

THE SCIENTIFIC OPTIMIZATION OF SPORT TRAINING FOR BODY FORTIFICATION

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The aim of this article is to compare and contrast sport training in general and sport education in school in order to emphasize the general differences and similarities between them. As a result of this approach, the role of physical exercise in both situations, the benefits it brings to the human body in terms of an improved physical condition and health will be discussed and underlined.

Key words: *energy source, inner balance, physical condition, physical exercises, sport education in school, sport training.*

1. INTRODUCTION

The human body is the material unit which, thanks to the physiological structure, is responsible for the vital process, interacts with cosmic powers, with the world of plants and animals. The human body is a complex informational system that simultaneously and repeatedly acts as information receiver (i.e. it receives, develops and assimilates information). The human body is a complex energetic system, it is matter and energy. The human being has a specific biped conformation that places it above all other beings on Earth and probably above all other beings that can exist on other planets [1].

The normal functioning of the human body in good conditions involves good health and is determined by the inner balance, which in turn submits to the movement, breathing, nutrition, circulation, excretion

and reproduction functions. These functions are ensured by complex organs that constitute various structures (muscular, bone, nervous, endocrine).

The general wellbeing represents a physical and psychological wellbeing. The physical wellbeing is determined by the normal functioning of the body's structures and systems. From the psychological point of view, the wellbeing involves a person's inner balance reflected in its level of respect and esteem, its full involvement in life's events and not in the least in its joy of life. This state will influence the person's social life quality. Its social status and social role will develop the inner wellbeing and identity, feelings of fulfillment and satisfaction. Having a guaranteed working place is also a key element which can affect the general wellbeing, integrity and bio psychological balance of the person. Thus we identify a circular causality,

because the 3 states depend one on the other and influence each other

The general wellbeing shapes the mental and the social environment. The satiric poet Juvenal, a critic of the Roman corruption, addresses the famous hexameter from SATIRA I to those who show no interest towards body health, but only to spiritual health: **“Optandum est ut sit mens sana in corpore sano”** - *it is desirable that a healthy mind should inhabit a healthy body* (Juvenal, cited by Kirițescu, [2]).

The famous Latin hexameter is the expression of the ancient Roman educational ideal, as well as its Greek correspondent KALOKAGATHIA, which reflects in equal measure the respect for body-soul-spirit that represents the unity of the human being. The approach for body problems can only be done through correlation with the psychological life and not least with the material component of the body.

The Cartesian expression the man is a “unity in duality” signifies the fact that human beings exist through body-soul-spirit, as particular entities one to the other, but in the same time connected through an indestructible bond, influencing and conditioning each other.

Generally speaking, physical condition involves the capacity of the human body to adequate its diverse reactions to the needs of the environment (daily activities incurred by professional requirements, family issues, social roles, etc.). The more tasks and activities a person is likely to accomplish, without fatigue affecting its physical state and energy resources, the healthier the person is.

The assessment of the physical

condition is relative and it depends on the following variables: genetics, age, sex, life style, etc. The improvement of the physical condition can be made through physical exercise, which is the main method of physical education and through the physical exercise characteristic of in sport training.

Every body structure (digestive, respiratory, circulatory) and system (muscular, bone, nervous, endocrine) participates to physical exercise. The systemic and continuous practice of physical exercises has an important role on the proper physical development of the human body, resumed in morphological and functional indices, as close as possible to the values attributed in this way to a healthy body at different ages.

Cârstea [3] claims that 3 primary objectives are pursued this way:

- harmony between the morphological and the functional indices;
- balance between the anthropometric indices;
- balance between the functional indices.

2. PHYSICAL EDUCATION AND SPORT

Physical education and sport refer to every form of physical activity meant, through an organized participation or independent one, to express or to improve the physical condition and spiritual comfort, to establish social civilized relationships and to obtain results in competitions on any level. The practice of physical education and sport represents a right of the person, without discrimination, guaranteed by the state, and the administrative

authorities and sporting institutions have the obligation to support physical education, sport for all and competitive sport and to ensure the conditions of its practice.

Physical education represents the conscientious physiological activity of the human body pursuing health maintenance and the growth of the biological potential of the person, in order to boost its social input. It is closely linked to the intellectual education, moral and esthetic one, constantly being under the influence of the intellect and influencing the other two [3].

In other words, physical education means the instructive/educational process that pursues the formation, the growth and development of the physical capacities of human beings, with clear objectives, for all ages. It can be met as an instructive/educational process, specially conceived in educational institutes, military system, different associations, etc. or as an independent activity: various games, walks, hikes, gymnastics, etc.

Sport training, unlike physical education, is addressed to a smaller number of people and represents the instructive/educational process which takes place systematically, conscientiously and continuously, aiming to adapt the human body to physical and psychological effort of very high intensity, with the purpose of obtaining high performance sport objectives, in different sport branches. In comparison with physical education, it has a smaller number of physical exercises, but these represent specialized techniques.

In conclusion, performing physical education and sport training involves sustained effort consisting in muscle contraction, as well as in

important body functions and also psychological effort. For a better understanding of the orientation and the conduct of physical effort in physical education and sport training the following structure is proposed:

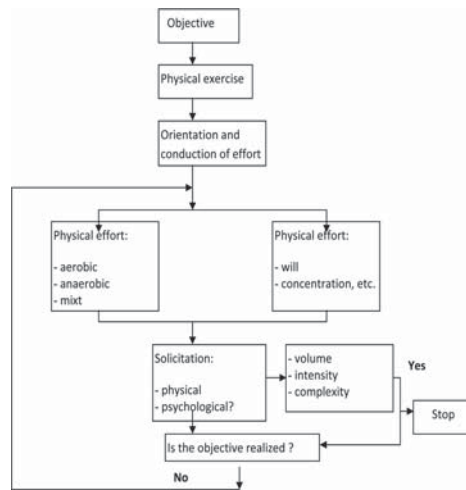


Figure 1. Physical effort orientation and conduct

During physical effort, through the contraction of muscle structures energy is consumed. The largest part of the energy obtained by the muscular groups necessary to the body is obtained through the glucose-oxygen reaction.

Amide is a carbohydrate present in rice and pasta. It is a polymer of glucose. In the process of digestion the enzymes dissolve the amide in the glucose. The glucose obtained passes through the intestinal wall in the blood circuit which in turn distributes it throughout the entire body. A part is deposited in the liver under the form of glycogen. When the level of glucose from the blood drops, then the reserve from the liver is liberated. The rest of the glucose is distributed to all the other cells of the body.

During physical effort of great intensity, the muscular structures that are activated need to be fed with energy as fast as possible. This energy is obtained from glucose

The energy required for muscle contractions in the effort made in the aerobic regime is obtained from the reaction between glucose and oxygen. A big part of it is used for the movement of the body, and the rest for temperature fixture. Another result from the reaction is the carbon dioxide which is transported in the blood and eliminated through the lungs. Water will also be transported by the blood, and the elimination of the largest part is done from the lungs, and the rest through urine

For the anaerobic regime, the effort made is an intense one and the energy is consumed in very little time. The muscular system requires a rapid alimentation with a large quantity of energy. Since oxygen cannot be transported fast enough to the muscle structures activated, the effects of the anaerobic effort appear. Thus, glucose transforms very fast in the energy necessary for muscle contractions, but also in the required thermal energy. The quantity of energy obtained is much smaller: about a minute after lactic acid occurs, muscle fatigue and pain also appear. As a result, effort must be stopped in order to avoid collapse.

3. ENERGY SOURCES

Energy is the capacity of the athlete to produce effort, and the effort itself represents the contraction of muscles to apply a force against a resistance. Energy is the required condition to perform

an exercise or to perform structures of physical exercises in practice or in competitions. Energy is obtained from the transformation of food, at cell level, in a rich energy compound known as adenosine triphosphate (ATP), which is then stored in the muscular cell. ATP represents a molecule of adenosine released from the transformation of ATP (rich in energy) in ATP+P (adenosine+diphosphate+ phosphate). When a phosphate link is decomposed in ATP+P, energy is released. In the muscular cells only a limited amount of ATP is stored. Therefore, as Bompia [4] underlines, the ATP reserves need to be constantly restored to facilitate the physical activity in development. This is also displayed in Fig. 2. The body can replenish the reserves of ATP through any of the 3 energy systems presented in the figure below, depending on the type of activity: the ATP-PC system, the lactic acid system and the oxygen system (O₂).

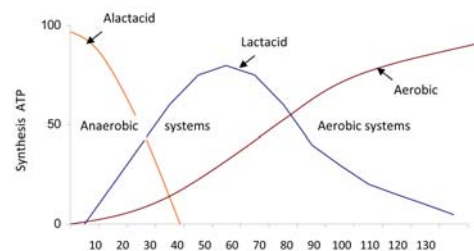


Figure 2. The primary sources of energy in sport activities (modified after Del Monte, Sardela, Facini and Lupo, 1985, cited by Bompia, [4])

4. PHYSICAL CONDITION

The physical condition is the physical capacity of the body to deal with long distance efforts of high intensity, maintaining the efficiency indices constant, in other words through overcoming the apparition of the phenomenon called fatigue.

The physical condition can be:

A – general;

B – specific for certain sport branches.

A. The general physical condition has the following components:

✓ cardiovascular resistance, represents the capacity of the circulatory system to provide oxygen to the muscles;

✓ muscular resistance is the capacity of muscle structures to contract, without having the fatigue occur to soon;

✓ physical vigor (“freshness”), represents the combination between cardiovascular resistance and muscular resistance. The common feature of this component is the resistance of the body to long periods of effort, without getting tired;

✓ mobility is of maximum importance. Mobility represents the physical capacity of realizing movements of great amplitude, in a passive or active way and it refers to joints, to be supple signifies elasticity of the muscles structures, conditioning mobility;

✓ the speed is the capacity of the body to execute acts and actions involving movements, in a short period of time;

✓ the tissue structure of the body refers to the fat tissue and the muscle tissue.

The level of physical constitution depends on the degree of solicitation of the body of the person, in physical effort. In normal conditions, any person who works out, must have a minimum level of physical condition.

B. Specific physical condition for certain sport branches.

The physical condition specific to a certain sport branch, is generally built on the general physical condition. In other words, in order to be a good athlete you must have a very good condition. That is why, it is important to identify the factors that influence physical condition. A very good physical condition is imposed by an excellent level of health.

The most important factors are:

✓ age: the maximum level would be 20-23 years of age; a good physical condition is determined at all age categories by 2 things: the optimization on scientific basis of the training and continuity;

✓ sex: boys and girls as well can work out starting with young ages; from 10-11 years old boys start growing in height and mass, the muscle structure is developing, making them stronger than the girls, while girls possess a greater degree of joint mobility;

✓ eating program: a good physical condition is determined by a balanced diet and of good quality;

✓ physical exercise: the primary tool of physical education and sport, it represents the main support upon which physical condition is built, consolidated, perfected and maintained;

✓ over-training: as any exaggerated thing, it does not help the

body and leads to chronic fatigue, which can be solved through break;

✓ drug abuse: drugs are chemical compounds that influence in a negative way the primary functions of the body, automatically physical condition;

✓ stress: stress has many harmful effects on health; the solution is through movement;

✓ environment: has a positive effect on health and physical condition, if clean, unpolluted.

5. EFFECTS OF TRAINING ON THE BODY

The vast majority of professionals in the domain have considered that the even though the effects of sport training do not appear right away, they have an effect in “the long run”. Motivated and responsible training based on principles and rules always produces the desired effects.

Training in the anaerobic regime has spectacular effect on the breathing system and circulatory one. As far as the breathing function is concerned, the effects are:

✓ the cord grows in dimension, the walls thicken;

✓ the capacity of the cord improves, the contractions become more powerful, and the quantity of blood pumped will be bigger;

✓ a larger amount of blood is covered, with more erythrocytes in this way a larger quantity of oxygen can be transported;

✓ the diameter of the arteries is bigger, the walls become more elastic and the blood pressure drops;

✓ the cardiac frequency is diminished while in pause;

✓ After work out, the pulse regains normal state more rapidly.

Training in the anaerobic regime has the following effects:

✓ The cord expands its dimensions, the wall become thicker in order to support the great tension generated by efforts of maximum intensity;

✓ The elimination of lactic acid is more efficient, because of the tolerance of the muscular system towards it

Training in both the aerobic regime and in the anaerobic one also results in the improvement of muscular resistance as well as muscular force.

The development of muscular resistance triggers:

✓ The development around muscular structures of a network of capillary veins, that, through this form of training, will be provided with more blood through which oxygen and nutritive substances will be transported;

✓ The capacity of the muscles of transforming fats (lipids) in energy;

✓ The muscular system will resist facing efforts longer, without getting tired, using oxygen more efficiently.

The growth of muscular strength involves:

✓ A development of the muscular mass, contractions becoming stronger and more dynamic;

✓ A development and definition on joints and tendons.

The 2 forms of training mentioned above have spectacular effects on the fat tissue, joints and bones. These can be summarized as follows.

Effects on the fat tissue:

✓ Improves the capacity of the muscular structures activated, transforming fats in energy sources;

✓ Elimination of surplus which represents an unnecessary load for the body, it transforms those who train in flexible people, strong and confident in their own powers with maximum rating on all levels.

Effects on the joints:

✓ They fortify and the resistance of ligaments improves;

✓ The synovial glands secrete more synovial liquid that lubricates bones, leading to their thickening;

✓ Through the diversity of physical exercises from stretching the general mobility and that of joints is improved.

Effects on the bones: the resistance of the bone system is enhanced.

The human body undertaking physical solicitations due to various forms of training, needs in a general, 4 types of nutritive substances, necessary to obtaining energy. Water along with food fibers, occupy an essential spot.

The substances mentioned above and their characteristics are:

✓ Carbohydrates, which found in foods rich in amide and sweets;

✓ Fats generate energy. They can successfully replace glucose, which as we know it is itself a source of energy. The more intense the trainings are, the larger quantity of fats will be burnt in the muscular structures;

✓ Proteins are considered by the specialists in the domain, as the "material of construction" of the body, that participate directly to

rebuilding the tissues after effort and especially rebuilding the muscular structure. They participate as well to improving the blood circulation and are also used as source of energy.

✓ Vitamins and mineral substances.

Depending on the intensity of physical effort, the body needs certain quantities of vitamins and mineral substances, with a triggering role. These are:

✓ Vitamin A: found in fish, eggs, liver, vegetables and it is necessary for a good eye sight, as well as a good quality of the skin tissue. The lack of this vitamin creates problems at eye level (incapacity of seeing at night and dark places), degradation of skin;

✓ Vitamin C: found in citric fruits and vegetables. A sufficient quantity of this vitamin, has an effect on the skin tissue, healing wounds much faster. It insufficiency causes scurvy;

✓ Vitamin D: present in milk, eggs, fish and liver. It results under the action of sun rays in deposits in the skin tissue. It is necessary for a better resistance of bones and teeth. Researches in the domain have pointed out the fact that in its absence, calcium cannot be assimilated.

✓ Calcium: is found in milk, cheese, sardines, dry fish, green vegetables. The balanced presence of calcium in the body has a positive effect on contractions and contractions of the muscular system, also on the resistance of teeth and bones. The lack of these substances leads to bone fragility;

✓ Iron: found in liver, green vegetables, beans, bread. This element participates in the realization of the synthesis of hemoglobin from the erythrocytes. Its insufficiency causes dizziness and anemia;

✓ Iodine: is present in cultivated vegetables near salt lakes and seas, sea fruit. It helps the hormones that control the speed of the consumption of energy substances. The off balance of this element has consequences on the thyroid gland;

✓ Water: met in the blood, fluids, in the extremely large number of cells. It is lost through sweat and urine. Hydration during training but also after is a necessity.

6. CONCLUSIONS

Taking in consideration everything mentioned above, I consider that through a scientific optimization

of exercises and of structures of exercises with a regular practice, adapted to personal variables and to high performance standards, we can agree with the Romanian writer Ioan Slavici who said that “Physical education is the art of realization of the human being”.

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