimization of sportsmen's training and competition functioning management were analyzed. In the basis of modern system of elite sportsmen's training for competition functioning is realization of knowledge and practical experience of different specialists. Provisioning of conditions for different profiles specialists' participation in sportsmen's training is ensured by large training centers with developed infrastructure and wide complex of services for sportsmen. *Conclusions:* coordination of different profiles' specialists in sportsmen's preparation for competition functioning and in competition functioning is ensured by different forms of management. The most effective of them is model of chief coach's and chief of complex scientific group's cooperation.
Key words: training, sportsman, management, model of management, personnel, training centers.

Introduction

Up to 1960-s the process of elite sportsmen's training was exclusively the sphere of coach's activity. Effectiveness of sportsmen's fitness depended only on coach's knowledge, skills and experience. Next years role of different profiles' specialists increased (physiologists, bio-chemists, psychologists, sports medical doctors, specialists in motor qualities' development, in periodization of trainings and other) in optimization of training process. Specialists helped sportsman and coach to raise quality of training, to avoid over-fatigue and over-training with their advices and researches. In 1960-s, in the USSR, GDR and other Eastern European countries, at combined teams scientific groups were formed. Such groups realized scientific-methodic provisioning of athletes' training. Even initial results of those groups' work showed purposefulness of their potential usage for increasing of effectiveness of sportsmen's training and competition functioning.

In 1970-s–1980-s functioning of complex scientific groups in combined teams of the USSR and German Democratic Republic (GDR) became an integral part of training process. In these groups specialists of different profile appeared – in theory and methodic of sports training, in physiology, bio-chemistry, sports medicine, psychology, dietetics, physical therapy, genetics, pharmacology. Besides, specialists from educational and scientific centers of sports profile, well-known experts from adjacent spheres (biology, medicine, cybernetic) were involved. Such practice developed also in other countries: in France, Australia, Italy, Cuba and Spain. Then such practice was transferred in many other countries, interested in successes on world and Olympic arenas.

Finally it resulted in the fact that specialists in many other specialties were involved in modern practice of elite sportsmen's training. Training process became so complicated that even a coach of the highest qualification can not have the required scope of knowledge and practical skills at modern level.

In these conditions there appears demand in substantiation of material-technical and organizational-management forms, capable to ensure conditions for realization of potentials of different profiles' specialists, as well as for coordination of these specialists' functioning in training and competition work.

Purpose, tasks of the work, material and methods

The purpose of the works is to study conditions and organizational management forms of material-technical and personnel potential's realization in modern system of elite sportsmen's training.

The methods of the research: analysis of special literature, questioning of experts, content-analysis, systemic-integration method, procedural approach.

Results of the research and discussion

Strive for realization of material-technical, scientific and personnel potential of modern sports resulted in creation of complex or special-purpose training centers. Such centers work in close contact with scientific establishments, consultants of different profiles, narrow specialists. The tasks of these centers is provisioning of

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sportsmen with different services. In such centers sportsman is ensured with comprehensive and complex support of rather wide group of specialists: planning of training process and its maintenance; organizational and material-technical provisioning and etc.

It is known that it is impossible to ensure complex of services for sportsmen's effective training at modern stage without sports-training centers with developed infrastructure. Such centers shall have conditions for work of different profiles specialists. For illustration we can familiarize with list of services of the largest training centers of China, France, Norway, Australia, Great Britain, Canada and a number of other countries. These centers are characterized with modern approaches to elite sportsmen's trainings. As an example we can refer to list of services, provided by sports training centers in Canada.

In Canadian centers sportsmen are provided with modern sports facilities and equipment, conditions for living, eating and recreation. Additionally they are provided with services for optimization of training process:

- Services of dietetics specialists, psychologists, chiro- and massage specialists, physical therapists, bio-chemists, physiologists, specialists in physical training, in planning of training process and so on;
- Prophylaxis of sports traumas and diseases, treatment and rehabilitation; combination of sports practicing and education; employment, social adaptation after sports; optimization of life process and solution of current life problems (relations in collective, with coach and specialists; with mass media; law assistance, financial management, cooperation with sponsors and etc.);
- Enriching of knowledge in field of methodic of training and optimization of competition functioning by module system (building of many years' training, composing of training plans, eating of sportsman, physical training, mental training, recreation and rehabilitation, leadership and ethic and etc.).

Functioning of specialists in sports training centers is various. For example, in Australian training centers the process of elite sportsmen's training for international competitions has complex character. This process is realized by group of different profiles' specialists. Sports medical doctors work on prophylaxis of sports traumas and professional diseases. They coordinate their activity with work of narrow specialists (cardiologists, podiatrists, therapists, gynecologists and other) and interact with other specialists. Activity of physical therapists includes prophylaxis of traumas and rehabilitation after traumas, acceleration of recreational reactions after great training and competition loads with the help of wide spectrum of physical therapy methods. Physical therapists accompany sportsmen at competitions. They closely interact with coaches and medical doctors in problems of optimization of sportsman's condition.

Physiologists and bio-chemists deal with comprehensive testing of sportsmen's potentials and functional state, with studying of adaptation processes' dynamic; with diagnostic of over-fatigue and overload of functional systems; they give recommendations on correction of training process, prophylaxis of doping, behavior in far flights, in training in different conditions (midlands, highlands, high temperatures). Physiologists and bio-chemists closely interact with medical and dietetics specialists, psychologists. Their aim is working of consistent recommendations.

Specialists in bio-mechanics study sports technique. They use different dynamic and kinematic sportsman's body and motor characteristics; work out recommendations on correction of movements, on reduction of aerodynamic and hydrodynamic resistance. Modern sports industry provided wide spectrum of devices in disposal of bio-mechanic specialists. Such devices permit to register and process different information, which reflect sportsman's technique and reserves of its perfection.

The work of sports psychologists covers two relatively independent branches. The first is connected with optimization of training and competition functioning. It implies application of stimulation of motivation methods as well as concentration and regulation of psychic tension; resistance to physical and emotional stresses. The second direction ensures resistance to environmental negative impacts: social problems, relations in training group and family, traumas, diseases, perfectionism and etc.

Dietetics specialists work out general strategy of eating and usage of food additives considering specificity of kind of sports, content of training process and athletes' individual characteristics. They also shall correct eating and liquids taking during trainings and at competitions, depending on definite situation: energy losses of sportsmen, environmental temperature, conditions of midland and highland, specificities of cuisine in places of competitions and etc.

Specialists in informational technologies help sportsman and coach to use potential of Internet. It permits to immediately receive different information on increasing the quality of training process. Such information can relate to achievements of science; technique and tactic of main contestants' competition functioning; different simulators and devices; opinions of known specialists about one or another problem and so on. These specialists also fulfill intellectual analysis of information, recommendations on its usage, informational communicative interaction with other specialists.

Thus, recent years professional medium of elite sportsmen's training has been widening greatly. In such medium analytical approach is closely connected with optimization of many separate components of training system. It is supplemented with by effective synthesis and systemic thinking. It in no way belittles role and authority of coach. On the contrary, it provides coach with wide spectrum of additional opportunities.

Widening of specialists' circle in process of sportsmen's training put in the first place demand in coordination of their functioning; in exclusion of hypertrophied influence of some of them on training process; prevention from contradictory and not approved recommendations. Such coordination can be ensured in several ways. One of them implies imposing of coordination functions on coach (see fig.1).

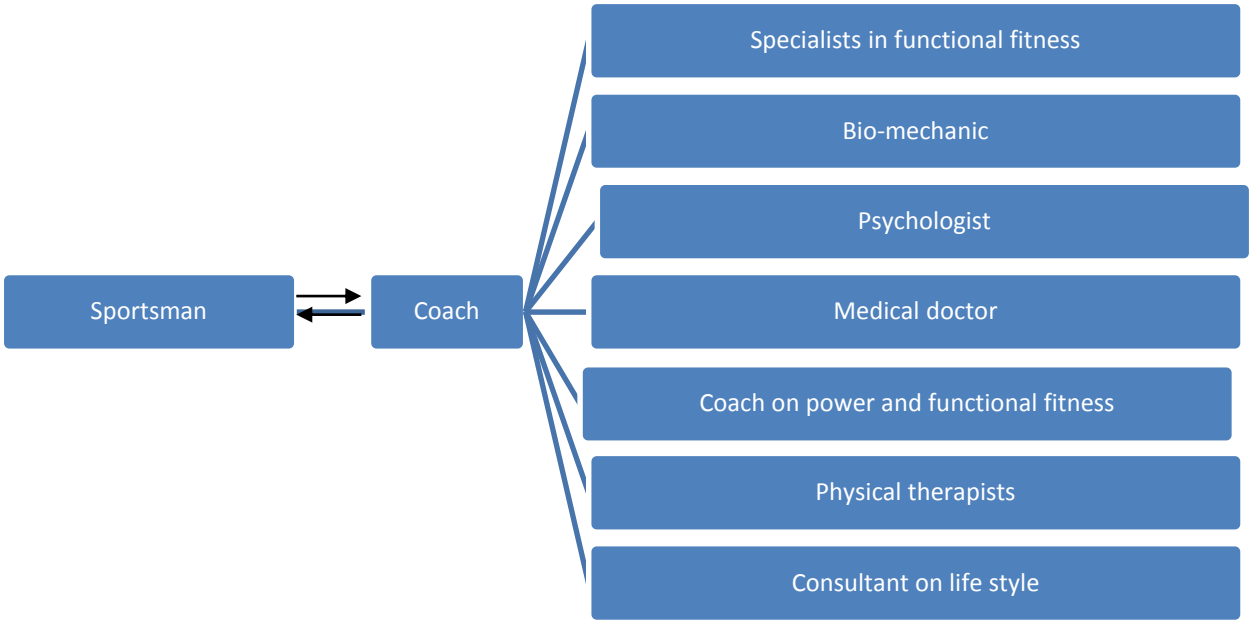

Fig. 1. Training system, controlled by coach (Abraham, Collins, 2011)

More preferable is management system, in which coordination functions are imposed on manager (see fig.2). Manager coordinates work of coach and other specialists. He creates atmosphere, excluding acute role conflicts. He also encourages discussions and debates as important tools of making correct decisions.

Such form of management demonstrated its high effectiveness in a number of combined teams of the USSR in years of their highest achievements on world and Olympic arenas. Chief Coach was the manager. His functions included: formation of general strategy of team's training and performance in competition; coordination of combined teams coaches' functioning as well as sportsmen's personal coaches; coordination of functioning of complex scientific groups' specialists, medical doctors, administrators. Chief Coach did not have his personal disciples. They practically did not interfere in pre-worked out and approved training process. One of lucky example of such activity was experience of work of Sergey Voytsekhovskiy, who was Chief Coach of swimming combined team in1973–1982. For short period of time (1973–1976) he managed to make one of the most lagging team of soviet sports a world leader. In period from 1976 to 1982 swimmers of this team won 14 gold medals only at Olympic Games and world championships.

There is one more recommended model of management (which can be effective in case of disunity of trained groups, instructed by different coaches); this model is based on manager's functioning. Manager coordinates sportsmen's and coaches' functioning with functioning of different profiles' specialists (see fig.3).

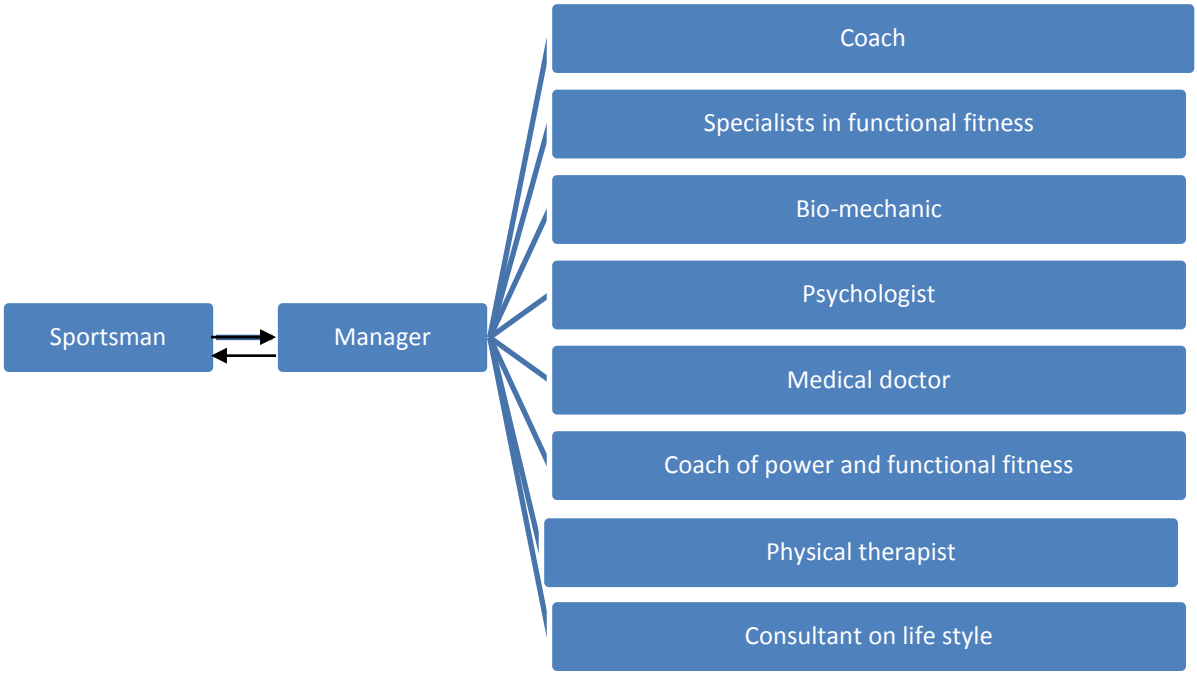

Fig2. Training system, controlled by manager (Abraham, Collins, 2011)

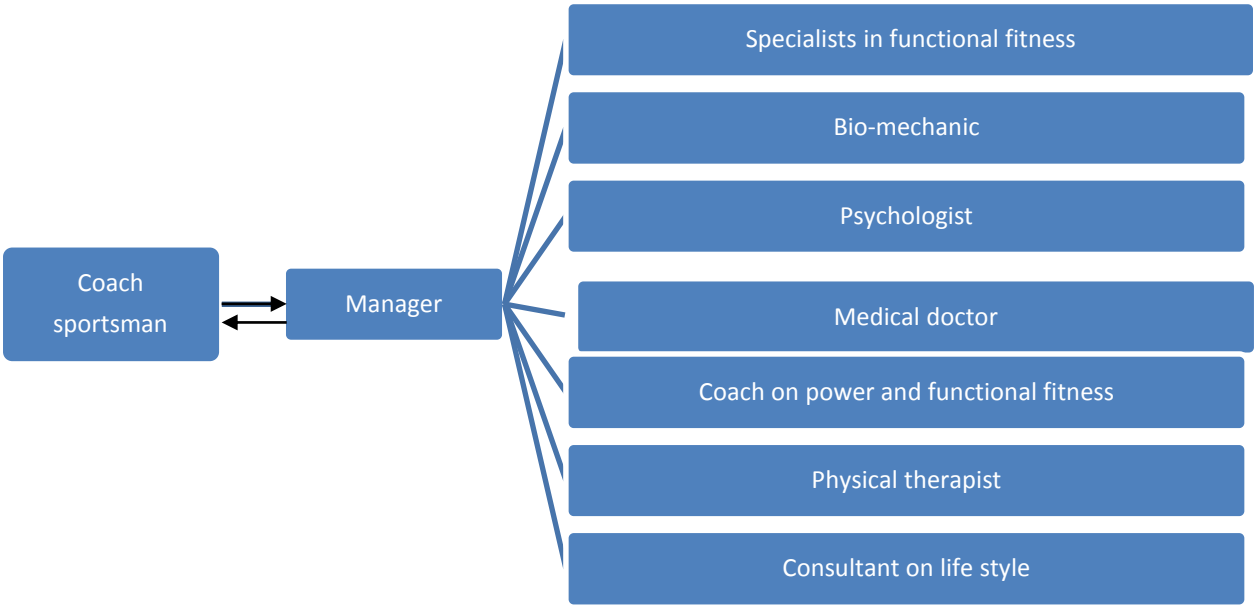

Fig.3. Training system for disunite groups, controlled by manager (Abraham, Collins, 2011)

It is worth to pay attention to management model of sportsmen's training and different profiles specialists' functioning, which successfully was realized in 1980-s in combined teams of GDR and USSR. Manager's functions were imposed on two specialists: chief coach and head of complex scientific group (see fig.4). Chief coach solved the tasks of general strategy of training organization and management; material, personnel and financial provisioning; coordination of coaches' staff; provisioning of scientific and medical maintenance of sportsmen's life style, their participation in main competitions and etc. Functions of head of complex scientific group implied formation and realization of scientific maintenance system, coordination of other specialists' functioning (physiologists, bio-

chemists, bio-mechanics, dietetics specialists, medical doctors, psychologists, specialists in training methodic), coordination of their functioning with coaches' staff in training process.

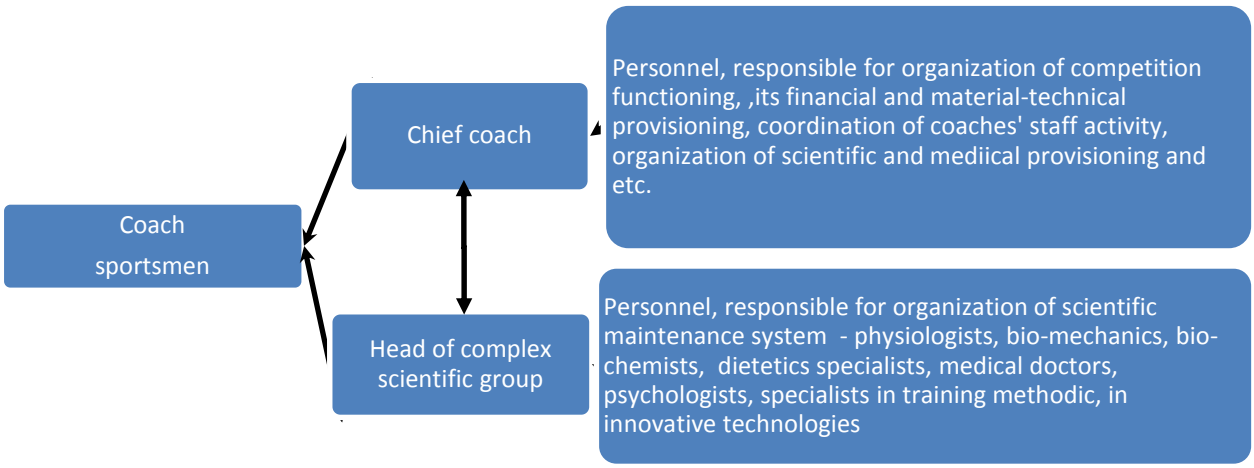

Fig. 4. Diagram of management of USSR and GDR combined teams in 1970-s –1980-s

During certain period of time (1980–1992) such model was the basis of USSR bicycle combined teams' training (highway and track). Its realization ensured high and stable results of soviet sportsmen at Olympic Games and world championships. Positions and opinions of main managers (chief coach and head of complex scientific group) did not always coincide. There were acute discussions and even conflicts, which were regarded at the highest levels with participation of head of all Olympic training system's head. But it was an additional factor ensuring business environment and optimal decisions' taking.

In the same way management of GDR combined teams' training was built. The only distinction was that managing decisions of Chief Coach and head of scientific group were restricted by requirements of general conception of combined team's training. Such conception was reliably worked out and substantiated. It clearly showed the functions of specialists, involved in work. It substantially simplified usage of external factors, directly connected with sportsmen's training and competition functioning. Besides, it excluded emotional and ill-conceived decisions, extra independence of coaches and absence of coordination of different profiles specialists' functioning.

Conclusions

In the base of modern training and competition functioning of elite sportsmen there is application of knowledge and practical experience of different profiles' specialists: coaches, managers, specialists in theory and methodic of training, medical doctors, physiologists, bio-chemists, psychologists, dietetics specialists, pharmacologists, bio-mechanics, genetics, physical therapists and other.

Creation of conditions for these specialists' participation in training processes and competition functioning; coordination of their activity are rather important side of management in this field. Such approach does not admit one-side, contradictory and ill-conceived recommendations and decisions. Conditions for different profiles specialists' participation in sportsmen's training process are ensured by large training centers with developed infrastructure and wide spectrum, of services for sportsmen. Acute rivalry between such centers and specialists, working in them for involvement of sportsmen is extremely important for progressing of the centers and increasing of their services' quality.

Coordination of different profiles specialists' functioning in sportsmen's training and competition activity is ensured by different forms of management. The most effective of them is model of chief coach's cooperation with head of complex scientific group (cooperation of main managers). Such model envisages their active interaction as well as interaction with many specialists, coaches and sportsmen.

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PRINCIPLES OF CREATION OF COMPLEX PHYSICAL REHABILITATION PROGRAM FOR CHILDREN AFTER COCHLEAR IMPLANTATION

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Abstract. *Purpose:* to elucidate main principles of complex physical rehabilitation program for senior pre-school age children after cochlear implantation. *Material:* 40 hard hearing children of senior pre-school (main group) were tested. Main group №1 consisted of hard hearing children (10 boys and 11 girls), who did not underwent cochlear implantation and learned by program of pre-school educational establishment for hard-hearing children. Main group №2 consisted of 19 children after cochlear implantation, registered at oral-aural specialists (10 boys and 9 girls). For them the author's program of physical rehabilitation was worked out. Comparison group consisted of 40 children with normal hearing (18 boys and 22 girls). Effectiveness of the worked out program was assessed by parameters of physical and psycho-motor condition, by children's physical qualities. *Results:* the offered program of children's physical rehabilitation was developed on the base of assessment of physical and psycho-motor condition, physical fitness. The program is of complex character and includes the following elements: domestic habilitation, kinetisotherapy methodic (morning hygienic exercises, Yoga for children, health related training complex, fit-ball training, breathing and articulation exercises), massage (general, speech therapy massage), hardening. *Conclusions:* Complex character of the worked out program implies diverse influence on different disorders in children's organisms. All these are realized against the background of main etiological factor of these changes (deafness) removal. Such approach results in improvement of children's condition, their quicker socialization and possibility to study in comprehensive school in due time.

Key words: children, cochlear implantation, physical rehabilitation, psycho-motor, fitness.

Introduction

Already conducted researches of hearing in different countries showed that approximately 4-6% of all world population have hearing disorders. All these complicate social communication. With it, about 2% of population has two-side significantly expressed hard hearing [14, 16]. As per statistical data in Ukraine there are nearly 100 thousand deaf people, from them 11 thousand children with hearing defects of different etiology [8]. In this connection there ap-pears a problem to ensure full development and social adaptation of children with restricted hearing.

Recent years, in Ukraine cochlear implantation (CI) has been acquiring still more popularity as highly effective method of deaf children's rehabilitation. Such approach permits to renew hearing and speech and to live full life. With it, among implanted there increases quantity of early age children. These children are one of the most promising categories of candidates to CI. It is connected with importance of initial years of child's life for potential development of oral-aural and oral-motor rain centers [11, 12, 15]. Pre-school age is the most responsible stage of organism's development and on of the most important in formation of personality. In this period basis of health, full physical development are embedded; stabilization of biological pre-conditions for personal psycho-motor development is realized [11, 19].

CI is an efficient mean of deaf persons' rehabilitation. But for full and harmonious child's development it will be useful only in combination with further insistent rehabilitation: correction of exclusively hearing functions, disorders of psychic and physical conditions. The purpose of postoperative oral-aural rehabilitation is teaching to perceive hearing irritations (verbal and non-verbal); teaching to understand them and use new hearing senses for training of oral speech [5, 9, 13, 18].

After CI children become absolutely new contingent of physical rehabilitation. The existing scientific approach-es concern correction of children's with permanent deafness state. The problem of rehabilitation of children after CI is regarded exclusively from pedagogic point of view, though their physical condition is abnormal, because it was formed in conditions of hearing deprivation. At the same time, children after CI are characterized by high rehabilitation poten-tial. Plasticity of brain and potential of normal physical growth permit them (with appropriate rehabilitation) to quickly catch up their healthy peers [20, 21].

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Purpose, tasks of the work, material and methods

The purpose of the research is to elucidate main principles of complex physical rehabilitation program for senior pre-school age children after cochlear implantation.

Material and methods of the research: theoretical analysis and generalization of scientific-methodic literature data as well as own experience as the basis of authors' physical rehabilitation program for senior pre-school age children after CI creation.

We tested 40 hard hearing children of senior pre-school age (main group). Main group №1 (MG1) consisted of hard hearing children (10 boys and 11 girls), who did not underwent cochlear implantation and learned by program of pre-school educational establishment for hard-hearing children. Main group №2 (MG2) consisted of 19 children after cochlear implantation. They were registered in oral-aural specialist of Center of medical-social rehabilitation for children with nervous system's organic lesions of Ivano-Frankivsk regional children's clinical hospital (10 boys and 9 girls) of age 5.3±0.2 years. For them the author's program of physical rehabilitation was worked out. Control group (CG) consisted of 40 children of 5.1±0.3 years' age with normal hearing (18 boys and 22 girls). Effectiveness of the worked out program was assessed by parameters of physical and psycho-motor condition, by children's physical qualities. Effectiveness of the worked out program was assessed by parameters of physical and psycho-motor condition, by children's physical qualities.

Results of the research and discussion

When creating the program we considered that development of all psychic functioning components of children is closely interconnected. In such case formation of hearing and speech depend on psycho-physiological status, especially on level of intellect and cognitive processes. That is why compulsory element of children's after CI rehabilitation is development of non-verbal functions, which are not connected with speaking. Non-verbal measures were based on data about normal formation of this age children's psycho-motor skills and corresponded to program of common pre-school educational establishment. It included development of the following: motor functioning, perception of surrounding world, attention, thinking, emotional-will sphere [1].

Specific feature of early rehabilitation of children after CI is that it has intensive, complex character and shall be realized by a number of specialists – rehabilitation specialist, speech pathologist, speech therapist and psychologist. Effect of specialists' functioning is summed up at the account of diverse actions, oriented on achievement of total result. The purpose of such approach is maximally efficient training to perception of speech, correction of delays in physical and psychic development and preparation for studying in comprehensive school [5, 11, 13].

Complex program of physical rehabilitation of children after CI was implemented during one year in three stages: preparatory, main and supporting (see fig.1). Control over functional systems' state was fulfilled before beginning of the program's implementation and after every stage. The purpose of this control was assessment of load's adequacy and the offered means' effectiveness.

Active cooperation with parents was an integral part of the worked out rehabilitation program. With it, we considered that pre-school age child quickly tires and the time of his (her) being in rehabilitation conditions is rather restricted. It should be noted that such child requires very intensive correction [9, 11]. Most part of day child spends with parents (as far as he (she) does not attend pre-school educational establishments); the parents are examples of behavior and are the main circle for child's communication. Child with hearing problems to large extent copies parents' behavior visually even, when he (she) starts hearing. That is why under supervision of rehabilitation specialist parents realized such components of rehabilitation program as early hygienic morning exercises, hardening, independent kinesiotherapy exercises, breathing articulation complex.

Disorder of oral-aural function is connected etio-patho-genetically with lagging in physical and psycho-motor development, detected in initial testing [3, 4]. For solution of these problems we used the following means of physical rehabilitation.

Recommendations on domestic habilitation of children after CI

- Ensure ensure eating full of calories and vitamines-micro-elements, which would correspond to increased child's requirements, resulted from intesification of physical activity;
- Activate fine motor abilities (bending and unbending of fingers in fist, tapping musical rhythm on table with fingers; rolling of ridge objects wih hands; making traceries with small objects, seeds, mosaic; play with small toys, constructor, puzzles and etc);

Stage	Month	Training mode	Tasks	Means							
Preparatory	1	Moderate	*Initial control*	Every day independent trainings with parents	Kinesiotherapy	Kinesiotherapy (Yoga for children) – twice a week – in rehabilitation center	Recommendations on domestic habilitation	Massage	General – 10 sessions Speech therapeutic – 20 sessions	Hardening	Air
			Organism's adaptation to increasing physical loads Mastering of the offered methodic of physical qualities' and physical condition correction Correction of psycho-motor development Setting of initial oral-aural contact with rehabilitation specialist and parents								
	2					Articulation exercises, everyday with parents					
	3					Breathing play complex – 3 times a week, with parents					
Main	4	Training-moderate	*Intermediate control*			Kinesiotherapy– 3 times a week – in rehabilitation center			General – 10 sessions Speech therapeutic – 15 sessions		Air, Sun and water
	5		Development of oral-aural function Improvement of cardio-vascular and respiratory systems' functions Correction of psycho-motor development Further development of physical qualities Improvement of physical condition and posture indicators General strengthening of children's organism								
	6										
	7					Articulation exercises, everyday with parents					
	8					Breathing play complex – 3 times a week, with parents					
	9										
supporting	10	Training	*Intermediate control*			Kinesiotherapy–twice a week (fit-ball) – in rehabilitation center			General – 10 sessions Speech therapeutic – 10 sessions		
			Fixing of the received results Further improvement and stabilization of internal organs' functions Further development of physical activity Improvement of physical endurance Further development of physical qualities Preparation for studying in comprehensive school								
	11					Articulation exercises, everyday with parents					
	12					Breathing play complex – 3 times a week, with parents					
			Final control								

Fig.1. Diagram of complex rehabilitation program for senior pre-school age children after CI

- Train new movements in calm atmosphere, repeat them together wih child;
- Constantly comment actions, fulfilled by child, with clear and simple words;
- Teach child to fulfill action immediately by signal;
- Attract child's attention to surrounding sounds and speech; train to correlate ound and source of sound, explain the meaning of sound;
- Suport different forms of music's perception: listening to music, singing, playing musical instruments, dances under rhythmical music;
- Encourage domestic communication with peers, having normal hearing;
- Create habitual situations and actions of repeated character;
- Make pauses between phrases, giving chance for child to answer;
- Conduct trainings in morning time, when child is not tired.

Program of kinesiotherapy

The purpose of kinesiotherapy was: correction of lagging in physical development, acceleration of oral-aural rehabilitation, improvement of general condition through normalization and increasing of internal organs' functional reserve, overcoming of general immobility. Kinesiotherapy program was implemented in the form of trainings in rehabilitation center and trainings with parents. Their frequency was conditioned by density of child's schedule (meaning other kinds of rehabilitation trainings and considering inadmissibility of child's physical and emotional overloading, especially in period just after CI). That is why frequency of kinesiotherapeutic trainings in preparatory period was twice a week (20 minutes every training); in general stage – 3 times a week (25 minutes – duration) and in final stage – twice a week with 30 minutes' duration of every training. With parents breathing and articulation exercises, morning exercises were practiced every day.

In early period after implantation child has not normal hearing and reaction to sound and its understanding [5, 21]. That is why in moderate mode trainings were conducted as clearly as possible at slow rate. The purpose was to give opportunity for child to repeat. As far as children are usually not interested in the trainings it is necessary to use play method as often as possible.

In the process of working out of physical rehabilitation program for children after CI we observed: requirements of regulation, adequacy and strict dosing of physical loads; their systemic character; gradual widening of means, complexly influencing on internal organs and skeletal-muscular apparatus; selection of exercises in compliance with child's psycho-motor condition [1, 10].

Kinesiotherapy trainings in rehabilitation center both in preparatory and main periods were conducted individually. In final stage trainings were practiced with small groups and constant current control for monitoring of tolerability and adequacy of physical load. Kinesiotherapeutic trainings were divided in main, preparatory and final parts [6, 10].

Morning hygienic exercises (MHE)

MHE were practiced to make easier transition from sleep to active functioning. It was fulfilled everyday, in the morning, before breakfast, approximately at one and the same time in well ventilated room. After MHE hardening procedures were practiced. In preparatory period MHE duration was 10 minutes; in main and final periods – 15 minutes. MHE was practiced in the form of game. Every exercise was explained to child, for it to be clear and acceptable. For this purpose parents were recommended to learn all exercises previously.

Yoga for children

In the next rehabilitation period, kinesiotherapy trainings were conducted with application of Yoga for children exercises (baby yoga) – a kind of Kha-Tha yoga. Such session implies practicing of only asanas, which are technically acceptable for children [7].

We considered low level of CI children's physical fitness and therapeutic effectiveness of asanas. Such trainings were conducted for cultivation of children's habit for regular loads during day as well as for development of physical qualities (flexibility, endurance and coordination), organism's adaptation for increasing physical load.

The trainings were conducted in playing form. Asanas were named by known for child words, mainly names of grass or other plants: for example "posture of tree" or "posture of dog". It motivated children for recalling and repetition of images; improved their psycho-emotional state. Musical accompaniment was selected in compliance with

name of posture, i.e. with sound made by animal (for example, dog barking, cat meowing and etc). It made easier perception and remembering of new words and sound concepts.

Health related training complex

After mastering of simple movements by CI children and adjustment of oral-aural contact with rehabilitation specialist, kinesiotherapeutic (health related training) complex was started. The complex was oriented on correction of main health disorders.

The trainings included exercises for balance, psychic processes and hearing function activation. The trainings were fulfilled with rhythmic music accompaniment [10]. Means for development of speed-power qualities were: different kinds of run, jumps, throws, exercises with ball. Playing method included mobile games, repeated tasks, and in-game compositions.

Correction of balance was conducted with exercises on reduced support area. Well mastered and safe exercises (walking, stances) first were fulfilled with open eyes, then – with closed. All exercises for balance correction and training were fulfilled with support.

Complex of exercises for vestibular disorders and resistance to vestibular irritators required preliminary training of technique. Exercises were fulfilled in three planes, mainly in motion. We considered that exercises with bent head in frontal plane influence on frontal channels of vestibular apparatus. Irritation of horizontal semi-circular channels was caused by torso rotation, by 180° (360°) turns, in jump from the spot, in walking and run. Eolith apparatus is influenced by beginning and end of linear motion, acceleration and slowing of movements. For increasing of influence on vestibular system previously mastered exercises were fulfilled with closed eyes. It activated other compensatory mechanisms of perception. Besides, throws of different diameters and weight balls for accuracy were fulfilled. This exercise is a strong irritator of vestibular apparatus. In this exercise children have to bend head back, tense eyesight, coordinate movements and keep balance.

Aerobic with fit-ball

Up to final rehabilitation stage children already acquired skills in oral-aural communication. That is why kinesiotherapeutic trainings with fit-ball were conducted with small groups. It facilitated children's communication, creation of game atmosphere; it permitted to carry out exercises in pairs. Fit-ball trainings had the purpose:

- Strengthening and development of arms', shoulder girdle muscles; training of abdomen, back, legs' and foot arch muscles;
- Improvement of joints' flexibility and mobility;
- Training of balance and vestibular apparatus functions;
- Formation of correct carriage and prophylaxis of flat feet;
- Training of dexterity and motor coordination;
- Training of musicality and perception of rhythm;
- Training of aerobic endurance.

The trainings included different kinds of walk, jumps at the spot and in motion; jumps with fit-ball in hands and between legs, sitting on it. Children fulfilled general exercises, sitting or lying on ball, using fir-ball as object.

Articulation exercises

The purpose of articulation-breathing gymnastic for CI children was: training of full movements and definite positions of articulation apparatus's organs, which are required for correct pronunciation of sounds and smooth breathing, as well as for expansion of respiratory system's functional reserves [2].

Articulation exercises were recommended to be fulfilled every day in playing form with parents after analyzing of every exercise with rehabilitation specialist. Duration of exercises was 5-7 minutes; 3-5 exercises in one session with quantity of exercises' repetition 5-7 times. Static exercises were fulfilled during 10-15 sec.

Articulation gymnastic included exercises for lips and development of their mobility as well as exercises for cheeks, static and dynamic exercises for tongue, for lower jaw's mobility, throat muscles and soft palate.

Breathing exercises

Demand in breathing exercises was conditioned by low functional indicators of CI children's respiratory system. Besides, it was necessary to control these indicators in the process of oral speech development. It was also necessary to train deeper inhale in CI children and longer, smooth exhale; to correctly regulate breathing. Breathing games with usage of fine objects, included in program, train fine motor skills and creative thinking (for example in

the process of making required for the objects – snowflakes, butterflies, paper boats and so on). Besides, we familiarized children with new figural concepts, required for better mastering of oral speech.

Massage

General massage

Rehabilitation program included restorative massage for organism's general strengthening. All techniques of classic massage were applied. Softer and gentler influences were preferred: different kinds of stroking, careful rubbing with finger tips and soft kneading. Light strikes were fulfilled by fingers and palms. Criterion of intensity in massage techniques was full absence of pain and unpleasant feelings, which could cause reflex muscular tension and child's fear of rehabilitation procedures. Intensity and depth of massage techniques were increased gradually. With it we avoided expressed child's fatigue after massage session [6].

We practiced ten sessions of general massage in every rehabilitation period: at the beginning of preparatory and final and in the middle of main period. This massage did not intersect with sessions of speech therapeutic massage (in total three courses). Duration of session in preparatory period was 20 minutes; in main – 25 minutes; in final – 30 minutes. General massage was fulfilled 2 – 3 times a week, depending on rehabilitation period.

In massage passive movements in all joints are widely used. Special attention was paid to massage of fingers' and wrist joints. Its purpose was to make fine motor abilities' training easier. In feet massage we additionally toned muscles of arch. Besides we accented on back, chest and neck area muscles. Its purpose was improvement of additional and articulation apparatuses' trophies, expansion of respiratory organs' functional reserves, strengthening of back muscles for improvement of carriage.

Massage session was finished with general massage of all body with multi-needle applicator of Liapko ("needle shower") Applicator massage was practiced with child in standing position in the following sequence: legs, arms, front and back of torso. Duration of such massage was 2-3 minutes.

Articulation massage

Articulation (speech therapeutic) massage was conducted for normalization of general, facial and articulation muscular tonus; for reduction of articulation apparatus muscles' dystonia; stimulation of pro-prioceptive Артикуляційний (логопедичний) масаж проводили з метою нормалізації м'язового тонусу загальної, мімічної і senses; increasing of amplitude and scope of articulation movements; activation of those muscles of periphery speech apparatus, which had insufficient contracting functioning; for improvement of spontaneous coordinated movements of articulation organs [2].

In worked out articulation program we used strengthening manual speech therapeutic massage. Such massage is based on classic technique. Sessions were conducted by the following schema: in preparatory period – thrice a week – 20 sessions; in main period – two cycles (15 sessions in each) with pause of 3 months, twice a week; in final period – 10 sessions – twice a week. Initial duration of procedure was 5-7 minutes. Then it gradually increased to 20-25 minutes.

The massage was carried out in the following order: facial muscles, lips' muscles, tongue's muscles, neck and shoulder girdle's muscles. Speech therapeutic massage finished by general soft massage of mentioned areas, front of neck and adjoining area, front and back of chest by Liapko's applicator – roller during 1-2 minutes. Its purpose was increasing of speech therapeutic massage effect.

Hardening

Children's hardening had purpose to achieve general strengthening of organism, prevention from catarrhal diseases and improvement of immune system [1, 6]. In the worked out by us rehabilitation program we used hardening by low temperatures. It is the simplest method for domestic conditions. It was realized by parents under supervision of rehabilitation specialist by the following means:

- General: correct day regimen of day, rational eating, practicing of physical culture;
- Special: hardening by air (air baths), Sun (Sun baths) and water (washing, contrast baths for lower limbs, rubbing).

Effectiveness of the created rehabilitation program was proved by confident ($p<0.05$) results in respect to initial indicators of CI children, showing improvement of anthropometric indicators (body mass, chest, arm, hip circumference), physical qualities (strength, dexterity, endurance, flexibility) [3, 4].

The data, received in the process of scientific research, prove acuteness of the problem of correction of deaf children's health (Forostian O., 2001; Vypasniak I.P., 2004; Liakhova I.M., 2005; Baykina N.G., Kret Ya.V.,*2007; Ivakhnenko* A.A., 2011) and rehabilitation of special contingent of hard hearing children after CI (I.V. Koroliova, 2005; O.V. Zontova, 2007; B.S. Moroz, 2013).

For the first time the fulfilled research substantiated demand in creation of correction-pedagogic and physical rehabilitation program for CI children. The presented in the program means are proved and acceptable for application in any center, dealing with problems of the mentioned contingent. Specific feature of this rehabilitation program is complex approach to recreation of physical and audio status of a child: methodic of deaf child's recreation as a member of society with normal hearing and physical condition.

Conclusions

The presented physical rehabilitation program for senior pre-school age children after CI was worked out on the base of assessment of physical and psycho-motor condition and physical fitness. The program has complex character and includes the following elements: domestic habilitation, kinesiotherapy methodic (morning hygienic gymnastic, Yoga for children, health related training complex, fit-ball trainings, breathing and articulation exercises), massage (general and speech therapeutic), hardening.

Complex character of the worked out program implies diverse influence on different disorders in children's organism. All these are realized against the background of removal of these changes (deafness) main etiologic factor. Such approach results in improvement of children's condition, their better socialization and possibility to study in comprehensive school.

The prospects of further researches in this direction imply detail study of the worked out program's influence on functioning of senior pre-school age children's organism after cochlear implantation.

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Conflict of interests

The author declares that there is no conflict of interests.

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EFFECTIVENESS OF HEALTH TOURISM APPLICATION AS THE BASIS OF HEALTH RELATED RECREATIONAL TECHNOLOGY IN PRIMARY SCHOOL PUPILS' PHYSICAL EDUCATION

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Abstract. *Purpose:* to search effective methods of health tourism application in physical education of primary school age pupils. *Материал:* in the research 40 children participated, who were divided into control (9 boys and 11 girls) and experimental (10 boys and 10 girls) groups. We registered physical fitness, physical health, adaptation-reserve potentials and psychological state of primary school pupils. *Results:* specificities of health tourism means' application as the basis of health-related recreational technology were determined. We found improvement of children's health by 10%. Besides, we observed prevailing improvement of organism's resistance to environmental unfavorable factors and indicators of psycho-emotional state. *Conclusions:* application of health tourism means increases organism's functional potentials, physical health and psycho-emotional state of schoolchildren.
Key words: health tourism, technology, physical condition, physical education, primary school pupils.

Introduction

One of main tasks of National strategy of education development in Ukraine for the period up to 2021 is formation of harmonious, moral and physically healthy personality with responsible attitude to own health. Recent time still greater anxiety has been being caused by physical condition of school age children. Unfortunately, with every school year the quantity of healthy children reduces [9, 10]. It requires systemic physical culture- health related work, starting from primary school. Analysis and generalization of scientific works permitted to mark out the following directions in solution of problem of primary school pupils' physical condition improvement: working out of new educational and physical culture-health related technologies [8, 15, 20], implementation of pedagogic control system of children's physical condition components [5, 7], improvement of program-normative principles of physical education [1, 13].

In opinion of scientists [2, 3] the problem of children's health improvement can be solved just at the account of extracurricular activities. Such activities can be realized in the form of recreational-health related motor functioning – specially organized motor functioning of proper scope and optimal intensity in leisure time. The purpose of such trainings is recreation of workability, promotion of comprehensive personal development, weakening of chronic diseases' risk [6].

Tourism (hiking) has been acquiring rather great popularity to day, as far as it is one of most accessible kind of health improvement. Tourism has great potential of schoolchildren's recreational –health related activity. Tourism is realized as: health related mean [12]; as complex of students' physical education means [17]; as method of organism's functional potentials' strengthening [11, 18, and 19].

Researches of health tourism implementation in primary school children's physical education are rather fragmentary [14, 15]. Questions of organization and practicing of extracurricular classes with primary school pupils have been still open. All these do not permit to completely realize health tourism potential as universal method of physical health improvement of schoolchildren.

Purpose, tasks of the work, material and methods

The purpose of the research is to determine effective methods of health tourism application in physical education of primary school age pupils.

The tasks of the research:

1. Analyze literature sources devoted to application of health tourism means in primary school pupils' physical education.
2. Work out recreational-health related technology on the base of health tourism, oriented on strengthening of primary school age children's physical condition.

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3. Determine effectiveness of the worked out recreational-health related technology in primary school pupils' physical education.

Material: in pedagogic experiment 40 pupils of 3-4 forms participated: they were divided into control (CG – 9 boys and 11 girls) and experimental (EG – 10 boys and 10 girls) groups. Stating experiment was conducted with sample of 163 pupils of primary school (82 boys and 81 girls).

The methods of the research: theoretical analysis and generalization of scientific literature data, pedagogic methods of research, physiological methods (pulse metering, spirometry, functional tests), psychological methods (test "Self-feeling, activity, mood" and "School motivation" be methodic of N.G. Luskanova), method of express assessment of physical health level (PHL) by G.L. Apanasenko), assessment of children organism's resistance to environmental unfavorable factors (methodic of G.N. Serdiukovska), assessment of children's adaptation-reserves' potentials (methodic of S.V. Gozak and O.T. Yelizarova), methods of mathematical statistic.

Results of the research

Stating experiment resulted in the data, which witness about low level of physical condition components in primary school age children:

- Medical examination found 53.99% of pupils with health problems;
- Analysis of children organism's adaptation-reserve potentials showed that in 85.89% of primary school pupils there is tension of adaptation mechanisms (corresponds to pre-nosological state);
- Functioning of children's respiratory systems is characterized by lower values of lungs vital capacity in respect to age standards;
- 73% of primary school pupils demonstrated low physical fitness;
- Physical workability of 76.69% children was satisfactory;
- 55.21% of examined children had low PHL;
- Indicators of primary school pupils' psychological state witness about increasing of tiredness in most of children (that is conditioned by low psycho-emotional reaction to learning load);

  34.36 % of primary school children had low level of school motivation.

Thus, practicing of physical culture-health related work in physical education of primary school pupils for improvement of their physical condition is an urgent demand.

It is known that health tourism is popular among primary school children and their parents. Questioning showed that 40% of children prefer tourism as a kind of physical culture-health related activity (first of all in the forms of hiking and active rest). With it 26.26% of parents offer to practice more walks and hiking with children. In the same way 24.24% of parents are sure that for improvement of quality of physical education in school children shall spend more time in the nature.

Main means of health tourism are walks, hiking, overcoming of natural local and long obstacles, orientation on the terrain, special tasks on techniques of bivouac works, outdoor games and relays; compete functioning with tourism elements.

On the base of scientific-methodic literature data and results of our own studies [4] we worked out and substantiated recreational-health related technology on the basis of health tourism means as well as the content of recreation-health related trainings. Besides, we determined effectiveness of this technology's application in physical education of primary school pupils.

The target of the offered recreation-health related technology is improvement of primary school age children's physical condition. Realization of recreation-health related technology was conducted in three stages: preparatory, main and finalizing. In the frames of recreation-health related technology on the base of health tourism means we developed program of extracurricular activities for 3-4 forms children with week load 6 hours (216 hour per academic year).

The structure of the program includes three components: informational, motivational and operative-active. Every of these components, in its turn consist of several blocks. Informational component consists of the following blocks:

- Block "Be healthy", which includes questions of health, hygiene, significance of motor functioning for health, techniques of self-control;
- Block "Friend of Nature" – contains about nature and protection of environment.

Motivation component includes the following blocks:

- "Contest" – children's participation in physical culture-sports festivals, in mass competitions;
- "Competition" – children's participation in group or school tourism and orientation competitions.

Operative-active component consists of the following blocks:

- Block "Tourists", which is composed of exercises and tasks on tourism technique; tactic and technique of movement in hiking group on slightly crossed terrain; topical plays, contest and special tasks, competition functioning;
- Block "Orientation", which includes exercises and special tasks on orientation, games and contest tasks with elements of orientation on terrain in conditions of gym; competition functioning;
- Block "Physical culture", including physical exercises and complexes of general character; breathing exercises; exercises for correct carriage, for prophylaxis of flat foot; exercises for culture of movements, travel and jumps; different outdoor games and relays;
- Block "Local historians". It covers excursions and walks for familiarization with natural and historic objects of the terrain, lore games on terrain.

In forms of classes' organization play and competition methods prevail (in elementary forms). During three classes in one week children are offered to realize four roles, according to the name of block of operative-active component: in one of them main role is tourist; in other – orienteer, in third – local historian. Accordingly, content of classes and exercises correspond to given role. Role of physical culturists is played by children at all classes (warming up, recreational exercises, exercises for endurance, breathing exercises and etc.).

Physical loads, offered in the frames of recreational-health related program are only in aerobic mode of organism's energy supply. Low intensity of physical load (HBR - 110-120 b.p.m. $^{-1}$] is used in walking. In warming up and exercises of finalizing part we used physical load of moderate intensity (HBR - 125-135 b.p.m. $^{-1}$). Highly intensive physical load (HBR - 140-150 b.p.m $^{-1}$) was used in exercises of main part of classes. Considering children's PHL physical loads were variable. Differentiation of physical load was realized with the help of simplification of conditions of exercise's fulfillment, reduction of quantity of repetitions and duration of exercise; change of exercise's temp, reduction of stage duration or distance (see table 1).

Table 1. Parameters of physical loads during fulfillment of special physical exercises by children with different PHL

Special physical exercises	Physical health level									
	Average and below average					Average and above average				
	I	II	III	IV	V	I	II	III	IV	V
Flying Fox	+	1-2	s	5-7	60	+	2-3	M	8-10	50
Crossing on log	-	1-2	s-m	2-3	40	-	2-4	m-f	4-5	30
Crossing on parallel ropes	-	1-2	s-m	5-7	40	-	2-3	m-f	8-10	30
Crossing on bumps	+	1-2	m	4-5	40	-	2-3	m-f	6-8	30
Crossing on bumps with poles	+	1	s-m	4-5		-	2	m	6-8	40
Under-climbing and over-climbing	+	1-2	s-m	3-4	40-50	-	2-3	m-f	5-6	30
Free climbing (horizontal)	+	1-2	S	4-8	60	-	2-3	m-f	8-15	50
Free climbing (vertical)	+	1	S	2-3		+	2	m-f	4-6	50

Special physical exercises	Physical health level									
	Average and below average					Average and above average				
	I	II	III	IV	V	I	II	III	IV	V
"Pendulum" crossing	+	1-2	s-m	2-3	40-60	-	3-4	m-f	2-3	30
Obstacle course	+	1	s-m	20-30		-	2	m-f	30-50	60

Notes : I – simplifications of exercise's fulfillment conditions; II – quantity of repetitions (times); III – temp of exercise's fulfillment (s – slow, M – moderate, f – fast); IV – distance (m); V – duration of rest intervals (sec.).

For determination of the worked out recreation-health related technology's effectiveness we conducted formation stage, which was fulfilled in the form of model experiment.

EG children were trained as per the offered recreational-health related technology on the base of health tourism means. CG children were trained by program "Junior tourists-local historians", developed by Ukrainian state tourism center, during one week trainings in both groups were conducted trice. The essence of these both programs was equal. The difference was that in content: in CG sports tourism and sport orientation, directed to achievement of sports results, were accentuated; in EG content of program envisaged application of health tourism means and was based on recreational components (outdoor games, entertainments, contest-competition functioning, walks, excursions, hiking).

As a result of formation pedagogic experiment EG children demonstrated mainly higher positive changes in physical condition and organism's functional state, comparing with CG children: statistically confident ($p<0.05$) reduction of heart beats rate in rest (by 6.02%), increase of lungs' vital capacity (by 12.71%). In EG by 20% of children exceeded level of adaptation-reserve potentials of organism and by 5% level of physical workability.

Analysis of pedagogic testing results in dynamic of formation experiment witnesses that:

- CG children, comparing with EG children, demonstrated more significant reduction of quickness indicators (boys – by 4.01%, and girls – by 1.15%), indicators of general endurance (boys – by 6.84%, and girls – by 3.19%) and increase of speed-power abilities (boys – by 0.25%, and girls – by 1.67%, that is connected with usage of sports tourism means;
- EG children showed more significant, comparing with CG children, reduction of coordination abilities (boys – by 2.47%, and girls – by 3.44%), increase of static balance indicators (boys – by 5.22%, and girls – by 14.05%), flexibility (boys – by 80.44%, girls – by 40.93%).

In the process of formation experiment in EG by 10% more children increased indicator PHL than in CG. Besides, we observed prevailing increasing of EG children organism's resistance to unfavorable environmental factors, comparing with CG: the cases of diseases – by 10.18% less and by 16.73% less quantity of days of diseases. In EG quantity of children who were not ill at all during academic year was by 5% higher than in CG.

In dynamic of formation pedagogic experiment EG children demonstrated statistically confident ($p<0.05$) more significant improvement of psycho-emotional state (self-feeling – increment more than by 0.29 points, activity – by 0.72 points and mood – by 0.52 бала). In EG by 30 % quantity of children with strengthened school motivation increased, comparing with CG.

Thus we proved purposefulness of the worked out by us tested and scientifically substantiated recreational-health related technology on the base of health tourism means. The program can be used in process of primary school age children physical education for improvement of their physical condition.

Discussion

Analysis of scientific literature confirmed that:

- Level of health components of primary school age children is low [9, 10, 16];
- More than half of children have diseases of non infectious character, among which disorders of skeletal motor apparatus prevail [1];
- Most of children have low PHL [16].

Optimization of primary school pupils' motor functioning in extracurricular time is one of ways of their physical condition's improvement [9, 16]. Application of health tourism's different means positively influences on PHL of primary school age children's physical workability and physical fitness [15, 19]. With it means of health tourism have great potential for creation of innovative physical culture-health related methodic [14, 15, and 18].

Conclusions:

1. Analysis of scientific-methodic literature showed that physical education system requires optimization at the account of recreational-health related technologies as extra-curricular activities. Health tourism has great potential of means and is a reserve of children's motor functioning in extracurricular time.

2. The offered by us recreational-health related technology on the base of health tourism means is oriented on improvement of primary school pupils' health condition. The program material is composed of informational, motivation and operative-active components and has block system.

3. We have proved effectiveness of worked out, tested and scientifically substantiated recreational-health related technology on the base of health tourism means: in comparison with CG children, EG children demonstrated prevailing more significant positive changes of physical conditions, organism's functional state, adaptation-reserve potentials and physical workability indicators; PHL, organism's resistance to environmental unfavorable factors, indicators of psycho-emotional state.

4. The fulfilled research creates foundation for further scientific works, connected with foundation of recreational-health related technologies for pupils and for people of other age categories.

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Conflict of interests

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MODERN PROBLEMS OF PERFECTION OF ELITE LIGHT ATHLETIC SPORTSMEN'S TECHNICAL SKILLFULNESS PERFECTION

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Abstract. *Purpose:* perfection of elite sportsmen's technical skillfulness in competition kinds of light athletic. *Material:* the data of more than 60 literature sources were systemized. Expert questioning of 36 coaches, having experience of work with elite sportsmen, was carried out; documents of training process planning were analyzed as well as sportsmen's diaries (n=244). *Results:* we have presented main principles of sportsmen's technical skillfulness perfection and elucidated characteristics of technical training methodic. We have determined main priorities of technical training building for light athletes at every stage of many years' perfection. Dynamic of competition practice volume has been found as well as main requirements to selection of training means of technical orientation. The data of bio-mechanical criteria of sportsmen's technical skillfulness assessment have been supplemented. *Conclusions:* effectiveness of sportsmen's training methodic is determined by realization of previous stages' technical potential in final competition results. It can be achieved by determination of means of and methods of different orientation rational correlation.

Key words: technical skillfulness, technical training, elite sportsmen, training means, sports results, technique of motor actions.

Introduction

At present time winter and summer calendars of events are still widening with increase of starts quantity by individual invitation of sportsmen- leaders of world rating. It permits to perform not less than in thirty competitions during years. Constant desire of high sports results stabilizes possibility of high results. It is connected with excessive nervous-psychic and physical loads, with worsening of technical fitness. All these result in reduction of efficiency in main competitions. Achievements of Ukrainian sportsmen-light athletes significantly lag behind from foreign during several years.

Results of performances at 30th Olympic Games in Beijing (2008) and 31st Olympic Games in London (2012), at world championships 2013 and 2015 showed main drawbacks in training of Ukrainian light athletes. They proved opinion of many specialists that existing system does not correspond to modern tasks of training of elite light athletes [4, 5, 6, 25, 35].

Light athletic is a kind of sports with complex coordination of motor structure and high dynamic loads. High level of world achievements sets difficult task before domestic specialists, which is connected with perfection of technical skillfulness of elite sportsmen. Every new step directly depends on special physical fitness, which is ensured by groups of exercises of different orientation [12, 13, 16, 19, 20].

Technical training requires fulfillment of great scope of exercises with different intensity. Training means shall facilitate perfection of required physical qualities and ability to use them in motor structure of competition exercise [16, 26, 30].

Selection of training means become more and more important. Achievement of higher sports results is connected with demand in fulfillment of such scope of training loads, which would ensure successful performance in one competition exercise. For this purpose it is necessary to use technical means, creating the basis for technical fitness. Such basis increase competition intensity of some characteristics of main exercise [15, 24, 26].

In spite of great practical experience and numerous works on training of elite light athletes, the questions of planning of technically oriented training loads in annual cycles have been regarded insufficiently. There has appeared demand in further perfection of traditional system of technical means and methods' application in annual training cycle, which would ensure high sports results in light athletic.

Considering specific character of the kind of sports and demand to effectively endure maximal load, some principles of methodic of technical means and methods' application in annual training cycle at stage of individual potentials' maximal realization, requires reviewing [14].

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Purpose of the research, tasks, material and methods

The purpose of the research is perfection of elite sportsmen's technical skillfulness in competition kinds of light athletic.

The tasks of the research:

1. To study main problems of elite sportsmen's technical skillfulness perfection in light athletic at modern stage.
2. To study specific features of elite sportsmen's technical skillfulness perfection methodic in light athletic.
3. To determine requirements to training means in process of elite light athletes' technical training.

Material and methods: analysis and generalization of special scientific-methodic literature and documents; study and generalization of sports practice advanced experience; pedagogic observations.

For further studying and solution of elite light athletes' technical perfection problem we fulfilled analytical review of scientific-methodic literature (more than 60 sources). The data about volumes of competition practice and technically oriented means at different stages of annual training cycle were generalized. At different stages of many years' perfection the data were insufficient.

At the last stage of the research we conducted analysis of practical experience of leading Ukrainian light athletic coaches: experts' questioning of 36 elite sportsmen's coaches; analyzed technical process planning and coaches' diaries (n=244). Besides, we determined optimal criteria of technical skillfulness assessment.

Results of the research

Technical skillfulness shall be interpreted as perfection of motor component, rationality of technical structure and perfectness in their usage. With functional-structural approach to organization and control over motor actions it is evident that this concept is much wider. It includes structural-technical perfection of motor act and mechanisms of control and regulation of motor actions. All these ensure high final results. From position of requirements of sports actions' extreme mode technical skillfulness shall be understood as perfect mastering of the sports exercises' most rational motor structures with orientation at maximum in conditions of acute sports competition [10]. It is integral conception of theory and methodic of sports training. It is based on such fundamental concepts as sports technique and technical training. It is a result of development of definite light athletic effective technique and successful pedagogic process's application in technical training. Training of high quality results in high technical skillfulness of sportsmen. Such skillfulness ensures high probability of excellent results [3, 8]. With it any competition result is an integral indicator of sportsmen's skillfulness. It as if integrates many of multidirectional factors of training (see fig.1).

High technical skillfulness is a necessary condition of elite sportsmen's training. Development and perfection of technical training in many years' aspect can conventionally be divided into three stages: 1) choice of specialization and initial training; 2) formation of physical fitness and technique of the chosen light athletic kind, in which it is necessary to increase impact of training means on sportsman's organism; 3) development of physical qualities and technical perfection in the chosen light athletic kind, videlicet: further strengthening of technical means' impact on sportsman's muscular-skeletal apparatus [21].

Recent years great positive experience of technical skillfulness perception in light athletic has been accumulated [5, 10, 26]. However, its dynamic requires searching new more effective ways of special technical fitness increase as well as physical qualities development.

At every stage of annual training there are definite tasks. At the beginning of preparatory period it is the task of restoration of already achieved best results of technical fitness. Then it is possible to pass to ensuring higher level of indicators, i.e. to perfection. In competition period of training the main task is maintenance of technical fitness level (which was achieved in preparatory period) and increase of technical and physical potentials' realization level.

At any stage of annual training cycle elite sportsmen's technical skillfulness is perfected in conditions of high intensity of fulfilled exercises. To avoid stresses it is necessary to constantly consider individual features and functional state of sportsman's organism. Besides, in weekly cycle it is necessary to alternate high volume of training work with moderate and low, using variation approach.

Main specific features of perfection of technical skillfulness include: 1) correspondence of means of muscles' local and regional development to main exercise by kinematic and dynamic characteristics; 2) correspondence of muscular work mode in perfection of technical actions to sports functioning; 3) definite correlation of volumes of main, special and special auxiliary exercises' fulfillment [17].

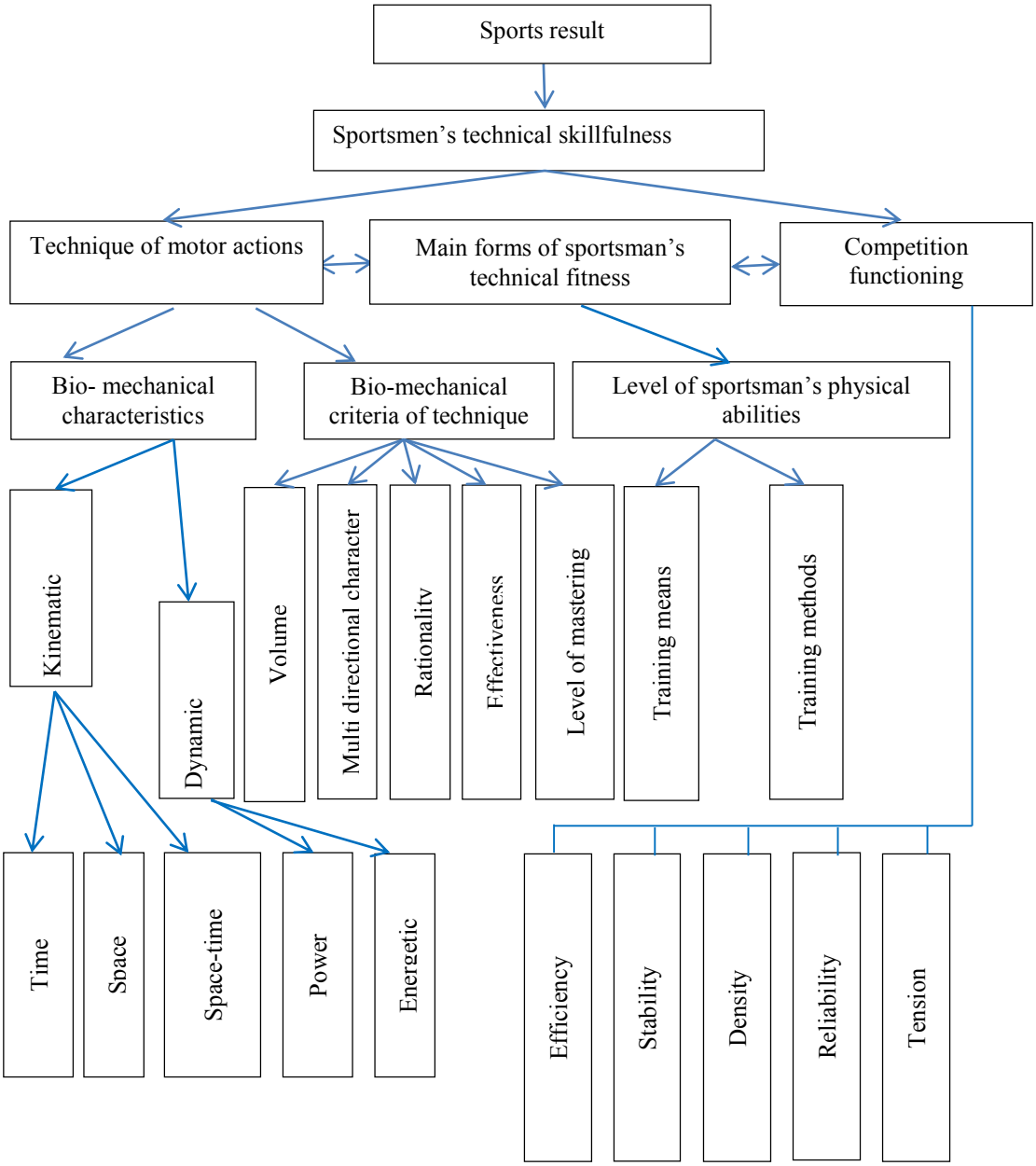

Fig.1. Main structural components of sportsmen's technical skillfulness

Main parameters of special exercises' correspondence to main and competition exercises are the following:

- Power of push off, for which phase duration, force extreme and mean power of push off are the derivatives;
- angle speed values of jerking leg's unbending joints and hip joint' bending joints of waving leg in push offs;
- "zones of working angles" in joints of jerking leg in push offs, whose indicators are minimal joint angle and joint unbending amplitude (especially ankle and knee joints);
- "coordination structure" of exercise, which shall be regarded, coming from demand in observation of the following principles: "dynamic balance", "conjugated development of physical qualities and sports technique's perfection", "functional correspondence of muscles' work when applying special training means" [5, 7, 11].

Discussion

Commonly accepted periodization of sports training, oriented on planned preparation of sportsmen to main starts of season [22, 27, and 29] was conditioned by competitions' system in1960 – 1970. However, recent decade in light athletic calendar of events has significantly widened and total quantity of international competitions increased

[1, 31, and 38]. It resulted in rising of density and duration of competition season. The strongest Ukrainian sportsmen nearly do not perform in domestic competitions; they compete abroad in series of Grand-prize, "diamond League" and other competitions. If earlier the main purpose of training was to gradually prepare a sportsman for main starts of season, then, now, accent is made on readiness for high results' achievements in every competition. Sportsmen have to start in average at least once every 7-10 days. In spite of such great changes in calendar of events, traditional structure of annual training cycle construction has still been preserved [2, 19, 26, 33, and 36].

Modern ideas about laws of sports form achievement point at impossibility of its maintenance during all annual training cycle [6, 7, 23, and 37]. Competitions of annual cycle shall be subordinated to achievement of peak of sportsmen's speed-power, functional, technical-tactic and psychological potentials by the moment of main competitions [28, 32].

Specialists see solution of the problem in rational planning and distribution of competitions in annual training cycle [28]. When planning competitions in year it is necessary to consider unity of light athletes' training and competition loads in training system. Competition loads shall harmoniously coincide with dynamic of training ones and be an integral unit. Competitions of every training cycle's stage shall be in compliance with sportsman's fitness at definite stage of appropriate period. Sportsman's participation in competitions at different stages shall correspond to the level of his fitness and ability to solve the set tasks. At the beginning of summer competition season some commercial competitions are recommended. When preparing for main year's competitions starts are of preparatory character and have little psychic tension. Participation in great number of commercial competitions is recommended after Olympic Games and world championships. The existing at present rating system of results' assessment permits for light athletes, having high places in world rating, to participate in Olympic Games and world championships without preliminary selection. Elite sportsmen have opportunity to purposefully train for main year's competitions. The rest sportsmen shall show high results in selective competitions.

Usage of individually maximal training and competition loads is one of the most important principles of sports training, which ensure effective formation of long-term adaptation. There are two approaches, supplementing each other, depending on sportsmen's qualification and fitness, on stage on many years' training and period of training macro-cycle.

The first approach envisages even increase of volume and intensity of irritators that results in gradual strengthening of impact of sportsman's organism and planned formation of long term adaptation to impact factors.

The second approach is connected with sharp increasing of loads' volume and intensity and their high concentration in time. It is connected with deep mobilization of functional reserves of sportsman's organism. However, it creates pre-conditions for jump-like formation of adaptation processes [7, 28, and 29].

Experience of elite light athletes' training shows that in existing methodic of sportsmanship's perfection there is a number of organizational and methodic disadvantages:

1. There is no single opinion of practical specialists about main principles of conceptual apparatus of this field of knowledge. It inserts uncorrectable mistakes in strategy of training in the whole [18].

2. Important aspects of sports' techniques' rational examples in different kinds of light athletic have not been sufficiently studied in theory and practice.

3. In methodic provisioning of elite sportsmen's training process, in most kinds of light athletic main accents are made on increase of functional potentials. There are practically no special recommendations on methodology of technical skillfulness perfection.

4. There is excessive increase of mechanical work's volume.

5. In special technical training non-specific means, which lost training effect, are used.

Prevailing role of special training means at stage of maximal realization of individual potentials, is conditioned by: 1) loss of informative value of comprehensive or special training means, i.e. reduction of their training effect in connection with sportsman's high workability; 2) reduction of fitness "transfer" with growth of organism's functional specialization, when non adequate means of any, even the highest intensity, do not give quantitative increment of the achieved special workability [7].

6. Application of technical training means, which do not correspond to biomechanical structure of competition exercise, in training process [25].

7. Application of technical training means, which do not facilitate realization of accumulated in competitions motor potential.

8. In connection with widening of calendar of events and demand in performances at the highest level for long time, the system of means and methods does not permit to maintain sportsmen's technical fitness for long period of time.

Intensification of elite sportsmen's technical training requires higher level of pedagogic control, which shall be conducted more carefully: from sportsmen's familiarization with new techniques, teaching to their elements and to perfection of technical skillfulness. Such control can be effective only if its structure will include biomechanical criteria as objective indicators of technical skillfulness level: volume, comprehensive character and rationality of technical training; effectiveness of techniques' mastering and skillfulness in it [9, 18, 34].

The received in our research results prove demand in searching of ways for sports' results' rising, connected with perfection of technical skillfulness [18, 28, 31, 32]. When assessing elite light athletes' technical skillfulness it is necessary to consider biomechanical characteristics, biomechanical criteria of motor techniques; level of sportsmen's fitness and indicators of competition functioning.

For further perfection of elite sportsmen's technical skillfulness in light athletic the most important is the search of highly effective means, which would correspond to biomechanical structure of main competition exercise.

Conclusions

1. Technical skillfulness as system property of human motor function has multi-dimensional hierarchic structure. Its level can not be assessed by one of any listed indicators. Just because of this fact its perfection shall be approached from complex systemic positions. It well permit to increase the quality of Ukrainian light athletes' training to the greatest international competitions.

2. For noticeable increase of sportsmen's preparation for the greatest competitions it is necessary to solve all problems of their technical skillfulness perfection.

3. In light athletic not so the scope of loads as their skillful usage has decisive importance, as well as determination of training load's effective content, rational distribution of loads' volumes, selection of the most effective training means and methodic, their places in annual training cycle.

4. Effectiveness of elite sportsmen's training methodic is determined by realization of technical potentials of previous training stages in final result. It can be achieved by determination of rational correlation of multi-directional means and methods. Application of exercises, oriented on perfection of light athletes' high technical fitness, will be the most important.

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Conflict of interests

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OPTIMIZATION OF TRAINING PROCESS IN PRE-START FENCING TRAINING ON THE BASE OF OUT-OF-TRAINING MEANS' OF MOBILIZATION ORIENTATION APPLICATION

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Abstract. *Purpose:* to show effectiveness of out-of- training means of mobilization orientation in pre-start preparation of elite fencers. *Material:* in the research 12 elite sportsmen-fencers participated. *Results:* it was found that under influence of the worked out pre-start complex (during 15-18 minutes), comparing with traditional warming up (40 minutes) more expressed mobilization effect was registered. This effect also lasted longer time. Higher stimulating effects of pre-start complex are proved by confident differences in sportsmen's special workability ($p < 0.05$). *Conclusions:* the achieved stimulating effects reduced duration of general warming up to twenty minutes. It permits to more rationally organize pre-start training of fencers in comparison with application of traditional means.
Key words: martial arts, fencing, preparation, out-of- training, means, competitions.

Introduction

Strive for strictly balanced system of trainings and competition loads, rest, eating, means of workability restoration and stimulation, functional reserves mobilization is an important direction in perfection of modern training system [9, 13]. Development of this direction is connected with increasing of out-of-training and out-of-competitions factors' role: workability stimulation means in training system of sportsmen. It is also necessary to match them with content and orientation of competition functioning in every kind of sports [2, 3].

Realization of this direction of researches is rather important for fencing. Recent time in this kind of sports competitiveness has been increased; duels have become more tensed and dynamic. The existing pre-start training system does not always correspond to peculiarities of modern system o competitions conduct [5, 17, and 20]. Analysis of scientific-methodic and special literature showed that there was certain deficit of works, devoted to increase of special workability in direct preparation of sportsmen for competitions [10, 18, and 19].

In this connection, researches of existing sportsmen pre-start training system's perfection and its matching with specificities of competition functioning in fencing are of special importance.

Purpose, tasks of the work, material and methods

The purpose of the research is to show effectiveness of not training means of mobilization orientation in pre-start preparation of elite fencers.

In the research elite male fencers participate (n=12, from them 6 were international master of sports of Ukraine of 18-24 years' age).

Results of the research

Conditions of fencing competitions' conduct do not always permit to optimally realize pre-start warming up potential. Elite sportsmen face the fact that systems of competitions' conduct at national and international levels are substantially differ. These distinctions shall be considered when organizing direct preparation for competitions. For example: great number of national tournaments took not more than one day. Within this period sportsmen shall pass qualification stage, consisting of 6 duels (5 pricks in each); and stage of direct retirement. The stage of direct retirement consists of approximately the same quantity of duels (15 pricks in total). Exclusion is only tournament of the strongest Ukrainian fencers, which took two days. Analysis of competition functioning results of Ukrainian national combined team shows, that 90% of sportsmen practice only one general and special warming up just before qualification stage of competitions. At the same time most of international competitions have more complex structure. In stages of World Cup or tournaments of "Grand prize" series fencers have to compete during two days. The first day includes qualification stage. After it several duels follow (maximum three) by system of direct retirement. With it cases, when sportsmen's expectation of their duels can last for several hours, are rather often. In such case it is necessary to repeat special and general warming up. Analysis of competition functioning and many years' experience of performances at tournaments permit to say that traditional system of Ukrainian sportsmen's pre-start training can be sufficiently effective at domestic competitions. But it demonstrates significant disadvantages at international level.

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These disadvantages are connected with not rational application of pre-start mobilization means. In its turn, it is connected with the fact that traditional pre-start warming up of Ukrainian fencers nearly does not differ from the used in training process. It is quite evident that constant application of monotonous warming up exercises does not result in required functional shifts in sportsman's organism. Besides, the existing system of pre-start impacts requires rather much time.

In this connection our research was devoted to seeking of such means of sportsmen's pre-start preparation's organization, which would permit to optimize pre-start warming up and ensure durable mobilization effects in various conditions of competition functioning.

For increasing of sportsmen's pre-start training effectiveness we worked out complex of out-of-training means of mobilization orientation. In the process of experimental complex's working out we considered specific features of competition functioning. Interval between warming up and main competition functioning seems to be exclusively important. As a rule total duration of warming up is from 60 to 90 minutes. With it duration of general part of the warming up is 40-50 minutes. Duration of interval between warming up end and main competition functioning beginning varies in wide range, depending on stage of competitiopn: from 10-20 to 45-60 minutes (see fig. 1). Interval between warming up end and beginning of competition's qualification stage is usually from 15 to 25 minutes. With it sportsmen try to maximally approach the end of warming up to the start of competition functioning. It is connected with the fact that sportsman shall be present near the place of his duel 15 minutes befor the beginning of competition. It is a requirement for the referees to check the presence of sportsman and the presence of appropriate signs on their equipment. Besides, qualification fight are not conducted simultaneously. That is why expectation of first duel can take in averatge 10-20 minutes.

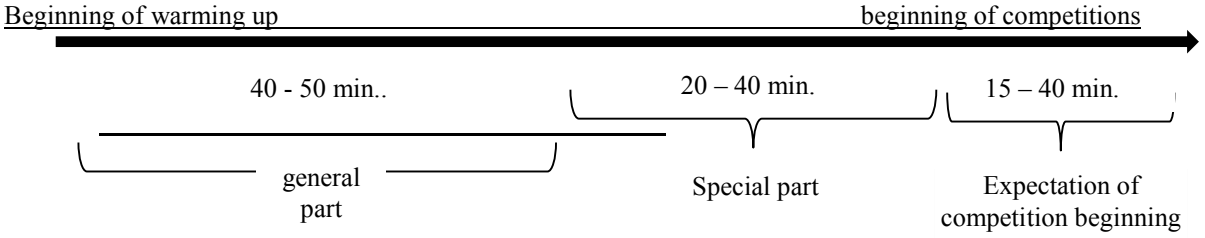

Fig. 1. Specificities of fencers' pre-start warming up

Duration of warming yp effects depends to large extent on the character of fulfilled exercises, sportsman's fitness and his individual features. In competition of "A" category sportsmen shall wait in special "call room", for long period of time (25-30 min.) Then sportsmen will have to go to sports track and perform without additional warming up. In this connection means of pre-start training, permitting to maintain mobilization potential after warming up, are of great practical significance [2, 3].

The researches, conducted earlier [6, 7], showed that application of the worked out by us complex positively influences on functional indicators of sportsmen's organisms and permits to receive long lasted adaptation (mobilization) effect. Such approach seems to be exclusively important in conditions of non stable system of competitions on national and international levels.

Results of our research point that application of the worked out complex of pre-start impacts instead of warming up general part permits to substantially shorten warming up time in the whole. In its turn it permits to reduce physical tension level and preserve forces for further competition functioning.

In our research it is shown (fig.2) that the most effective application of pre-start impacts is 45 minutes before the beginning of competitions.

It is connected with the fact that under influence of the worked out pre-start complex (which took 15-18 minutes) in contrast to traditional warming up, taking 40 minutes, more expressed mobilization effect was registered.

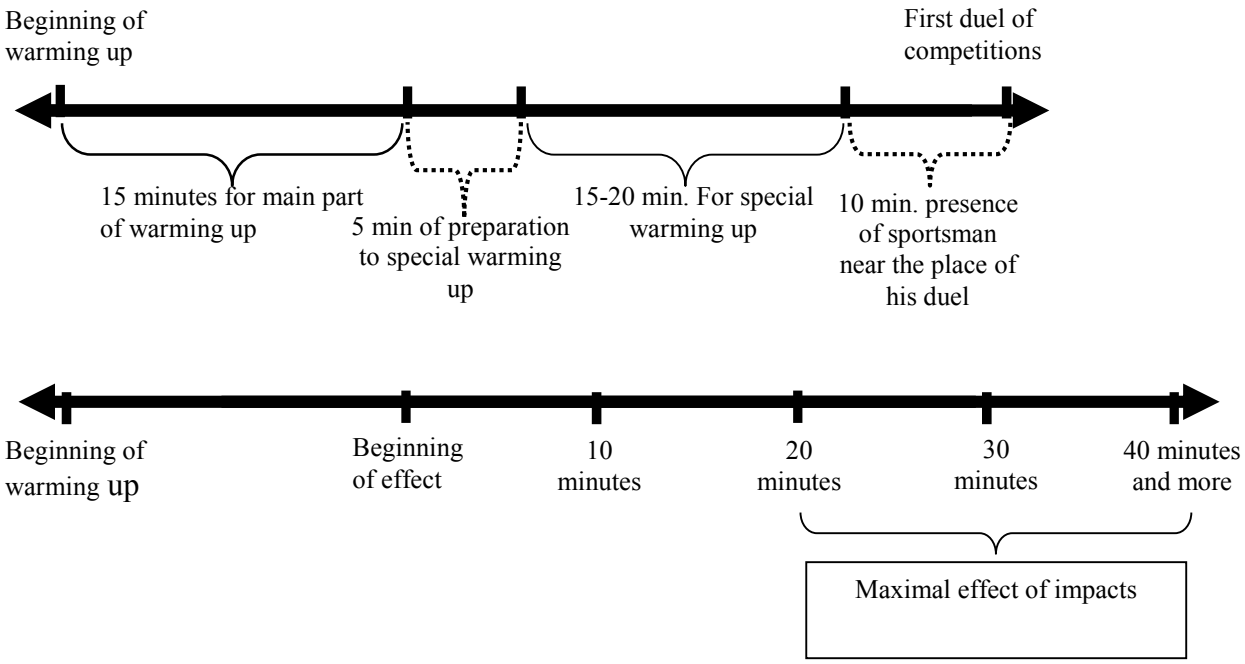

Fig.2. Specific features of application of pre-start impacts' experimental complex

This effect continued longer time. It is proves by indicators, showing fencers' special workability: indicators of sportsmen's neuro-dynamic functions, of cardio-vascular system's response to endured load [6, 7, and 8]. Comparative analysis of the indicators before and after application of experimental pre-start impacts' complex showed confident improvement of simple and complex visual-motor reaction time ($p<0.05$), as well as confident increase of training impulse ($p<0.05$): indicator of "doze-effect" impact in response to the fulfilled work. Besides, we registered high subjective self assessment of sportsman's state: increased workability, high quickness, quick restoration after loaf in special warm up, feeling of freshness and wish to participate in competitions (combat readiness).

The presented data witness about positive influence of experimental complex on indicators, which are in the base of fencers' special workability. These indicators show at demand in further perfection of pre-start training system in this kind of sports.

Discussion

The fulfilled research permitted to substantiate demand in further perfection of pre-start training system and purposefulness of experimental out-of-training means' complex application in variable conditions of elite sportsmen's competition functioning. The received results permit to say that the offered complex increases effectiveness of sportsmen's pre-start functioning. As a result – it increases organism's potentials for realization of existing functional potential. The received results witness about positive influence of experimental complex on organism's functional potentials of elite sportsmen.

The results of the research noticeably supplement theoretical ideas about specific features of pre-start preparation's organization for elite fencers at modern stage [11, 17, 19, and 20]. We also confirmed results of a number of authors about demand in complex and rational application of training and out-of-training means in system of sports training. Such approach results in increase of competition functioning effectiveness in the whole [2, 9, 13]. Besides, we supplemented theoretical principles concerning realization of elite sportsmen's functional potential in process of direct preparation for competitions [1, 4, 12, 14, 15, 16]as well as the data about modern approaches to optimization of elite sportsmen's pre-start training with the help of out-of-training means [10, 17, 19].

Conclusions

1. Analysis of the results showed that modern system of pre-start training in fencing has a number of disadvantages and in most cases contradicts to modern competition system in fencing. It weakens possibility of organism's reserves realization and does not ensure optimal structure of competition functioning.

2. It was shown that the worked out complex of pre-start impacts positively influence on functional indicators of sportsmen's organisms. Maximal stimulating effect of experimental complex application is observed in period from tenth to thirties minute after application of the complex.
3. The achieved stimulating effects reduced duration of general warming up to twenty minutes. It permitted to more rationally organize pre-start training of elite fencers, comparing with traditional means usage.

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Conflict of interests

The author declares that there is no conflict of interests.

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METHODIC APPROACH TO DETERMINATION OF COGNITIVE FUNCTIONS' NON-UNIFORMITY IN PRE-SCHOOL AGE CHILDREN, REQUIRING SPEECH DISORDERS CORRECTIONS

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Abstract. *Introduction*: It is known that children with speech disorders can have problems in cognitive functioning, restrictions in communication, isolation, aloofness. Naturally, such children need speech therapy and developing of thinking processes, perfection of cognitive functions. *Purpose:* To determine changes in non-uniformity of children's cognitive and psycho-physical functions after application of dance-cognitive training forms. *Material:* In experiment 5-6 years' age children with speech disorders participated. The tested group consisted of 14 children. All parents gave written consent for participation of their children in experiment. We used cluster analysis and assessment of main psycho-physical and cognitive functions with the help of tests of increasing complexity. The tests were assessed in points from 1 to 10. In assessment we considered musicality, coordination of dance movements, plasticity. *Results:* at the beginning and at the end of academic year we formed sub-groups with uniform physical and psycho-physical qualities, cognitive functions and dance abilities. Cluster analysis permitted to determine the fact of uniformity increase in children with improved indicators of psycho-physical qualities and cognitive functions. *Conclusions:* we offered programs of dance-cognitive trainings for pre-school age children with speech disorders.
Key words: speech disorders, physical qualities, psycho-physical condition, cognitive functions, dance abilities.

Introduction

As on to day, education of children with speech disorders is an important pedagogic problem, which touches child's psych-physical condition. Many researchers found that children with speech disorders can have cognitive problems, neurological deviations, limited communication with peers, isolation and aloofness [2, 3, 6, 12, 16, 19, and 22]. Such children need long-term speech therapeutic corrections. They can demonstrate different emotional reactions, critical assessment of own speech deficiency. In this connection, in many tasks they try to consciously avoid oral answers. In pre-school educational establishments children with speech disorders are united in one group, though hey perceive information and think differently. As a result one and the same academic program for one part of children is difficult and for other – too easy.

Since long ago, in pedagogic it has been known how great potentials for education of soul and body are embedded in synthesis of music and plasticity **[1, 4]**. Organization of movements with the help of musical rhythm trains children's memory, attention, inner concentration; facilitates formation of targeted activity. It is pointed in works of many researchers [3, 6, 8, and 12].

It is known that in process of dance-cognitive trainings, with multiple repetitions of movements under musical accompaniment many sections of cortex activate: the back of the head, temple, forehead, cerebellum, Brock's parietal area. It results in formation of conventional-reflex connections that can facilitate development of thinking processes and improvement of cognitive functions [13, 14].

In our opinion knowledge and understanding of musical theory (size, temp, duration, musical strike, accent, rhythm, musical phrase) in combination with dance figures are speech functions' natural correction means' components.

We think that correction works with pre-school age children, having speech disorders, will be effective, if to determine, first, non-uniformity of group by degree of cognitive functions, ability to perceive temp and musical rhythm in process of dance figures' fulfillment. For this purpose cluster analysis can be used, which permits to find similarities by many variables [10].

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Purpose, tasks of the work, material and methods

The purpose of the work is with the help of cluster analysis to determine non-uniformity of cognitive and psycho-physical functions in 5-6 years' age children of group with speech disorders; to assess correctness of the chosen methodic approach.

The methods and organization of the research:

For assessment of main psycho-physical and cognitive functions before and after application of dance-cognitive forms, as methodic approach we used complex of tests with increasing complexity. This complex permits to assess psycho-physical functions, verbal thinking, rhythm-motor (or dance) abilities).

We determined static and dynamic motor coordination, quickness of movements' fulfillment, ability to reproduce several movements at the same time. Points were given in the following way: high level – 9-10 points; above average – 7-8; average – 5-6 points; below average – 3-4 points and low level – 1-2 points [9].

Assessment of verbal thinking was fulfilled by methodic of Ya. Yerasyk [9], based on formulated by a child answers to questions put to him (her). Points were accounted in the same way.

Assessment of rhythm-motor (or dance) abilities, musicality, coordination of dance movements, plasticity was realized on the base of analysis of possibility to make several simultaneous movements as dance composition under musical accompaniment. Points were accounted in the same way.

Uniformity of the tested children's group was determined with cluster analysis, included in program StatSoft STATISTICA 10.0.

On the base of such analysis we built classification system of the tested objects and variables in the form of tree (dendrogram) and dividing of objects into pre-set number distant from each other classes.

Results of the researches

By the received data of physical qualities, psycho-physical condition, cognitive functions and dance abilities we fulfilled cluster analysis. It permitted to find uniformity of the tested group, consisting of 14 children before application of dance-cognitive forms.

We determined that the group was non-uniform (it consisted of two sub-groups). The first included children, coded as 2, 3, 6, 13, 14, 4, 12. The second group included children, coded as 1, 5, 7, 8, 10, 9. The first sub-group was composed of children, whose values were at levels average and above average. In the second sub-group there were children with values at average and below average level (see table 1).

Table 1. Change of non-uniformity of cognitive and psycho-physical functions' manifestations in 5-6 years' age children with speech disorders

Before application of dance-cognitive training forms																					After application of dance-cognitive training forms																				
	Physical						Psycho-motor						Cognitive					Dance					Physical						Psycho-motor						Cognitive					Dance			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	8	3	4	3	7	7	5	7	4	7	8	3	3	7	3	3	3	3	4	5	1	7	8	8	8	8	6	6	7	8	6	7	7	6	6	6	7	5	7	7	7
2	8	4	8	8	4	5	6	8	8	8	6	8	8	8	8	8	7	5	7	6	2	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	8	8
3	8	8	6	8	8	8	5	8	7	8	8	8	8	8	8	8	7	8	8	8	3	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
4	8	8	6	6	8	5	5	5	8	6	6	8	8	8	8	8	8	8	8	8	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
5	3	7	4	6	3	7	4	6	3	3	6	7	7	5	6	5	6	6	6	6	5	4	7	5	7	4	5	6	5	7	6	7	7	7	7	7	6	6	6	6	6
6	8	8	6	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
7	7	7	4	6	3	3	3	7	7	6	7	7	3	3	6	6	4	4	5	4	7	7	7	5	6	4	4	7	7	7	7	7	7	6	7	7	6	6	7	5
8	7	7	3	6	4	7	4	4	7	6	6	7	3	3	6	6	6	6	6	6	8	7	7	4	7	7	7	4	5	7	7	7	7	5	7	7	7	6	6	7	7
9	8	8	4	5	8	8	5	7	6	6	7	8	5	4	4	4	5	8	8	8	9	8	8	5	8	8	8	6	8	8	8	8	8	8	6	6	8	8	8	8	8
10	7	6	3	6	7	6	7	5	7	6	6	3	3	6	5	6	7	7	5	4	10	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7
11	**5**	**7**	**6**	**7**	**2**	**2**	**2**	**7**	**7**	**7**	**3**	**2**	**2**	**2**	**2**	**2**	**8**	**8**	**8**	**6**	11	**7**	**7**	**6**	**7**	**5**	**3**	**3**	**7**	**7**	**7**	**3**	**2**	**3**	**2**	**2**	**2**	**8**	**8**	**8**	**7**
12	8	8	5	8	3	8	8	8	8	8	4	4	4	8	8	8	3	8	8	8	12	8	8	6	8	8	8	8	8	8	8	5	8	8	8	8	8	4	8	8	8
13	8	8	8	8	8	8	8	8	8	8	5	5	8	8	8	8	8	8	8	8	13	8	8	8	8	8	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8
14	6	8	8	8	8	8	8	8	8	8	8	6	6	8	6	6	8	8	8	8	14	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6	8	8	8	8

Child, who was not included in any group

Sub-group of children, characterized by "average" and "above average" indicators

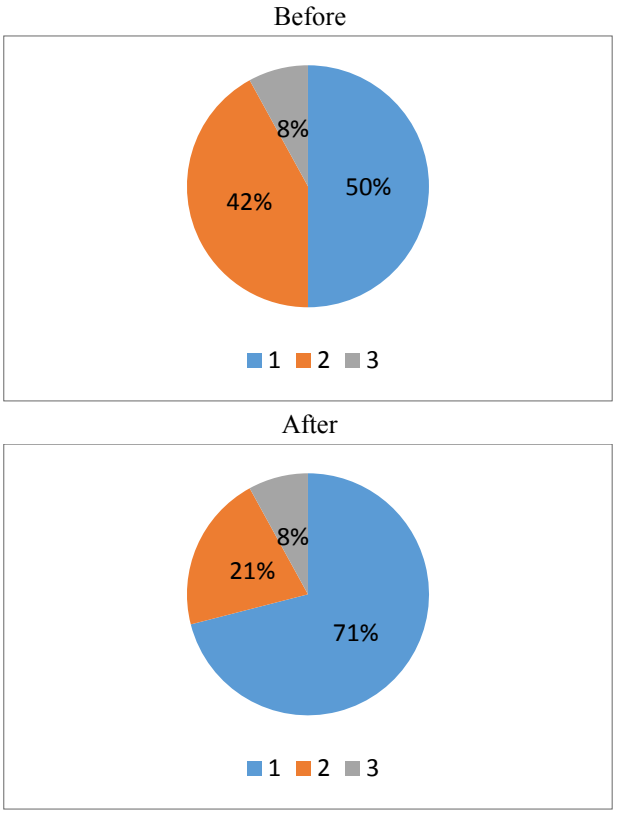
Sub-group of children, characterized by "average" and "below average" indicators

1 – Child's code; 2 – Walking on checkered site; 3 – Lie down – stand up; 4 – Ball throw for accuracy; 5 – Jumps (on 1foot, 2 feet); 6 – Arms' holding with closed eyes; 7 – Test 1 – arms' holding; 8 – Test 2 – touching of nose with closed eyes; 9 – Test 3. Out-jumping; 10 – Test 4. Picking up of coins in box ; 11 – Test 5. Drawing of circles in air; 12 – Test 6. Handshake; 13 – Answer 1; 14 – Answer 2; 15 – Reason 1; 16 – Reason 2; 17 – Reason 3; 18 – Musicality ; 19 – Creativity ; 20 – Coordination of dance movements; 21 – Plasticity.

One of the tested children, coded as 11, was not included in any group, because his psycho-physical condition and cognitive functions were the lowest.

After application of dance-cognitive trainings we fulfilled repeated testing of uniformity of children's grouping. It was found that their distribution into sub-groups changed.

Before application of dance-cognitive trainings 50% of children had level "average" and "above average", 42% - "average" and "below average" and 8% - "below average". After application of dance-cognitive trainings 71% of children had level "average" and "above average", 21% - "average" and "below average" and 8% - "below average" (see fig.1). We found that one child required very special, individual approach. Though, he also demonstrated improvement of some indicators.



1 – Mean values "average" and "above average"
2 – Mean values "average" and "below average"
3 – Values "below average"

Fig.1. Distribution of children's uniformity according to cluster analysis.

The fact that group was re-formed to the side with higher quantity of children with better psycho-physical characteristics, cognitive functions and dance abilities witnesses about positive effect of correcting, rhythm-motor dance trainings. As the following observations showed, from the beginning of new academic year, children of first sub-group successfully started school period. Children from weak sub-group continued learning in pre-school educational establishment.

Discussion

The received results supplement the data about usage of cluster analysis for determination of 5-6 years' age children's grouping (children with speech disorders) in compliance with their psycho-physical condition, cognitive functions and dance abilities. The fulfilled researches prove that pre-school age children with speech disorders lag behind their peers by cognitive functions and by some psycho-physical indicators. Many researchers determined that children with speech disorders can have problems in cognitive functioning, neurologic deviations; limited communication with peers, isolation and aloofness [2, 3, 6, 12, 16, 19, 22].

In other works [3, 6, 12] we observed high prognostic ability for organization of movements with the help of musical rhythm. It facilitated development of children's attention, memory, internal concentration, formation of targeted activity. Dance trainings significantly improve physical qualities, psycho-physical and cognitive development [7, 8, and 11].

The received data supplement awareness of some authors 8, 15, 17] about application of cluster analysis for determination of uniformity of 5-6 years' age children's with speech disorders physical qualities, psycho-physical condition, cognitive functions and dance abilities. Such approach can be used in strategy of increase of dance cognitive trainings' effectiveness.

Conclusions

1. We outlined approaches to grouping of 5-6 years' age children with speech disorders in compliance with their psycho-physical condition, cognitive functions and dance abilities.

2. The fulfilled cluster analysis permitted to register increase of uniformity of children with improved indicators of physical qualities, psycho-physical condition, cognitive functions and dance abilities. Thus, it proved effectiveness of the offered program of dance-cognitive trainings for pre-school age children with speech disorders.

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PECULIAR FEATURES OF MEN PHYSICAL CONDITION IN PLANNING HIGHLY INTENSIVE PHYSICAL LOADS IN WINTER PERIOD

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Abstract. Physical functioning of average and high intensity is an important component of mature men's health and longevity. For highly intensive physical functioning organism's physical fitness is required. Human physical condition can change under influence of season factors. *Purpose:* to determine specific features of men's physical condition before their highly intensive physical trainings in winter period and test them. *Material:* 25 men of 35-48 years' age without chronic diseases were chosen for experiment. All they observe healthy life style. Body mass index, physical condition by methodic of Bayevskie were tested. The research was conducted in the following way: in the morning and in the evening of every day. Physical functioning was tested by methodic IPAQ. *Results:* we registered confident ($p<0.05$) distinctions in men's physical condition before and in the day of their highly intensive physical functioning. We noticed changes in the following: body weight, heart beats rate, adaptation potential of Bayevskiy. The most significant indicator was the marker. For testing of its effectiveness we offered for men to plan highly intensive physical functioning in compliance with this marker during one month. Result was confident ($p<0.05$) increase of duration and quantity of highly intensive physical trainings, improvement of physical condition by 3.13% in complex test of Bayevskiy. *Conclusions:* Consideration of men's physical condition plays important role in planning their highly intensive physical functioning. Increment of Bayevskiy's adaptation potential by 5.25% can be informative marker in winter period. It is a factor for highly intensive physical functioning planning for definite day.
Key words: physical functioning, intensity, physical condition, planning, men, life style.

Introduction

Human physical condition (PC) is a reflection of person's life style, which changed depending on environment – seasons of year. In mature age PC is conditioned by many factors. Among them there is physical functioning (PF). Physical functioning also is influenced by season factors [5, 15]. Aerobic physical functioning of average and high intensity is especially effective for keeping optimal functional state of mature age men [6]. PF of average intensity does not require significant physical loads and can be realized in domestic or social functioning. For highly intensive physical functioning (HIPF) in mature age certain physical readiness of organism is required. It is reflected in human physical feeling, self-feeling and desire to practice it. Specific feature of such PF planning for mature age men is their independent character [1] and desire to enjoy it [16]. Realization of this desire is connected with healthy organism and excellent physical condition. That is why for planning and control of HIPF current information about men's PC is required. It can facilitate them for HIPF in winter period.

There are very little researches devoted to human PC and its changes, resulted from season influence. It is considered that living in megalopolises neutralizes season impacts on human life style. It is facilitated by acceptable food of each season, unchangeable during all year social rhythm. A number of researches note season variations in eating of China women [9] and Spain population [10]. There is reduction of PF in winter period, comparing with summer [5, 12, and 17]. In researches, conducted in Australia it is noted that with starting of winter period there happens rising of blood pressure and body mass index (BMI) [18]. IIn other researches it is said that in winter PF is reduced in connection with poor physical condition of elderly people [8].

HIPF is of special importance for health. It results in reduction of blood pressure [13], improvement of metabolism. All these result in optimization of height-weight indicators [14]. At the same time quantity of HIPF trainings of mature men can vary from 3 0 4 times a week to 2-3 times a month [3]. Most of mature age Europeans have never practiced HIPF or sports regularly [7]. The existing recommendations of World health protection organization (WHO) concerning HIPF are limited only by quantity of recommended minutes per week (not less than 75) and by quantity of trainings (not less than 2, or 20 minutes, trice a week). In recent instructions on PF for European region for 2016-2025 WHO has increased time for HIPF. It is additional preference for health, which is recommended

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for all population strata. As on to-day we have not found recommendations concerning PC role in season PF of mature age men. Researches [5, 11, 19, and 20] make us to consider it.

Purpose, tasks of the work, material and methods

The purpose of the work is to determine specific features of men's physical condition before their highly intensive physical trainings. Such data can be used for current HIPF planning in winter period.

Organization and methods of the research: experiment consisted of two parts: laboratory and forming. We selected 25 men of 35-48 years' age without chronic diseases. All they observe healthy life style and independently practice HIPF in the form of health related run, swimming, trainings in gym. Physical condition of these men in testing days did not exceed average month standard of Bayevskiy's adaptation potential (APB) – 1.80 absolute units (a.u.) [2]. The research was conducted in the south of Ukraine in winter period during 30 days of laboratory and 30 days of forming experiment.

For studying of men's physical condition we tested body mass index (BMI), *(kg/m²)*. Assessment of physical condition was conducted twice a day: in the morning and in the evening by APB index. Body weight was measured with electronic balance (error up to 50 grams). Blood pressure and heart beats rate (HBR) were registered by automatic tonometers Contec 08A. APB was calculated every morning after night sleep and every evening before sleep according to appropriate recommendations of WHO (1999). HIPF was tested in compliance with international questionnaire IPAQ (*International Physical Activity Questionnaire*) [3]. We studied quantity of trainings in a week and their duration. The received results were noted in individual diaries. Laboratory experiment included comparison of average month PC day indicators of men with indicators before and in day of HIPF. We compared indicators, registered in the morning (M) with indicators, registered in the evening (E) and difference between them during day (M-E) and in the night (E-M). Difference between PC indicators is presented in percents by formula:

$$x=(b-a):a*100\%$$

where, x – percentage; a – previous indicator; b – next indicator of compared pair of numbers.
In case of HIPF registration during several days percentage was calculated only before the first day.

In laboratory experiment men practiced HIPF in usual for them mode. In forming experiment we offered to plan HIPF in compliance with morning information about their PC. Results of forming experiment were processed by weekly data.

Statistical calculation was carried out with the help of non-parametrical statistic, as far as some results did not comply with normal distribution. We determined the following: interquartile range (IR), median (Me). Comparison of indicators' groups was realized with Wilkes's criteria of sign ranks. Programs EXEL and Statgraphics16 were used.

Results of the research

Comparing men's PC in ordinary days with PC in HIPF days (see table 1); we found significant distinctions in most of the tested indicators. In HIPF days weight (M) was confidently higher by 0.39%. HBR (M) was higher by 1.18%. APB (M) was higher by 3.61% while APB (E) –2.78%. There were no confident differences in change of APB during day (M-E) and in the night (E-M).

Table 1. Comparison of men's PC indicators in ordinary days and in days with highly intensive physical functioning

№	Indicators	Ordinary days (n=705) *Me* (95%IP)	HIPF (n=99) *Me* (95%IP)	Difference (%)	W (p)
	Body weight (M) (*kg*)	87.44 (84.32;90.56)	87.78 (84.11;91.45)	0.39	75941 <0.05
	HBR (M) (*b.p.m.*)	49.97 (46.35;53.59)	50.56 (47.26;53.86)	1.18	79264 <0.05
	APB (M) (a.u.)	1.66 (1.64;1.68)	1.72 (1.66;1.78)	3.61	8100.5 <0.05
	APB (E) (a.u.)	1.80 (1.77;1.82)	1.85 (1.81;1.90)	2.78	7815.5 <0.05

Difference APB (M-E) (a.u.)	-0.14 (-0.15;-0.12)	-0.14 (-0.18;-0.1)	-	2598 >0.05
Difference APB (E-M) (a.u.)	0.1 (0.07;0.14)	0.1 (0.06;0.13)	-	2609 >0.05

The most important in finding of informative PC indicators were distinctions, registered before and in days of HIPF (see table 2). Body weight (M) was higher in HIPF days by 0.39%. HBR (M) was also higher by 1.96%. APB (M) was higher by 5.25% and APB (E) – by 3.93%. There were no distinctions between APB indicators during day (M-E) and in the night (E-M).

Table 2. Comparison of PC indicators before and in days of highly intensive physical functioning

№	Indicator	Before (n=84) Me (95%IP)	HIPF (n=99) Me (95%IP)	Difference (%)	W (p)
	Body weight (M) (*kg*)	87.44 (84.04;90.84)	87.78 (84.11;91.45)	0.39	25487 <0.05
	HBR (M) (*b.p.m.*)	49.59 (46.51;52.67)	50.56 (47.26;53.86)	1.96	28843 <0.05
	APB (M) (a.u.)	1.63 (1.57;1.70)	1.72 (1.66;1.78)	5.25	41592 <0.05
	APB (E) (a.u.)	1.78 (1.73;1.84)	1.85 (1.81;1.90)	3.93	34624 <0.05
	Difference APB (M-E) (a.u.)	-0.13 (-0.18;-0.09)	-0.14 (-0.18;-0.1)	-	14847 >0.05
	Difference APB (E-M) (a.u.)	0.15 (0.1;0.19)	0.1 (0.06;0.13)	-	17336 >0.05

Comparing PC indicators before HIPF days with ordinary days it is necessary to be sure that PC indicators, registered before HIPF were less then in ordinary days (see table 3).

Table 3. Comparing of men's PC indicators before HIPF days with indicators of ordinary days днями

№	Indicator	Before HIPF (n=84) *Me* (95%IP)	Ordinary days (n=705) *Me* (95%IP)	Difference (%)	W (p)
	Body weight (M) (*kg*)	87.44 (84.04;90.84)	87.44 (84.32;90.56)	-	2260 >0.05
	HBR (M) (*b.p.m.*)	49.59 (46.51;52.67)	49.97 (46.35;53.59)	0.77	50871 <0.05
	APB (M) (a.u.)	1.63 (1.57;1.70)	1.66 (1.64;1.68)	1.84	51089 <0.05
	APB (E) (a.u.)	1.78 (1.73;1.84)	1.80 (1.77;1.82)	-	42561 >0.05
	Difference APB (M-E) (a.u.)	-0.13 (-0.18;-0.09)	-0.14 (-0.15;-0.12)	-	4015,5 >0.05
	Difference APB (E-M) (a.u.)	0.15 (0.1;0.19)	0.1 (0.07;0.14)	-	32075 >0.05

It was found that body weight (M), APB (E), difference in APB in day (M-E) and in the night (E-M) did not differ confidently ($p>0.05$). At the same time HBR (M) and APB (M) were confidently less than in ordinary days by 0.77% and 1.84% accordingly. It is proved by worsening of PC indicators just in the morning of HIPF day.

Comparative analysis of men's PC in HIPF days and in ordinary days resulted in certain differences. We used them for current planning of HIPF. In forming experiment men were offered to plan HIPF for days, when APB (M) increased more than by 5.25%, comparing with previous days.

As a result of forming experiment there appeared PC and PF positive changes in men (see table 4).

Table 4. Comparison of physical functioning and physical condition indicators in laboratory and forming experiments

№	Indicators	Before experiment (n=98) *Me* (95%IP)	After experiment (n=86) *Me* (95%IP)	Difference (%)	W (p)
	BMI (*kg/m²*)	27.68 (25.63;29.74)	27.99 (25.94;30.04)	1.12	5452.5 <0.05
	HIPF (*quantity/week)*	1.08 (0.01;2.15)	1.3 (0.02;2.58)	20.37	4654 <0.05
	HIPF *(minutes/week)*	14.34 (10.03;20.65)	18.2 (14.16;22.24)	26.92	4821 <0.05
	HBR (M) (*b.p.m.*)	49.14 (46.61;51.67)	48.62 (46.0;51.24)	-	2581 >0.05
	APB (M) (*a.u.*)	1.60 (1.49;1.73)	1.55 (1.43;1.66)	3.13	1792.5 <0.05

BMI of men increased by1.12%. Quantity of HIPF trainings increased by 20.37%. Time of training increased by 26.92%. APB (M) also improved by 3.13%.

Discussion

In contingent, chosen for our research there was insignificant increase of BMI (by 10%). This fact can be related (with normal PC indicators) more to muscular tissue than to fat. APB was relatively normal. Morning HBR (M) also reflected healthy cardio-vascular system. HIPF was much less than recommended 75 minutes and less than 2 times a week.

Testing of PC changes in ordinary days and in HIPF days permitted to assess PF (by APB (E)) influence on men's organism and pre-conditions for HIPF trainings. Differences in PC were obvious by all tests, conducted in the morning (body weight, HBR, APB (M). Confident increase of body weight, HBR and APB before HIPF trainings can be explained by different factors of life activity. But increase of body weight in the morning, worsening of HBR indicators and APB witness about direct influence of eating increase. It also can witness about reduction of PF before. It generates extra energy in organism and stimulates men for HIPF.

Comparison of PC before HIPF days and in HIPF days proved our previous assumptions about body weight increase and relative worsening of PC indicators. Percent age of changes by PC tests was higher than in comparison with ordinary days. Complex test PC – APB (M) gave the highest percentage – 5.25. It is purposeful to use this indicator ion current planning of HIPF.

Comparing PC indicators before HIPF with ordinary days witnessed that just before HIPF PC was better. It points at importance of PC exactly in that day.

Confident differences between APB morning-evening (M-E) and ordinary days were not found. It can witness about relatively adequate physical load of men's physical; condition in HIPF days and quick recreation of organism. Testing of APB in the evening of previous day and in the morning (E-M) showed stable recreational process during sleep in different days. That is why there were found no differences between them and ordinary days.

By results of forming experiment we can say that on consideration of APB (M) HIPF weekly quantity and duration depend. In its turn, such functioning optimally influences on men's PC in winter period.

Conclusions

Physical condition is very important for HIPF of mature age men. The most informative and acceptable for mass usage PC indicator can be APB (M). Its increase by 5.25% in winter period can be a reason for current planning of HIPF for this day. Consideration of this indicator is effective in optimization of mature men HIPF and PC.

The prospects of further researches imply studying of men's physical condition characteristics, which facilitate HIPF in other seasons.

Conflict of interests

The authors declare that there is no conflict of interests.

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ANALYSIS OF POSSIBILITY OF COMPETITION DISTANCES' COMBINATIONS, REALIZED BY ELITE SWIMMERS ON THE BASE OF INDIVIDUAL INDICATORS OF TECHNICAL-TACTIC ACTIONS

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Abstract. *Purpose:* to find out possibility of competition, different by length distances' but with same structure of fulfilled movements combinations, realized by elite swimmers. *Material:* the tested group consisted of participants of European, 2014 championship final starts. We analyzed performances of men and women at distances 50, 100 and 200 meters (in total 12 distances for every swimmer). *Results:* we determined time and space characteristics of swimmers' technical-tactic actions. Correlation of indicators of final starts participants' competition functioning and indicators of sportsmen, who won medals at these distances was determined. We found elements of competition functioning, in fulfillment of which sportsmen's individual features are manifested most of all. *Conclusions:* the fulfilled analysis of competition functioning of European championship final starts' participants permits to say that elite swimmers (breaststroke style) are able to achieve high results at competition distances of different length, with definite level of technical-tactic fitness. *Conclusions:* individual potentials of elite swimmers permit to use different technical-tactic variants of distance covering. That is why the sportsmen are able to demonstrate high results at competition distances of different length with equal structure of fulfilled movements.
Key words: swimmers, competition functioning, speed, temp, length of stroke, breaststroke.

Introduction

Swimming is one of not numerous kinds of sports, in which athletes' achievements has not reached their maximal values. Swimmers' results continue to rise, even in spite of prohibition for usage of special suits. Application of such suits resulted in many world and national records. Strongly increased competitiveness caused sportsmen's desire to expand their competition range. In this connection there appeared the problem of choice by them of main and additional competition distances [3; 5]. Solution of this problem is facilitated by analysis of elite swimmers at high rank competitions [3-7; 10; 14].

Individualization of sportsmen's training envisages orientation of every sportsman on the most favorable model of competition functioning, which would meet his technical-tactic potentials. Rather often swimmers perform at distances, which differ by technical structure of fulfilled movements. However, such distances are alike most of all by tactic of their covering [3; 6]. That is why a question arises: can sportsmen achieve high results at different length distances with one swimming style?

Purpose, tasks of the work, material and methods

The purpose of the research is to find if it is possible for elite swimmers to combine different by length but with equal structure of fulfilled movements distances.

The methods of the research: for achievement of our purpose we used the following methods of research: analysis of scientific-methodic literature and competition records, video recording, analysis of video materials, statistical processing of the received data.

Organization and methodic of the research: the research was conducted in two stages. The first stage implied study of competition records [26] and analysis of performances of the strongest European swimmers, specializing in different swimming styles, at continental chapionships from 2010 to 2014. Separately we studied performances of men and women at distances 50, 100 and 200 meters (in total 12 distances for every sportsmen). We caounted quantity of nominees in every swimming style by gender aspect.

The second stage implied analysis of indicators of swimmers-men's competition results in breaststroke style at European championship (EC) 2014. The tested group consisted of finalists at distances 50, 100, 200 meters (breaststroke style). Video recording was fulfilled during EC with video camera SONY DCR-HC42E, (frequency 25 Hz). The camera was installed so that to cover all parts of the distances.

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Competition functioning was assessed by the following indicators: period of sportsmen's staying on Соревновательная деятельность оценивалась по следующим показателям: продолжительности пребывания start pedestal after start signal; passing start segment (from start line to 15 meters point); parts of distance swimming (their quantity depended on the length of competition distance); turn segments. Processing of video material was realized with the help of program Adobe Primiere Pro 2. As a result we received digital data of time and space characteristics of sportsmen's competition functioning. We calculated the following: mean speed of distance swimming (V_2, m/sec.); speed of swimming of start (V_1, m/sec.) and turn segments (V_3, m/sec.). We found length (SL, m) and tem of strokes at distance (SR, cycles/min). Effectiveness of swimming technique was assessed by values of stroke index (SI = V*SL, m^2/sec.) [12].

During statistical processing of data we found minimal (min), maximal (max) and mean group ($\bar{x}$) values of indicators; mean square deviations from mean values (σ) and variation coefficients (V_A,%). Besides, we calculated percentage of competition functioning individual indicators from mean group values, where $\bar{x}$ =100%).

Results of the research

Study of records of three last European championships permitted to find the quantity of prize-winners in program 2010-2014. Among men the quantity of prize-winners was higher than among women. During all studied period their quantity varied: men – from 30 to 34 persons; women – from 28 to 30 persons. In case of one winner and one prize-winner at every step of podium, maximum 36 persons could pretend to be nominees of the analyzed distances (see fig.1).

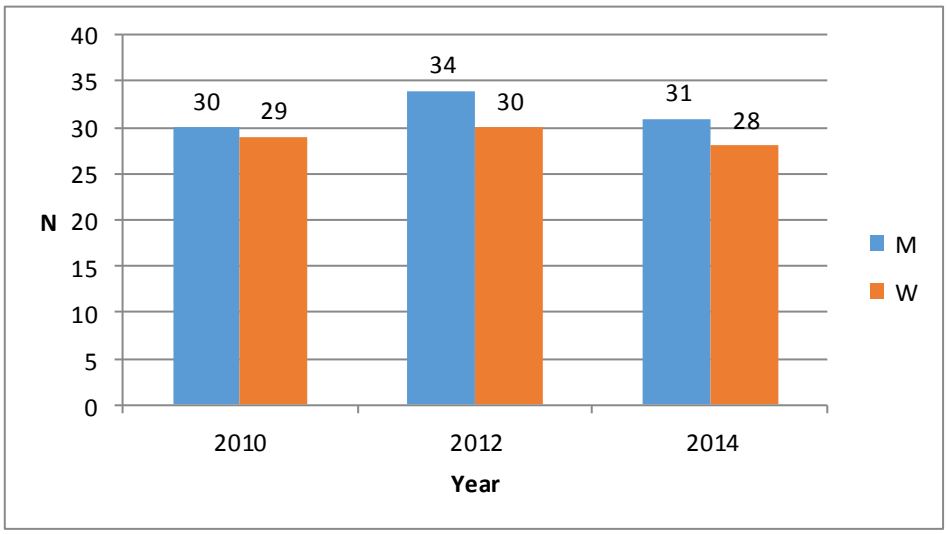

Fig.1. Quantity of medalists in free style, butterfly, on back and breaststroke swimming styles (distances 50, 100, 200 meters0 at European championships 2010-2014: N –quantity of sportsmen, who won medals; M - men; W – women;

Analysis of swimmers' performances by gender aspect witnesses that in free style, butterfly and on back men won more medals. At three championships men medalists were by 3-4 more than women. Exclusion was breaststroke distances, were at podium more women turned out to be than men (see table 1).

Table 1. Quantity of medalists by styles of swimming (distances 50-200 meters at European championships 2010-2014

Style	Men				Women			
	2010	2012	2014	Total	2010	2012	2014	Total
Free style	9	9	8	26	8	8	7	23
Butterfly	8	8	10	26	8	7	7	22
On back	7	10	8	25	7	7	7	21
Breaststroke	6	7	5	18	6	8	7	21
Total:	30	34	31	95	29	30	28	87

Men's performances at championship of Europe, 2014 were analyzed more specifically. 9 medals were distributed among only 5 the strongest breaststroke swimmers of continent. It was the first case in history of studied EC. That is why it is purposeful to analyze the sportsmen's performances more carefully.

As per records of competitions at the shortest distance45 sportsmen started. The range of results (by table of scores, adopted by international swimming federation FINA) was from 695 to 963 scores. While the range of finalists' results was from 890 to 963 scores, (see table 2).

Table 2. Participants of final swim at distances 50, 100, 200 meters (breaststroke style) at championship of Europe, 2014

	Finalists					
Place	**Distance 50 m**	**Scores**	**Distance 100 m**	**Scores**	**Distance 200 m**	**Scores**
1	Adam Peaty	963	Adam Peaty	974	Marco Koch	989
2	Giedrius Titenis	928	Ross Murdoch	951	Ross Murdoch	982
3	Damir Dugonjic	914	Giedrius Titenis	943	Giedrius Titenis	955
4	Caba Siladji	912	Daniel Gyurta	930	Andrew Willis	950
5	Andrey Nikolaev	909	Giacomo Perez-Dortona	907	Ilya Khomenko	924
6	Andrea Toniato	909	Andrey Nikolaev	892	Luca Pizzini	912
7	Giacomo Perez-Dortona	908	Damir Dugonjic	888	Laurent Carnol	880
8	Hendrik Feldwehr	890	Hendrik Feldwehr	879	Kirill Prigoda	871

Analysis of finalists' list in all kinds of breaststroke program showed that six from eight sportsmen, who started on the shortest distance, started also on distance two times longer. Two of them took the same position like in the first case: sportsman from Great Britain Adam Peaty became winner while Hendrik Feldwehr (Germany) - outsider at both distances (see table 2).

From finalists of 100 meter' distance (breaststroke style) only two athletes started on distance 200 meters. With it, their results at both distances were the same. For example, Ross Murdoch (Great Britain) became silver prize winner and Giedrius Titenis (Lithuania) – bronze winner in both cases.

Results of Lithuanian sportsman should be stressed specially. After successful performance at world Championship (WC) 2009 (bronze medal at distance 200 meters, breaststroke) he had no noticeable achievements at great international competitions. However, from 2009 to 2013 he was in ten of the best European swimmers at distances 100 and 200 meters, though he did not take the highest places. His performance at European championship 2014 can be considered his return to elite of European swimming. Results of this sportsman permitted for him to take position on podium in all breaststroke programs. Study of competition records showed that no sportsman or sportswoman (of continental championships from 2010 to 2014) could do the same.

More detail analysis of the swimmer's performances permitted to find indicators of competition functioning, which distinguished him from all finalists (i.e. his advantages or lagging behind his opponents).

It is known that arsenal of technical actions is rather limited in cyclic kinds of sports. That is why sport result in swimming is regarded as total of separate actions' duration at distance: start, distance swimming; turns (if required) and finish [3; 5-7; 14-16].

The fulfilled analysis showed that results of swimmers-men in breaststroke at last European championship were rather dense (V_A from 0.77% at distance 50 meters to 1.57% at distance 200 meters). Such indicators as mean speed of distance swimming; speed at start segment and turns (see table 4) also were a little variable. This fact permitted to concentrate attention at competition elements, in fulfillment of which variations were more noticeable: i.e. fulfillment of which was to lager extent conditioned by sportsmen's individual abilities.

In the conducted earlier researches it was determined that in swimming duration of start has strong correlation with final result at distance. It is especially noticeable in sprinter numbers of program [6-8; 10; 22]. According to data of Mason & Cossor [14] final result at 50 meters'distance by 30% depends on effectiveness of start; at 100 meters distance this influence is 15%. In opinion of Arellano et al. [7]; Maglischo, E. W. [13]; Rejman & Ochman [15];

Ruschel et al. [16]; Thompson et al. [24]; Welcher et al. [25] perfection of start technique (reduction of time of its fulfillment) can substantially shorten time of competition distance swimming.

Swimming start, as it is, shall be regarded as technical element, consisting of actions above water and under water [4; 8; 16; 22; 25]. Surface part include time of sportsman's being on start pedestal (block time – BT). This indicator noticeably varied (comparing with speed characteristics) in finalists of all analyzed distances (V_A=6.82% at 50 meters distance; 5.98% – at distance 100 meters and 6.31% – at distance 200 m). Lithuanian swimmer was on pedestal much longer than most of sportsmen. Lagging behind mean group indicators (depending on distance) was from 6.1 to 11.8 % (see table 4). Loss in surface actions he had to compensate by distance swimming.

Table 4. Indicators of competition functioning of European 2014 championship finalists of 50 meters' distance (breaststroke)

Indicators	Statistical characteristics					Giedrius Titenis		
	$\bar{x}$	σ	min	max	$V_{A\%}$	x	%	$\bar{x}$
Result (50)	27.46	0.07	27.00	27.72	0.77	27.34	99.6	
Result (100)	60.10	0.26	58.96	61.02	1.23	59.61	99.2	
Result (200)	130.01	0.72	127.5	132.96	1.57	128.93	99.2	
$BT_{(50)}$	0.66	0.05	0.58	0.70	6.82	0.70	106.1	
$BT_{(100)}$	0.69	0.04	0.61	0.74	5.98	0.73	106.4	
$BT_{(200)}$	0.7	0.04	0.65	0.78	6.31	0.78	111.8	
$V_{1(50)}$	2.28	0.05	2.22	2.34	2.05	2.34	103.0	
$V_{1(100)}$	2.29	0.04	2.25	2.36	1.70	2.27	99.2	
$V_{1(200)}$	2.28	0.07	2.19	2.37	2.86	2.30	100.8	
$V_{2(50)}$	1.68	0.02	1.66	1.72	1.20	1.67	99.6	
$V_{2(100)}$	1.58	0.03	1.53	1.61	1.63	1.60	100.9	
$V_{2(200)}$	1.50	0.02	1.46	1.53	1.47	1.53	101.9	
$V_{3(100)}$	1.66	0.06	1.59	1.78	3.46	1.66	100.3	
$V_{3(200)}$	1.57	0.03	1.51	1.62	2.06	1.59	101.5	
$SR_{(50)}$	62.6	2.62	59.2	67.2	4.18	60.0	95.9	
$SR_{(100)}$	50.4	2.68	46.7	53.6	5.32	47.6	94.5	
$SR_{(200)}$	36.5	3.64	31.4	42.3	9.97	31.4	86.1	
$SL_{(50)}$	1.69	0.07	1.57	1.77	4.01	1.77	105.2	
$SL_{(100)}$	1.94	0.14	1.71	2.08	7.23	2.07	106.7	
$SL_{(200)}$	2.51	0.21	2.13	2.75	8.34	2.75	109.5	

Indicators	Statistical characteristics					Giedrius Titenis		
	$\overline{x}$	σ	min	max	$V_{A\%}$	x	%	$\overline{x}$
$SI_{(50)}$	2.83	0.11	2.65	2.96	3.91	2.96	104.8	
$SI_{(100)}$	2.82	0.28	2.20	3.05	9.84	3.05	108.5	
$SI_{(200)}$	3.76	0.32	3.15	4.19	8.52	4.19	111.5	

As it is known start segment is a unique one for every swimmer. It hinders comparison of its effectiveness in different sportsmen. It is also known that international rules oblige swimmers to emerge from water after crossing 15 meters' (from start line) point. That is why this segment is called start one in swimming. The received by us data witness that speed of finalists at start segment at 50 meters distance varied from 2.22 to 2.34 m/sec. (V_A=2.05%), at distance 100 m – from 2.25 to 2.36 m/sec. (V_A=1.70%), at distance 200 m – from 2.19 to 2.37 m/sec. (V_A=2.86%). Start speed of Lithuanian sportsman at distance 50 m was by 3% higher than mean start speed of other finalists. For compensation of lagging behind on pedestal the sportsmen demonstrated the highest speed at start segment in the swim. His start speed at distance 100 m was by 0.8% lower than mean group speed, but at distance 200 m – by 0.8% higher.

Speed of turn at 100 meters distance varied from 1.25 to 1.78 m/sec. (V_A=3.46%). Indicator of G.T. practically coincided with mean group indicator. Mean speed of all turns at 200 meters distance varied a little less – from 1.51 to 1.62 m/sec. (V_A=2.06%). This action was fulfilled by Lithuanian swimmer better than by most of his opponents (his mean speed of turns was by 1.5% higher than mean group speed) (see table 4).

Main distinctions of sportsmen's technical-tactic potentials are manifested in strictly individual combination of temp and length of stroke at distance. One and the same speed can be achieved with different combinations of stroke length and temp. But, the higher is speed the less is the quantity of combinations. With achievement of maximal speed – there is the only variant. Long stroke requires great efforts, which increase content of lactic acid in blood. That is why it is necessary to be able to vary swimming speed with minimal energy consumption [1; 11;17; 18].

We found that with increase of distance length difference between minimal and maximal values of temp and stroke length also increased: i.e. distinctions in competition functioning tactic became more noticeable. Minimal temp of strokes at 50 meters distance was 59.2 cycles/min., maximal - 67.2 cycles/min. (V_A=4.18%). At distance100 m. – 46.7 and 53.6 cycles/min., accordingly (V_A=5.32%). At the longest distance– 31.4 and 42.3 cycles/min., accordingly (V_A= 9.97%). Stroke length varied accordingly: from 1.57 to 1.77 (V_A=4,01%); from 1.71 to 2.08 м (V_A=7.23%); from 2.13 to 2.75 m (V_A=8.34%). Lithuanian swimmer demonstrated the least frequency of strokes with their higher length against the background of other finalists. With increasing distance length the swimmer noticeably reduced temp of movements (60.0 – 47.6 – 31.4 cycles/min.,) and made stroke longer (1.77 – 2.07 – 2.75 m). If at the shortest distance his individual indicators differed from mean group indicators by 4.1 and 5.2%, then at the longest distance differences reached 13.9 and 9.5%. The calculated index of effectiveness (SI) is a bright proof of it. This index implies that with pre-set speed, swimmer with longer stroke length has more effective swimming technique. Mean group SI values of finalists at sprinter distances were practically equal and increased only at 200 meters distance. Individual values of Lithuanian sportsman were maximal in every final swim (superiority over other finalists reached from 4.8 at distance 50 m. to 11.5% at distance 200 m) and increased with increasing of distance length (see table 4).

Discussion

In the fulfilled researches [9; 12; 19; 20; 23] it was determined that in swimming technique there are three variants of arms and legs' movements coordination: 1) sliding (when between finishing of push with legs and beginning of stroke with arms there is a moment of sliding); 2) continuous (when stroke beginning coincides with finishing of legs' push); 3) overlapping (when phase of arms' movement starts from the moment of legs' push finish). The first variant of coordination is more frequently used by sportsmen, who specialize at 200 meters' deistance. The second is used at 100 meters distance; and the third – at distance 50 meters [20; 23]. The found individual indicators of Lithuanian swimmer's stroke length and effectiveness index permit to say that he completely mastered all variants

of breaststroke techniques. The sportsman is able also to effectively use distance length. His indicators differ from data, received by other researchers. Temp of sportsman's movements is lower, but stroke length is noticeably higher, comparing with the best breaststrokers of Ukraine and Europe [2; 4; 5; 21].

In the researches of recent years it has been proved that variability of movements' techniques is not a negative factor. Intra-individual variability permits for elite swimmers-breaststrokers to successfully adapt coordination of limbs' movements to current conditions. Thus, sportsmen regulate period of sliding in the most streamlined position [**Ошибка! Источник ссылки не найден.**]. The sportsman, having sufficient level of technical variability, is able to understand and take the most optimal decision of motor task's solution. In this case the sportsman uses individual optimal forms of coordination.

The conducted analysis of competition functioning of EC 2014 finalists permits to say that elite swimmers-breaststrokers, if having certain level of technical tactic fitness, are able to achieve high results at competition distances of different length.

Conclusions:

Individual potentials of elite swimmers permit to use different technical-tactic variants of distance swimming. That is why they are able to demonstrate high results at competition distance of different length with equal structure of fulfilled movements.

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COMPARATIVE ANALYSIS OF FOOT SUPPORT-SPRING INDICATORS OF PRIMARY SCHOOL AGE CHILDREN WITH WEAK EYESIGHT IN PHYSICAL EDUCATION PROCESS

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Abstract. *Purpose:* to fulfill comparative analysis of foot support-spring indicators of schoolchildren with weak eyesight. *Material:* in the research 7-10 years' age children (n=76) with weak eyesight participated. The children learn in specialized boarding school. *Results:* we found statistically confident differences between some foot support-spring indicators of primary school children with weak eyesight and their practically healthy children. It was registered that primary school children had weaker muscles and ligaments of lower limbs. The reason can be insufficient motor functioning and muscles' stiffening in moving in space as well as the absence of exercises for prophylaxis of foot functional disorders. *Conclusions:* we determined that there is demand in working out and implementation of practical recommendations in physical education process of schoolchildren with weak eyesight. Physical education process shall be oriented on educational aims, on application of health related correcting and compensatory-prophylaxis physical exercises. Such approach will positively influence on correction of foot support-spring disorders.
Key words: primary school pupil, eyesight, weakened, foot.

Introduction

Muscular skeletal apparatus has a lot of functions, the most important of which are ensuring of support, protection and movements of human body. Every of these functions provide different biological and morphological structures. In this connection many skeleton and muscles' system morphological formations participate in realization of the whole complex of morphological functional organs and systems [2, 7, 11, 12, 26, and 27].

Such motor abilities as standing and locomotion are of special importance for assessment of human biological condition. They are indicators of his (her) adaptation mechanisms to environmental conditions. It is important both: in phylogeny and ontogeny aspects [3, 8, 9, 13, 21-25]. In conditions of natural locomotion foot serves as support and ensures organization of spring interactions of human body with surface. It means that in foot motor mechanisms great potentials of spring-ductile properties of the whole lower limb are embedded [1, 5, 11, 12, 28-31].

Study of foot adaptation potentials in sports and physical culture practicing is rather important for assessment of foot's functional-morphological characteristics. Under influence of physical exercises, foot can significantly deform. Often it results in undesirable after effects in dynamic of ordinary walk and in progressing of foot pathologies. That is why, detail and profound study of foot motor potentials in different conditions of its motor function's organization acquires high methodological importance. It requires organization of specialized control over foot morphological functional state in period of active sports or physical culture practicing [5, 8, 11, and 12].

Analysis of special scientific-methodic literature showed that practically all specialists point that children with visual analyzer problems have secondary disorders of health, as well as related deviations of morphological-functional systems in work of muscular-skeletal apparatus. Among functional disorders of muscular-skeletal apparatus, primary school pupils with weak eyesight had disorders of carriage and support-spring properties of foot [6, 14, 17, 19, and 20]. Among many researches we can mention the works of K.N. Sergiyenko [11, 12]. The author determined interconnection of lower limbs geometry and bio-mechanical properties of skeleton muscles, ensuring foot functional resistance of primary school age children. A.A. Dyachenko [5], in the process of her researches found that primary school age children with weak eyesight lag behind their practically healthy peers by somatic metrical characteristics ($p<0.05$). It was found that the most expressed lagging of primary school children with weak eyesight had by characteristics of foot support-spring properties: height of foot arch, forefoot and heel angles. N.L. Nosova [9] determined the height of foot arch in practically healthy primary school pupils. Analysis of the researches showed that all data were presented fragmentary and did not reflect the whole depth of the problem. In our researches, in the process of stating experiment we studied the whole number of quantitative data. These data completely characterize foot support-spring properties of primary school age pupils with weak eyesight. Among them the main are: foot length

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and height, length of foot supporting part, expressiveness of arch, height of ankle, foot rise, angles of support and spring foot arches, Freedland's index.

Purpose, tasks of the work, material and methods

The purpose of the work is to fulfill comparative analysis of foot support-spring indicators of schoolchildren with weak eyesight and find statistically most significant differences.

The tasks of the work:

1. To analyze special scientific-methodic literature and determine importance of the problem of foot support-spring functional disorders in 7-10 years' age children with weak eyesight.

2. To fulfill comparative analysis of some foot support-spring indicators of primary school pupils with weak eyesight and their practically healthy peers.

3. To determine the most significant statistically confident distinctions in indicators of foot support-spring properties of primary school age children with weak eyesight by the data of different authors.

Material and methods of the research: analysis of special scientific-methodic literature, pedagogic observation, pedagogic experiment with the help of methodic «BIG FOOT» and «FOOT SPRINT», methods of mathematical statistic.

Results of the research

In our research we found angle characteristics, which play important role in formation of body vertical stability and human locomotion function: forefoot angle (angle between supporting part line and straight line, connecting the head of first forefoot bone with point of arch maximal height); heel angle (angle between supporting part line and straight line, connecting supporting calcaneal tuberosity with point of arch maximal height). Results were received in the process of digitization of feet images in program «BIGFOOT» [11, 12]. For comparative analysis of angle characteristics of foot support-spring properties we found and studied analogous indicators of other researches (see table 1).

Table 1. Angle characteristics' indicators of foot support-spring properties of primary school age children

Indicators	**Angle ° **				**Angle ° **			
Age, years	**7**	**8**	**9**	**10**	**7**	**8**	**9**	**10**
Adel Ben Zheddu Ben Larbi [1]								
$\overline{x}$	22.85	23.20	24.77	24.67	27.13	27.57	27.80	28.27
S	2.51	2.76	3.24	3.08	3.35	3.84	4.61	3.96
A.A. Dyachenko [2]								
$\overline{x}$	21.96	23.27	23.29	24.0	24.9	26.23	28.52	27.75
S	1.92	1.15	1.10	1.83	5.15	2.39	4.89	3.65
Results of our researches								
$\overline{x}$	15.04	20.70	13.54	12.86	23.0	20.89	20.85	18.97
S	3.19	2.96	3.53	3.53	5.90	5.91	5.10	5.71

The data of table 1 point that results of our researches of 7-10 years' age children with weak eyesight significantly lag behind by indicators of angle and angle from practically healthy children [1, 4, and 5]. It should be also pointed that we studied angle characteristics of foot support-spring properties both: right and left feet. The data of other authors are presented only ion right foot. That is why we fulfilled comparative analysis only by indicators of right lower limb.

Thus, it is obvious that it is necessary to work out and implement experimental program of prophylaxis of foot support-spring disorders in primary school age children with weak eyesight.

During phylogeny development human foot has significantly changed due to its adaptation to vertical movement. Owing to relative lengthening of tarsus and shortening of forefoot foot turned into organ of support. It was facilitated by development of longitudinal and lateral arches, strengthened by powerful ligaments and kept by tonus of foot muscles. Foot arches ensure characteristic springiness, which significantly soften pushes of foot on ground in walk, run or jumps [2, 3, 8, and 15]. That is why foot arch-type construction is the most important specificity of human foot as well as height of arches. Comparison of received by us values of foot arches of children with weak eyesight with practically healthy children's indicators is shown in table 2.

Table 2. Characteristic of foot arches of primary school age children

Indicators	**Right foot**				**Left foot**			
Age, years	**7**	**8**	**9**	**10**	**7**	**8**	**9**	**10**
L.N. Nosova [4]; practically healthy children								
$\overline{x}$	29.0	31.0	33.0	35.0	29.0	31.0	33.0	35.0
S	2.2	3.3	2.9	2.3	2.2	3.3	2.9	2.3
A.A. Dyachenko [3]; primary school pupils with weak eyesight								
$\overline{x}$	26.39	27.54	29.70	32.4	27.0	27.0	30.0	32.0
S	1.06	1.75	3.35	2.24	1.1	1.06	4.01	2.5
Results of our own researches								
$\overline{x}$	20.72	20.35	22.72	23.18	17.61	20.44	22.11	22.57
S	4.80	5.13	5.99	6.32	4.43	4.96	4.83	5.21

In this aspect it is interesting to compare the heights of foot arches. Spring oscillations of foot arch protect organism from rough pushes and shaking during walking. Disorders of foot spring properties are caused by overloads and over-fatigue of muscles.

Comparative analysis of foot arches characteristics of primary school age children with visual analyzer pathologies and practically healthy peers showed that they have statistically confident differences. It witnesses that in this indicator pupils with weal eyesight demonstrate the lowest results. Such tendency exists in every age period. For example, 7 years' age children with weak eyesight, by our data, have foot arch of right leg by 9 mm less than practically healthy children [4, 5, and 9]. In left leg mean statistic difference reaches 10 mm, comparing with children with weak eyesight and 12 mm, comparing with practically healthy children.

In children of 8 years' age we observed statistically confident difference ($p<0.05$) between data of right and left feet. Difference is 7 mm between peers with weak eyesight and 11 mm, comparing with healthy children. The highest difference between indicators of foot arch of children with weak eyesight and indicators of practically healthy children was observed in 10 years' age on left foot – 13 mm. Such significant difference between indicators justifies implementation of correcting prophylaxis means with application of technical equipment in physical education practice. Application of such equipment is oriented on improvement of foot support-spring properties of schoolchildren with weak eyesight. Regular medical examinations shall assess effectiveness of such physical exercises' prophylaxis complexes. The purpose of these examinations – determination of tendencies to improvement of foot arch characteristics and reduction of flat foot risk.

Analysis of special scientific-methodic literature [6, 15, 16, 17, and 20] witnesses that at present time little attention is paid to rising generation's physical condition. In opinion of leading specialists in physical culture [10, 13, 14], physical education means are very powerful factor of disorders correction and prophylaxis of morphological functional deviations in child's health. Sports and physical culture practicing facilitate development of child's motor abilities and skills and improve muscular skeletal apparatus morphological and functional indicators. Among them the main are: improvement of muscular tonus, respiratory and cardio-vascular systems. Keeping of vertical posture in

static and dynamic exercises facilitate correct carriage, mobility of ligament-muscular apparatus, strengthening of foot support-spring properties.

Discussion

Study of foot support-spring properties of school age children with weak eyesight is caused by urgency of such researches. Analysis of scientific literature points at principle importance of foot support-spring properties' development in schoolchildren with weak eyesight [2, 4, 5, and 7]. The authors think that "foot is pedestal of body". That is why any disorders influence negatively on effectiveness of the whole muscular-skeletal apparatus work.

In our research we found the whole number of statistically confident distinctions, comparing with practically healthy children. It witnesses that children with weak eyesight have weaker muscles and ligaments of lower limbs. The reason of it can be insufficient motor functioning, muscles' stiffening in movements as well as absence of prophylaxis exercises, which would prevent from foot functional disorders. It of common knowledge, that children with visual analyzer's pathologies have secondary disorders and deviations from normal functioning of muscular skeletal system. Among them we can name: disorders of carriage, flat foot, joints' limited mobility. Thus, physical education process for such contingent shall be directed to educational activity, application of correcting-health related means, compensatory-prophylaxis physical exercises.

Conclusions:

Analysis of special scientific-methodic literature showed that normal functioning of foot is the main pre-condition of muscular-skeletal apparatus effective work.

Different authors stated that primary school age children with weak eyesight lag behind in indicators of physical condition, physical fitness and functional disorders of muscular skeletal apparatus. It also relates to foot support-spring properties.

Comparative analysis of quantitative data, received by different authors, confirms the results of our experiment. The experimental data witness that children with visual analyzer's problems lag behind from their healthy peers in indicators of foot support-spring properties.

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MODERN APPROACH TO IMPLEMENTATION OF HEALTH RELATED TECHNOLOGY FOR PRIMARY SCHOOL CHILDREN

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Abstract. *Purpose:* to work out and experimentally prove health related technology, which would facilitate formation of pupils' healthy life style. *Material:* In the research pupils of 8-9 years' age participated. From four tested forms we composed four groups. Control groups consisted of 19 boys and 17 girls; experimental groups – of 20 boys and 16 girls, who were practically healthy. *Results:* the highest absolute increment of physical fitness indicators in experimental group was found in such motor abilities as flexibility, strength of hands' and torso muscles, speed-power qualities. It was noted that for effective development of pupils' physical qualities decisive factor was consideration of sensitive periods and complex approach at physical culture classes. *Conclusions:* the received results witness about effectiveness of the worked out by us technology. It consists of two blocks with prevailing usage of health related exercises.

Key words: technology, health, health related exercises, formation, primary school pupils.

Introduction

Recent years, quantity of healthy pupils has been decreasing 3-4 times and, at the same time, level of motor functioning reduces. All these negatively influence on child's physical condition, slow development of main physical qualities: strength, quickness, endurance, flexibility, dexterity and etc. [14]. That is why, protection and strengthening of pupils' health, rising of motor functioning level, development and further perfection of main physical qualities are main tasks of primary school children's physical education and priority directions of our society progress [18, 19].

To day, in Ukraine high level of population morbidity is registered, especially among children and adolescents. During school period quantity of healthy children reduces 3-4 times from first to eleventh form. That is why preservation and strengthening of children's health, formation of spiritual demands and healthy life style skills are of first priority in society's development [6].

Physical culture is a part of society's general culture and one of social functioning spheres, oriented on health strengthening, development of human physical abilities. Main indicators of physical culture status in society are human health level and physical condition, application of physical culture in education, everyday life and sports achievements [2, 17].

Great number of scientific-methodic works is devoted to effectiveness of children's and adolescents' physical education: O. Dubogay [4], M. Boreyko [1], Yu. Vaskova [2, 3], T. Krutsevych [5], S. Prysiazniuk [8], A. Tsos [10], B. Shyan [11], L. Shuba [12-14], J. Rink [19], J. Fisher, L. Reilly, C. Kelly, A. Montgomery, J. Williamson [15] et al. All these permit to state that the basis of effective physical education in school shall be individualization of training process, directed to personality's interests and demands in free and independent development [12].

So, problem of health related technology's working out for primary school children with application of physical education means and methods is rather important.

Purpose, tasks of the work, material and methods

The purpose of the work is to theoretically ground, work out and experimentally test health related technology for facilitation of healthy life style effective formation in 8-9 years' age pupils with the help of physical education means and methods.

The tasks of the research:

1. To analyze current status of existing technologies, methodic and means of healthy life style formation in primary school pupils.
2. To work out health related technology, oriented on formation of 8-9 years' age children healthy life style.
3. To study our technology's influence on physical condition and physical health indicators of 8-9 years' age pupils.

The methods of the research:

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- analysis of literature sources;

- pedagogic observation (we studied influence of health related life style on health improvement and development of physical qualities);

- methods of physical health assessment. Assessment of physical health was realized as per "Express-screening of children's and adolescents' somatic health". In the basis of quantitative express assessment of physical health there were anthropometrical indicators (body length, body mass, vital capacity of lungs (VCL)] and status of cardio-vascular system. Criterion of reserve and saving character of cardio-vascular system's functioning was Ruffiet's index and "double product" in rest (Robinson's index). Criterion of external breathing function's reserve was vital index of muscular system – power index. All indicators were ranged. They were given certain points separately for boys and girls. After receiving of every indicator we found total of points, which was assessment of physical health level;

- pedagogic testing ("forward bent from sitting position", cm,; "torso rising in sitting position during 1 minute", quantity of times; "pressing ups", quantity of times; "long jump from the spot", cm; "shuttle run 4x9m", sec.; "30 meters' run", sec.).

- pedagogic experiment (for fulfillment of three stages of experiment the tested were divided into control and experimental groups);

- methods of mathematical statistic (mean arithmetic, mean square deviation, variation coefficient, standard error of mean arithmetic, correlation coefficient).

In the research pupils of 8-9 years' age participated. From four tested forms we composed four groups. Control groups consisted of 19 boys and 17 girls; experimental groups – of 20 boys and 16 girls, who were practically healthy.

Results of the research

Physical culture field in educational sphere reflects also in many spheres of society's functioning. Organization and content of physical education is regulated by:

- Laws of Ukraine: "On pre-school education", "On education", "On comprehensive secondary education", "On vocational-technical education", "On physical culture and sports"; by act of President of Ukraine and Cabinet of Ministers of Ukraine.
- Normative legal and other acts of Ministry of education and science of Ukraine, Ministry of health protection of Ukraine, Ministry of youth and sports of Ukraine about physical education of children and students;
- Inter-sector complex program "Health of nation";
- State standards of basic comprehensive education, approved by Cabinet of Ministers of Ukraine;
- Physical culture educational program for comprehensive educational establishments' pupils;
- Physical culture educational program for special health groups' pupils;
- Order of MES of Ukraine "On approval of safety regulations at physical culture and sports trainings in comprehensive educational establishments" [14].

The purpose of modern school is preparation of children for life. Every pupil shall receive knowledge, which he will require in the future [4].

The process of physical education shall be continuous. It can not be organized in the way different from the form of structurally separate trainings. Such trainings shall be separated one from other by more or less significant periods of time. Duration of such trainings depends on general regiment of life, character of main and other activity, dynamic of recreational measures and other factors. General principles of physical education admit combining of different training forms' different links; they can change in content and definite conditions of construction: by level of pupils' fitness and content, place of training, environmental conditions, technical provisioning and so on [11, 15, 16]. That is why it is necessary to activate systemic practicing of physical exercises in organized forms. In practice of physical education there are two forms of training: curricular and extracurricular [5, 6, 9]. TThese forms have certain tasks, purpose, content, means and methods. It conditions obedience of their building to general rules and pedagogic requirements.

In the base of experimental technology creation we put main directions and main tasks of personality's comprehensive harmonious development, different kinds of education: moral, civil, mental, physical and health related.

1. Moral education – is development of pupils' morality: formation of moral conceptions, view, beliefs, moral feelings; cultivation of skills and habits of moral behavior.

2. Civil education means development of patriotism, national identity, value attitude to nature and work.

3 Mental development implies mastering of definite volume of knowledge, expansion of world-vision, development of cognitive abilities.

4. Physical education is facilitation of pupils' correct physical development, health strengthening, training and perfection of motor qualities; formation of hygienic skills; formation of demand in systemic physical culture and sports practicing.

5. Health related education means formation of health culture, which includes knowledge about versatility of health exercises and their influence on organism [7].

The following pedagogic principles were the determining for us:

1. Complex approach to development of physical qualities;

2. Rational construction of trainings and complexes of exercises, which would comprehensively influence on child's organism. The exercises were selected, considering age peculiarities of primary school children's organism. Every complex includes exercises, requiring work of different muscles' groups and oriented on training of physical qualities;

3. Application of play method for strengthening of child's motivation for physical exercises' practicing. In primary school age it is necessary to stimulate child's creative abilities, help him (her) to awake interest for self-education, to acquire steady demand in creative thinking;

4. Application of self-control system for determination of physical qualities' increment [9].

So, ideological basis of healthy life style formation can be conception of effective usage of physical education forms and means, to be applied in academic day and in extracurricular time. It is a process of pedagogic assistance to a child in formation of his (her) as a subject, cultural identification, socialization, self –affirmation in life.

Considering the above mentioned we offer the author's health related technology. It is composed of two blocks, which supplement each other and, thus, comprehensively influence on a pupil (see fig.1).

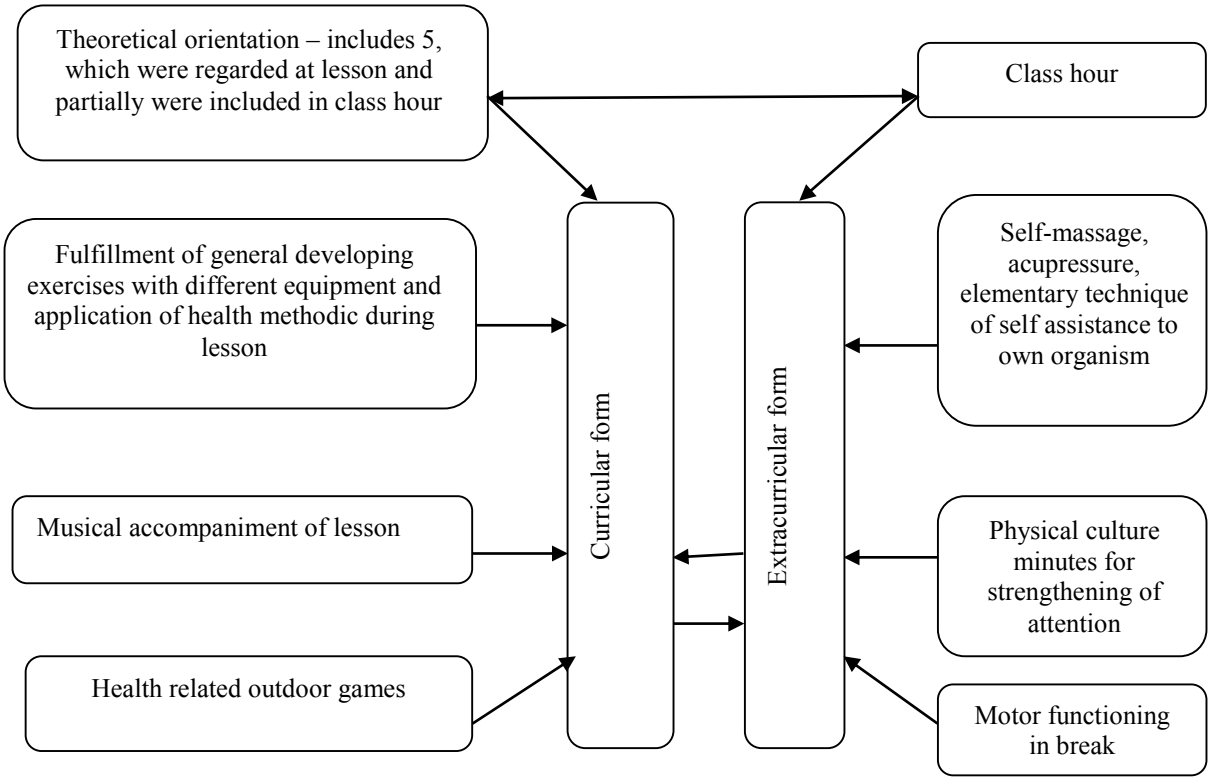

Fig.1. Diagram of experimental health related technology

Effectiveness of he worked out technology is assessed by level of pupils' physical qualities and physical health. Analysis of control and experimental groups' indicators shows that increment of indicators of body length; body mass and chest circumference correspond to age standard in both groups. However, analysis of these indicators did not show statistically significant ($p>0.05$) increase in experimental group after experiment, comparing with control group. Results of the research witness that there is statistically significant ($p<0.05$; $p<0.01$) increment of VCL (vital capacity of lungs) indicators; reduction of HBR (heart beats rate) and BP (blood pressure) in experimental group after experiment, comparing with control group.

After experiment assessment of pupils physical health level proves effectiveness of the worked out technology. For example, indicators, characterizing physical health of the tested pupils increased (boys – 24.3% and girls – 21.6% of experimental group reached average level of physical health; in control group – accordingly 8.1% and 9.4%).

After experiment the received data of boys remained similar in all tests: "forward torso bent" (V up to 5.62% – control group and V up to 5.42% – experimental group), "torso rising in sitting position during 1 minute (V up to 4.81% – control group and V up to 4.05% – experimental group), "pressing ups in lying position" (V up to 6.95% control group and V up to 6.89% – experimental group), "long jump from the spot" (V up to 8.11% – control group and V up to 7.76% – experimental group), "shuttle run 4x9 m" (V up to 5.22% – control group and V up to 5.93% – experimental group), "30 meters' run" (V up to 7.11 % – control group and V up to 6.55% – experimental group).

Analyzing indicators of test "Forward torso bent from sitting position" we registered the following increment: in control group - by 8.76 ± 0.85 cm; in experimental – by 11.47 ± 0.67 cm ($p<0.05$). Test "torso rising in sitting position during 1 minute" after experiment showed: control group - 27 ± 0.59 times; experimental group - 30 ± 0.70 times ($p<0.05$). "Pressing ups in lying position" of boys after experiment showed: control group – 18 ± 1.29 times; experimental group – 21 ± 1.31 times ($p<0.05$). Indicators of "Long jump from the spot" of boys after experiment were within average values and above it. In control group they were – 149 ± 3.09 cm; in experimental - 155 ± 3.02 cm ($p<0.05$).

Boys' results in "Shuttle run 4x9 m" after experiment were: in control group – 11.24 ± 0.19 sec.; in experimental group – 11.14 ± 0.21 sec. ($p<0.05$). Indicators of "30 meters' run" test increased in control and experimental groups: in control group – by 5.63 ± 0.19 sec.; experimental group – by 5.13 ± 0.18 sec., ($p<0.05$).

Concerning girls' results in control and experimental groups after experiment we found that girls' groups remain uniform by indicators of all tests: forward torso bent from sitting position" (V up to 8.04% – in control group and V up to 7.98% – experimental group), "torso rising in sitting position during 1 minute" (V up to 7.28% – in control group and V up to 7.71% – in experimental group), "pressing ups in lying position" (V up to 7.04% – in control group and V up to 9.81% – in experimental; group), "shuttle run 4x9 m" (V up to 7.73% – control group and V up to 7.08% – in experimental group), "30 meters' run" (V up to 9.72 % – control group and V up to 9.12% – experimental group).

Analyzing indicators of test "Torso bent from sitting position" we see the following increments: in control group – by 12.08 ± 0.67 cm; in experimental group – by 14.07 ± 0.72 cm ($p<0.05$). In test "Torso rising in sitting position during 1 minute" after experiment there were the following indicators: in control group - 28 ± 0.61 times; in experimental group– 30 ± 0.74 times ($p<0.05$). In "Pressing ups in lying position" after experiment there were the following indicators: in control group – 10 ± 0.29 times; in experimental group – 11 ± 0.42 times ($p<0.05$). Indicators of test "Long jump from the spot" were in control group – 131 ± 3.289 cm and in experimental group – 134 ± 3.81 cm ($p<0.05$). In test "Shuttle run 4x9 m" there were the following indicators: in control group – 12.71 ± 0.19 sec.; in experimental group – 12.57 ± 0.19 sec. ($p<0.05$). Besides, after implementation of experimental technology girls' indicators of "30 meters' run" test improved in both groups. In control group they were 6.10 ± 0.15 sec. and in experimental group – 5.90 ± 0.16 sec. ($p<0.05$).

It should be noted that for effective development of physical qualities in control and experimental groups, consideration of sensitive periods and complex approach at physical culture lessons were the decisive factor. It was proved that application of experimental technology ensured improvement of physical qualities practically by all indicators. So, analysis of results showed that application of experimental health related technology was effective and can be used.

Discussion

Physical culture lessons are the main form of pupils' physical education. They are compulsory for all pupils (except pupils-members of special health groups). These lessons shall actively facilitate successful realization of extracurricular and out-of-school physical education, formation of pupils' interest and skills in physical exercises in everyday life. It is necessary to strengthen influence of physical culture lessons on perfection of other physical education forms. It is known that even with physical culture lessons being of high quality, their direct influence on pupils' physical condition is insufficient. Scientific researches found that physical culture lesson ensures in average only 41% of hygienic norm of pupil's motor functioning. In this connection it is necessary to enrich and correctly combine different forms of pupils' physical education and health related physical culture work [5, 6, 11].

Orientation of physical culture curricular and extracurricular work on mass pupils' involvement in systemic physical culture and sports practicing to large extent facilitates schoolchildren health strengthening, improves their physical fitness. Analyzing the worked out by us health related technology we can note that it positively influenced on all aspects in our research. We registered improvement of VAL (vital capacity of lungs) indicators, reduction of HBR (heart beats rate) and BP (blood pressure) after experiment in experimental group pupils, comparing with control group ($p<0.05$; $p<0.01$). Besides, having analyzed physical fitness indicators in all groups we can note that after experiment physical fitness in experimental group reached high level and above average. In control groups there was also some increment but no so significant: indicators were at average level and above average. It is connected with the fact that in experimental groups, teacher used the author's technology: we selected all exercises, considering sensitive period and emotional state of children; also different equipment was used (both classic and non standard). All these components facilitated so positive results of the research.

Conclusions

1. Analysis of literature showed that the main problem of improvement of healthy life style formation in primary school pupils by means of physical education is seeking of innovative approaches to complex organization of curricular and extracurricular trainings; appropriate methods and technologies. Such trainings shall consider interests and age peculiarities of children.

2. It has been proved that main attention in optimization of health related physical culture process is paid to projecting of different health related physical culture systems. The basis of such systems is scientifically grounded and adequate correlations of internal and external factors of child's development. Considering these factors we worked out our health related technology.

3. The received results witness about effectiveness of the worked out technology. It is composed of two blocks with prevalence of health oriented exercises as new mean of healthy life style formation.

The prospects of further researches of the problem are connected with study of pupils' organism adaptation under influence of different health related means, oriented on development of memory, attention, physical qualities and health strengthening.

Conflict of interests

The author declares that there is no conflict of interests.

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STUDY OF AUTHOR'S APPLIED PHYSICAL TRAINING PROGRAM FOR MILITARY OFFICERS-GRADUATES OF RESERVE OFFICERS' DEPARTMENTS

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Abstract. *Purpose:* to test effectiveness of applied physical training program for military officers, called up to military service after graduation from reserve officers' departments. *Material:* the research was conducted on the base of Educational center 184 from June 2014 to December 2015. In the research 80 military officers participated (n=30 – graduates of military higher educational establishments; n=26, n=24 – graduates of reserve officers' departments) of 22-27 years' age. *Results:* we fulfilled analysis of military officers' physical fitness by exercises, which characterize general physical fitness and military applied skills (100 meters' run, chin ups, 3000 meters' run, passing obstacles course, grenade throws for distance and for accuracy, 5 km march-rush). We worked out the program, the essence of which implies ensuring of physical fitness and acceleration of reserve officers-graduates' adaptation to professional (combat) functioning. *Conclusions:* it was proved that implementation of the author's program influenced positively on perfection of general physical qualities and military applied skills of military officers-graduated of reserve officers' departments ($p<0.05$-0.001).

Key words: author's program, reserve military officers, military service, physical loads.

Introduction

The process of reformation and development of Military Forces of Ukraine (MFU) requires from military administrations to concentrate efforts on perfection of work with young military officers. Military officers' staff is replenished by graduates of military higher educational establishments (MHEE) and civil higher educational establishments (HEE) [2, 7]. Effectiveness of mastering of most of professions depends on quality and formation level of motor skills and abilities. That is why the problem of objective content of physical training forms of military officers (called up from reserve) is one of the most important in theory and practice of physical training [9, 10].

Our previous researches proved that physical fitness level of military officers (graduated of reserve officers' departments ROD) does not meet requirements of Instructions on physical training of Military Forces of Ukraine. Besides, it was found that physical training tests were passed only by 54% of officers ($p<0.01$). From them 83% did not fulfill exercises for endurance. It witnesses about absence of organism systems' readiness for professional tasks' execution [5, 9].

Results of researches [8-12] proved that 65.6% of officers (called from reserve) are not able to fulfill applied exercises: grenade throws for distance and accuracy; passing of obstacle course; martial arts techniques; 5 km march-rush [8, 11, and 12]. That is why seeking of new methodic, programs and exercises, which would permit for this contingent of military officers to quicker adapt to military service and be ready for fulfillment of their duties, is rather urgent.

Basing on analysis of many scientific works [3, 4, and 6] and on our own researches we worked out program of applied physical training of military officers- ROD graduates. It implies ensuring of physical fitness and acceleration of military officers-graduates' adaptation to professional (combat) functioning.

Purpose, tasks of the works, material and methods

The purpose of the research is to test effectiveness of applied physical training program for military officers, called up to military service after graduation from reserve officers' departments.

The research was conducted on the base of Educational center 184 from June 2014 to December 2015. In the research 80 military officers participated (n=30 – graduates of military higher educational establishments; n=26, n=24 – graduates of reserve officers' departments) of 22-27 years' age with statistically uniform indicators of physical condition and physical fitness ($p>0.05$).

Results of the researches

For testing the author's program effectiveness we tested military officers, servicing by contract after graduation from ROD (EG and CG1) and military officers, who graduated from MHEEs (CG2). Physical fitness level was tested

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with the help of exercises from Instructions on physical training in Military Forces of Ukraine, which characterize general physical fitness and military applied skills: 100 meters' run, chin ups, 3000 meters' run, passing obstacles course, grenade throws for distance and for accuracy, 5 km march-rush.

100 meters' test showed that at the beginning of experiment CG2 military officers had confidently better indicators than EG and CG1 ($p<0.05$-0.01). Between officers of EG and CG1 there was no confident difference ($t=0.36$; $p>0.05$). After implementation of the author's program EG indicators confidently improved in respect to initial data by 0.4 sec. ($t=2.51$; $p<0.05$). Indicators of officers, who were trained by traditional program, confidently did not change during formation experiment. For example, in CG2 mean time of 100 meters' run did not change. This indicator was 14.1 sec. ($p>0.05$). Mean time of this exercise's fulfillment by CG1 officers even worsened by 0.2 sec. ($p>0.05$).

Officers' testing in 100 meters' run at the end of experiment showed confident difference between CG1 and CG2 military officers ($t=4.07$; $p<0.001$) and between indicators of CG2 and EG ($t=2.85$; $p<0.01$). So, confident difference between CG2 and EG indicators ($t=0.88$; $p>0.05$) was absent. At the beginning of experiment such difference was present: $t=2.95$; $p<0.01$.

Strength was tested with exercise "chin ups". Initial results in EG and CG1 (ROD graduates) had no confident differences ($t=0.34$; $p>0.05$). But they were confidently worse than indicators in CG2 (graduates of MHEEs) ($t=6.21$; $p<0.001$). Thus, we confidently determined that strength level of officers-ROD graduated did not correspond to required level.

During formation experiment CG2 indicators reduced 0.6 times ($p>0.05$), and CG1 – 0.3 times ($p>0.05$). Indicators of military officers, who were trained by author's program, improved 0.8 times ($t=3.39$; $p<0.01$). At the end of experiment indicators in EG and CG1 became confidently different 1.0 times ($t=3.86$; $p<0.001$). At the beginning of experiment EG chin ups indicators were worse than in CG2 2.1 times ($t=6.41$; $p<0.01$). At the end of formation experiment difference between officers of these groups was 0.7 times ($t=2.11$; $p<0.05$). It was proved that implementation of the author's program permitted to confidently improve indicators of military officers' strength ($p<0.01$).

Endurance was assessed by results of 3 km run test. This exercise was fulfilled by military officers in field uniform, without ammunition. Initial testing showed that there was no confident difference between indicators of EG and CG1 ($t=0.84$; $p>0.05$). Their results were confidently worse than the results of MHEEs graduated by 68.5 sec. ($t=5.60$; $p<0.001$) and by 80.8 sec. ($t=6.58$; $p<0.001$). It proves that general endurance of civil HEEs and ROD graduates is low and foes not meet the required level. Among the tested officers only 21% fulfilled this exercise "satisfactory" for their age group.

The received data are given in table 1.

Table 1. 3 km run indicators (EG, n=24; CG_1, n=26; CG_2, n=30), sec.

Stage	CG2			CG1			EG			p (CG 2-CG 1)	p (CG 1-EG)	p (CG 2-EG)
	$\bar{x}$	σ	m	$\bar{x}$	σ	m	$\bar{x}$	σ	m			
Beginning	738.7	28.79	6.44	807.2	53.03	10.40	819.5	51.30	10.47	t=5.60 < 0.001	t=0.84 > 0.05	t=6.58 < 0.001
End	749.0	22.00	4.92	815.1	22.72	4.46	782.5 *	62.43	12.74	t=9.90 < 0.001	t=2.41 < 0.05	t=2.43 < 0.05

Notes: * < 0.05.

At the end of formation experiment it was found that implementation of the author's program of applied physical training influenced positively on general endurance of military officers. At the end of experiment testing showed that in EG 3 km run indicators significantly improved by 37 sec. ($t=2.24$; $p<0.05$). In other groups there was insignificant worsening of results by 10.7 sec. ($p>0.05$) in CG2 and by 7.9 sec. ($p>0.05$) in CG1.

Comparative analysis of indicators showed that after finishing of the author's program implementation EG results became much better than CG1 indicators (officers, called up after graduation from MHEEs) ($t=2.41$; $p<0.05$).

With it, indicators of EG officers were confidently worse than indicators of CG2 officers (t=2.43; p<0.05). At the beginning of testing difference between indicators was 80.8 sec. (t=6.58; p<0.001). At the end of experiment such difference was 33.1 sec. (t=2.43; p<0.05). Results of CG1 officers also were confidently lower than EG results. At the beginning of experiment it was 68.5 sec. (t=5.60; p<0.001). At the end of formation experiment the difference was 65.7 sec. (t=9.90; p<0.001): no changes in mean time of 3 km run were found in this group.

Thus,T testing of military officers' general endurance showed that existing program of physical training, its content and training methodic do not permit to achieve required level of physical fitness (of officers, who already have formed physical skills). The program also does not permit to form or perfect physical qualities of officers, who, before military service, did not receive proper physical fitness.

Results of EG officers' testing (who were trained by author's program of applied physical training) proved that applied trainings by their structure approach to military officers' professional functioning. It permits to confidently perfect officers' physical qualities (p<0.05-0.001) and approach their level to the required for fulfillment combat tasks. For determination of effectiveness of the author's program of officers' applied skills' formation and development we tested military officers with exercises. It permitted to find the level of skills, required by military officers, independent on their specialty.

One of such exercises is the obstacle course, which characterizes dexterity and special endurance; coordination, courage and decisiveness. Analysis of initial obstacle course indicators showed that results of CG2 were confidently better than in EG (ΔX=36.9 sec.; t=8.51; p<0.001) and in CG1 (ΔX=41.8 sec.; t=9.78; p<0.001). Though, no confidence difference was found between EG and CG1 (graduated from RODs) (t=0.90; p>0.05).

After formation experiment indicators of all groups changed in the following way: in EG results confidently improved by 19.7 sec. (t=4.29; p<0.001); in CG1 results also improved, but without confident difference in respect to initial data (ΔX=10.4 sec; p>0.05).

Comparative analysis of obstacle course results at the end of formation experiment showed that CG2 indicators remained confidently better than indicators of CG1 by 22.8 sec. (t=4.36; p<0.001) and, comparing with EG officers, by 8.6 sec. (t=2.23; p<0.05). With it, mean result of CG1 officers was worse than in EG (trained by the author's program) by 14.1 sec. (t=2.92; p<0.01). Thus, it was proved that implementation of the author's program confidently positively influenced on perfection of applied physical skills (p<0.01).

The next applied skill is grenade throws for distance. It is a complexly coordinated exercise. For its fulfillment it is necessary to have certain physical qualities and trained technique of throw. The exercise was fulfilled with standard grenade F-1, of 700 g. weight.

Testing results showed that at the beginning of experiment there was no confident difference between officers-ROD graduates (t-t_1 0.90; p>0.05). But they were confidently worse than in CG2 (graduates from MHEEs) by 2,1 m (t=2.58; p<0.05) in CG_1 and by 2.9 m (t=3.46; p<0.01) in EG.

After formation experiment dynamic of grenade throws' for distance results was as follows: CG2 results reduced by 0.4 м (p>0.05); CG1 results improved by 0.2 m (p>0.05) and EG results confidently improved by 2.2 м (t=2.53; p<0.05) in respect to initial data.

So, let us pay attention to comparative analysis of grenade throws at the end of experiment. Indicators of CG1 and CG2 confidently differ (t=2.12; p<0.05) at the beginning and at the end of experiment. Results of EG and CG1 do not confidently differ at the end of experiment (t=1.80; p>0.05). At the beginning of experiment difference of mean indicators of grenade throw for distance was 0.8 м (p>0.05) and at the end of experiment it became 1.6 m (p>0.05). Besides, it is interesting that we did not find any confident difference between CG2 and EG results at the end of experiment. Difference between results was only 2.9 м (t=3.46; p<0.01).

Next exercise was grenade throw for accuracy. Result of the exercise implies hitting in circle from three attempts. Initial testing showed that only 37.1% of officers (ROD graduates) can fulfill this exercise. Most of them even were not able to throw grenade to control circle. Accordingly initial data of CG2 officers were confidently better than in CG1 (t=6.47; p<0.001) and EG (t=6.11; p<0.001). With it, between groups of ROD graduates there was no confident difference (t=0.10; p>0.05).

Implementation of the author's program permitted to confidently improve EG results of this exercise: quantity of hits in control circle increased 0.6 times (t=3.44; p<0.01). In CG1 this indicator increased only 0.1 times (p>0.05).

Comparing of EG and CG1 results of grenade throws for accuracy showed confident difference at the end of experiment – 0.5 hits ($t=245$; $p<0.05$). But results of RODs graduates (both in EG and CG1) were confidently lower than results of MHEEs graduates. For example, indicators of CG2 officers were better than in EG 0.6 times ($t=2.60$; $p<0.01$) and 1.1 times better than in CG1 ($t=4.31$; $p<0.001$).

Analysis of 5 km march-rush results showed that from ROD graduates only 7% could fulfill this test. That is why formation experiment included this exercise as compulsory element. At the beginning of experiment time of march-rush fulfillment by MHEEs graduates was confidently better than the same of RODs graduates. For example, CG2 result was better than in CG1 by 140.2 sec. ($t=7.37$; $p<0.001$) and better than in EG by 163.2 sec. ($t=9.97$; $p<0.001$). With it, difference between EG and CG1 indicators was 23 sec. and it was not confident difference ($t=1.08$; $p>0.05$).

By results of formation experiment, conducted as per the author's program, we found that officers' indicatores reduced in respect to initial data. In CG2 mean time of this exrcvise's fulfillment worsened by 16.6 sec. ($p>0.05$) and in CG1 results of march-rush fulfillment reduced by 36.6 sec. ($p>0.05$). EG results (trained by the author's program) improved, in respect to initial data, by 73.1 sec. ($t=3.55$; $p<0.001$).

Comparative analysis of final 5 km march-rush indicators showed that mean time in EG was confidently better than in CG1 by 86.7 sec. ($t=2.79$; $p<0.01$). That is, we determined positive influence of the author's program on perfection of military officers' applied skills.

One and half year of experiment is not sufficient period for improvement of physical qualities of officers, who did not graduate from MHEEs. CG2 results were confidently better than CG1 indicators by 160.2 sec. ($t=6.40$; $p<0.001$) and better than in EG by 73.5 sec. ($t=3.70$; $p<0.001$).

Thus, by results of formation experiment we proved that implementation of the author's program positively influenced on perfection of general physical qualities and military applied skills of military officers ($p<0.05$-0.001). Applied content of the author's program permits to form required for fulfillment of professional duties officers' skills. Such approach permits to maintain or even to improve general physical qualities of military officers.

Discussion

Analysis of scientific works showed that in present conditions professional functioning has certain peculiar features and pet forward high requirements to physical and psychological fitness of military officers [1, 12]. Our previous researches proved that level of RODs graduates' fitness was insufficient for fulfillment of professional and combat tasks [9, 10]. Our present research supplemented results of scientists V.V. Vandenko [1] and I.L. Shliamar [12] about positive influence of physical exercises on physical fitness and health of military officers.

We worked out program of applied physical training for military officers – RODs graduates. It essence implies ensuring of physical fitness and acceleration of reserve officers-graduates' adaptation to professional (combat) functioning. Applied content of this program permits to form required for effective professional functioning officers' qualities. Besides, it was found that this program permits to maintain and improve physical qualities in process of physical trainings.

Conclusions:

The fulfilled research found that physical fitness level of reserve officers' departments' graduates (CG1) by results of exercises for general physical fitness and for military applied skills was confidently lower than in graduates of military higher educational establishments (CG2) ($p<0.05$-0.001). It witnesses about insufficient effectiveness of acting physical training program.

The fulfilled analysis of physical fitness in experimental group (EG), comparing with control group (CG1) showed confident differences practically by all indicators: 100 meters' run ($t=2.85$; $p<0.01$), chin ups ($t=3.86$; $p<0.001$), 3000 meters' run ($t=2.41$; $p<0.05$), obstacle course ($t=2.92$; $p<0.01$), grenade throws for distance ($t=1.80$; $p>0.05$) and for accuracy ($t=2.45$; $p<0.05$), 5 km march-rush ($t=2.79$; $p<0.01$). It witnesses about effectiveness of applied physical training author's program of officers, called up after graduation of reserve officers' departments.

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Conflict of interests

The author declares that there is no conflict of interests.

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