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Rationalization of Warming Up and Mind-Setting during Training of Rowers for “Dragon” Boat Competitions

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Abstract

Article contains information on the inclusion efficiency of out-of-loading means—such as biomechanical (vibration) muscles stimulation and mind-set training—mental mindset to upcoming competitive activity into the process of direct precontest training of rowers. The prestart training of the process of rowing of the Dragon boats is the research object. Subject content of the research is determined by the performance reflected by the rowing activity character and rowers' muscles of the upper shoulder girdle functionality. The research purpose performed was in ensuring the improvement of warming up and mind-setting component quality of the sports training process through inclusion of vibrostimulation and mindset training approaches into it.

Keywords

Rowing; Warming up; Vibration stimulation; Mental mindset; Muscle tone; Motion activity

Introduction**Introduce the problem**

Competitiveness in sports is one of the original models of real human relationships. This is the world of victories and defeats, confrontation and competition, orientation toward permanent self-improvement and achievement of prestigious cultural-creative and material values [1]. This type of activity as a powerful factor of mobilization of functional reserves of sportsmen organisms as a whole and the rowers, in particular, sets severe requirements to their organisms. Only the one who is committed to it will be able to meet the requirements [2,3]. This triad of tasks is solved during warming up, which is an essential for training and competitive activity [4].

Describe relevant scholarship

Warming up contributes to enzymatic reactions and increase in metabolic activity, blood and lymph circulation fastening, and thermoregulation activation. This helps increase the ability of the muscles, cords, and ligaments to stretch [4]. The importance of warming-up is extremely high for functional systems, providing for the body's aerobic performance activity. Body temperature increasing during warming up (up to 38.5°C) contributes to more intensive dissociation of oxyhemoglobin in tissues (Bohr Effect), which eases the muscles oxygen supply. Warming up must not only help the heart muscles but, the most important, must also increase the frequency of heart contractions, arterial blood pressure, and other functional indices that have to “work” with pulsus magnus (from 160 to 200 beats per minute) later, after the warming up. After the warming up and rest before the beginning of the competitive activity, pulse rate must not be lower than 130 beats per minute, and this is especially important for sportsmen performing sports like cycling. Nature of warming-up activity must be as close to the competitive activity nature as possible. In warming up, the same systems and organs of the body must be set into motion as those that will be working during the main competitive exercise. Muscle tone is defined as residual strain in muscles when they are in the state of rest or in resistance to passive movement during arbitrary relaxation of muscles (arbitrary denervation). Tone is a reflexive phenomenon, being provided both by afferent and efferent

components. Muscle tone has uncontrollable component of regulation, taking part in translational reactions, physiologic synkinesis, and coordination of movement. Role of warming up is very important during competitive period, in addition to physiological preoperational change of organism, and it is also aimed at mental condition normalization. It is usual for the latter to act as a regulator of the whole consciously carried out activity, including the sporting one. At the same time, the results of a survey of 100 persons showed that highly experienced rowers of Dragon boats and the sportsmen with degrees, from among the students engaged in this type of rowing, haven't thought of the most efficient warming up method before starting a competition. Most of them rely only upon their own general state, which may reflect the condition of the rowers' readiness to start only to some extent. The rowers when performing warming up are governed by the following main methodological provisions:

- warming up shall be longer in a cool weather;
- duration and intensity of warming up on land increases in a strong wind and heavy sea;
- portion of special simulation exercises in warming up increases as contest season approaches;
- warming up season shall be measured up against the nature of further activity;
- content of precontest warming up shall be usual for a rower.

State hypotheses and their correspondence to research design

From our point of view, following only these provisions cannot help the rowers increase their performance to the maximum extent and get them in a state of complete readiness to participate in the upcoming competitions. In addition, most of them don't use mind-set methods to increase commitment and creation of motivational mental set facilitating the increase in quality of upcoming contest activity. It is important to

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optimize the resources of a team to facilitate team performance in order to achieve good sport performance results [5]. Researches performed in the field of social psychology showed that functional components such as motivation, team spirit, and collective efficacy play an important role in group processes performance [6,7]. In addition, the range of concept-based provisions have proved the ensuring of performance and success in sports by one of the main components [8-10]. Together with that, sure enough, we should keep in mind that Dragon boat racing is the only discipline, not only in rowing but in all sport disciplines in general, where to be able to get high results, well-coordinated work of all team members (22 people) is necessary. Such a team is able to win only due to concerted efforts of all its members. Achievement of the highest level of uniformity of movement ensures the creation of a fully functional crew, characterized by team spirit and the consciousness of the necessity to act as a unified entity. According to data of M.V. Baranova and L.A. Egorenko [11], rowing team, being the unified biosocial and, at the same time, biomechanical systems, has a peculiar social and psychological climate density, which is different from other kinds of team activity. From all appearances, the high positivism of the latter is the pledge of high performance. In view of the foregoing, we supposed that special mental approach may, to a certain extent, facilitate the creation of a favorable precompetition motivation climate in the team and help achieve maximum performance from the rowers' team during a race. So we conducted this research to assess the efficiency of warming up including biomechanical (vibration) stimulation (BVS) and special mind-set (MS).

Methods

Measures and covariates

Further we consider it necessary to draw attention to the fact that the principle of physical training individualization providing the fullest compliance of content, methods, forms of trainings, and the amount and dynamics of loading with the features of every sportsman quite often is in conflict with the nature of activity incidental to numerous teams, what is the Dragon team. This relates to the content of a special part of warming up to be performed by twenty members of a crew of the Dragon boat, simultaneously being in a system of one watercraft. Nevertheless the individualization of certain parties of physical training of teams is possible for the purpose of selecting the most useful variant appropriate for their joint activity, i.e., rowing. Assessment of efficiency of the variant of warming up proposed for practical approval was performed according to the dynamics of tonus measurement and carpal dynamometry of twenty rowers of Dragon boats, control and training activity of which at 100 m distance was performed in individual boats—canoe in Novik Bay of Russky Island. Muscle tone can change depending on body condition or in case of illnesses being present. Peripheral arch functionality decrease leads to atony. In addition to it, muscle tone is influenced by temperature of the environment (cold would increase and warmth would decrease muscle tone), as well as changing emotional condition of the person. Normal state of muscle tone doesn't let a person's movements become sharp and irregular, it gives them certain smoothness, stereotype, and coordination. One of the indices of body physical condition is hand dynamometry, which in rowing would correlate to sport result. This index level will show us the degree of rower's readiness to demonstrate rational dynamical structure of competitive activity.

Experimental manipulations or interventions

General part of the variant of warming up proposed for approbation included: gentle run in a group for 1,000-1,500 m

distance, musculo-articular gymnastics, and individual and paired forms of building exercises performed during 5-min group moveable game, 1,000 m race with 60.0-70.0% intensity of personal result at this distance. In addition, before special part of warming up was performed on the water, the rowers were offered to be a part of the vibrostimulation session. Positive influence of this approach on the sportsmen's performance capability is described in the research of Nazarov [12], Ter-Asaturov and Dargaryan [13], and others. In the judgment of the scientists, during their life activity, the muscles fibers always vibrate with different frequency. Total frequencies determine the development of complex vibrational processes in muscles and tendons with a wide frequency spectrum, which in general have random character in a quiet state. At maximum tension, incidental to competitive activity, the specified vibrations become practically monochromatic with one certain and strictly constant frequency. This attests that muscles fibers in stressed state operate more synchronously and almost simultaneously. So there is an opportunity to use biomechanical stimulators to generate the parameters as close to maximal and submaximal mode of muscles operation during training process. In that case, at average muscles tension and certain conations, it would be possible to achieve the maximum operating mode at the expense of physiological response of the organism. In other words the appropriate training effect will be achieved for less own resources of organism. So we made an attempt to optimize the content in warming up of the rowers through biomechanical stimulation (BMS) of arms muscles, and we used portable training device—"vibrooar" representing a modernized biomechanical stimulator proposed by Iashvili with co-authors [14]. Controlled eccentric and electric motor with sheave reducer are the main functional elements of this device. One end of the cable is rigid with oar simulator handle and the other end is connected with eccentric. Eccentric sets the vibration amplitude (2-8 mm) and sheave regulator sets its frequency (25-40 Hz). Vibration is transferred to the arm and shoulder girdle muscles, operating in isometric mode and pulling handle of the rower sitting in a boat. Vibration exposure duration was 3-4 minutes. By analogy with the data obtained by Kolesnikov [15], it is possible to believe that BMS facilitates the increase of venous outflow in vibrating muscles, increases the arterial inflow, and width of blood vessels bed. The increased volume of blood accelerates aerobic metabolism of carbohydrates and increases the input of adenosinetriphosphoric acid (ATA) and hemoglobin into the muscle tissue. Acting as tonic and improving the functional state of neuromuscular apparatus, BMS acts as a passive additional warming up of muscles affecting the muscular structures not engaged into action before. Effects of muscular vibration impact on voluntary movement point at its relieving influence in connection with possible presence of positive mechanisms of afferent inflows and central mechanism of locomotive rhythmic initiation reciprocal interaction [16]. Skeletal muscle is a functionary type of tissue that is capable of adjusting to functions required from it. Vibration leads to the reflex of muscular tissue distortion. It causes the muscle contraction at the highest possible level, including the period right next to vibration-impact termination. Clinical experience gives evidence about the fact that body vibration has positive influence on the production of hormones and mediators taking part in muscle-tissue building, which reduces stress and nervous exhaustion. Except that, the vibration helps in best possible liquid distribution in movable joints and improves blood circulation, widening the distal vessels [17].

After BMS, it is recommended to turn to a special part of the warming up that is carried out directly on water in the Dragon boat.

This part of warming up is of 15-20 min in length and contains the following components:

- calm rowing for 2-3 min;
- 2-3 immediate accelerations for 25-75 m;
- calm rowing for 2-3 min;
- 2-3 technical starts and 2-3 starts to the full extent with 10-15 strokes;
- calm rowing for 1 min;
- passing with a competitive speed of 2 sections of 300 m length at preparation to the start at 500 m distance or 2 sections of 400 m length at preparation to the start for 1,000 and 2,000 m or 2-3 sections of 100 m length at preparation to the start for 200 m.

We recommend the sportsmen to finish warming up in 15-17 min before start, as this time is required for the evidence of supercompensation effect, and the state of best readiness in upcoming runs. The achievement of high level of readiness is not always sufficient for strengthened competitive activity. In warming up, great importance should be attached to prestart psychological mind-set that must follow after a special part of warming up. Sports practice and research practice prove that good psychological mind-set may largely ensure the success during a competitive confrontation. If physical content of warming up prepares the life-support systems of the organism for upcoming activity, then prestart psychological mind-set mobilizes a mind and creates conditions for efficient implementation of the planned race program. Psychological mind-set before start is considered to be the basis in preparation for responsible competitions. In this case, psychological mind-set was oriented toward a race at a high tempo for the whole distance that will help bring the rowers into a condition of readiness to react in a certain way in a certain situation. Mind-set has a conceptually functional meaning as a person previously prepared to a certain action is able to carry it out in a more efficient way [18,19]. In sport practice, the interest for psychology has never faded; nevertheless, the turn toward increasing importance for psychological preparation is especially peculiar for modern sport movement. In the mental approach creation for winning, the following should be the basis. First, it is necessary to correctly choose stage and final-goal orientation of the activity, secure the preservation of durable emotion state, set up the thought control. The main point is the understanding of the influence that the words being said in the external environment during the psychological tuning have on the sportsman behavior, as well as the words the sportsman tells himself in his own internal dialogue, answering the question why he needs to be the best of the best in the forthcoming sport activity. Achieving of positive psychological state of mind is undoubtedly important for achieving success. When positive psychological state of mind comes over a person, success is not late in coming, and any possible failure becomes a motivation for new achievements.

Based on the best practice in psychological training, we have developed the formula of psychological mind-set of rowers' team for forthcoming competitive activity proposed to the sportsmen along with BMS complex at carrying out of warming up. During the process of given positive state-of-mind creation, we used affirmations and short phrases, comprising verbal formula, that, being repeated many times, anchors the required image or mindset in the rowers' subconsciousness, contributing to their psycho-emotional background. These were quite emotional, expressive, tuning-motivating formula phrases. They had to be pronounced with increasing emotional intensity, by the end turning into an internal scream. After the formula pronouncing termination, the rowers had to mentally pour a bucket of cold water on themselves. In this case, determination and mind-set for victory left unchanged, but

the unnecessary emotions went away. Content of formula is repeated by the team of rowers after the captain became: "I'm calm, self-collected, and self-confident! I'm ready for activity of high intensity and power! I will be stretched to the limits and to the point of exhaustion! Energy overfills me; all my muscles are strong, powerful, and rapid! They are ready to work as a single well-coordinated mechanism! We focus on a start; we have fine appreciation of oar, monitoring a correct seat! Water surface is pliant, it easily holds a boat which is rapid and follows conscientiously the movements of our oars! And we take off as a dragon on a signal, rapidly increase the pace, then we turn to powerful and long stroke! We push forward! We sustain and maintain the pace, row powerfully, and feel the speed! We move to finish and row intensely! Finish is close and we make super power and individual rush! We will be the first ones! And now we are ready to start! We are cheerful, strong, and self-confident! We feel cheerful anger! Our muscles are ready for work, our mind is clear, cold, and our thoughts are clear! We are like a tough steel of a compressed spring! We can do anything! And never look back!"

Sport team members, during the psychological mind-set creation for the activity and during the process of direct interaction within the frames of conducting this activity, create a certain system of connections and relations, which are determined by character and requirements of the activity the team conducts, being notable for the highest level of solidarity and are characterized by convergent (having a tendency to approximation) type of development. The more mature and developed the sport team becomes, the more important the system of official relationships appears, being characterized by a steady orientation to the corporate principles of motor activity.

Results and Discussion

Information obtained at assessment of efficiency of application of the proposed session of vibration effect on neuromuscular apparatus of rowers along with application of mind-set formula is given in Table 1. The results of tonus measurement showed that against BMS and MS application, the amplitude of the tonus of biceps muscle of arm and posterior band of deltoid of control arm of rowers increased by 14.1 and 10.2 mion, respectively.

Performance	Warming up without BMS and MS constant load	Warming up with BMS and MS constant load	Difference in %	Value of t-test of differences
Amplitude of upper shoulder girdle tonus (mion): - biceps; - deltoid	20.11 ± 1.87 20.16 ± 2.02	26.12 ± 2.12 27.18 ± 2.41	3.3 34.9	2.17 2.29
Total carpal dynamometry (kg)	172.17 ± 1.24	178.12 ± 1.68	3.13	2.64
Average speed of rowing in 50 m (strikes/min)	72.60 ± 74.40	74.40 ± 0.66	2.48	2.00
Medium stroke in 100 m (strikes/min)	72.20 ± 0.66	73.80 ± 0.64	2.22	1.81
Average speed of rowing in 50 m (m/s)	4.74 ± 0.03	4.86 ± 0.02	2.53	3.0
Average speed of rowing in 100 m (m/s)	4.68 ± 0.025	4.80 ± 0.02	2.56	3.75

Note: $p < 0.05 = 2.0-2.5$; $p < 0.01 = 2.6-3.3$; $p < 0.001 = 3.4$ and more.

Table 1: Dynamics of motor performance factors and functional state of neuromuscular systems of the rowers at different variants of warming up ($n = 20$)

The results give evidence of the improvement of neuromuscular apparatus of kinematic components, bearing main load during rowing [20]. During scientific research performed by Nazarov [12], Ter-Asaturov and Dargaryan [13], Kiselev [3], it was established that under lowered functional state of neuromuscular system amplitude contraction is observed in the sportsmen due to increase in plastic resting tone and contractile tension tone. When increasing the muscles functionality the researchers observed quite a different situation. It was established that immediately after warming up, contained BMS procedure along with MS, the value of total carpal dynamometry at rowers increased by 3.18% ($p < 0.01$), and at passing of testing 100 m section there was a reliable increase (by 2.48%) of rowing pace at the first half of this distance and increase in average speed (more than by 2.5%) along the entire length.

So, the data obtained by us confirm the practicability of inclusion of vibration stimulation and psychological mind-set into prestart warming up of the rowers for the purpose of ensuring better competitiveness. This kind of warming up became a kind of ritual for FEFU team and was used by rowers during the 2014 season. It contributed to quite a successful performance of the team in many rounds. This ritual being observed became the pledge of psychological balance and optimal functional and locomotor readiness to begin the race before the start, when the rowers were willing to subdue their relationship to the main purpose, namely a quick, clear, and harmonious solution of motional task.

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