

ORIGINAL ARTICLE

MONITORING OF ANTHROPOMETRIC CHANGES IN THE ARMED FORCES OF THE CZECH REPUBLIC PERSONNEL DURING THE DEPLOYMENT IN AFGHANISTAN

Jan Psutka¹, Vladimír Pavlík¹✉, Jana Fajfřova¹, Miroslav Urban¹, Tomas Halajcuk²

¹ Faculty of Military Health Sciences, University of Defence, Hradec Kralove

² Military Medical Department, Division of Support, Ministry of Defence, Prague

Received 22nd August 2015.

Revised 9th November 2015.

Published 4th December 2015.

Summary

The aim of the work is to describe the change of nutritional status and the change of physical activities in soldiers of the Armed Forces of the Czech Republic during the deployment on foreign missions in Afghanistan. As for anthropometric data, body weight, body mass index and the amount of visceral fat and muscle mass were monitored. In each monitored person the measurement was performed at least twice, the first one immediately after the beginning of the mission and the control one shortly before finishing the mission. Height was measured using a calibrated measuring device and body weight was weighed using a calibrated stand-on scale. BMI was calculated as $BMI = \text{weight} / \text{height}^2$. The amount of total body fat was measured using Tanita BC-543 analyzer. After comparing individual contingents, statistically significant seems to be the Third Contingent, where a decrease of total body fat and visceral fat was observed. Similarly, statistically significant was the Fifth Contingent, where a decrease of body weight and BMI was observed. In the five monitored groups, which were measured in the Field Hospital in Kabul in the course of all four seasons of the year, some almost statistically significant changes of body composition, meaning a decrease of anthropometric characteristics, were registered. Only minimal statistical changes were registered in average values of all measured military professionals (n=251).

Key words: Armed Forces of the Czech Republic; Anthropometric parameters; Body Mass Index; Military Mission

INTRODUCTION

The standard of living in the Armed Forces of the Czech Republic (ACR) personnel is from

the point of nutrition or physical activities comparable with the standard of living of the Czech civilian population (1). However, a different situation is on foreign missions where besides common negative environmental effects in relation to nutritional status (excess energy input, decrease in energy output during a passive way of spending free time), there is a change of microclimatic conditions in a given area of deployment and a change of eating habits and physical regime associated with a long-term stay and fulfillment of tasks in professional soldiers on foreign missions (2,3). The change of nutritional status and the change of physical activities were monitored

✉ University of Defence, Faculty of Military Health Sciences, Department of Military Internal Medicine and Military Hygiene, Třebešská 1575, 500 01 Hradec Králové, Czech Republic

vladimir.pavlik@unob.cz

+420 973 253 176

in the ACR personnel during the deployment on foreign missions in Afghanistan.

SUBJECTS AND METHODS

Monitoring the influence of external living and working conditions on the change of nutritional status was carried out in personnel of the Field Hospital of the ACR, which was located at the airport in Kabul in Afghanistan. The number of persons, season of the year and numbers of the measurements in individual contingents that rotated in the Field Hospital are shown in Table 1. As for anthropometric data, body weight, body mass index (BMI), total body fat percentage and total body water percentage, the amount

of visceral fat and muscle mass were monitored. The measurement in individuals was performed under standard conditions and under the same microclimatic conditions. In each monitored person the measurement was performed at least twice, the first one immediately after the beginning of the mission and the control one shortly before finishing the mission in the Field Hospital. Monitoring was performed in some contingents more than twice. The total number of measured persons was 251 (183 men and 68 women). The average age in individual contingents was between the ages of 32 and 34. For processing and evaluating the measurement results, the descriptive statistics tools were used. All values are given as an average and standard deviation. For monitoring the changes in time at individual contingents, a Paired Student's t-Test was used.

Table1.

Contingents	1 st C	2 nd C	3 rd C	4 th C	5 th C
Deployment period	3-7/2007	8-11/2007	1-4/2008	4-8/2008	8-12/2008
Number of measured persons	35	75	41	50	50
Measurement frequencies	4x	3x	3x	2x	4x

RESULTS

In the following tables there are shown the results of selected anthropometric data determined at the beginning and at the end of the deployment of the First up to the Fifth Contingents under conditions of the Field Hospital in Kabul. After comparing individual contingents, statistically significant (level of significance $p < 0.001$) seems

to be the Third Contingent, where a decrease of total body fat and visceral fat was observed. Similarly, almost statistically significant (level of significance $p < 0.05$) was the Fifth Contingent, where a decrease of body weight and BMI was observed. Table 2 transparently shows anthropometric parameters in all measured persons ($n=251$). Only minimal statistically significant changes were observed there

Table2.

All (n=251)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	80,3 ± 13,5	25,4 ± 3,4	22,9 ± 6,2	59,0 ± 10,0	5,8 ± 3,2	53,2 ± 5,0
after	80,0 ± 13,0	25,3 ± 3,3	22,8 ± 6,2	58,8 ± 5,0	5,7 ± 3,1	53,3 ± 4,2
P	0,195	0,22	0,462	0,128	0,032	0,888

Table3.

1 st C (n=35)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	79,0 ± 14,1	25,9 ± 4,4	24,7 ± 8,3	55,6 ± 10,4	4,7 ± 3,0	52,4 ± 4,5
after	79,0 ± 13,4	25,9 ± 4,4	25,1 ± 8,3	55,7 ± 9,8	4,7 ± 3,1	52,4 ± 4,6
P	0,918	0,8	0,126	0,932	0,729	0,894

Table4.

2 nd C (n=75)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	78,9 ± 14,2	24,9 ± 3,2	21,9 ± 6,1	58,6 ± 10,0	5,4 ± 3,3	53,5 ± 6,9
after	79,0 ± 13,9	25,0 ± 3,2	22,0 ± 6,4	58,3 ± 10,1	5,3 ± 3,4	53,8 ± 4,4
P	0,861	0,842	0,699	0,265	0,203	0,653

Table5.

3 rd C (n=41)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	84,9 ± 12,7	26,2 ± 3,3	23,7 ± 5,4	62,1 ± 8,1	7,4 ± 3,0	52,8 ± 3,3
after	84,3 ± 11,9	26,0 ± 3,0	22,3 ± 5,4	62,3 ± 8,0	6,9 ± 2,7	53,8 ± 3,4
P	0,537	0,537	0,02	0,529	0,005	0,001

Table6.

4 th C (n=50)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	79,3 ± 12,4	25,3 ± 3,6	24,2 ± 5,3	58,1 ± 10,1	6,4 ± 3,1	52,7 ± 3,4
after	79,1 ± 12,3	25,2 ± 3,6	24,0 ± 5,1	58,1 ± 10,1	6,3 ± 3,0	52,0 ± 4,5
P	0,489	0,457	0,407	0,326	0,322	0,113

Table7.

5 th C (n=50)	Body weight (kg)	BMI (kg*m ⁻²)	Body fat (%)	Muscle mass (kg)	Visceral fat (%)	Total body water (%)
baseline	80,6 ± 13,3	25,1 ± 2,7	21,2 ± 5,3	60,3 ± 10,4	5,4 ± 2,8	54,4 ± 4,4
after	79,5 ± 12,8	24,7 ± 2,5	21,3 ± 5,3	59,4 ± 10,1	5,3 ± 2,9	53,9 ± 3,6
P	0,061	0,051	0,909	0,057	0,816	0,313

DISCUSSION

Living and working conditions together with eating habits and local food significantly influence energy balance of organism in professional soldiers (4,5).

Under conditions of the Field Hospital in Kabul, where extreme microclimatic conditions prevail (altitude of 1.800 m above the sea level and temperature differences ranging from -20°C up to +60°C), requirements for thermogenesis rise and therefore energy requirements of organism rise as well. The workload under field conditions is not only physical, but also psychical – stress from a possible attack, fears for own health and life, and thus it influences the total energy output. All-day food which was supplied centrally by another NATO country presents a risk of changes in nutritional status. A further quantity that significantly influences

nutritional status is physical activity during free-time that has an individual character in measured persons in the Field Hospital in Kabul. Physical activity under fighting conditions is closely associated with external temperature, frequency of fighting and season of the year. In the five monitored groups, which were measured in the Field Hospital in Kabul in the course of all four seasons of the year, some statistically significant changes of body composition, meaning a decrease of anthropometric characteristics, were registered. Only minimal statistical changes were registered in average values of all measured military professionals (n=251) without influencing the clinical status of a proband. It is possible to assume that all-day energy output in individual participants of the mission compared to their energy output under peaceful conditions in the Czech Republic did not differ. The above mentioned results are in accord with a high level of catering services, which can be characterized as above-standard with a large selection

of food concerning both the energy value and nutritional value.

CONCLUSION

During the deployment of the ACR personnel in the Field Hospital in Kabul in Afghanistan, no significant anthropometric changes in monitored persons were registered across all the contingents. Statistically significant changes of some parameters were caused by the change of physical activities depending on the season of the year, frequency of fighting in the area of deployment and also by the change of eating habits. Nutrition and physical activity are important factors of the environment and lifestyle that consequently influences not only the physical and psychical performance of an individual, but also his/her ability to be deployed on foreign operations (6,7).

REFERENCES

1. Pavlík, V.; Fajfrová, J. Prevence nadváhy a obezity v Armádě České republiky. *Hygiena* **2011**, 56, 85-88 (in Czech).
2. Sedek, R.; Koon, P. Nutrition knowledge and supplements intake among Royal Malaysian Navy Personnel. *Sains. Malays.* **2013**, 42, 1181-1190.
3. Packnett, E.; Niebuhr, D.; Bedno, A. Body mass index, medical qualification status and discharge during the first year of US Army service. *Am. J. Clin. Nutr.* **2011**, 99, 608-614.
4. Tomczak, A.; Bertrand, J.; Klos, A. Physical fitness and nutritional status of polish ground force unit recruits. *Biol. Sports.* **2012**, 29, 277-280.
5. Smith, T.; Dotson, L. Eating Patterns and Leisure-Time Exercise among Active Duty Military Personnel: Comparison to the Healthy People Objectives. *J. Acad. Nutr. Diet.* **2013**, 113, 907-917.
6. Slattery, M.; Mc Donald, A.; Bild, E. Associations of body fat and its distribution with dietary intake, physical activity, alcohol and smoking in black and whites. *Am. J. Clin. Nutr.* **1992**, 55,943-949.
7. Liston, P. Feeding frontline forces. *Jan. Intern. Def. Rev.* **1998**, 11, 26-30.