

STUDIES REGARDING INFLUENCE OF PHYSICAL TRAINING ELEMENTS SPECIFIC TO THE BASKETBALL GAME UPON OF MUSCLE TISSUE

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ABSTRACT. Throughout a sports effort, the sportspeople's bodies are subject to many factors, either good or bad, which lead in many structural and functional changes in the organs and their functionality. Thus, one can meet a number of metabolic and enzymatic changes in the musculoskeletal, circulatory and respiratory systems. This paper presents some elements of physical preparation that are specific to the basketball game and the way they influence muscle tissue.

Key words: *muscle tissue, physical training, basketball game*

REZUMAT. Influența elementelor de pregătire fizică specifică jocului de baschet asupra metabolismului țesutului muscular. În timpul efectuării unui efort sportiv organismul sportivului este supus unor multitudini de factori, benefici sau malefici, în urma cărora se produc numeroase modificări structurale și funcționale atât la nivelul organelor, cât și la nivelul funcționalității acestora. Astfel putem întâlni o serie de modificări la nivelul aparatului locomotor, circulator, respirator, la nivel metabolic și enzimatic. În lucrarea de față sunt prezentate câteva din elementele de pregătire fizică specifice jocului de baschet și modul cum influențează acestea țesutul muscular.

Cuvinte cheie: *țesut muscular, pregătire fizică, jocul de baschet*

INTRODUCTION

Physical training is an element of athletic training that plays an important role in the whole process of training, ultimately establishing the sportspeople's performance in training and competitions. Physical training includes an entire

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system of measures ensuring the high functional capacity of the body, the high development of basic and specific motor qualities, the optimal values of the morpho-functional indices, the full control over the exercises, and a perfect health condition (Drăgan, 2002).

This paper presents some elements of physical preparation that are specific to the basketball game and the way they influence muscle tissue.

Physical training has two components: general physical training and specific physical training (Bărbuica, 2012).

a) General physical training ensures the development of the basic motor qualities (speed, force, resistance, mobility) and the functional capacities of the body in general; it improves the general motor resources; it ensures the harmonious development of the morphological and functional indices conditioning the basketball game (Bărbuica, 2012).

Basic physical training employs simple (less complex) means, large volume, low intensity and density.

It takes place at the beginning of the training period and is limited in time, in favour of the specific physical training it substitutes.

b) Specific physical training is primarily directed towards developing the effort capacity that is specific to a certain sports branch, as well as the motor qualities that are previously combined and differently involved in order to establish the ultimate specific performance. Specific physical training is achieved by means of strictly specialized means aimed at developing the previously established combinations of qualities required by the characteristics of the basketball game, the muscle groups involved in the effort, and the stress type (Bărbuica, 2012).

This type of physical training grows in importance after the first third of the training period, throughout the whole pre-competition period.

It continues to occur as specific exercise throughout the competition period.

Characteristics of physical training elements upon of muscle tissue

The basic assumption in physical training is that it is possible to develop and enhance all motor qualities, despite their different levels.

Physical training is also based on anatomical and physiological assumptions, coordination, regulation and conditioning abilities. Another issue concerns the intensity of exercise which depends on each motor quality. Consequently, the issue of developing the motor qualities cannot be approached in general but it requires different approaches for each motor quality. Thus, the following basic motor qualities can be distinguished: speed, force, resistance, skill and mobility (Drăgan, 2002).

SPEED

SPEED is the ability of the body to perform a certain movement or a series of movements in a short time. The shorter the time is, compared with other performances of the same motion, the higher the speed is.

There are several factors that influence speed, playing an important role in speed development. These are:

- muscle fiber type
- the capacity of alternanting nervous excitement and inhibition
- the level of neural network development
- muscle capacity to store energy-yielding substances (ATP, CP) the extent of the muscle section
- the bone and ligament system
- the biomechanics of the movement

The energy substrate in the speed efforts is particularly provided by the following energy-yielding substances: adenosintriphosphate (ATP), creatine phosphate (CP), muscular glycogen (Apostol, 1998).

In the basketball game the main efforts are measured by the anaerobic alactacid and lactacid capacities. The anaerobic capacities are tested under apnea or low ventilation conditions. Absence of oxygen generates energy. Depending on the energy-yielding substrate and the dominant metabolic manner, the anaerobic effort can be alactacid and lactacid (Georgescu, 2004).

The anaerobic alactacid effort is the physical effort occurring at maximum intensity in the absence of oxygen; the length of time for such an activity is maximum 5-7 seconds.

Consequently, the effort volume is minimum, as the muscle is able to perform only a few contractions of high intensity. In this effort, the neuromuscular system is the limiting biological factor. The muscular mass is that the nervous system involves in performance is directly proportional with the performance effort that implies the breaking of higher external resistance. The ATP stock contained in the microfibers is sufficient for an intense effort lasting for 2-3 seconds, i.e. approximately 6mmols/kg. lean wet mass (Georgescu, 2004).

In order to continue the effort, ATP is quickly restored by a chemical reaction in which CP synthesizes about 20-30mmols/kg. lean wet mass. The energy released by this re-synthesis is sufficient for a high intensity effort lasting for 18-20 seconds. Thus, energy mobilization during the first 5-7 seconds is called the alactacid phase as it releases no lactic acid. Prolonged anaerobic efforts lead to the accumulation of lactic acid as a result of anaerobic glycolysis, since the oxygen demand required by intense exercise exceeds the oxygen supply level. When oxygen rate exceeds 60-80% of the maximum oxygen consumption, it is called anaerobic threshold (Georgescu, 2004).

The *anaerobic lactic acid effort* is the physical effort with under-maximum intensity and a length of time between 7 and 60 seconds. The working volume is still low, as the energy released by the aerobic decompositions of glycogen allows an effort that lasts for approximately 40-60 seconds. Carbohydrates provide the energy substrate that allows ATP re-synthesis. Glucose or glycogen decompose by the process known as anaerobic glycolysis.

The lactic acid resulted from aerobic glycolysis and accumulated in muscles and blood produces significant local and general changes that negatively affect the subsequent effort. The exhaustion of the energy strate (ATP and CP) determines the end of the effort. In the predominantly lactic acid performance, the accumulation of lactic acid id the main disturbing factor (Georgescu, 2004).

Speed development if mainly based on the following methods: repetition, signal performance, performance under easy and difficult conditions.

RESISTANCE

RESISTANCE is the capacity of the human body to perform mechanical work of a certain intensity for a long time, without losing efficiency under conditions of repressed fatigue. Resistance is directly dependent on the effort. Aerobic effort is physical exercise of constant intensity that lasts more than 3-5 main minute. The main feature of aerobic effort is reaching a constant level of oxygen consumption during the entire exercise, after an initial adjustment period varying between 3 and 5 minutes.

In this type of aerobic effort, the energy required for the performance is released by decomposing both liver glycogen and free fatty (unsaturated) acids. Transition from muscle glycogen consumption to liver glycogen consumption is marked by a specific condition of the body, generally known as 'dead point'.

The coverage of a large amount of energy by the fatty acids spares the muscle glycogen store, which, in this type of effort, should be the limiting factor. In sport training it is very important to know the sources of energy, i.e. the percentage of aero-anaerobic processes, in order to develop training programs that lead to their increase (Apostol, 1998).

In the basketball game, resistance effectively intertwines with strength and speed, representing the capacity of the human body to perform moderate intensity effort for a long period of time. This is one of the most perfectible motor qualities because it is determined by the development of the large functions and advanced specialist knowledge in the resistance development method. Resistance development during the game is based on the development means of general resistance as morpho-functional substrate for specific resistance (Dragan, I., 2002).

The correlation between the development of general and specific resistance presents a dynamics imposed by the concrete objectives of the training phases. Performance capacity is low when fatigue occurs as the use of a whole chain of structures exhausts the energy-producing substance and uimpedes liver synthesis of new substances able to support the work at the same level.

FORCE

FORCE is the capacity of the human body to overcome external or internal resistance by using muscle contraction. Force is determined by the following factors:

- the activity of nerve centres
- the level of cortex concentration
- the frequency of nervous impulses controlling muscle activity
- the number of fibers involved in the exercise
- the development level of the other motor qualities
- psychic factors: motivation, will, attention

Force development pre-supposes the application of a stimulus that should have a certain value in order to achieve a certain level of muscle tightness (Dragan, 2002).

SKILL

SKILL is the capacity to select and perform motor actions of high efficiency in a quick and correct manner under unpredictable circumstances. Skill is a form of complex performance expression by quickly learning new moves and fast adjustment to various situations, according to the basketball game specificities, or other basic and applied motor qualities. Basketball particularly requires kinaesthetic differentiation issues, spatial orientation ability, motor adjustment and re-adjustment capacity (Bărbuică, Moanță, 2009).

The factors determining skill are:

- the type of muscle fiber
- the bone and ligament system
- the ability of the nervous system to coordinate neo-muscular processes
- the tonus and force of muscle chains
- muscle capacity to relax and lengthen

MOBILITY

MOBILITY determines the efficient performance of the technical procedures and other preliminary exercise or exercise aimed to acquire the basic and applied motor skills correctly. Efficiency actually refers to easiness, fluency, flexibility. In basketball, mobility is particularly important in special situations that require ample movement. All technical and tactical actions during the game cannot be efficient without good active and passive coordination (Bărbuică, Moantă, 2009).

CONCLUSIONS

- Basketball and its methods can have a multiple influence upon the performers' bodies.
- Muscles, ligaments, tendons, articulations, internal organs and the nervous system, i.e. the whole human body is put under varied pressure with each moment.
- Physical training provides energy resources for the performance by stimulating the increase in the functional and morphological indices (articulation and ligament strengthening, muscle development and training for performing mechanical work).
- Physical training stimulates the increase in motor qualities, enhancing the general effort capacity of the human body and the technical and tactical skills included in the regulations referring to the specific exercise in which the sportsperson is specialized.

REFERENCES

- Apostol, I. (1998). *Energofiziologie* - Curs. Iași: Editura Univ. Al.I. Cuza.
- Bărbuică, I.S. & Moantă, A. (2009). *Determinative relations between the structure of an actuating activity, number of repetitions, time of execution and performance achieved*. Lucrare prezentată la Sesiune Științifică Internațională „Educația fizică și sportul în contemporaneitate”, Bucuresti.
- Bărbuică, I.S., Moantă, A. (2009). *Objectives and assessment of the relationships between some of the technical, processes of basketball and motor skills that support their execution*. Lucrare prezentată la Sesiunea științifică internațională „Educația fizică și sportul în contemporaneitate”. Bucuresti.
- Bărbuică, I.S. (2012). *Învățarea jocului de baschet*. București: Editura Printech.
- Drăgan, I. (2002). *Medicina sporivă*. Bucuresti: Editura medicală.
- Georgescu, E. (2004). *Biochimia efortului sportiv în medicina sportivă aplicată*. Bucuresti: Editura Editis.