

Nutritional behaviours of slovenian soldiers

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ABSTRACT:

Healthy nutrition is one of the most important conditions to maintain physical abilities of professional soldiers. We aimed to evaluate dietary behaviours, nutritional knowledge and body mass index of Slovenian professional soldiers with regard to selected biological and socioeconomic determinants.

This cross-sectional study included one contingent (n=84) of Slovenian professional soldiers who were sent on a peacekeeping mission to Bosnia and Herzegovina from July 2004 to January 2005. Their mean age was 27.3 years, 92 % of them were males, 61 % of them were single. A self-report questionnaire (n = 45 items) was used to obtain information on their biological and socioeconomic determinants and dietary behaviours. They completed the questionnaire after starting the peacekeeping mission in July 2004.

Statistical analyses revealed fruits were consumed by 40 % of the soldiers each day; vegetables were consumed by 38 % of each day. Single soldiers consumed fruit on a daily basis at a higher level than married soldiers, 53 % versus 22.2 %. Similar results were identified with vegetable consumption, 49 % daily consumption for single soldiers versus 22.2 % for married soldiers. Fried foods were consumed by 2 % of soldiers daily and soft drinks by 56 %.

There is a need for further nutritional assessment studies, initiation of nutritional educational programs into military trainings, and new organizational policies to support healthy eating.

KEY WORDS:

Dietary behaviours, Nutritional knowledge, Biological and socioeconomic determinants, Slovenian soldiers.

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INTRODUCTION

Healthy dietary behaviours have a protective role and increase longevity and quality of life, whereas unhealthy dietary behaviours are an important health risk factor, which can contribute to increased morbidity and mortality [1,2].

The aim of nutritional education policies is to prevent unhealthy dietary behaviours and diseases [3,4]. This can be achieved through education and via policies that support healthy eating [5]. In Slovenia, children learn the basics about foods and nutrition in primary schools in the subject called "home economics". The home economics curriculum includes basic information about food and nutrition, hygiene, mechanical and thermal processing of foods as well as about the understanding the information contained on the food labels. In high school this knowledge is systematically upgraded only at those schools which have nutrition programmes as part of their curricula. Currently, there are no nutrition programmes for life-long learning.

The first dietary behaviours are acquired already during infancy and childhood, and are later modified during the educational process and by the environment [6,7]. Nutritional knowledge has an important impact on dietary behaviours and acceptability of certain foods till adulthood. It is important to maintain a well-balanced diet with adequate energy intake as well as micro- and macronutrient intake. Additionally it is important to restrict unhealthy dietary behaviours such as too high intakes of: total fat, trans and saturated fats, cholesterol, salt, sugar, alcohol as well as active or passive smoking [8,9,10,11].

The dietary behaviours of soldiers should aim at maintaining a healthy well-balanced diet to best satisfy their physiological needs. In the nutrition educational programmes in the United States Army some time is devoted to informing the soldiers about healthy dietary behaviours and the prevention of unhealthy dietary behaviours [12,13].

In Slovenia several studies have shown that dietary behaviours of adults Slovene are not optimal (adequate). They are characterized by insufficient number of daily meals, excessive energy and fat intakes, and insufficient carbohydrates and dietary fibres intakes [14,15,16,17]. The National Survey on Health Status and Health Behaviour of Slovenian adults, published in 2004, has shown that Slovenia has already reached epidemic levels of excessive food intake and obesity [14].

Slovenia became a full member of the NATO in 2004 and from this year forward maintains a professional army. Before that the Slovenian army consisted of military recruits. A few studies concerning dietary behaviours of Slovenian recruits exist, but there has been no research about dietary behaviours of Slovenian professional soldiers [18,19].

This study is the first study in the field of Slovenian military medicine with participation of professional soldiers. The aim of the study was to evaluate dietary behaviours and nutritional knowledge of Slovenian professional soldiers and to investigate the relationships between unhealthy nutrition, nutritional knowledge and body mass index and selected bio-

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logical (age) and socioeconomic determinants (education and marital status). The results of our study can serve as a basis for working out the development of the nutritional educational programmes and policy change for military personnel of the Slovenian army which will promote healthy lifestyle. These preventive measures can contribute to the reduction of high mortality in Slovenia, attributable to non-communicable disease.

METHODS

Study population

Our study included 84 professional soldiers who served in one contingent of the Slovenian units of the Stabilization Forces in Bosnia and Herzegovina (SFOR BiH) from July 2004 until January 2005. The soldiers were active-duty soldiers, employed by the Ministry of Defence of the Republic of Slovenia. They were selected by their commanding officers in April 2004 based on their physical and mental abilities and went through the military training program for a period of a few weeks.

The study protocol was approved by the Ethical Committee of the Medical Faculty of the University of Ljubljana and included informed consent from the soldiers.

Study protocol and data collection

To assess the dietary behaviours and nutritional knowledge of Slovenian professional soldiers was used **a multiple-choice questionnaire which consisted of three parts**. The questionnaire was given to the soldiers to be completed on their own after their arrival into BiH in July 2004. They were divided into four groups. Each group was tested separately. The testing session lasted about 45 minutes and the soldiers could return to other tasks as soon as they completed the questionnaire. All 84 soldiers returned the questionnaire and all were completely answered.

In Part I data were collected the data about biological (date of birth and gender) and socioeconomic determinants such as education, rank in the Slovenian army, marital status and number of children. A soldier's marital status was categorized as: a.) I am single; b.) I have a partner but I don't live with him/her; c.) I cohabit with partner d.) I am married and e.) I am divorced. The soldiers were asked to record their body weight and height. Body mass index (BMI) was calculated as weight divided by height squared (kg/m^2). The equivalent World Health Organization (WHO) BMI standards were used as reference: normal range BMI between 18.50 and 24.99; overweight BMI between 25.00 and 29.99; obese BMI=30.00 and more [20]. Since no underweight persons were identified, there was no need to identify this group.

In Part II dietary behaviours of the soldiers was investigated by the food frequency questionnaire (FFQ). Our FFQ was created based on the questionnaire used in the previous large extend Slovenian cross-sectional study (CSS) that was conducted in late spring 2001 [14]. The Slovenian CSS represented a part of a wider World Health Organization project of Countrywide Integrated Noncommunicable Disease Intervention Health

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Monitor (WHO CINDI – CHM). The WHO – CHM project is mostly aiming at monitoring, assessing and comparing the trends of health behaviour in CINDI countries with different political and economic systems [21]. The project is coordinated by Finland, due to its rich tradition and great experience and successes in preventing non-communicable disease [22]. The FFQ reflected dietary behaviours of the soldiers over a period during the previous one year while they were serving in the army at home in Slovenia. Namely, soldiers work in the army but they live at home.

Part III included the questions related to the nutritional knowledge of the soldiers. Questions were adopted from the research which was made on the active-duty Navy personnel in the United States Army [12]. This part included 40 true/false items (22 true and 18 false) which concerned nine nutrition content domains: calories/food intake, fats, cholesterol, vitamins/minerals, fibre, sodium, carbohydrates, protein, and weight loss diet. The true/false items were scored as follows: “+1” for correct response, “0” for incorrect response or no response and were summed together. In addition, items written to tap similar content domains were clustered together into nine priori scales as mentioned above; the scales were computed as the mean value (from 0.00 to 1.00) of all the items in the cluster. Content validity of the questions has been done by the author of research [12].

Statistical methods

Statistical data analyses were performed with Statistical Package for Social Science, version 13.0 (SPSS Inc., Chicago, IL, USA). Numeric variables are presented as mean \pm standard deviation (SD) and categorical variables as percentage (relative numbers).

Unhealthy behaviors in nutrition were defined on the basis of Slovenian CSS [20]. Behaviors classified in our study as unhealthy were: consumption of three daily meals or less, consumption of fruit 4-6-times per week or less, consumption of vegetable 4-6-times per week or less and consumption of fish and sea food 1- 3-times per week or less. All components were considered as equally important, and the number of unhealthy components was calculated for every participant. The participants were classified into two groups on the basis of the number of unhealthy components as follows: healthy (0 components) and unhealthy (1-4 components). Taking into account the nutritional knowledge, the soldiers were divided into two groups, namely soldiers with adequate nutritional knowledge if they achieved 21 or more scores (i.e. if they answered at least 21 items correctly) and soldiers with inadequate nutritional knowledge if they achieved 20 or less scores (i.e. if they answered 20 or less items correctly).

The observed outcomes were examined in relation to numerous covariates including: age: <25; 25-30 and >30 years; level of education: vocational or high school and college or university; marital status: single and married. The strength of the association between observed outcomes and selected biological and socioeconomic determinants was estimated using chi-square test (χ^2 test) and Contingency coefficient (C). The level of significance was set at $P < 0.05$ [23].

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The soldiers consumed most often white bread (31.4 %), followed by different sorts of bread (26.5 %) and by wholemeal bread (8.4 %).

RESULTS AND DISCUSSION

Characteristics of the study population

General characteristics of the participating soldiers are shown in table 1. They were on average 27.3 years old (SD=3.77), predominantly males, finished vocational or high school education, primarily single and without children. Less than half of the soldiers had normal BMI, 45.2% of the soldiers were overweight and 6 % were obese.

Table 1:

Biological, socioeconomic and anthropometrical data of the participating soldiers in percentages ($n=84$).

Variable	Percentage /%
Age (y)	
<25	13.1
25-30	69.0
>30	17.9
Sex	
Males	91.7
Females	8.3
Rank	
Soldier	79.8
Officer	20.2
Education	
Vocational/high school	90.5
College or university	9.5
Current marital status	
Single	60.7
Married	39.3
Children	
No	81.1
Yes	18.9
Body mass index	
18.0 – 24.99 (normal)	48.8
25.00 – 29.99 (overweight)	45.2
≥ 30.00 (obese)	6.0

Dietary behaviours and nutritional knowledge of the soldiers

The mean number of meals consumed by the soldiers per day was 3.32 (SD=1.05). Only 35.3 % of soldiers ingested 4 or more meals per day; 45.2 % of the soldiers consumed breakfast every day, 75.0 % lunch and 44.0 % dinner. Morning and afternoon snack were consumed by 20.0 % of the soldiers every day.

Ordinary margarine was mainly used by 38.2 % of soldiers in the form of bread spread and 40 % of soldiers used margarine with less fat content. Full-fat milk was mainly consumed by 34.5 % of soldiers, milk with low fat (1.6 % fat or less) by 50.0 % and skimmed milk (0.5 % fat) by 3.6 % of soldiers.

The soldiers consumed most often white bread (31.4 %), followed by different sorts of bread (26.5 %) and by wholemeal bread (8.4 %).

Table 2 shows the frequency of consumption of some food items, fast foods and soft drinks by soldiers.

Table 2:

Frequency of intake of food items, fast foods and soft drinks by Slovenian soldiers ($n=84$) in percentages.

	Every day	1-3 times a week	1-3 times a month	Never
Milk and milk products	29.8	63.0	4.8	2.4
Fruits	40.5	55.0	1.2	2.4
Vegetables	38.1	52.3	3.6	6.0
Poultry	6.0	71.4	20.2	2.4
Red meat	1.2	71.5	23.7	3.6
Fish and seafood	7.1	29.7	52.4	10.8
Potatoes, rice, pasta	4.8	88.0	6.0	1.2
Cereals and cereal products	6.0	40.5	29.7	23.8
Fried food	2.4	54.8	42.8	0.0
Sandwiches, hot dogs, pizza	9.5	46.4	42.9	1.2
Canned food, instant soups	0.0	7.1	51.2	41.7
Sweets, confectionery	8.4	45.2	45.2	1.2
Soft drinks				
(Coca Cola, Fanta, Sprite)	56.0	35.7	8.3	0.0

In the part of the questionnaire concerning nutritional knowledge of the soldiers the mean number of correct items was 21.2 (SD = 2.85). The mean scale scores range from 0.66 to 0.38. Soldiers achieved the highest scores on the questions about fibres, proteins and sodium (0.66, 0.61 and 0.60), whereas the lowest scores for the questions related to carbohydrates and calories/food intake (0.39 and 0.38). Questions related to vitamins and minerals, fats and cholesterol resulted in similar response means (0.55 for questions referring to vitamins and minerals, 0.53 for questions about fats and 0.52 for questions on cholesterol). For the questions concerning weight loss diet the soldiers achieved mean value 0.59.

Dietary behaviours, nutritional knowledge and body mass index related to selected biological and socioeconomic determinants

Table 3 shows the influence of some socioeconomic and biological determinants on dietary behaviours and nutritional knowledge of the soldiers. There were differences in food intake according to age. In response to the question do you consume fish and sea products at least 1-3 times per week: a positive response was received by 75 % of the soldiers aged more than 30 years; 34.8 % of soldiers aged from 25 to 30 years; and 22.7 % of soldiers aged under 25 years ($\chi^2 = 8.067$, $C = 0.296$, $P < 0.05$). Responses also varied according to educational level attained. In response to how often fish and sea products were consumed, those with higher education consumed more; 75 % of the soldiers with college or university degree, and 32.9 % of soldiers with vocational or high school ($\chi^2 = 5.511$, $C = 0.248$, $P < 0.05$). There were statistical correlations between marital status of the soldiers and frequency of fruits and vegetables consumption. Fruits were eaten by 53.0 % of single and only 22.2 % of married soldiers ($\chi^2 = 8.372$, $C = 0.301$, $P < 0.05$) whereas

vegetables were eaten by 49.0 % of single and 22.2 % of married ($\chi^2 = 6.570$, $C = 0.269$, $P < 0.05$) every day.

There was no statistical significance between nutritional knowledge (i.e. number of scores) and selected biological and socioeconomic determinants.

Table 3:

Impact of some biological and socioeconomic determinants on dietary behaviours and nutritional knowledge of participating soldiers ($n=84$).

	Age <i>P</i> -value ^a	Education <i>P</i> -value ^a	Marital status <i>P</i> -value ^a
Dietary habits:			
N° of daily meals intake	0.859	0.677	0.270
Frequency consumption of:			
Fruits	0.686	0.348	0.004
Vegetables	0.916	0.971	0.010
Fish and sea foods	0.018	0.019	0.704
Nutritional knowledge	0.776	0.857	0.455

a: χ^2 test

Table 4 shows the influence of some socioeconomic determinants on BMI. Among soldiers with vocational or high school were more than half of those with normal BMI and soldiers with college or university had normal BMI only in 25.0 % ($\chi^2 = 6.461$; $C = 0.267$; $P < 0.05$). In the married group of soldiers were 60.8 % of those with normal BMI and in the group of single only 30.3 % ($\chi^2 = 7.551$; $C = 0.287$; $P < 0.05$).

Table 4:

Statistical significance among the groups classified to BMI and selected socioeconomic determinants ($n=84$).

	BMI groups (%)			<i>P</i> -value ^a
	18.50-24.90	24.91-29.90	>29.90	
Age groups (y)				
<25	60.9	39.1	0.0	0.362
25-30	47.8	43.5	8.7	
>30	33.3	60.0	6.7	
Education				
Vocational/high school	51.3	44.7	3.9	0.040
College/university	25.0	50.0	25.0	
Marital status				
Married	60.8	35.3	3.9	0.023
Single	30.3	60.6	9.1	

a: χ^2 test

There are few published studies on soldier's nutrition therefore our data was compared with data based on adult population. Our study is the first that investigated dietary behaviours and nutritional knowledge of the Slovenian professional soldiers. This group of Slovenian soldiers which was investigated is not representative of the entire Slovenian military. Slovenian soldiers are to a great extent overweight and obese and have quite unhealthy dietary behaviours. The dietary behaviours of

Slovenian soldiers in our study did not differ extensively from the dietary behaviors that were reported for the Slovenian adult population [14,15,16]. On average, soldiers in our study ate only three meals per day. Less than half of them ate breakfast regularly. The national health study conducted in late spring 2001 showed, two thirds (67 %) of Slovenian adults consumed three meals per day or less; 49 % had breakfast every day, 98 % lunch and 54 % dinner [14]. Soldiers in our study had too long time intervals between the meals. They reported to consume morning and afternoon snacks only 20 % of the time, whereas the Slovenian adults in 37 % and 30 % respectively [14]. From present study, the causes can not be explained, but the assumption is that this is due to the fact that the majority of soldiers drives to work from distance places and usually do not have time to eat.

It was found previously that in order to achieve healthy dietary behaviours of Slovenian soldiers, we need to ensure an adequate nutritional knowledge at the first place [18,19]. The soldiers who participated in our research did not have any nutritional educational programs when they joined the Slovenian army not even later when they served in the army, so their answers reflected only their basically acquired knowledge during childhood and educational process. Comparing the knowledge of Slovenian soldiers in our study with the literature data on American soldiers, the average achievements during the test in Slovenian soldiers were lower compared to the American soldiers [12].

Cross sectional evidence show that married persons have healthier lifestyle than unmarried persons [14,27]. There are several underlying mechanisms by which change in marital status affect healthy behaviours. It has been hypothesised that the marital relationship provides social control over healthy behaviours. Social support from a spouse may also be a key mediating factor in the establishment and maintenance of a healthy lifestyle [27]. In contrary to the literature our data have shown that married soldiers consumed fruits and vegetables less often than single. This is interesting compared with the Slovenian study about health and state of health, conducted in November 2007, where this is opposite; namely 82 % of married and 63 % of single inhabitants ate fruits every day; 81 % of married and 65 % of single ate vegetables every day [28]. Further studies are required to clarify this inversely findings that we found in our study.

Many studies have found that individual with lower education have higher BMI than individual with higher education [29,30]. In our study this findings were contrary, possibly because of the fact, that Slovenian soldiers with vocational/high education had a rank of professional soldier and soldiers with college/university had a rank of an officer. Professional soldiers have different physical trainings every day, because of maintaining adequate psychophysical condition. On the contrary officers have higher position that is they have more desk work and not so many physical trainings anymore. Several, but not all cross-sectional studies have shown that married or cohabiting subjects have a higher BMI than subjects living alone [31,32,33,34]. Our data have shown that in the group of married soldiers there were more of those with normal BMI than in the group of single soldiers.

On average, soldiers in our study ate only three meals per day.

From present study, the causes can not be explained, but the assumption is that this is due to the fact that the majority of soldiers drives to work from distance places and usually do not have time to eat.

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In summary our study showed that dietary habits of Slovenian soldiers markedly deviated from healthy dietary habits and reflected dietary habits of adult Slovenian population.

Based on our research findings, the Ministry of Defence of the Republic Slovenia will be able to form suitable and focused preventive programmes with the aim for improving dietary behaviours and nutritional knowledge of Slovenian professional soldiers and in particular to promote physical activity between them.

In our study, soldiers reported height and weight by themselves. Self-reports of height and weight are considered valid for the population studies, with correlations between measured and self-reported weight averaging from 0.97 to 0.99 [35]. The BMI is a simple, easy- to- use, and cost effective screening tool, because it is highly correlated with various measures of body fat. In our study only 49 % of soldiers had normal BMI. According to the Slovenian national health survey there was 44 % of adult Slovene with normal BMI (33 % of men and 53 % of woman) [14]. Because of increasing obesity rates in the United States, the Army's standards now disqualify a large percentage of the population. A study conducted by Army researchers found that 27 % of the 18-year-olds who applied to join the military in 2006 were overweight—up from 23 % in 1993 [36]. Body habits, as described by BMI, is related to skeletal size, muscle mass and adiposity. It was reported that overweight and obesity were not significant predictors of discharge from United States Air Force [37]. It is possible that some of individuals classified as the overweight or obese in our sample had higher BMI's due to increased muscle mass and not due increased body fat.

In summary our study showed that dietary habits of Slovenian soldiers markedly deviated from healthy dietary habits and reflected dietary habits of adult Slovenian population. 51,2 % of Slovenian professional soldiers were overweight or obese. Their knowledge about the nutrition was poor. In the view of socioeconomic status, we found that healthier dietary habits prevailed among older, single and among higher educated soldiers. In contrary normal BMI prevailed among less educated, as well as among married soldiers. Nevertheless it must be emphasized that our study offers the basic information about dietary behaviours, nutritional knowledge and BMI of Slovenian professional soldiers, which all need to be improved. Changing the traditional lifestyle is one of the most important elements in health but extremely difficult, and a process of very long duration, tightly bound to the economy and politics of a country [38]. The results of the present study clearly show the need for a greater emphasis of the benefits of regular and adequate nutritional education early in military training to encourage soldiers to adopt healthier behaviours. Intervention programs should be targeted at younger and less educated soldiers and physical activity (especially among overweight and obese soldiers and officers) encouraged. Based on our research findings, the Ministry of Defence of the Republic Slovenia will be able to form suitable and focused preventive programmes with the aim for improving dietary behaviours and nutritional knowledge of Slovenian professional soldiers and in particular to promote physical activity between them. Further detailed investigations of health status, anthropometric measures, dietary habits as well as physical activities of representative sample of Slovenian soldiers should be performed in the future. The investigations should be performed periodically (i. e. every 4 years) in order to follow the trends in dietary habits as well as to follow the efficacy of the education process.

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