

# Assessment of the nutritional status of women – officers of the Polish Army and students of the Main School of Fire Service (MSoFS)

Anna Kłos, Jerzy Bertrandt

Department of Hygiene and Physiology, Military Institute of Hygiene and Epidemiology, Warsaw, Poland

**Author's address:**

Anna Kłos, Military Institute of Hygiene and Epidemiology, Kozielska 4, 01-163 Warsaw, Poland; phone (+48) 226853171; e-mail: A.Klos@wihe.waw.pl

**Received:** 2013.08.12 • **Accepted:** 2013.09.24 • **Published:** 2013.09.30

## Summary

**Introduction:** Experience of modern army, in which the principle of gender equality is guaranteed by military regulations, indicates that female as well as male, can be an excellent soldier, and her achievements result from individual character traits. Responsible positions occupied by women in the Polish Army, as well as in other uniformed services, require from them good physical condition that is conditioned by good nutritional status. Therefore, it seems very important to monitor the nutritional status of women who are officers in the Polish Army, as well as female students from MSoFS, future officers of the State Fire Service (SFS).

**Aim of the work:** The aim of the work was estimation of protein energy and mineral nutritional status women – officers of the Polish Army and female students of the MSoFS– future officers of the State Fire Service.

**Methods:** Total of 30 women – officers of the Polish Army and 13 female students of the Main School of Fire Service – future officers of the State Fire Service took part in the research on nutritional status. Estimation of nutritional status was done based on the anthropometric measurements such as: body height, body mass and Body Mass Index. Bone mineral density tests were carried out by densitometry method, using the EXA 3000 apparatus. Bone calcification was assessed on the forearm bone of non-prevailing hand on the basis of the T-score value that is a number of standard deviations above or below correct value for population of young healthy people.

**Results:** Overweight was found among 14.8% of female soldiers while only 9.1% of female students from the MSoFS indicated overweight. Results of densitometry tests revealed that status of bones mineralization in 50% of female officers and in 30.8% of female students was characteristic of osteopenia. Changes in bones calcification characteristic of osteoporosis were not found at all.

**Key words:** magnesium, daily food ration, soldiers, military service.

## Introduction

In studies on nutritional status of soldiers, only men doing military service were the subjects of the research. Experience of modern army,

in which the principle of gender equality is guaranteed by military regulations, indicates that female as well as male, can be an excellent soldier, and her achievements result from indi-

vidual character traits [1]. Until recently, sight of a woman in uniform has been an extremely rare phenomenon. Now, number of women in uniforms increases each year [2]. More and more young girls are opting for a military career or career in other uniformed services, such as police, border guard or fire service. Possibility of self-realization and prestige of uniformed services in society are the main reasons why they choose uniformed services.

Today, the vast majority of women in the Polish Army serve in medical units, logistics, administration and in the judiciary. More and more often it happens that women soldiers are commanders not only in typical military units, but also in Polish contingents abroad. In some NATO countries i.e. in The Netherlands or Denmark women can serve in all types of combat units. In US Army, where the biggest number of women serve, only posts related to direct combat actions are unavailable for them, while in the German Army, until recently, women could only be members of medical units or military band.

Currently, in many countries of modern world we observe pandemic of civilization metabolic diseases that are related with nutrition. Commonly occurring obesity, which is a metabolic disease itself, predisposes for cardiovascular diseases, including hypertension and arteriosclerosis, diabetes and certain cancers, that is disorders that are the main cause of deaths. Over the past two decades, there has been a significant increase in weight of citizens in many countries in the world, including Poland. Research carried out by the Food and Nutrition Institute indicates that overweight or obesity are found among about 50% of adult Poles aged 19-59 years old [3]. In addition to protein-energy nutritional status, mineral nutrition status associated with proper bones calcification is important. Calcium deficiencies in the diet may lead to decalcification and decrease in bone mineral density, which in turn can cause osteopenia and/or osteoporosis occurrence [4].

Responsible positions occupied by women in the Polish Army, as well as in other uniformed services, require from them good physical condition that is conditioned by good nutritional status. Therefore, it seems very important to monitor the nutritional status of women who

are officers in the Polish Army, as well as female students from MSoFS, future officers of the State Fire Service (SFS).

## Material and methods

Total of 30 women – officers of the Polish Army and 13 female students of the Main School of Fire Service – future officers of the State Fire Service took part in the research on nutritional status.

Estimation of nutritional status was done based on the anthropometric measurements such as: body height, body mass and Body Mass Index. These data allowed to qualify examined women, in accordance with the Ferro-Luzzi classification, to the following groups: underweight (BMI < 18,4 kg/m<sup>2</sup>), standard body mass (BMI 18,5-24,9 kg/m<sup>2</sup>), overweight (BMI 24.9–30 kg/m<sup>2</sup>) and obese (BMI > 30) and indicating enormous obesity when BMI is above 40 kg/m<sup>2</sup> [5].

Bone mineral density tests were carried out by densitometric method, using the EXA 3000 apparatus. Bone calcification was assessed on the forearm bone of non-prevailing hand on the basis of the T-score value that is a number of standard deviations above or below correct value for population of young healthy people [6]. The T-score value > -1 was accepted as a norm, it means that bone mineral density value is not lower than one standard deviation below mean value. The T-score values included between -1 and -2.5 are characteristic of osteopenia when the T-score < -2.5 is typical of osteoporosis [7].

## Results and discussion

The average age of examined female officers was 28.5±5.1 years old. The majority of the subjects i.e. 78.6% were higher educated while 21.4% were secondary educated. Average height and body weight of examined women amounted to 164,4±5.9 cm and 60.7±8.9 kg respectively, while average BMI value amounted to 22.2±2.66 kg/m<sup>2</sup>. The percentage fat content was 22.4±5.5% and lean body mass amounted to 46,1±5.3 kg. The age of students from the MSoFS was 20.5±1.0 years old, average height and body weight amounted to 167,4 cm and 60.8±5,1 kg respectively. The average BMI was 21.7±1.9 kg/m<sup>2</sup>, while the percentage fat content was 24,2±6.5%, and lean body mass amounted to 46.9 kg±3.5 kg (Table 1).

Overweight was found among 14.8% of female soldiers while only 9.1% of female students from the MSoFS indicated overweight. Obesity was not found at all (table 2).

**Table 1:** Basic anthropometric parameters of examined women.

Examined parameters	Female officers	Female students
Age of subjects [years]	28.5±5.1 22-43	20.5±1.0 19-22
Body height [cm]	164.4±5.9 152.9-174.8	167.4±4.7 160.4-173.6
Body mass [kg]	60.7±8.9 43.6-85.2	60.8±5.1 53.7-70.0
Arm circumference [cm]	27.2±3.0 22.5-34.0	27.4±1.9 25.0-30.0
Biceps [mm]	2.42±0.52 1.8-4.2	2.44±0.63 2.0-3.8
Triceps [mm]	2.86±0.49 2.0-4.0	3.07±0.52 2.2-3.8
Under scapula [mm]	15.11±5.84 7.0-30.4	13.40±3.21 8.2-19.4
Over iliac [mm]	19.61±7.53 7.0-33.0	19.80±6.76 9.8-32.0
BMI kg/m <sup>2</sup>	22.17±2.66 17.7-27.8	21.73±1.87 18.6-25.1
Percentage fat content	22.36±5.50 11.2-31.8	24.23±6.47 17.3-40.6
Lean body mass [kg]	46.7±5.28 37.3-62.3	46.9±3.47 42.5-53.9

**Table 2:** Overweight and obesity occurrence in the examined groups of women (%).

Examined parameters	Female officers	Female students
Standard BMI (18.5-24.9 kg/m <sup>2</sup> )	85.2	90.2
overweight 25.0-29.9	14.8	9.1
Obesity >30	–	–

Results of densitometric tests revealed that status of bones mineralization in 50% of female officers and in 30.8% of female students was characteristic of osteopenia. Changes in bones calcification characteristic of osteoporosis were not found at all (Table 3).

**Table 3:** Percentage of disturbances in bone mineralization among female students.

T-score value	Female soldiers	Female students
T-score >-1 (norm)	50	69.2
-1 < T-score > - 2.5 (osteopenia)	50	30.8
T-score <-2.5 (osteoporosis)	–	–

Examinations of female officers carried out previously showed that 18,2% of them were overweight and 2.3% were obese. At the same time 4.5% of examined women officers revealed underweight. Significant percentage of women (48.1%) showed changes in bones calcification characteristic of osteopenia, while 27.8% revealed changes typical of osteoporosis [8]. The results of carried out comprehensive research among students of different universities in the country have shown that underweight was found among 10% of female students in Medical University in Łódź and among 29% of female students from Medical University in Poznań [9,10]. Overweight was found among 13.8% of female students from Medical University in Białystok [11]. Obesity among examined female students ranged from 0.4% in Poznań to 1.2% in Białystok. Evaluation of bone tissues carried out among women of Warmia and Mazury revealed that 29% of examined women showed bone calcification changes characteristic of osteopenia, and 12% – changes characteristic of osteoporosis. A total number of sub-population with low bone mass was up 41% of the examined population [12].

## Conclusions

- 1) In the light of civilization metabolic diseases risk overweight occurrence among women-officers of the Polish Army and female students from the MSoFS is an essential nutritional problem.
- 2) Disturbances in bone mineralization found among 44% of examined young women may be the reason of osteoporosis and fractures occurrence, and as a result their elimination from the service.
- 3) There is an urgent need to carry out extensive actions in the scope of nutritional prophylaxis of civilization metabolic diseases among women serving in the Polish Army and in State Fire Service.

## References:

1. Szubińska B.: Women, peace, security. MON Warszawa 2013.
2. Kłos A., Bertrandt J., Kurkiewicz Z., Bieniek R., Sawicki K.: Evaluation of nutrition and nutritional status of young women – future regular soldiers. *Lek. Wojsk.* 2006, 82, 185-188.
3. Jarosz M., Traczyk I.: The strategy of obesity counteracting in Poland in the light of the European charter of obesity counteracting. *Dietetyka* 2008, 2, (1), 3-7.
4. Arden N.K., Spector C.D.: Osteoporosis – the current level of knowledge. Borgis. Warszawa 2000.
5. Ferro-Luzzi A., Sette S., Franklin S., James W.P.: A simplified approach of assessing adult chronic energy deficiency. *Eur. J. Clin. Nutr.* 1992, 46, 173-186.
6. Lorenc R.S.: Diagnostics of Osteoporosis. Osteoforum, Warszawa 2000.
7. Filler S., Cooper C.: Epidemiology of osteoporosis. W Bandurski E.: Osteoporosis – current level of knowledge. Warszawa 2000, 10-21.
8. Bertrandt J., Kłos A.: Estimation of nutritional status of women soldiers serving in the Polish Army. Symposium Impacts of gender differences on conducting operation activities. Antalya Turcja, 2008.
9. Paradowska-Stankiewicz I., Grzybowski A.: Assessment of nutritional status in a group of secondary school students and students of the Medical University in Łódź. *Żyw. Człow. Metab.* 2007, 34, 933-937.
10. Duda G., Suliburska J.: Analysis of stimulants consumption by students. *Bromatol. Chem. Toksykol.* 2003, supl. 249-254.
11. Ostrowska I., Czapska D., Karczewski J.: Nutritional value of food and health status of cohort of students from Medical Academy in Białystok. *Żyw. Człow. Metab.* 2001, 28, 707-712.
12. Przybyłowicz K., Cichoń R., Wądołowska L.: Assessment of calcium intake and parameters of its circulation in bones in women population. *Brom. Chem. Toksykol.* 2006, supl. 457-462.