

## **STUDY OF THE DAILY ENERGY REQUIREMENT OF THE CADETS FROM VASIL LEVSKI NATIONAL MILITARY UNIVERSITY**

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### **Abstract**

The operative norms for nutrition of the military personnel are a result of the carried out in the 70-ies years of the past century research about the nutrition and the alimentary status of the servicemen and the achievements of the science of nutrition, the concepts for preparation and implementation of the Armies at that time. In this light the study of the actually consumed energy by the Cadets from Vasil Levski National Military University gives a suitable base for the elaboration of new rational norms of nutrition, which could correspond to the requirements for a healthy way of life.

Aim of the research is to determine the value of the daily energy requirement of the Cadets from Vasil Levski National Military University, which would serve as a starting point for elaboration of new standards of nutrition of the Cadets at Vasil Levski National Military University.

Object of research is the rational nutrition of the Cadets, as a component of the healthy way of life during the process of their education at Vasil Levski National Military University.

Subject of research is the actually consumed energy requirement of the Cadets during the process of their education at Vasil Levski National Military University.

**Keywords:** military personnel, norms, cadets, rational nutrition.

## **1. INTRODUCTION**

At the beginning of the 21st century the world community starts to realize and to redefine the crucial meaning of the problem of nutrition of the population. In world scale there exist Nutrition Institutes, where the problems of nutrition in the light of rational feeding of the population not only in the separate countries, but in the world overall, are being examined.

In the last years in the world can be observed a significant displacing of the sick rate of the population, including Bulgaria, which may is connected with the changes in nutrition and way of life. According to the specialists, such changes contribute to the epidemic of non-infectious diseases, such as: cardio-vascular diseases (coronary heart disease, hypertension and stroke), some cancer diseases, diabetes, obesity and others. According to the international ranking of the WHO, during the last decades in Bulgaria high mortality is maintained, linked with the diseases of the circulatory system and occupies one of the leading places in

the world regarding mortality due to stroke.

The problematic, connected with the organization of feeding of the servicemen from the Ministry of Defense and from the Bulgarian Army is a process, which can't be isolated outside the scientific achievements and the tendencies in the sphere of protecting the health of the nation. Without any doubt, the Ministry of Defense is a part of the integrated effort for implementation of the National Action Plan "Foods and nutrition" – 2005-2010". The elaboration of this document is a result of the adopted by all countries-members of the WHP decisions for implementation of new policy in the sphere of nutrition, the aim of which is improvement of health. It's consistent with the contemporary requirements in the sphere of healthy nutrition and safety of foods, the European directives and recommendations and the gained long experience of Bulgarian scientists in this sphere.

It ought to be taken into account, that the operative norms for nutrition of the servicemen are a result of the carried out in the 70-ies years of the past century research about the nutrition and the alimentary status of the servicemen and the achievements of the science of nutrition, the concepts for preparation and implementation of the Armies at that time. In this light the study of the actually consumed energy by the servicemen and in particular by the Cadets from Vasil Levski National Military University during their process of their training gives a suitable base for the elaboration of new rational norms of consumption of various food products, consistent with the new economic conditions in the Republic of Bulgaria, which correspond to the requirements for a healthy way of life.

## **2. STUDY OF THE DAILY ENERGY REQUIREMENT OF THE CADETS FROM VASIL LEVSKI NATIONAL MILITARY UNIVERSITY**

Basic stages of the examination ((Nichev, 2017a, pp. 399-404; Terziev, Nichev, 2017b, pp. 627-630; Terziev, Nichev, 2017c, pp. 846-850; Terziev, Nichev, 2017d, pp. 631-635; Terziev, Nichev, 2017e, pp. 667-671, Human energy requirements, 2001a; Westerp, 2013a; Regulation, 2005a)

The basic stages of the used methodology for determination of the 24-hours energy requirement consist in:

Determination of the method for calculation of the daily energy requirement. Within the frames of this stage an examination of the methods for calculation of the daily energy requirement was carried out and as the most suitable was selected the method, offered by the United Nations Food and Agricultural Organization, WHO and the University of the UN, which was adapted to the specificity of the activity of the Military University.

Analysis of the methods of measuring the expenditures of time and selection of the most suitable method for the particular conditions. From the performed inspection of the methods of studying the time expenditures and the specificity of the educational process a conclusion is imposed, that the most suitable method to apply for the study of the 24-hours' time expenditure is the chronometry method.

Preliminary study of the main events, included in the distribution of time during the 24-hours period. Resulting from the analysis a chronogram of the organization and structure of the 24-hours period of the Cadets at "Vasil Levski" NMU, according to the time distribution, was prepared.

Analysis of the duration of the specific events from the time distribution during the 24-hours period. During the period 02.05.2017 - 12.05.2017 a group chronometry of the duration of the specific events, having the character of work activity, of the time distribution during the 24-hours period at Vasil Levski National Military University was carried out.

Determination of the norm of physical activity (NPA) for each sort of physical activity. Based on an analysis and recommendations of the United Nations Food and Agricultural Organization, a NPA for each single activity of the 24-hours period of the Cadets from Vasil Levski National Military University was determined.

Performing of an individual chronometry during the period 15.05.2017 - 19.05.2017.

Analysis of the obtained results.

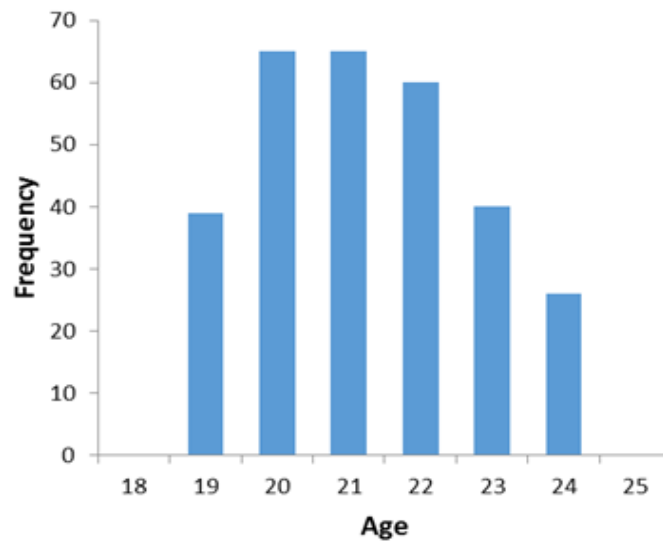
### **Analysis of the obtained results**

During the study of the daily energy requirement of the Cadets, the energy requirement of medical healthy, performing their usual tasks from the time distribution Cadets from Vasil Levski National Military University – region Veliko Tarnovo, was evaluated. Totally 295 examinations of 59 Cadets had been carried out. All examined persons are at age within the limits 19-24 years and are students from first up to fifth course. The main characteristics of the examined group are listed in Table 1.

**Table 1. Characteristics of the examined group**

Parameter	Unit	Cadets (n=295)		
		Average reading	Standard deviation	Range
Age	Years	21	± 1	19-24
Weight	kg	72,1	± 13,6	47,0-108,3
Height	cm	174,7	± 10,1	150-196
Energy requirement	kcal/daily	2673,6	± 518,3	1651-4161
Level of physical activity		1,56	±0,13	1,32-2,13

The age of the examined cadets is within the range 19-24 years. 11.1% of the women and 14.1% of men are 19 years old. The histogram1 illustrates the frequency of distribution of the whole examined group, while Figure 1 shows the percentage of age according to genders.



Histogram 1: Age distribution in years of the whole examined group.

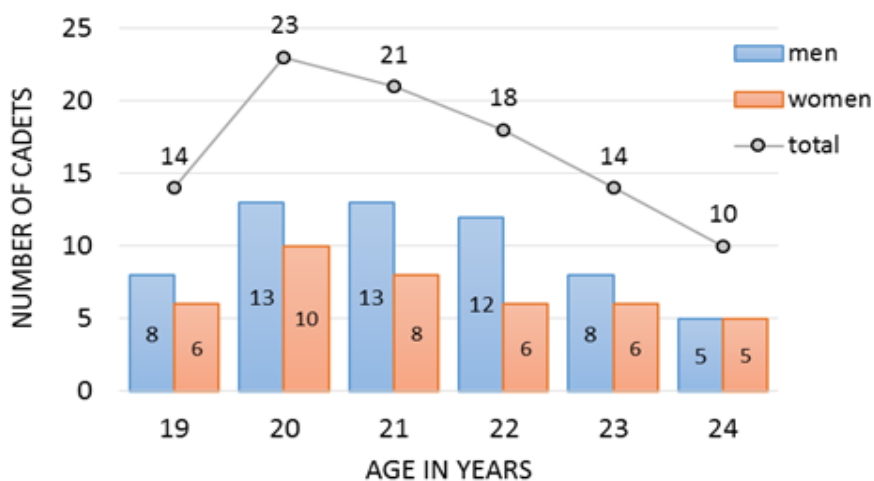


Fig. 1: Distribution of the examined persons according to age and gender.

**Levels of physical activity and time spent at different actions**

As Klaas Westerterp notes, the expenditures on energy effectiveness increase from 20% for the one year old children up to 35% for 18-years old persons, where the teenagers spend averagely 9% of their active time on

high intensity activities, while the corresponding share for adults is 4%. On the contrary, children spend averagely 19% of their whole active time on high intensity activities. Because of the fact, that the daily energy requirement is directly dependent on the body weight, a far more suitable measuring factor is the level of physical activity. During the determination of the level limits of the physical activity, the data from the WHO have been used and the physiological norms of nutrition of the population in Bulgaria. The energy requirements are strongly dependent on the usual physical activity. For a deeper profundity of the analysis of the energy requirement of the Cadets from Vasil Levski NMU, the intensity of the usual physical activity of the students has been classified into four categories. For each category are determined the limits of the NPA values, not average values, same for women and men. It must be noted, that levels of physical activity, higher than 2.40, are difficult to be maintained during a long period of time.

At Table 2 are shown the levels of physical activity, connected by the everyday activities of the Cadets.

**Table 2: Classification of the levels of physical activity**

Category	Level of physical activity
Low	1,40 - 1,69
Moderate	1,70 - 1,99
High	2,00 - 2,39
Very high	Over 2,40

At Figure 2 is illustrated the time duration, spent on different sorts of physical activity during the period 15.05.-21.05.2017. It's visible from the analysis of the performed by the Cadets activities, that the time spent on sleeping or educational activity form the major time volume of the low level of physical activity.

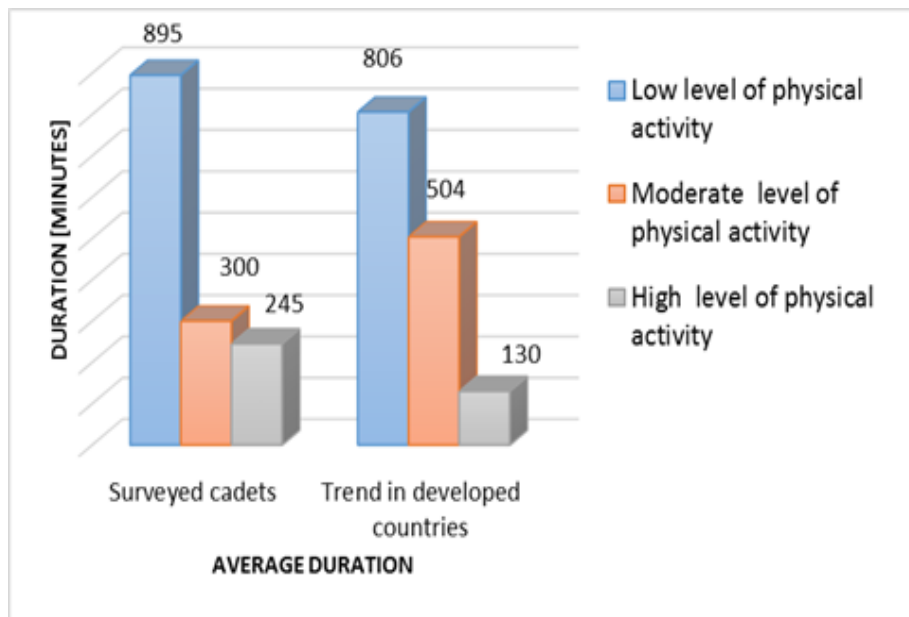


Fig. 2: Duration of the actions in the different sorts of physical activity.

On the days from Monday to Thursday at the low level of physical activity all activities, starting from rest (sleeping) and school hours are found, at the moderate level of physical activity prevails the official time, while the private time and a small part of the official time form the time, spent at the high level of physical activity. On Fridays, at the low level of physical activity, except the time spent on rest (sleeping) and the school hours also a big part of the official time (37,3%) is included, while the bigger part of the private time (80,6%) and a small part of the official activity (10,2%) determine the moderate levels of physical activity, while the cleaning of the areas during the household half-day belong to the very high levels of physical activity (Table 3).

**Table 3: Time, spent at the different levels of physical activity**

Character of the activity Day of the week	Cadets		Time spent at the particular level of physical activity			
	Dura-tion [min.]	Average NPA	Low	Mode-rate	High	Very high
From Monday until Thursday						
Rest (Sleep)	480	1,00	480			
Official time	140	1,70		110	30	
School hours	460	1,62	460			
Private time	360	2,13			360	
Altogether	1440		940	110	390	
Friday						
Rest (Sleep)	480	1,00	480			
Official time	295	1,89	110	30		155
School hours	305	1,34	305			
Private time	360	2,06		290	70	
Altogether	1440		895	320	70	155

From the conducted research a conclusion is imposed, that the general energy requirement for female cadets is smaller than that of the male cadets. After giving an account of the body mass it becomes visible, that the female cadets consume almost the same quantity of energy, as the cadets-men. The small differences between the daily energy requirement for 1 kg of the body weight of the examined groups is owed to the fact, that the energy requirement of men on main metabolism is higher than that of women, because of the higher body mass, what leads to a higher general energy consumption, including the average daily energy requirement for 1 kg of the body mass. The general daily energy consumption and the daily energy requirement for 1 kg of the body mass for cadets-men and cadets-women are presented at Table 4 and Figures 3 and 4.

**Table 4: Energy requirement of the examined Cadets**

Examined groups	Number of researches $n$	Average reading $\bar{x}$	Standards deviation $\sigma$	Range $min - max$
Total daily energy requirement [kcal/daily]				
Cadets including	295	2673,6	$\pm 518,3$	1651 – 4161
Men	205	2941,5	$\pm 358,0$	2346 - 4161
Women	90	2063,3	$\pm 227$	1651 - 2729
Daily energy requirement on 1 kg of the body mass [kcal/kg]				
Cadets including	295	37,2	$\pm 3,7$	30,2 - 52,4
Men	205	37,7	$\pm 3,8$	30,4 - 52,4
Women	90	36,2	$\pm 3,3$	30,2 - 50,5

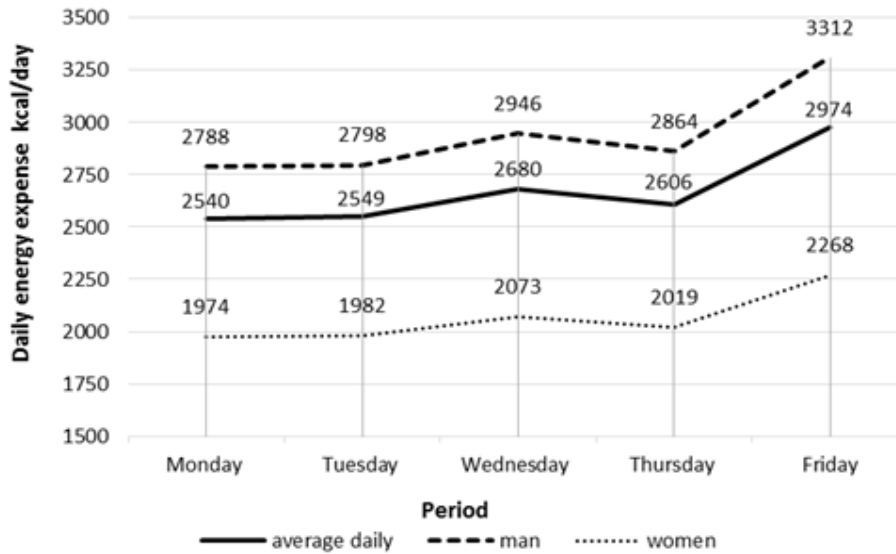


Fig. 3. Total daily energy requirement of the Cadets from Vasil Levski National Military University during the examined period.

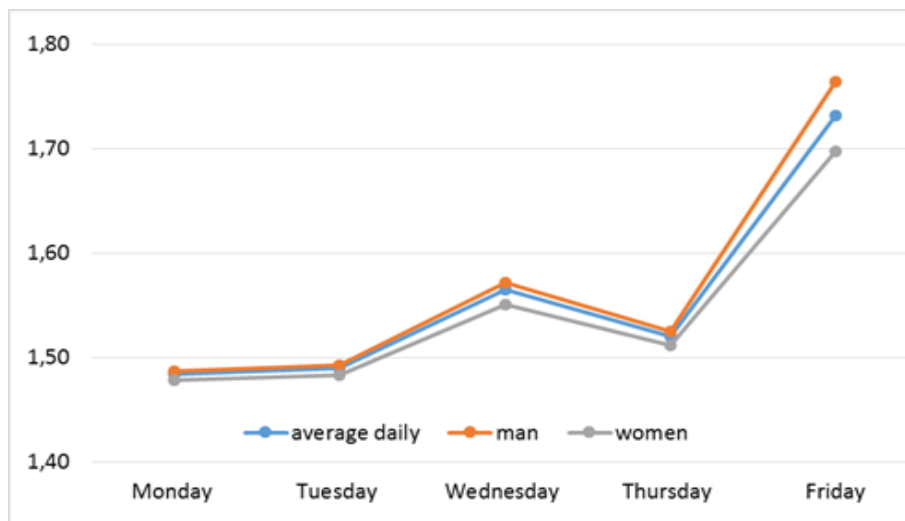


Fig.4. Daily energy requirement on 1 kg of the body mass of the Cadets from Vasil Levski NMU during the examined period.

The averagedly weighed norm of physical activity for the performance of different sorts of muscle activity during the training of Officers of Tactical Management Level is equal to 1.52 and is placed in the middle of the range of values for the low level of physical activity. The average energy requirement for the performance of different sorts of physical activity amounts 37.3 kcal/kg of the body weight, where the corresponding values for the men are 37.7 kcal/ kg and 36.2 kcal/ kg for women.

During performance of field trainings and tactical day trainings, the daily energy requirements of the Cadets usually exceed 4200 kcal/daily, and in days with a normal learning process the average daily energy is 2673,6 kcal/daily. The cold environment and the high altitude create a tendency to increasing of the energy requirements, because the Cadets are normally wearing heavier clothing and equipment and are executing more intense activities in result of the reduced quantity of oxygen in the atmosphere air, the presence of a snow cover and the tough terrain. On the contrary, the hot environment doesn't increase or reduce the general energy requirements (Terziev, Nichev, 2017f, p.164; Terziev, Nichev, 2017g, pp.915-919; Terziev, Nichev, Bogdanov, 2017h, pp. 469-475; Terziev, Nichev, Bogdanov, 2017i, pp.671-677; Nichev, 2017j, str. 121-128; Nichev, 2017k, pp. 129-135; Kanev, Terziev, 2017l, pp.413-423; Kanev, Terziev. 2017m, pp. 595-606; Sotirov, Terziev, 2015a, str. 197-207; Sotirov, Terziev, 2015b, p.25; Terziev, 2017n, pp. 893-908; Terziev, 2016a, s.84-90; Terziev. 2017o, p.252; Terziev, 2017p, pp.22-28; Terziev, Vezieva, Arabska, 2016b, str.106-121; Terziev, Manolov, 2016c, pp.15-20; Terziev, Minev, Sotirov, Ivanov, 2016d; Terziev. Kanev, 2017q, pp.733-742; Terziev, Madanski, 2017v, pp.917-937; Terziev, Madanski, 2017r, pp.28-36;

Terziev, Madanski, 2017s, pp.610-625; Terziev, Madanski, Kanev, 2017t, pp.575-594; Terziev, Madanski, Kanev, 2017u, pp.396-415; Terziev, Madanski, Kanev, 2017v, pp.1331-1346; Terziev, Madanski, Kanev, 2017w, pp.1355-1372; Terziev, Madanski, Kanev, 2017x, pp.1380-1393; Terziev, Nichev, 2016e, pp.101-106; Terziev, Nichev, 2017y, pp.661-666; Banabakova, Georgiev, 2018a, pp. 46-51; Banabakova, Georgiev, 2018b, pp. 462-467; Terziev, Manolov, 2016f, pp.307-318; Terziev, Manolov, 2016g, pp.15-29; Terziev, Manolov, 2016h, s.96-106; Terziev, Manolov, 2016i, pp.570-575; Terziev, Manolov, 2016j, pp.9-13).

### **3. CONCLUSION**

The presented data illustrate the huge scope of the daily energy requirements of the Cadets from Vasil Levski National Military University. The energy requirements of the Cadets vary mainly depending on the quantity of physical activity, which is being accomplished. For the Cadets, studying in Vasil Levski NMU, the energy requirements for the securing of execution of different forms of mental and physical activities during the day, corresponds to a labor activity with a low intensity grade. Though, in the evaluation of this circumstance, it's necessary to take into account not only the scale of the energy requirements, but also the fact, that this kind of activity continues five years long at the Military University.

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