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Original Article

Theoretical and methodological concepts that subsidize the scientific direction of sports training in handball

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Abstract
To achieve a long-lasting, efficient and effective training process, coaches are obliged to know both the general means and methods of specific training and the ways of strictly objectivizing the training effort throughout the training of athletes Only objective knowledge and appreciation of the body's request in each training allows the coach to guide the scientific process of the entire training process. Knowing the biochemical reactions that take place during and after physical exercise is a prerequisite and essential condition for the scientific direction of training. The use of information resulting from biochemical investigations leads to a correct routing of training to increase performance..
Key Words: workout, effort, specificity, biochemical investigations, performance.

Introduction

Changes in handball, content and technical-tactical structure, as well as the level of players' demand for motric, physiological, mental, mental, motivate the need to find the most effective ways to maximize performance. This requires a scientific and effective management of sports training to provide players, regardless of the playing field, energy resources to support specific effort, functional capacity appropriate to the specificity of effort, motivation, efficiency and efficiency in the game. This favors / enhances the level of bio-psycho-motric and technical-tactical potential of athletes.

Domain: Sports training science

The complexity of training as a long-lasting instructive-educational process sport training defined as "a complex, bio-psycho-pedagogical process, systematically deployed and gradually gradual adaptation of the athlete's body to intense physical and psychological efforts necessary to achieve performance in competitions "(Dragnea, A. and Mate-Teodorescu, S., 2002) and considered as one of the four conditional factors of sports performance (Epuran, M., 2001) goes beyond the boundaries of a simple instructive-educational process having several constituent sides. The approach to achieving the training goals, namely "preparing the athletes in view of increasing the performance potential and the development of the whole personality is a psycho-pedagogical process with its own specificity" (Popescu, V., 2011) specificity reflected by its.

In essence, getting great performances is inconceivable without an approach that does not identify with a process of transformation and development, adaptation, specialization and adjustment, characteristics of sports training. Thus, "the transformations within the training aim at both the performance component as a result and its structural component" (Dragnea, A., and Mate-Teodorescu, S.) maximizing the performances based on functional, structural and psychic modifications of the requests as a reaction complexity of the athlete's body to the stimuli applied according to the principles and methods of sports pedagogy. Biological and psychological changes are added in this way also to the motric ones, based on the capitalization of the predispositions, diversification and differentiation of the specific skills as a result of the intervention of the complex motorized learning process, to the "special qualitative parameters determined by the existence of the competitive situation, the action of the subject under the conditions of physical and psychic solicitation " (Epuran, M., and Stănescu, M.). The set of transformations produced by the action of specific demands on the body determines a specialization of adaptation in accordance with the competitive effort profile, which "is mainly achieved when the number of competitions increases greatly and concerns the motor skills, technical-tactical skills and psychological processes that are required priority according to the particularities of the sporting branch ". (Epuran, M., and Stănescu, M., 2010).

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Since its appearance until now, handball has developed a long period of development, constantly modeling without altering the essence of "collective, dynamic, synthesis of basic human motor skills, such as running , "jumping, catching and throwing" (Kunst-Ghermănescu, I. et al., 1983), "a system of specific actions, systemically correlated, in which the player consciously adjusts his relationships with opponents, teammates, time, space and ball game "(Negulescu, CI, 2000), touching and maintaining a high-class competitive spirit with strong tendencies to assert in the world hierarchy of sports disciplines.

We consider that the long-term training, the fundamental requirement of modern sports training, is based on the designing of the training, the understanding of the functional mechanisms that govern the relation between the formative stage-periodization-objectives during the training of the athletes (Mihăilescu L., 2016, P.26-28 , Rață G., 2005 p 69). The complexity of this relationship is emphasized in the following figure.

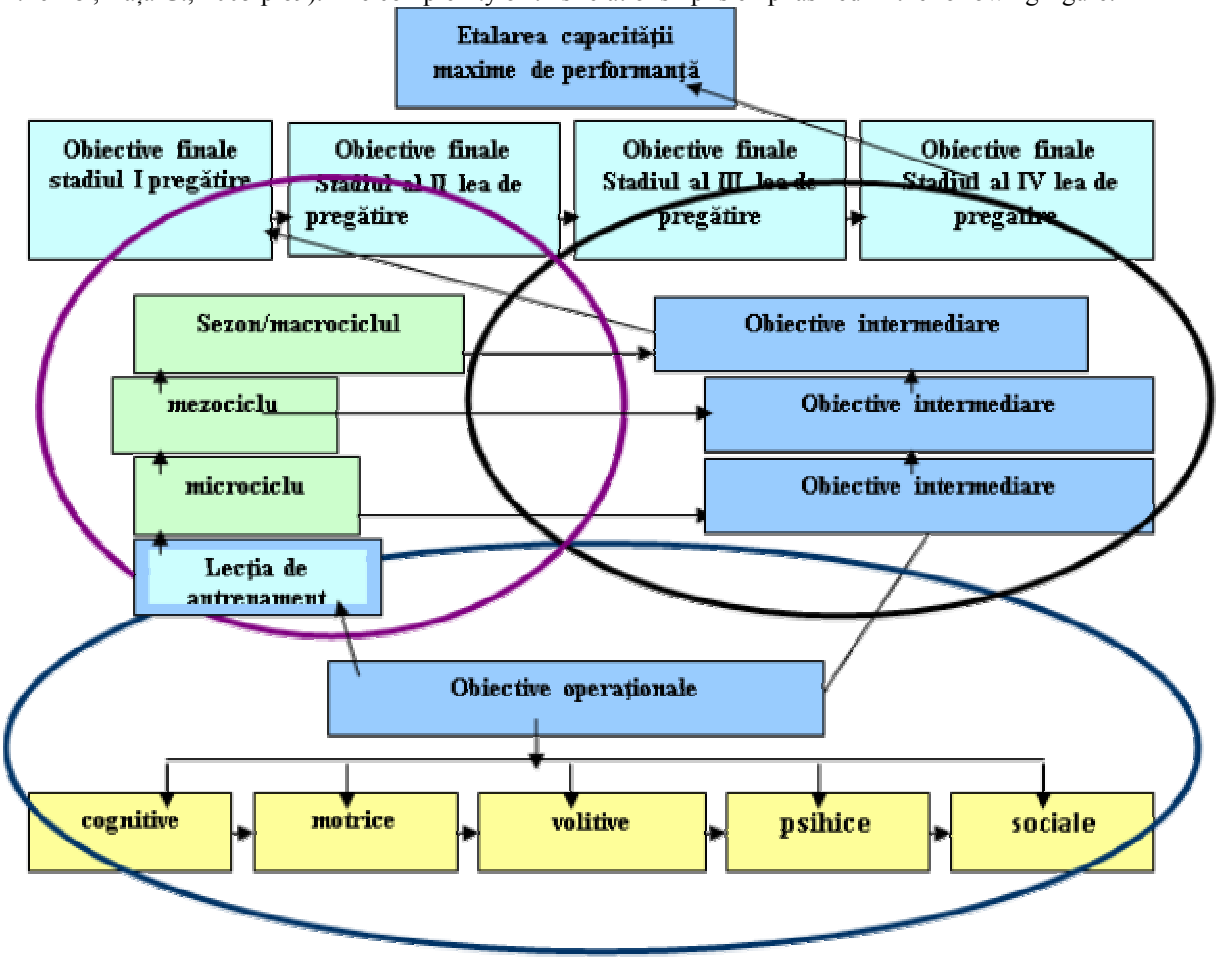

Fig.1. Relationships of the interdependence of the training structure with the different categories of training objectives, processing afterwards.

Regarding his evolutionary potential, Kunst-Ghermănescu, I. (1983) stated that "being a relatively young sportsman, handball has an uninterrupted development, every major international competition the technical-tactical treasure of the game is enriched with new elements, which proves he still has beautiful perspectives and is far from the time of full stabilization."

This tendency to increase and maintain the gameplay throughout the game, largely based on increasing the speed of play in all phases of the attack, and a total commitment of each defense player, raises a new handball model : dynamic, elastic, anticipative, and the new conditions of manifestation of the technical-tactical potential require the re-orientation of certain aspects of the training.

Colibaba-Evuleț, D., and Bota, I., (1998) asserts that "In sports games, volume indicators of effort have a particularly important role to play in solving methodological problems such as: the amount of training required to perform, , the qualitative leap ", the formation of dynamic representations and stereotypes, the over-learning of technical-tactical skills, the analogy and the modeling of the training process, etc.". Dragnea, A., and Mate-Teodorescu, S., (2002) argue that the most important feature of the effort is the difficulty of training - represented by the ratio of work quantity to effort. In this respect, the controllable components of the volume (Dragnea, A., and Mate-Teodorescu, S., 2002) are available to the coach for the monitoring of the difficulty: the duration of the stimulus (the time it acts), the stimulus density (action / , the stimulus amplitude or variability (duration and number of stimuli) and the frequency of the stimulus application.

The effort intensity is defined by Georgescu, M., (1977) "the amount of mechanical work done in the time unit", and its appreciation in sports games is achieved by the number of executions per time unit. Dragnea, A., and Mate-Teodorescu, S., (2002) specify that there is a difference between the intensity of the effort - which is the characteristic of labor provided by the subjects, independent of their possibilities, and the intensity of the request - given by the.

The complexity of the effort is "the originality of the typological configuration of the elements" (Neumann and Morales quoted by Orțanescu, C., 2001), and after Dragnea, A., and Mate-Teodorescu, S., (2002) the complexity of the effort is represented by the number of driving actions performed simultaneously during a driving activity. Regarding the complexity of the effort, Colibaba-Evulit D. and Bota I., (1998) state that it "is closely related to the motoric structure of the game and to the factors that cause different types of omnivorous solicitation of the organism", highlighting the following types of requests : static complex requests caused by the locomotor (static stresses, dynamic demands); Physical stresses caused by connections between the components of the game model (tactical and inverse tactics, high physical stress tactics, speed technique, high-psychological gameplay); associated psychological demands (determined by the characteristics of the game and caused by competitive conditions); requests of an intellectual nature; requests of a voluntary nature; affective requests; psychosocial requests; static and variable requests such as volume, intensity, and complexity based on: strategy and tactics applied, opponent encountered, game tempo, etc .; play interruptions caused by the regulation, referees, coaches; training stress and long-term competition.

Nicu, A., (1993) states that although the complexity of the effort determines the body's demand, its influence on the limiting organs of the aerobic and anaerobic exercise capacity (heart, neuromuscular system) is insignificant compared to the other parameters of the effort.

In order to choose and apply the most effective methods of developing the functional qualities of athletes (Marinescu, G., 2003): knowledge of the energetic characteristics of the branch of the cyclical sport or of the "key" sporting elements (motric gesture) in the aciclic sports; the clear distinction between the "power" and "capacity" of each energy system and the knowledge of the limiting factors of the system; a good understanding of the factors that characterize each of the energy producing systems (aerobic, anaerobic); Recognizing the duration of restoration of reserves or energy substrates and how to speed up processes; knowledge and application of methods and tests for functional quality assessment of each energy system ".

Competitive queries (competitive level, tactical tasks, opponent characteristics, etc.) or training (specific exercises used in training) can influence the share of two-way (aerobic and anaerobic) engagement. In this respect, Georgescu, M., (1993) states that in the case of mixed intensive efforts, the anaerobic conditions predominate when "the stress phases have high intensity, it lasts a bit and the intensity variations from one situation to the other are high (.. .), "And if the duration of requests increases and their intensity is lower and small variations," mixed efforts get a significant aerobic weight "(for example, in the case of attacking seats, in defense system, etc.).

The aerobic or anaerobic predominance of effort also varies according to the occupied position in the team (the aerobic substrate is more desirable in extreme actions than in the inter-subject).

Starting from these aspects, the handball player will have a very good anaerobic exercise capacity, allowing for the support of explosive force, force-speed, strength-strength, strength-speed. On the other hand, these anaerobic efforts require a very good aerobic metabolic base, which allows the restoration of oxygen deficiencies and the restoration of the acid-base balance in the stages in which play is characterized by low or medium intensity efforts (Dragan, I., 1994).

As reference points, in the literature (Scott, C., B., 1991 and Apostu, M., quoted by Prisăcaru, I., R., 2010) it is stated that the average value of the energy consumption in the handball game rises to 11 kcal / min. for boys (weighing 70 kg) and 8.6 kcal / min. in the case of girls (weighing 54 kg). The maximum aerobic power is estimated at 5400 - 5800 ml O2, and the body weight is 62 - 70 ml. Global anaerobic capacity is within the range of 3600 - 3800 kgm (40 - 46 kgm per kg body).

During the handball specific competitive effort "the maximum heart rate is 170 b / min, but there are some times when it rises to 190 - 200 b / min." (Hantulu, C., 2000, p. In the recovery period (breaks, changes) the heart rate decreases in the first two minutes to 115-120 b / min, and in the fifth minute it stabilizes at 84-96 b / min (Orțănescu, C., 2001). The same author presents an example of how to measure the intensity of handball handball exercises with heart rate.

3. Evaluating and monitoring reactivity / effort adaptation

In the training process, the succession of stimuli determines a variation of homeostasis (normal biological state). It is followed by a compensatory reaction that tends to eliminate the imbalance caused by physical load. Repeating several times through training, this reaction ends with a gradual increase in the functional reserves consumed during the effort, exceeding their initial level. This process has been called overcompensation, but it does not fully explain the phenomenon of adaptation to effort. Overcompensation refers to the "relationship between effort and recovery as biological bases of physical and psychological stimulation, which predominates over normal daily activities" (Bompa, 2002, p. 38).

Remaining in the sphere of scientific guidance and sports training as a long-lasting process, the achievement of the main goal, the achievement of a higher level of adaptation - of the sport shape, imparts to its

whole extent its ascendant character (determined by the maturation of the subject, the motoring baggage, the promotion in an echelon superior competition) as well as its essential note - the phasic character, which determines the resumption of the process from year to year but from higher odds. The principle of individualisation centers activity on the individual's potential and reactivity.

The habit of the body with intense effort is a requirement determined by the evolution of sports performances itself, a development reflected in a suite of world and Olympic recordings made over the last 15 years in all the samples, but also in team sports where the speed and the force of the movements are known high values. Adaptation of the body to intense and maximum efforts, specific to high performance training, should not be in contradiction with the requirement for the gradual preparation of the body specific to children and juniors.

"Adaptation to training is the sum of the transformations caused by repetitive, systematic exercise" (Bompa, 2002, p. 37). The author points out that these changes come from the physiological demands of the athletes following the effort they make.

In terms of the typology of the Verchosanski adaptation quoted by Rusu, 2009 identifies two fundamental typologies of adaptation to the effort:

• "Subjects capable of fast but short (fast) adaptations that respond to a high spectrum of stimuli: ideal for sports and speed.

• "Subjects less resistant to stimulus fluctuations but capable of bearing loads prolonged and endowed with great recreational capability: ideal for sports and sports. "

In terms of duration, adaptation to training can be short-lived and unstable and long-lasting (Platonov V., 2015, p 89):

Short and unstable adaptation that manifests in sports training during and after exercises. Thus, the immediate adaptation reaction takes place over three phases: "stimulation of the organs and systems that provide the activity (increase of heart rate, VO2); the development of activities at a constant level called the stable state (complex physiological state which allows the body to bear without great changes of a larger working load) and the "stable state" disorder, the balance due to the disorderedness between the body's need and the capacity of organs in the effort ".

• Long-term adaptation is determined by the high efforts that cause hyperfunction organs and systems. This adaptation takes place over three phases: "the systematic mobilization of the functional resources of the body through the long training process (the cumulative effect of the short-term adaptations); the systematic systematic increase in effort that results in intense structural and functional transformations in organs and tissues. Hypertrophy of specific effort organs and stable long-term adaptation occurs with a sufficient amount of energy reserves with a close connection between the control and the operating elements. "

The assessment of the demands, the level of reactivity of the athletes to the effort in general and the handball players in particular is a requirement of the scientific direction of the training. In a compex process, such as sports training, evaluation is accompanied by monitoring, as evaluation is a finding, a moment-by-moment view, and may be episodic, while monitoring even if done largely on data provided by evaluation is a dynamic process with a permanent character.

The biochemical monitoring of the training is a complex means of effective training of the training with the help of the information provided by the biochemical analyzes according to Mihăilescu L., Dubită / Gîju N., 2016, considers that the following general principles should be known and respected in the monitoring application:

• The principle of multidisciplinarity: theories and methods of biochemistry, physiology, medicine, biomechanics, psychology and methodology of sport;

• The field investigation principle: measuring the response in specific effort;

• The principle of periodization: periodic assessment within the preparation macrocycles;

• The principle of individualisation: interpreting the results by referring to the athlete's own values;

• The principle of maximizing information: maximum information from the minimum of investigations, investigating the relevant moments of preparation (control samples, loading steps, etc.) - performance equipment, precise and rapid methods;

• The principle of minimizing invasive methods: harvesting minimal amounts of biological samples (capillary blood microprobes from the finger or ear lobe);

• The ethical principle: free acceptance by the athlete. Constraint induces psycho-vegetative manifestations that alter the biochemical and physiological response, compromising the outcome of the monitoring.

Any sporting activity involves a smaller or greater effort, which involves additional energy consumption than that required in normal vital processes, so-called basal metabolism. Metabolism represents the totality of biochemical and biophysical processes, of supramolecular mechanisms that take place after the laws governing living matter. Metabolic aspects have constituted and are a major concern of researchers in the field of physical exercise in performance sports, and this study can not be conceived without the profound research of the biochemical substrate conditioning the physiological processes.

For the sports effort, especially performance, whose dynamics in relation to the specifics of the movements performs a wide range of stages depending on the time of deployment, the biochemical mechanisms for the realization of muscle consuming energy have particular aspects.

Energy can be defined as the capacity of a body system to carry out an activity, a mechanical thing. There are different groups of organic substances (carbohydrates, lipids, proteins) that, besides other roles, also have an important energy function, but the direct energy source that supplies the energy required by various biological processes, including muscle contraction, is adenosine triphosphoric acid (ATP). The biochemical parameter of determinism of human anthropological constitutional biotype, along with somatophysiological, motor and psychic parameters, is an essential element for sports training.

Things are explained by the fact that the functioning of the body, in general, and especially in the conditions of effort, is conditioned, first of all, by the energy factor involved in the formation and restoration of the complex molecules from the simple ones in the production of the thermal energy and the energy Mechanical for both internal movements (cord, lung, digestion, etc.), as well as for external ones, whose effect is on osteoarticular and muscular systems.

The supply of energy from the CoA, which further, through energy transfer, will rebuild the ATP molecules (1 molecule of acetyl CoA rebuilds 12 molecules of ATP) can be achieved under the conditions of O2 depletion by anaerobiotic processes or in the presence of O2 through aerobic processes.

Between the anaerobiotic and aerobiotic metabolic pathways there are close correlations and interconditions, which are important in sports training. Thus, anaerobic processes (anaerobic glycolysis) at the level of red blood cells lead to the formation of difosfoglycerate (2-3 DPG), which in turn boosts the release of O2 from oxyhemoglobin, increasing the efficiency of aerobic processes. Also, lactic acid formed in anaerobic processes is converted into glucose in both the liver, for the most part, and in the red muscle fibers, through the Cori cycle, even during the anaerobic effort.

These energetic chemical reactions are dependent on a number of factors that contribute to the achievement of the body's homeostasis (Canon), respectively to the maintenance in certain constant limits of a series of physical, chemical, biological, enzymatic parameters that condition the whole body function, basal and all the more so in the effort. From the multitude of these factors we mention: the level of the endogenous water, the pH level and the degree of acidity of the various humors and structures of the organism, the speed of various enzymatic reactions, which depends on the concentration of the substrates (mainly carbohydrates, lipids, antide).

The restoration of the biological parameters of various functions and substrates takes place in a specific chain as follows: FC and blood pressure are restored within 20-60 minutes after exercise, sugars in 4-6 hours, proteins in 12-24 hours, and lipids, vitamins and enzymatic substrates even after 24 hours, another important role is played by the central nervous system in conducting the restoration after effort (Drăgan I, Săмescu I, p. 85). Biochemical restoration can not be achieved without taking into account the biochemical data, the basic condition of the athlete in the various situations of training and competition (Gagea A., 2007, p.123).

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Conclusions

In order to achieve a long-lasting, efficient and effective training process, coaches are required to know both the general means and methods of the specific training as well as the means of strictly objectivizing the training effort throughout the training of the athletes. objectively assessing the body's request within each training allows the coach to guide the entire training process scientifically.

Knowing the biochemical reactions that take place during and after physical exercise is a prerequisite and essential condition for the scientific direction of training. The use of information resulting from biochemical investigations leads to a correct direction of exercise to increase sport performance.

The analysis of biochemical parameters is relevant by their dynamics and their importance for the prognosis of muscular injury risk situations, leading to an increase in the quality of the biochemical diagnosis and prognosis in sports training.

Biochemical stress testing involves the biochemical verification of the main stimuli used in training (intensity, volume and ratio of stimuli, their distribution during the weekly basic training cycle, the significance of stimuli, metabolic costs, the determination of duration and running times in different areas of effort to be able to achieve optimal resistance and speed training, recovery time, etc.).

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