



THE EFFECT OF NUTRITION ON THE HEALTH STATUS OF SOLDIERS IN MISSIONS

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ABSTRACT

The paper deals with the issue of the influence of soldiers' nutrition in foreign missions on the contents of total cholesterol (TCH), triglyceride (TAG), glucose, and alanine aminotransferase (ALT). Combined rations consisting of the preparation of hot meals on a military base and combat rations of foodstuffs that provide soldier's nutrition, in case of impossibility to deliver the hot meals, are an optimal solution. Adverse effect on consumption had psychosocial factors, i.e. eating in a hurry and stress, about the culture of eating it cannot be spoken at all. Air pollutants of chemical contamination and air contamination of the diet had a significant negative impact. The biochemical tests showed that the prolonged duration of the mission led to deterioration of health, especially in dislipidemic disorders. The increase in levels of TCH is particularly evident with the troops in the KFOR mission. The obtained values are characterized as an increased risk of acute cholesterolemia and are also enhanced by the low average age of evaluated group. The growing trend of increase in cholesterolemia is presented as a general phenomenon by foreign and domestic authors.

Keywords: military missions, soldier's nutrition, biochemical tests, total cholesterol, triglycerides, glucose, alanine aminotransferase

INTRODUCTION

Improper nutrition is cited as a major risk factor that should be affected at people at risk and also preventively in the general population (**Bergmann et al., 1990; Lewis, 1994; Alderman et al., 2006**). Nutritional studies emphasize continuity of formation or forceful influence of other risk factors, while present acting of energy excessive or otherwise improper nutrition (**James et al., 1988; Shepherd et al., 1991; Clap et al., 1991; Gourley, 1998; Almond et al., 2006**).

Poor nutrition, genetic load (a disease of myocardial infarction in parents to 60 years), male gender, smoking, hyperlipidemia, hypertension, low physical activity, age, obesity, diabetes mellitus II. Type, bad tolerance of carbohydrates, hyperinsulinism, hyperfibrinogenemia and psychosocial factors are classified the fore as the undisputed risk factors (**Anděl, 1994; Hiramatsu et al., 1994; Behrman and Rosenzweig, 2004**).

Risk factors accompany disabled persons of varying duration, and most of them depend on the chosen way of life. Incorrectly, health-threatening habits can be affected by suitably motivated individual interventions (**Fried et al., 1985; Kant et al., 1991; Berlinsky et al., 2006; Bleakley 2007**).

The aim of this work was to show the influence of risk factors affecting the health of troops in missions.

MATERIAL AND METHODS

Alimentation of participants of foreign missions in the Persian Gulf was carried out by the military of Saudi Arabia; the only criterion was the financial limit of U.S. \$ 60 per soldier and day. In the first period of the mission, soldiers consumed a combined diet of canned rations HIGHLANDS (VYSOČINA) and canned food supplies from Alima Brno. In the next phase, French battle dose including pastries were delivered. In the last phase of the mission, alimentation was ensured in a restaurant in military town KKMC (King Khalit Military City) of Saudi Arabia. KFOR mission had a financial limit in the amount of 160 CZK per soldier and day. Supplying of rations was carried out in two variants: by supply of food from the Czech Republic, or by purchase in the area of military contingent (bread, fruit and vegetables). Military field hospital UNTAES was subordinated to the command of IFOR. Boarding for soldiers of the mission was organized in the care of international units. Hot food,

prepared at the military base, was consumed and mainly French combat rations were available.

Laboratory tests of biological material (blood) and monitoring of selected characteristics of the health and nutritional status, disorder in lipid metabolism, glycemia, and enzymatic tests – determination of enzyme ALT were performed. Diagnostic methods and procedures specified in the materials of Bayer company and photometric determination on the ADVIA 1650 were used for the TAG, glycemia and the enzyme ALT determination.

RESULTS AND DISCUSSION

In the Table 1, evaluation of the level of nutrition of participants operating in the mission area within the SFOR mission in Bosnian Krupa is presented as an example.

Table 1 Evaluation of the level of nutrition for November 1999

Nutritional factor	Unit	Standard	Reality	% of Performance
Energy value	MJ	18.090	21.894	141.5
Proteins in total	g	151.0	174.8	115.8
Animal proteins	g	90.6	112.0	123.6
Plant proteins	g	60.4	62.8	104.0
Lipids	g	160.4	239.7	149.6
Linoleic acid	g	12.7	35.8	281.7
Saccharides	g	608.0	635.1	104.5
Calcium	mg	1 212.4	1 348.5	111.3
Phosphorus	mg	2 195.0	2 772.8	126.3
Iron	mg	24.8	37.5	151.3
Vitamin A	µg	1 340.0	1 622.7	121.1
Vitamin B1	mg	2.0	2.7	133.5
Vitamin B2	mg	2.3	2.3	100.7
Vitamin PP	mg	34.1	34.6	101.4
Vitamin C	mg	89.5	204.7	228.7

Persian Gulf – activity of soldiers from the chemical section of the mission in the Persian Gulf (anti-chemical battalion) consisted of regular monitoring of the chemical

environment in the 12-hour shifts. Physical load was, due to the mandatory wearing of chemical masks and chemical suits at a high temperature, very demanding and can be evaluated by medical classification as hard work at metallurgical plants or forest workers laboured also by unusual hot climate; temperature at noon was about 45°C and at night dropped to 0°C. Participants of the mission (Central Europeans) tolerate temperature fluctuations up to 50°C, but these are spread over the year (winter -15°C, summer 35°C). Large temperature changes during 24 hours resulted in the failure of thermoregulation system of soldiers (e.g. increased sweating, persistent feelings of cold after returning from a mission). Great attention was paid to compliance with the correct drinking regime; recommended drinking of beverages was in quantities of 7-10 litres a day. Soldiers did compulsory self-control of urine (density, colour and quantity of urine) and the findings they reported to their commanders.

KFOR - due to improvised diet in the Persian Gulf, an organization of catering for KFOR soldiers was better, because the food was consumed regularly and was hot. Energy and nutritive value of diet dose highly exceeded the subsistence requirements for paratroopers. Increased energy intake was reflected by increasing of the weight in the selected group of soldiers. The financial limit of subsistence allowance was sufficient to ensure the nutritional value of food at the subsistence allowances for paratroopers. Bakery products were purchased from local sources, where mostly dominated wheat bakery products. The bread has a particular significance as an important source of fibre, one of nutritional factors, which is not one of monitored indicator, but its importance in the diet is still urgently emphasized particularly with regard to health effects (lack in food is one of the causes of colon cancer).

When evaluating the health status of participants in missions in the Persian Gulf, military hospital in the Mission UNTAES and the KFOR mission in Kosovo, we have come to the findings presented in Table 2 and 3.

Table 2 Assessment of BMI on a sample of soldiers in the Persian Gulf, KFOR and UNTAES

Mission		BMI (kg.m ⁻²)					
		Normal (< 25)		Overweight (25-30)		Obesity (> 30)	
		Quantity	Relative frequency (%)	Quantity	Relative frequency (%)	Quantity	Relative frequency (%)
Initiation	Persian Gulf	16	14.8	88	81.5	4	3.7
	UNTAES	28	71.8	11	28.2	0	0.0
	KFOR	19	44.2	22	51.2	2	4.6
Termination	Persian Gulf	59	54.6	48	44.5	1	0.9
	UNTAES	28	71.8	11	28.2	0	0.0
	KFOR	20	46.5	20	46.5	3	7.0

Table 3 Average values of selected biochemical tests

		n	Total cholesterol	TAG	Glycemia	ALT
				mmol.L ⁻¹		μkat.L ⁻¹
Initiation	Persian Gulf	108	4.5	1.2	4.3	0.32
	UNTAES	39	4.3	1.2	4.2	0.42
	KFOR	43	5.1	1.2	5.2	0.49
Termination	Persian Gulf	108	4.3	1.1	4.2	0.56 ^a
	UNTAES	39	4.1	1.1	4.0	0.56
	KFOR	43	5.2 ^b	1.1	5.1	0.60

Legend: ^a Increase of the ALT enzyme value was attributed to increased load of liver and the cause, according to the literature, was viral hepatitis

^b At the end of the mission, the total cholesterol value was higher than 5.2 mmol.L⁻¹ in 18 men, i.e. 41.8%, which is according to the average age of the whole set, 29 years, the value of risk.

After termination of the mission, about 10-15% of participants of the mission suffered from the disease, so-called "Gulf syndrome" manifested by various health disorders (increased incidence of dental caries and other diseases of the teeth, damage of the skin, increased sweating, hair loss, insomnia, mental disorders, organic affection of internal organs, various cancers, etc.). Although, the causes of disease have not been satisfactorily explained

to this day, we can assume the integrated interaction of many factors, among which further presented evidence relating to the cultural level of hygiene and diet could be included. Problems occurred in the distribution and meal consumption outdoors. As a result of eating food in open areas, pollution of the prepared food by desert sand occurred due to air flow, so it was not possible to exclude microbiological contamination due to air pollution particles from rotting animal remains (dead animals, excrements) located freely in the wilderness, etc. The level of food hygiene and health status was also greatly influenced by the fumes of burning oil wells, which in the form of greasy soot, tar (toxic and carcinogenic substances in nature), contaminated all objects in the space, including clothing, tents, consumed food, etc. In the armies of NATO, the standard of catering for troops was in closed, alternatively air-conditioned tents. It is also necessary to point out the widespread incidence of smoking during a mission in the Persian Gulf as a reflection of the mental state.

CONCLUSION

The optimal solution is combined rations consisting of the preparation of hot meals on a military base and combat rations of food (CRF) providing the nutrition to soldiers in case of impossibility to delivery hot meals. This may be accompanied by appropriate types of CRF.

Based on these results, suitable utilization of recommended food groups, with the emphasis on nutritionally disadvantageous reduction in food species such as sausages, smoked meat and pork fatty meat can be recommended. The problem is the bread that is usually replaced by a soft and durable bakery products and also low consumption of potatoes and pulses. Psychosocial factors, i.e. eating in a hurry, stress, about the culture of eating it cannot be spoken at all, had adverse effects on consumption of food. Air pollutants of chemical contamination and air contamination of the diet had a significantly negative impact.

The trend of deteriorating health, especially dislipidemic disorders arose from the evaluation of laboratory biochemical tests of the group of soldiers mentioned in Table 3. The increase in levels of TCH is particularly evident with the troops in the KFOR mission. The obtained values are characterized as an increased risk of acute illness of cholesterolemia. The risk is also enhanced by the low average age of evaluated group.

The increasing trend of growth in total cholesterol is referred to a general phenomenon of foreign and domestic authors (**NCEP, 1993**).

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