

EFFORT IN THE MILITARY PHYSICAL EDUCATION AND SPORTS TRAINING SESSION

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Abstract: *The article analyzes the aspects related to the dynamics and direction of the effort in the military physical education and sports training session. At the same time, during the article we will present the general characteristics of the effort in physical activities, characteristics that are absolutely valid for many disciplines in the process of military training. It is also noted that the specific efforts of physical education and sports in the army are important energy consumers as they demand the somato-functional and mental response of the military. In this sense, the proper dosing and directing of the effort involves improving the body of the military at different levels, necessary for the training for fighting at performance standards.*

Keywords: *physical effort; stress; energy consumption; intensity; fatigue; rest.*

Introduction

All the actions of an individual, regardless of their nature, have a common feature represented by the energy consumption. Decreased energy sources lead to fatigue. Depending on the value of the energy consumption and directly responsible for the occurrence of fatigue is the effort, which must be analyzed in correlation with fatigue and, obviously, with the action of removing it, namely with recovery.

Effort, fatigue, recovery, rest are organically associated physiological phenomena of movement, activity. In their absence, the activity cannot be conceived, just as we cannot imagine that they can manifest themselves in isolation, outside the activity, of its consequence.

According to the Explanatory Dictionary of the Romanian language, the effort represents a “*voluntary tension of the physical or mental powers of the organism in order to achieve a higher than usual yield; endeavor, perseverance*”¹. In the Dictionary of Psychology (1978), Paul Popescu Neveanu defines effort as a “*conative conduct of mobilization, concentration, acceleration, of physical and mental forces, within a system of conscious self-regulation (feedback), in order to overcome an obstacle, overcome a resistance of the environment and of one's person*”.

Therefore, the effort implies finality and is characterized by focus, adequacy to the obstacle to be overcome, tension and unification of physical, mental and intellectual resources. Military activity involves the body's demand over the usual level imposed by the performance of daily activities, effort (regardless of its nature), fatigue and rest having other values, other meanings.

According to the literature specific to the field of physical education and sports, physical effort is a functional overload that produces a change in the body's homeostasis, in order to cover the increased metabolic needs of its major functions. It also involves motor actions underlying the muscle contractions resulting from the transformation of chemical energy into mechanical energy in the active muscles. During exercise, the body consumes smaller or larger amounts of oxygen which contributes to the recovery of the energy substrate.

Physical effort is a stressor, a stimulant that forces the body to respond properly through electrical, mechanical, caloric manifestations, the answers being customized according to each

¹ <https://www.dex.ro/efort>, accessed on 16.01.2021.

individual. In human activity, physical effort is divided into: professional effort and sports effort. In the military, professional efforts are limited to combat training (where military physical education is a key component), the effective battle or the execution of various missions (where physical and mental demands are very intense), but also sports activity (military participation in various sports and military-application competitions).

Dynamics of effort in the military physical education lesson/session

The effort in physical education and sports is determined by the themes and objectives specific to each theme approached in the lesson, which leads to a differentiation of the three classic parameters of this effort: volume, intensity and complexity.

In military physical education, the dosing of effort involves some peculiarities dictated by methodological reasons different qualitatively and quantitatively from school physical education, but also from those in the field of sports. The modification of the effort parameters and the correlation with the necessary rest, obviously with the observance of the physiological laws of the organism, are programmed according to the training objectives and the type of the military structure, of the subunits / groups that are being trained. Even if the military physical education is organized and takes place with a great diversity of ages, motor potential, gender, execution conditions, etc., we must take into account what specialists consider that “*the dynamics of the effort in the lesson can be appreciated based on the biological echo that the work has done*”². The dynamics of the effort in the physical education and sports lesson is its curve or trajectory in graphical representation according to the succession of structural sequences. This dynamic has been established, in general, on the basis of many concrete records through protocols for the evolution of different indicators. However, the most common control indicators are the heart rate and respiratory rate.

It is true that there are many ways to measure the intensity of physical effort, but the most common and safest is *the maximum heart rate*, because the number of heart beats per minute properly reflects the body's response to effort. Therefore, regardless of the form of training (military physical education, sports training, individual physical training, etc.), it is necessary for any participant to know how to determine his *maximum heart rate*, *resting heart rate*, *spare heart rate* and *optimal heart rate* depending on the objectives set.

The maximum heart rate can be determined using physical tests and heart rate monitors (watch or bracelet) that force the body and especially the heart to the maximum limits for a short time. The maximum heart rate can be calculated using certain formulas that can vary for 95% of subjects of the same age in a range of ± 20 beats / minute, which is very important for calculating training zones. *Resting heart rate* requires accurate knowledge of the pulse topography (it can be detected in the radial artery or carotid artery; note that the carotid pulse is always taken unilaterally, synchronous pressure of the carotid arteries can cause syncope). It is usually determined in the morning after waking up, in supine, counting the beats within a minute. *The spare heart rate* is obtained by subtracting from the value of the maximum heart rate the value of the resting heart rate. *The optimal heart rate* is determined using all three heart rates listed above. Initially, the frequency of the desired training level is determined (the reserve frequency multiplied by the intensity at which the training is performed as a percentage of the maximum physical potential), then the optimal heart rate by adding the training frequency with the resting frequency³.

In the physical education lesson and in the military physical education session, the evolution demonstrated by ergophysiology, for the gradual and well-performing engagement of the body in effort, highlights a curve-shaped path whose representation quotas are established by the values of functional indicators mention. Thus, during the first three sequences of the

² A. Dragnea and collaborators, *Educație fizică și sport – teorie și didactică*, Editura FEST, București, 2006, p. 49.

³ I. Andrei, V. Ceascai, *Efortul fizic pe înțelesul tuturor*, Editura Universității Naționale de Apărare ”Carol I”, București, 2017, pp. 31-34.

lesson (especially on the second – *the preparation of the body for effort* and the third – *the selective influence of the musculoskeletal system*) there is a continuous upward curve highlighted by the values of heart rate and respiratory rate. Starting from about 70 beats / minute and 16-18 breaths / minute at the end of the third link they reach levels around 120-130 beats/minute, respectively 20-22 breaths / minute, a situation that corresponds to warm-up for effort of the body, expressing "*a state of optimal psycho-physical, sensory and kinesthetic preparation, which prevents possible accidents* (C. Bota, 2000)"⁴.

In the thematic part or thematic parts (IV, V depending on the lesson topics approached), the effort curve usually registers a "plateau", namely a relative stability, depending on the operational objectives and the methodology used. In general, there are "increases / exceedances" when developing/educating motor qualities or consolidating or improving motor skills/abilities, especially when using bilateral sports games, some movement/dynamic games, application routes and relays, provided these are performed in the form of competition⁵.

Acting in order to achieve the specific operational objectives of the military physical education lesson (mainly in the training subunits of the operative structures) entails the most important demands exercised at the level of the body. As a result, in the thematic part specific to some topics in military physical education (varied terrain running, forced marching and throwing hand grenades, combat sports, obstacle course, applicative-military swimming, military cross-country skiing, etc.) there is an apparent stabilization of the effort at high levels, the heart rate values being around 160 pulses/minute. However, this stabilization is apparent because the nature of the content elements, the methodology and means used, the duration and type of pauses are variables according to which the effort can register small variations, heart rate values alternating between 140-180 beats / minute. In other words, the body's reaction manifests itself, with small oscillations, at a high level compared to the preparatory part of the lesson. In these topics, we can no longer talk about that "plateau" because it is very difficult to achieve, given the impossibility of a perfect balance between demand (effort), which can be kept relatively constant and the energy sources that are constantly declining and the fatigue intervention.

The downward evolution of the values of the functional parameters is a physiologically normal one, ensured by the last two sequences of the lesson or by the last part of the sport training session, which aim at returning the body to an optimal state to continue the training activity. This generates the downward phase of the effort curve, to levels close to those recorded before the start of the training session, but it should be noted that the military body must be accustomed to, at least after carrying out activities involving the movement of troops (on foot, on skis, swimming, etc.), to be able to perform another specific mission.

Directing the effort in the military physical education lesson/ session/sports training

As we have noticed, physical effort consists in the stress of the organs, systems and functions of the body during the performance of an activity. During that stress, energy is expended and a certain degree of fatigue accumulates. Increased energy consumption caused by effort leads to unpleasant sensations, general or local, subjective and objective, which indicate fatigue.

In this context, the task of directing the effort in the military physical education / sports training lesson / session falls to the physical education / sports training specialist who has the obligation to ensure a proper dynamic, which requires a good knowledge of the effort-fatigue-rest relationship.

Fatigue should be considered as a normal, transient physiological process, which manifests itself after a prolonged or intense activity. This "*can be seen as the body's acute response to physical effort, manifested by a state of discomfort characterized by a temporary decrease in exercise capacity and an alteration (imbalance) in the coordination of body*

⁴ A. Dragnea and collaborators, *op.cit.*, p. 49.

⁵ Gh. Cârstea, *Teoria și metodică educației fizice și sportului*, Editura AN-DA, București, 2000, p. 118.

functions'⁶. As the energy consumption increases, certain phenomena specific to fatigue are manifested, as follows: difficulty in continuing the effort, diminution of the coordination skills, sensation of suffocation, pallor of the face, slackness, etc. Exaggerated efforts, in terms of duration and intensity that characterize military activity, lead to exhaustion of the body, to the impossibility of continuing the effort, if the prior training process has not been carried out in accordance with specific demands.

Studies have also shown that stress during exercise leaves obvious marks on the central nervous system reducing accuracy. Thus, there are disturbances in the work alternation of different bundles and muscle fibers. It is known that, in normal activity, the muscle does not work with all its fibers, achieving a rational succession of muscle labor with the rest of the neuromuscular units. Rotational programming of muscle fibers favors the recovery processes, the intake of energy reserves, thus delaying the appearance of fatigue. During an intense or long-lasting effort, due to the onset of fatigue, it is not possible to achieve optimal management of the body's activity, nor the rational coordination of agonist and antagonist muscle contractions. Or, such a complex activity as that of making a sustained effort cannot be accomplished without the precise and finely coordinated integration of a considerable number of apparatus, organs and systems. In this sense, the state of fatigue being a reversible and physiologically natural, must be monitored by the specialist throughout the training sessions, but also outside them, as an exponent of the effect determined by the specific effort on the military body.

Rest is an essential element for the development and improvement of the body's functions. The correct establishment of the effort-rest ratio (effort dosing) during the military physical education session or sports training and during a system of lessons, is one of the essential problems of the leader of the instructive-educational process. It is well known that the recovery mechanisms cannot be improved without the body getting tired beforehand. According to studies, changes in the body's exercise capacity are phasic. Thus, after effort, in the first phase of rest, the capacity is restored to close to the initial level, then, in the second phase, the phenomenon of over-recovery (overcompensation) occurs and finally, in the third phase, the body returns to the initial level.

In general, for the activity of physical education and sports, the overcompensation phase is of particular importance because, in this phase, the body's effort capacity is at a higher level than the initial one, due to the efforts imposed by the will, by the somato- vegetative recovery and restoration processes. Therefore, in order for the effort to lead to favorable changes, it is necessary to repeat it before this phase of overcompensation (over-restoration) disappears.

Rest between exercises and repetitions in a lesson or cycle of lessons should ensure that the effects of fatigue are extinguished. However, the duration of the rest should not be extended beyond the phase in which the favorable consequences of the effort are maintained (the overcompensation phase), when the body's resources are mobilized to an increased work capacity. At the same time, the effort must not be repeated on a basis of non-recovery, because it leads to exhaustion, and its resumption after the effects of the previous effort have faded cannot ensure progress.

Therefore, increasing the quality and quantity of effort is an important condition for the continuous development of the body's ability to function. The systematic repetition of an effort leads over time to changes in the body's adaptation and, implicitly, to its accustoming to that request. It follows that, in this phase of adaptation, the repetition of the same effort can no longer be a stimulus, being absolutely necessary to increase it.

That is why it is so important that the effort be directed by a specialist in the field in any form of institutionalized physical activity. With strict reference to military physical education or sports training, the increase in effort must take into account the principle that each session builds on the previous one and prepares the next. The following effort is also resumed before the effects

⁶ A. Dragnea and collaborators, *op.cit.*, p. 50.

of the favorable changes obtained in the body in the overcompensation phase are completely extinguished.

In the military physical education and sports training session or in other forms of organizing the practice of physical exercises, there are two main ways of directing the effort:

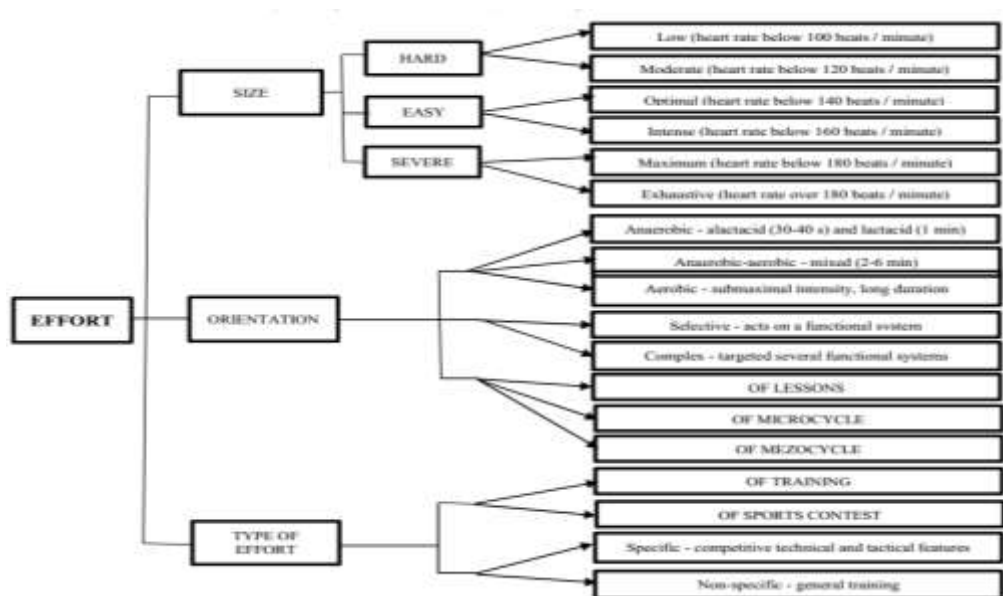
- *anticipated directing*, achieved through planning documents developed by the specialist for different periods of time; this anticipatory guidance is much more accurate for lesson plans or for other current and concrete activities;

- *concrete directing*, achieved in lessons or other current activities, depending on the reaction of the subjects to the specific effort; this reaction is appreciated by the specialist by objective methods (heart rate and respiratory rate) and subjective methods (skin color, perspiration, level of motor coordination, accuracy in performing motor acts and actions, attention of subjects, etc.). In this way, if the reaction to effort of the subjects requires, changes must be made to the anticipated directing, at least in terms of the duration of pauses between repetitions and their nature (larger, smaller, active, passive, etc.), the parameters of effort and exercise conditions⁷.

General characteristics of the effort

The main elements based on which the regulation of the effort and the orientation of its influences are realized in the physical education or sports training lesson are: volume (quantitative side of the effort – number of repetitions, duration of executions, distances covered, etc.); intensity (qualitative side – speed of execution, duration of breaks, value of loads, etc.); complexity (direct connection with the coordination of movements in the process of forming motor skills and abilities).

The following is a classification of the effort characteristic of the field of physical education and sport, but which can be valid in many categories of military training:



Effort classification in physical education and sports training
(adapted from A. Dragnea, 2006)⁸

In conclusion, the activity of physical education and sports in the armed forces aims to improve the apparatus, organs, systems and functions of the military body, which cannot be achieved without the request beyond the usual limits, beyond the thresholds of demand. Such high demands (increased energy consumption and relatively pronounced fatigue) are the only

⁷ Gh. Cârstea, *op.cit.* p. 120.

⁸ A. Dragnea and collaborators, *op.cit.*, p. 54.

ones able to produce response reactions with an overadaptation character and to determine the improvement of the military body from a morphofunctional point of view.

The effort in the lesson must be appreciated as an important condition for achieving the objectives of physical education and sports in the armed forces, being one of the priority directions for modernizing the leadership of this instructive process. Lessons / sessions cannot be just recreational because military physical education, as a fundamental component of the training process, contributes substantially to increasing the operational capacity of the armed forces. In this sense, ensuring proper dynamics of the effort in the lesson and directing it with maximum efficiency are attributes of the specialist in the field, on whose methodical training depends the fulfillment of the objectives of the training process.

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