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GENERAL ASPECTS OF THE PHYSICAL TRAINING REQUIRED BY THE MILITARY FOR THE EXECUTION OF THE MARCH

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Since ancient times, during military conflicts, soldiers had to carry their combat equipment on the battlefield or up to certain areas of stationing as close as possible to the battlefield. Even today, the physical ability of load bearing is a vital skill, and there is no other way to achieve it with a reasonable degree of stability, accuracy and efficiency than exercise. The instructive-educational process of military physical preparation can provide the military with complex and varied motor skills, including the fast deployment of subunits in unfavorable weather conditions, with appropriate weaponry and equipment.

Keywords: physical training; military physical education; physical exercises; heart rate; march.

Introduction

Throughout the centuries, history has been decided on the battlefield, the difference between winning and losing being attributed to multiple factors, like: structure of the army, used tactics, combat equipment or the bravery of the soldiers. Until the beginning of the 18th century, during the movements of the troops, rarely and only in special scenarios, had the military personnel transported cargos exceeding 15 kg. The additional equipment, usually consisting of all the weapons, clothing and accessories which a soldier had on the battlefield, was transported by auxiliary personnel with the help of horses and covered wagons. This, as well as equipping the troops with enough supplies for more days, contributed to the development of maneuvering capacities and the encouragement of moving autonomy. Gradually, after the 18th century, the emphasis on the centralized transport of materials faded; the armed forces, becoming more disciplined, imposed soldiers to carry their own cargos. This offered the troops much tactical flexibility and maintained a high level of individual effort capacity in the ranks.

Physical training in the army is not a sports branch which includes different contests like athletics, but it is done with types of training that develop the soldiers' basic movement abilities to an extent which allows them to complete their missions, without being influenced by external factors like: food, sleep, shelter or heat. Soldiers must be capable of living in rough conditions, not wasting energy wailing, marching, and then fighting. There is no point in travelling faster than anyone and reaching the destination without having any physical resources to enter the combat or travelling the distance, being ready for combat and having to wait for your teammates, which may arrive very late or not arrive at all. The most important physical components which exert influences over the physical training of a unit are the morale and the will to fight. The level of these is very high if we improve the group's cohesion, strengthen the bonds between members, finding the right leader of the group which will help improve the unit's performances.

„Physical training, as for war, wants to educate the basic movement abilities (strength, endurance, speed, sleight), the adaptation of the physical efforts to the potential scenarios, utilizing means of action that include all the individual equipment in light work conditions, as well as hard conditions of work."[1].

Considering all these aspects, a march consists in a fast, organized travel, on varied terrain, having the weapons and combat materials on the soldiers, and the development of the ability to successfully finish this combat actions' component; the great maneuvering of troops represents a permanent

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concern of the NATO armed forces. However, even if the march can be a decisive factor in winning a fight, in some climate conditions, it must not be done, because it could lead to the loss of functional capabilities of soldiers' organisms as a result of excessive strain caused by heat.

A march in marching order[2]is known in British army as *"Tab"* (an abbreviation for *Tactical Advance to Battle* [3]) / *"tabbing"* or *"Yomp"* in an unconventional language used by marine corps from *Corps of Royal Marines*. In British army, the march in marching order is considered as being a basic movement skill, being annually evaluated with a test (known as *"Combat Fitness Test"* - CFT) conceived to measure the level of muscular force and endurance of soldiers. *"The test includes a march on varied terrain, in a fast pace, using complete combat equipment (instruction uniform, individual weapon – SA80 and the backpack with a weight of 15 - 25 kg). The distance that must be covered (between 6 and 8 miles) and the weight depends on the unit's quiddity and soldier's specialization"*[4]. During the selection of future soldiers, the recruits, in the beginning phase, are ordered to march for a distance of 2 miles, because leg wounds are frequent during the basic military training, since many teenagers are not used to executing physical training in military clothing.

The most famous recent *"Yomp"* was the march executed during the Falklands War (well-known as Malvinas War) in 1982. After they had landed on the beaches in San Carlos (on the North-West coast of East Falkland), British soldiers went to attack the Argentine troops, travelling 90 km along the Islands for 3 days, having on them marching orders weighing between 36 - 54 kg. As a war consequence, the word *"Yomp"* [5] (hard march with all the equipment on you) definitely entered the British slang.

General aspects regarding the execution of a march

The march with cargo is considered as being a form of physical training which involves a big consumption of energy, that is why soldiers have to be sure that they: have a good general physical condition, are aware of the hard nature of this form of training, previously been through a training schedule which included a combination between developing strength and endurance, and that they have consulted a physician regarding their capability of participating in such physical activities.

The gradual increase of overloading is an important principle of all the physical training practices for soldiers who will execute a march. Also, it is important to balance all the components of the instructional and educational process, because this physical component is not the only one in the conception of the physical trainings of soldiers. The 4 basic principles below illustrate how a march training must be structured and, more important, illustrates the order in which they must be used so as to prevent the overworking or exhaustion (only one movement quality must be developed during one training session):

- the principle of frequency refers to the fact that the first aspect which must be developed is the frequency of the training sessions (start with one per month, then two per month and finally three per month);
- the principle of duration (time and distance) involves the increase of time allocated for the marching drill, by gradually increasing the number of kilometers that have to be covered (for example: 2 km, 4 km, 6 km, 8 km, 10 km), which will cause an increase of time;
- the principle of intensity admits in advance that the intensity of a march is the 3rd element that has to be increased, this being determined by: the weight, the speed (pace) of the march and the type of terrain (off road or ground level, covered in asphalt, gravel or unpaved land). The increase of intensity can be combined with the reduced duration (for example: travelling 10 km with 20 kilos to 8 km with 30 kilos);
- the principle of overcompensation refers to the fact that a good recovery between two training sessions is essential for becoming more powerful and more prepared. The growth of movement qualities, like strength and endurance, are based on this principle. This means that, at the end of every march executed the energy resources in the organism are consumed, and during the rest they recover. However, the indicated process will not make the body return to the state before the training, but produces an over recovery or a state of over reward. If we execute the next march too soon, before a full recovery, the state of overtraining may appear.

Depending on the operational requirements, the structure of a training program as for executing drill marches depends on a series of factors that have to be taken into account: the aim of the physical instruction process (the type of march – normal or forced, travelling speed, the weight, the distance to be covered, the type of terrain, the meteorological conditions and the physical state of soldiers – sleep deprivation, fatigue, etc.), the initial level of physical preparation of each soldier (and of unit) and the time available for executing training sessions.

The body will need time to accommodate as intensity of the training increases and this will be equally applied to the recruits who execute base military training and are not used with marches, and it will also be applied to the soldiers that are preparing for this kind of exercise (for training, evaluation or combat). Therefore, a good coordination between classical principles and the proper instruction methods in the process of physical training of soldiers is important for the following: to prevent the emergence of a state of extreme fatigue (first of all because of travelling long distances), to reduce the risk of injury and to improve performance. In time, after more months, as a consequence caused by the changes occurring in the conditions of the body, there will appear some structural and functional changes such as: adaptation to walking with boots, bones (especially the metatarsus), muscles, ligaments and tendons becoming stronger.

During the execution of an organized march in a formation in which the unit is arranged in a column, a soldier that has a step distance and a traveling speed very close to the average of the group must be established as a directional to impose the pace. If the pace imposed by him is not quite constant, then it is possible that many soldiers may have difficulties, which will lead to division in multiple groups and, in the end, stopping in order to regroup. Therefore, the establishment of travelling speed in a march drill is very important (this depends, obviously, on the purpose of the march, the terrain that will be travelled on, and the weight) to not negatively influence the group's efficiency during military operations which will be later executed.

Research demonstrated that the heart rate will increase proportionally to the movement speed, as follows: with approximately 5 heartbeats/ minute when the speed increases from 5 to 5.5 km/h, with approximately 10 heartbeats / minute when speed varies between 5.5 and 6 km/h and with approximately 15 heartbeats / minute when speed increases from 6 to 6.5 km/h[6]. The correct estimation and the monitoring of the movement speed can be done by timing the necessary time to cover a certain distance (to complete a certain track). To accomplish the proposed objectives, the next table can be used to establish if an adequate travelling speed has been selected, time being approximated for the ease of calculations. After

Table 1 *Necessary values for determining the adequate travelling speed*

Travelling speed (km/h)	Seconds necessary for travelling 100 m	Minutes necessary for travelling 1 km
4.0	90	15:00
4.5	80	13:20
5.0	72	12:00
5.5	66	11:00
6.0	60	10:00
6.5	55	09:15
7.0	51	08:30

choosing a travelling speed, it must be maintained, as much as possible, during the march.

Different weights and loads that soldiers transport, and also their attributions in the group, must be taken into consideration in elaborating a training program for marches.

If these are related, but there are differences regarding soldiers' body weight, this must be examined at the moment of conceiving the training program. A soldier who weighs 60 kg will have more difficulties with a pack which weighs 40 kilos than a soldier who weighs 100 kilos. This can seem contrary for the idea that all of group must carry the equipment and, therefore, they need to train in the same marching order. The idea is that they must keep a balance in the training schedule, taking into account the length of step and the body weight of every soldier and, also, the necessity of fulfilling the mission (objectives).

This means that sometimes training must be done with packs which are based on certain percent of soldier's body weight and, sometimes, with equipment which is connected with the next operational task. A practical report for weight of pack, based on percentages of body weight, is: between 25 - 40% for men and between 23 - 32% for women. Some research conducted by the United States Army demonstrated that the trained soldiers (specialized soldiers in special operations) can carry a load which is equivalent with 45% of body weight during 8 hours (including periods for rest, and the medium moving speed was 4 km/h)[7]. The difference between men and women, with respect to the marching order appears because women have less muscular mass in comparison with men. However, there is a percent of military personnel that has a relatively low weight, which causes training in a lighter marching order that the one that needs to be carried in next military operations. It is recommended that this group of soldiers need to train within the parameters highlighted above at the beginning of training period and to advance until they can carry the necessary weight. This may help for the motivation of soldiers and to prevent and exclude causes which imply the appearance of injuries and overtraining (pathological condition which results from exaggerated efforts).

For that kind of soldiers, whose physical performance is reduced by the appearance of medical conditions (injuries, diseases, etc.) and by skipping the training period, an adjusted (individual) schedule must be drawn up. These soldiers, who have not trained for about 6 weeks or more, are advised to not return too early to the physical training of group, of their current level, because this may cause injuries. Thus, in case of injury, disease or absence for another reasons, it is recommended to apply the 50% rule. This rule means that those soldiers who return to physical training must, as a general rule, do it after 50% of their lost time (for example, the lack of 6 weeks training means the return after 3 weeks of individual specific training).

Considering the delivered information based on the research conducted on necessary physical training of soldiers for executing marching drills, there are three main additional recommendations. The first guide-line refers to alternating specific training sessions with marching with those for strength (especially the muscles of superior part of torso) and resistance (the capacity of aerobic effort), succession which will lead to the biggest progress of physical performances of soldiers for marching in marching order[8]. The favorite mix of most specialists in military physical education is two sessions of training for strength and two sessions of training for endurance per week; these can be combined (strength and resistance within same lesson). Instead, one lesson of training specific for march cannot be combined with resources of action such as physical exercises for the development of strength or resistance.

The second important aspect of marching drill is to obtain a balance between constant improvement of performances and avoiding excess. In this regard, I would recommend executing a march in marching order once in ten days, considering, of course, the objectives of training and the capacity of physical effort of group. The last recommendation would be including in the training program the sessions of short but intense effort, especially for groups that must execute, finally, drill marches between 30 - 40 kilos. By growing the intensity (the weight of knapsack) and by the substantial reduction of distance, more beneficial results can be obtained in a short time. This kind of training program must include alternating long distance drill marches (carrying about 25 kilos) and short distance/intense marches, with heavy weights (for example: a march of 6 km in 4 parts with 1.5 km per part, with a

weight of 45 kilos, and after every part is followed by a break of 5 - 10 minutes). It must be noted that this short and intense marches need to be realized by soldiers during the general period of physical training or if they missed training for a long time. The soldier needs to be well prepared and strong enough to finish this kind of training.

By the emergency of situation, by the effort and by the movement speed, the march can be normal or forced (by speed). This is an efficient modality of moving a group of soldiers from point A to point B. Practically, this element can be realized in a few different ways (by objective), there exists 3 basic factors: weight (basic for stabilizing the movement speed), the stage of physical training by group and what military operation needs to be conducted at the destination (or how fast you can get to the respective point).

One of the distinctive basic marks of forced march is the impact of effort for tendons, ligaments and joints. The combination between this high strain of physical capacities for achieving the goal and wearing boots can increase the chance of accident (for example: a painful patellofemoral syndrome, disease of Achilles's tendon, inflammation of plantar fascia, iliotibial tendon syndrome, periostitis etc.). The prevention of situations which can cause an injury and reducing risks in this respect can be realized following some easy steps such as:

- first execution of a normal march, because the human body will accommodate with this kind of effort;
- first 2 specific trainings for the forced march must be executed with high quality sport shoes, focusing on accommodation with effort parameters (capacity, intensity, complexity), without causing any abnormal reactions to the body;
- for ensuring a bigger absorption of shocks with high impact, an unpaved surface (like a forest area) must be used;
- during a training session, development of movement qualities like power and stamina must be combined with specific training for the forced march to optimize its performance;
- stamina, deciding factor of forced march, can be improved with at least 2 endurance trainings per week;
- the final element which must be improved is the intensity of specific trainings for forced march, this implying: weight gain, movement speed gain, progressive reduction of walking time and progressive running time gain (alternating them);

Moreover, several general principles of training were discussed, including a few variations of speed movement during march. However, usually in practice, training programs must be designed, so as to combine training for normal march with forced march. Then, the following principles should be applied:

- the gradual increase of the level of physical training of the military with the help of the parameters of physical effort (frequency, intensity, density, complexity);
- the beginning of the training based on normal march, and after three or four weeks the introduction of specific training for the forced march;
- the alternation between normal and forced march should allow the human body to recover between two forms of training. Then, we will use a weekly training program, alternatively using two types of walking, thus slightly reducing normal frequency of 10 days.

Conclusions

The process by which you can complete a march drill without having the feeling of repulsion is represented by the gradual completion of an appropriate training program using the right clothing and equipment, following the recommendations on hydration / food intake and preventing accidents by establishing prematurely their signs and symptoms. Finally, if you must participate in a walk, make sure it is properly organized by an experienced and professional specialist, who will provide all the right safety measures and first aid procedures.

Apart from the fact that, historically, marching is the simplest and most effective way to train the military to successfully fulfill their specific obligations, it is also an exceptional way to improve aerobic capacity, strength, body posture and their mental health. Although much further research is needed on this topic, it is appropriate that, in light of recent developments in the nature of military operations conducted by military forces around the world, the available evidence should be considered and appropriate strategies implemented to enhance the capacity to carry all the weight implied by

marching order and to reduce the risk of accidents in the military.

Strong physical tasks such as *marching,* digging and handling of materials have been identified by the researchers as common physical activities of primary importance in the current NATO missions (humanitarian, counterterrorism, peacekeeping, conflict resolution, etc.). Given the ultimate goal of choosing the optimal solution to improve the physical training of the military, by reviewing the lists of essential tasks and taking into account the types of missions undertaken by NATO forces (past and present), the Romanian army must adapt the criteria and methodology according to the requirements of the modern combat space, aiming to increase the level of physical training of the military personnel.

NOTES:

1 G.C. Ciapa, *Physical training of the Romanian military in modern conflicts*, National Defense University „Carol I" Publisher , Bucharest, 2018, p. 43.

2 By *„marching order"* we understand the load transported by a soldier during the march (weapons and equipment) as opposed to the „fighting order" that wieghs around 10 kilos.

3 http://www.infobarrel.com/British_Army_Fitness_-_The_Eight_Mile_TAB.

4 G.F. Băiţan, *Physical Training of the Military in the Romanian Armed Forces in the Context of NATO Integration*, National Defense University *„Carol I"* Publisher , Bucharest, 2019, p. 129.

5*Your Own Marching Pace* according to the website https://acronyms.thefreedictionary.com.

6 https://bootcampmilitaryfitnessinstitute.com/exercises/the-loaded-march-preparation-training-guide.

7 J.J. Knapik, R. Johnson, *Road march performance of special operations soldiers carrying various loads and load distributions*, Technical Report No. T14-93. Natick, MA. US Army Research Institute of Environmental Medicine, 1993.

8 A.G. Williams, M.P. Rayson, D.A. Jones, *Resistance training and the enhancement of the gains in material-handling ability and physical fitness of British Army recruits during basic training*, Ergonomics, 45(4), 2002, pp. 267-279.

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