



# PARTICIPATION IN A HEALTHY EATING AND PHYSICAL ACTIVITY INTERVENTION AND NUTRITIONAL KNOWLEDGE AMONG POLISH AIR FORCE SOLDIERS

Magdalena KRZYŻANOWSKA<sup>1</sup>, Paweł JAGIELSKI<sup>2</sup>, Agata GAŹDZIŃSKA<sup>1</sup>

<sup>1</sup> Laboratory of Dietetics and Obesity Treatment, Department of Psychophysiological Measurements and Human Factor Research, Military Institute of Aviation Medicine, Warsaw, Poland

<sup>2</sup> Department of Nutrition and Drug Research, Faculty of Health Science, Jagiellonian University, Medical College, Cracow, Poland

**Source of support:** This research was funded by the Ministry of National Defence of the Republic of Poland, grant number 256/2017/DA, dated 5 July 2017.

**Author's address:** M. Krzyżanowska, Military Institute of Aviation Medicine, Krasynskiego 54/56 Street, 01-755 Warsaw, Poland, e-mail: mkrzyzanowska@wiml.waw.pl

**Introduction:** Proper nutrition is essential for the health, fitness, and operational readiness of Air Force soldiers, who often face high physical and mental stress. Inadequate nutritional knowledge and poor dietary habits can negatively impact their condition and task performance. Previous studies show insufficient nutritional knowledge and high rates of overweight and obesity among soldiers. This study aimed to assess differences in nutritional knowledge between Polish Air Force (PAF) soldiers who participated in an educational program on healthy eating and physical activity and those who did not.

**Methods:** Among 390 PAF soldiers, 195 participated in the education program while 195 did not. Nutritional knowledge was assessed using a 32-question proprietary questionnaire, scored on a 5-point scale. Nutritional status was measured by body mass index (BMI). Statistical analysis included the Mann-Whitney U test and the  $\chi^2$  test.

**Results:** Soldiers participating in an education program achieved significantly higher nutritional knowledge (mean  $26.1 \pm 4.1$ ) than non-participants ( $22.4 \pm 3.6$ ;  $p < 0.0001$ ). Post-education, 84.6% achieved at least a good rating, versus 55.9% without education. Soldiers in the 'post-education' group outperformed the control group (without education) in 14 of 32 questions. Nutritional status did not differ significantly between groups ( $p > 0.05$ ). Notably, in both groups, only about one-third of soldiers had a normal BMI.

**Conclusions:** Soldiers who participated in the educational program demonstrated higher levels of nutritional knowledge than those who did not, suggesting a potential benefit of such initiatives in a military setting. The identified areas of knowledge deficits indicate the need for further development and targeting of educational programs.

**Keywords:** nutrition education, nutritional knowledge, nutritional status, public health, soldiers

**Cite this article:** Krzyżanowska M, Jagielski P, Gaździńska A: Participation in a Healthy Eating and Physical Activity Intervention and Nutritional Knowledge Among Polish Air Force Soldiers. Pol J Aviat Med Bioeng Psychol 2026; 32(1): 5-12. DOI: 10.13174/pjambp.07.05.2026.01

**Copyright:** © Military Institute of Aviation Medicine, 54/56 Krasynskiego St., 01-755 Warsaw, Poland • **License:** CC BY-NC 4.0 • **Indexation:** Ministry of Science and Higher Education (Poland) • **Full-text PDF:** <http://www.pjambp.com>

## INTRODUCTION

A balanced diet is essential for maintaining health and physical fitness. It provides the energy and nutrients needed for the body to function properly, maintain homeostasis, and support regeneration and adaptation. Proper nutrition also helps prevent chronic metabolic diseases [7]. In military service, especially in highly demanding units such as the Polish Air Force (PAF), a nutritious diet is critically important. Soldiers face considerable physical and mental stress, from intensive training to operational responsibilities. As a result, an adequate diet not only sustains their combat readiness and mental resilience but also plays a key role in preventive healthcare.

Scientific literature contains publications on adverse changes in the nutritional status of Polish soldiers, such as overweight and obesity, which are partly the result of poor eating habits. In addition, studies on the nutritional knowledge and eating habits of soldiers indicate the need for increased educational activities in this area [1,9]. In the context of the air force, where both physical and cognitive fitness are of strategic importance, ensuring a comprehensive approach to nutrition, including knowledge, habits, and nutritional status, can play an important role in improving service effectiveness.

Nutrition education, defined as a systematic process of expanding knowledge, building skills, and shaping nutritional attitudes, leads to conscious food choices and supports long-term health maintenance. In the context of military training, nutrition education can play a dual role: as a tool to support operational efficiency and as a strategy for the prevention of lifestyle diseases among service personnel. In light of the above, assessing differences in nutritional knowledge between soldiers who participate in educational programs on the principles of healthy eating and physical activity and those who do not is an important element in preventing nutritional disorders and in developing targeted educational and intervention programs for this professional group.

The objective of this study was to compare nutritional knowledge between PAF soldiers who participated in an educational program on healthy eating and physical activity and those who did not. The study also aimed to determine whether soldiers who participated in an educational program differ in their nutritional knowledge from those who did not, and whether such programs may be relevant for promoting healthy behaviors and supporting preventive strategies in military.

## METHODS

### Participants

An anonymous survey was conducted among a group of 390 PAF soldiers from military units across Poland who expressed willingness to participate in the National Health Program for 2016–2020 (operational objective 1: Improving the diet and nutrition of the population and physical activity levels, point 1.2.: Information and educational activities promoting proper nutrition and physical activity among uniformed services). An invitation to participate in the National Health Program was sent in advance to all commanders of military units. If they agreed, invitations were sent by e-mail to their subordinates. Soldiers who expressed their willingness to participate in the program were enrolled. Assignment to groups was based on the order of enrolment. The first 195 PAF soldiers who expressed a desire to participate in the National Health Program were assigned to the study group, and the next 195 PAF soldiers were assigned to the control group.

Two groups were included from the study:

1. Study group – 195 soldiers – participants in a two-hour education course on rational nutrition and physical activity, conducted by experts from the Military Institute of Aviation Medicine's Dietetics and Obesity Treatment Laboratory as part of the National Health Program for 2016–2020; for the purposes of data analysis, the group was labeled 'post-education'.
2. Control group – 195 soldiers – individuals who did not participate in nutrition education as part of the National Health Program – labeled as the 'without education' group.

### Materials and Apparatus

The nutritional knowledge of all respondents was assessed using the same proprietary questionnaire. It included questions on demographic data (age, gender, education, place of residence), 30 closed questions about the basics of nutrition, and 2 questions on recommendations for physical activity. The questions from the survey on nutritional knowledge are presented in Table 3. In the 'post-education' group, the questionnaire was administered immediately after the education course. The number of correct answers was calculated for each respondent. The maximum number of points that could be obtained was 32. Based on the number of correct answers, an overall assessment of the level of knowledge was assigned according to the following criteria:

- insufficient – 0% to 35% of points,
- poor – 36% to 50% of points,

- sufficient – 51% to 70% of points,
- good – 71% to 90% of points,
- very good – 91% to 100% of points.

All study participants completed the questionnaire correctly; therefore, all questionnaires were included in the statistical analysis.

The subjects' nutritional status was assessed using body mass index (BMI). Height was measured using the Harpenden Anthropometer (Holtain Ltd., UK) [6] with an accuracy of 1 mm, in a standing position without shoes. Body weight was determined in underwear only, after emptying the bladder. The degree of overweight and obesity was assessed based on BMI in accordance with the World Health Organization (WHO) criteria [12]. Three groups were created: BMI in the range of 18.5–24.9 (normal), 25.0–29.9 (overweight) and > 30.0 (obese).

All procedures were approved by the Institutional Review Board of the Military Institute of Aviation Medicine, Warsaw, Poland (decision No. 01/2018 of 9 March 2018), and were performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All participants provided informed consent.

### Statistical analysis

Statistical analysis was performed using the Mann-Whitney U test and the  $\chi^2$  test. Statistical analyses were performed using PS IMAGO PRO 7 (IBM SPSS Statistics 27, Armonk, NY, USA). The level of statistical significance was set at  $p < 0.05$ .

## RESULTS

### Sample characteristics

In the 'post-education' group, 93.8% of respondents were men, while in the 'without education' group this percentage was 92.8% ( $p > 0.05$ ). The average age of respondents in the 'post-education' group was  $33.8 \pm 7.8$  years, while in the 'without education' group it was  $39.1 \pm 8.1$  years. The 'post-education' group was significantly younger ( $p < 0.0001$ ).

The average BMI was  $26.1 \pm 2.9$  kg/m<sup>2</sup> in the 'post-education' group and  $26.2 \pm 3.5$  kg/m<sup>2</sup> in the 'without education' group ( $p > 0.05$ ). In both groups, approximately one-third of soldiers had a normal BMI (33.3% in the 'post-education' group vs. 36.9% in the 'without education' group), while the remaining participants were classified as overweight. Detailed data are presented in Table 1 and Figure 1.

No statistically significant difference in educational level was found between the study groups (higher

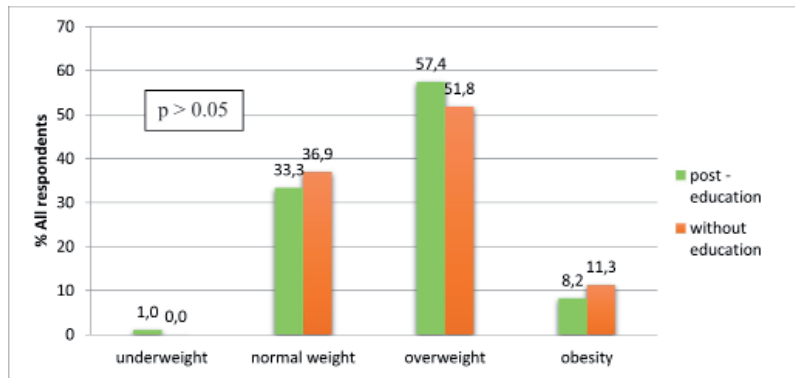


Fig. 1. Nutritional status of the surveyed Polish Armed Forces soldiers according to BMI.

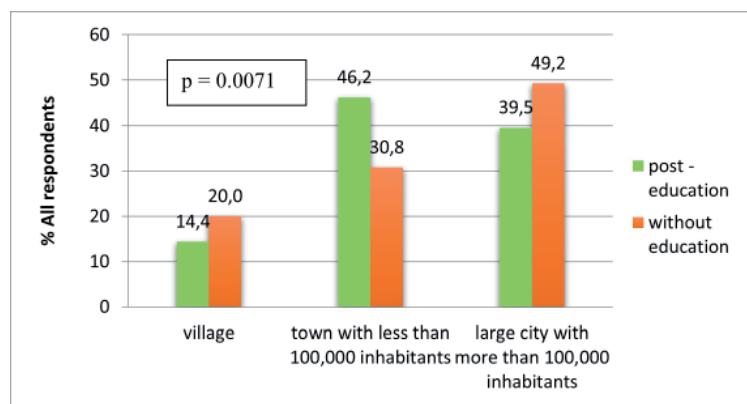


Fig. 2. Place of residence of the surveyed Polish Armed Forces soldiers.

Tab. 1. Characteristics of the surveyed Polish Armed Forces soldiers, by group.

	All respondents						Study group (post-education)				Control group (without education)				p
	N	X	SD	Me	Min	Max	N	X	SD	Me	N	X	SD	Me	
Age (years)	390	36.5	8.4	36.0	21.0	84.0	195	33.8	7.8	33.0	195	39.1	8.1	39.0	<b>&lt;0.0001</b>
Weight (kg)	390	82.8	12.0	83.0	48.0	128.0	195	82.9	12.0	83.0	195	82.6	12.1	82.0	0.4002
Height (cm)	390	177.7	7.0	178.0	140.0	197.0	195	178.0	6.8	178.0	195	177.4	7.1	178.0	0.5381
BMI (kg/m <sup>2</sup> )	390	26.2	3.2	25.7	17.2	43.4	195	26.1	2.9	25.7	195	26.2	3.5	25.8	0.7156

N – sample size, X – mean value, SD – standard deviation, Me – median, Min – minimum, Max – maximum, p – Mann-Whitney U test result. Bold values denote statistical significance at the  $p < 0.05$  level.

Tab. 2. Assessment of nutritional knowledge among Polish Armed Forces soldiers.

	All respondents						Study group (post-education)				Control group (without education)				p
	N	X	SD	Me	Min	Max	N	X	SD	Me	N	X	SD	Me	
Total nutritional knowledge score	390	24.2	4.4	24.5	5	32	195	26.1	4.1	27	195	22.4	3.6	23	<b>&lt;0.0001</b>

N – number, X – mean value, SD – standard deviation, Me – median, Min – minimum, Max – maximum, p – Mann-Whitney U test result. Bold values denote statistical significance at the  $p < 0.05$  level.

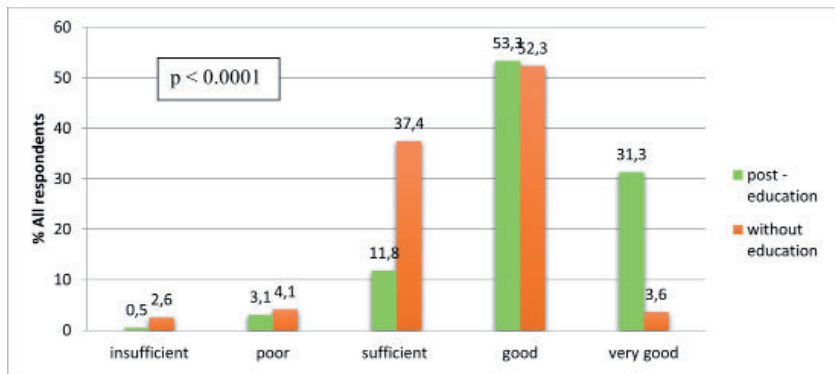


Fig. 3. Nutritional knowledge of Polish Armed Forces soldiers depending on their participation in training on the principles of healthy eating and physical activity.

education – 84.6% versus 88.7%;  $p > 0.05$ ), but there was a significant difference in the place of residence of the study participants ( $p < 0.05$ ). A total of 46.2% of soldiers from the 'post-education' group lived in towns with fewer than 10,000 inhabitants, compared to 30.8% of soldiers from the 'without education' group. Detailed data are presented in Figure 2.

### Assessment of nutritional knowledge

The study revealed issues related to the principles of rational nutrition in which Polish soldiers' knowledge is insufficient, and participation in education on healthy eating and physical activity helps them achieve a higher level of knowledge

in this area. Table 2 presents the total number of correct answers broken down by group.

A statistically significant difference was found in the total number of points obtained by the analyzed groups, as well as differences in the assessment of knowledge ( $p < 0.05$ ). Figure 3 shows the overall assessment of nutritional knowledge for all respondents. Half of the respondents received an 'good' rating. In the group of individuals who did not participate in the education course, 37.4% of soldiers received a sufficient rating for their nutritional knowledge, and only 3.6% received a very good rating.

The overall assessment of nutritional knowledge among soldiers who participated in the education course showed the opposite pattern. Here, 31.3%

Tab. 3. Percentage of correct answers to questions on nutritional knowledge among Polish Armed Forces soldiers.

No.	Question	Percentage of correct answers			P
		All respondents	Study group (post-education)	Control group (without education)	
1.	What do you think constitutes a healthy diet?	93.3	94.9	91.8	0.3020
2.	What is at the base of the food pyramid?	52.8	69.7	35.9	<b>&lt;0.0001</b>
3.	What is at the top of the food pyramid?	67.4	78.5	56.4	<b>&lt;0.0001</b>
4.	How often should milk and dairy products (yoghurt, kefir, cheese) be consumed?	57.7	74.4	41.0	<b>&lt;0.0001</b>
5.	How often should vegetables and fruit be consumed?	97.2	97.9	96.4	0.0910
6.	How much fluid should be consumed daily?	46.4	63.6	29.2	<b>&lt;0.0001</b>
7.	What is the source of complete protein in the diet?	81.5	86.2	76.9	0.1370
8.	What is the source of 'good fats' in the diet?	95.1	96.4	93.8	0.7610
9.	What is the source of cholesterol in the diet?	69.2	66.2	72.3	<b>0.0080</b>
10.	What are the sources of complex carbohydrates in the diet?	71.0	77.9	64.1	<b>0.0090</b>
11.	What are the sources of simple carbohydrates in the diet?	62.3	73.8	50.8	<b>&lt;0.0001</b>
12.	Which foods contain the most fiber?	93.8	94.9	92.8	0.8290
13.	What is the main function of carbohydrates in the body?	92.8	93.8	91.8	0.2950
14.	What is the main function of protein in the body?	95.6	95.4	95.9	0.1780
15.	What is the main function of fats in the body?	53.1	56.4	49.7	0.0440
16.	What is the main function of vitamins and minerals in the body?	63.8	63.6	64.1	0.4790
17.	What provides the most calories: 1g of protein, 1g of carbohydrates, 1g of fat, 1g of alcohol?	50.8	61.5	40.0	<b>&lt;0.0001</b>
18.	What is the correct BMI value?	83.1	86.2	80.0	0.0040
19.	What is the correct body fat content?	69.5	81.5	57.4	<b>&lt;0.0001</b>
20.	What can cause obesity?	82.6	82.1	83.1	0.6770
21.	What are the complications of obesity?	88.7	88.7	88.7	0.4640
22.	What are the benefits of weight loss?	88.7	90.3	87.2	0.5530
23.	What is a safe rate of weight loss?	92.1	93.3	90.8	0.2370
24.	Which foods should be limited to prevent high blood pressure?	77.4	80.5	74.4	0.3600
25.	What is the maximum recommended daily salt intake?	70.3	86.2	54.4	<b>&lt;0.0001</b>
26.	What are the World Health Organization's recommendations regarding sugar consumption?	62.3	72.3	52.3	<b>&lt;0.0001</b>
27.	What type of processing should be used to prevent lifestyle diseases (overweight and obesity, cardiovascular diseases, cancer)?	72.1	75.4	68.7	<b>0.0300</b>
28.	What is the recommended number of meals per day?	81.8	84.1	79.5	0.4930
29.	What should be the longest interval between meals?	74.1	79.0	69.2	0.1390
30.	At what time should the last meal be eaten?	83.1	91.3	74.9	<b>&lt;0.0001</b>
31.	What are the World Health Organization (WHO) recommendations for physical activity to maintain good physical and mental fitness?	79.5	82.6	76.4	0.1620
32.	How many steps should be taken daily to maintain a healthy and slim figure?	71.8	88.2	55.4	<b>&lt;0.0001</b>

p – chi-square test result. Bold values denote statistical significance at the  $p < 0.05$  level.

of respondents received a very good rating, and only 11.8% received a sufficient rating. A statistically significant difference was found in favor of soldiers who had undergone education in healthy eating ( $p < 0.0001$ ). In the group of individuals who underwent education, 84.6% of soldiers received at least a good rating, while in the 'without education' group only 55.9% of soldiers did so.

Table 3 shows the percentages of correct answers to individual questions by group. For 14 questions, statistically significant differences ( $p < 0.05$ ) were found in the percentage of correct answers depending on the group. For 13 questions, this difference favored the 'post-education' group, which had undergone training on the principles of healthy eating.

The most difficult question for soldiers from the 'post-education' group was 'What is the main function of fats in the body?', to which 56.4% of respondents gave the correct answer, while for soldiers from the 'without education' group it was 'How much fluid should be consumed daily?', which was answered correctly by only 29.2% of respondents. Nutritional knowledge on topics such as the levels of the food pyramid, recommendations for daily fluid intake, the functions of fats in the body, recommendations for the consumption of milk and dairy products, and the energy value of macronutrients was rated lowest among more than half of the soldiers in the 'without education' group. In the 'post-education' group, the percentage of correct answers to any of the questions was not lower than 50%.

## DISCUSSION

The study found that soldiers who participated in the education program on healthy eating and physical activity demonstrated significantly greater nutritional knowledge than those who did not. Soldiers who participated achieved significantly higher scores both in the overall knowledge assessment (26.1 vs. 22.4 points;  $p < 0.0001$ ) and in specific areas. It should be emphasized that, although participation in the education required prior approval from superiors, participation in the study itself was voluntary and did not involve compulsory secondment to take part in the project.

The level of knowledge about healthy eating among military personnel has already been the subject of research by other authors. Bębnowicz et al. [1] showed that in GROM special forces units, which are characterized by high physical demands and health awareness, the nutritional knowledge of soldiers was assessed as insufficient, especially in areas related to sources of fat in the diet, the energy value of food, and the principles of the Healthy Eating Pyramid. The researchers showed that most of the respondents (73%) obtain their nutritional knowledge from websites, every second respondent (55%) from the press or conversations with friends/acquaintances, and 40% from television. It should be emphasized that the Internet is a source of information that varies greatly in terms of the quality and reliability of content. In addition to reliable websites created by scientific institutions or specialists in the field of dietetics, there are many unprofessional portals and blogs that disseminate unverified nutritional information, which may influence the development of incorrect eating habits. Specialists

(dietitians, doctors), who should be the main source of knowledge, were indicated by only 12% of respondents.

Kler et al. [9] also demonstrated an insufficient level of nutritional knowledge in their research, this time among soldiers of the Territorial Defense Forces. Importantly, the authors also pointed out that the main sources of knowledge were the Internet and friends. Similarly low levels of nutritional knowledge in the areas of healthy eating discussed here were demonstrated in our earlier research [2] among cadets at the Air Force Academy in Dęblin (currently the Polish Air Force University). The overall assessment of knowledge among cadets was varied. It should be noted that the young age of the respondents is particularly important here from the point of view of the health consequences of eating habits developed later in military service. The formation and consolidation of unhealthy eating habits at a young age can cause numerous health problems, including those related to maintaining a healthy weight [8,17]. In this group, too, the main source of knowledge indicated by 70.2% of respondents was the Internet, followed by friends (52.1%).

The problem of maintaining a healthy weight among soldiers in modern armed forces is global in nature and has been the subject of numerous scientific studies [3,4,15]. For this reason, it is reasonable to conduct research to identify the factors contributing to this phenomenon and to implement preventive measures that can reduce the negative consequences of excessive body weight, such as deterioration of health, reduced operational readiness, poorer physical fitness test results, increased sick leave, and the risk of dismissal from service [10,14]. Health education, including nutrition education, can be one of the tools to counteract the development of metabolic diseases, including obesity, in this professional group.

The results obtained in our study, showing significantly higher levels of nutritional knowledge among soldiers who participated in the education program compared to non-participants (average 26.1 vs. 22.4 points;  $p < 0.0001$ ), are consistent with reports from other military populations, which highlight the potential role of educational programs. Similar findings were reported in studies of Israeli female combat recruits, where participation in a short nutrition education program during basic training was associated with higher nutritional knowledge and more favorable nutritional attitudes and behaviors, with some of these patterns persisting in long-term follow-up [5].

A study by Uglem et al. [16] conducted among soldiers of the Norwegian National Guard showed that an intervention involving nutrition training combined with a change in the canteen environment resulted in improved knowledge and increased consumption of vegetables, fruit, and cereal products with higher nutritional value. At the same time, no similar changes were observed in the control group. These results are also confirmed by a systematic review by Kullen et al., which showed that most educational interventions in the armed forces of various countries lead to significant positive changes in nutritional knowledge and diet quality [11].

Systematic reviews and observational studies indicate that individuals with greater nutritional knowledge are more likely to make healthier food choices and have a higher-quality diet. This correlation includes, among other factors, higher consumption of vegetables and fruit, a better fat profile, and greater compliance with dietary recommendations. Importantly, similar correlations have also been found in military populations, where higher nutritional knowledge among soldiers was positively associated with diet quality as assessed by the Healthy Eating Index [13].

In light of these data, the results of this study, particularly the significantly higher percentage of 'very good' ratings in the 'post-education' group (31.3% vs. 3.6%) and better results in answers to 13 out of 32 questions, suggest that participation in educational programs may be associated with higher levels of nutritional knowledge among soldiers. Importantly, the identification of questions that caused the most difficulty for soldiers post-education (e.g., concerning the function of fats in the body) and the particularly low scores in the 'without education' group (e.g. recommended fluid intake – 29.2% correct answers) emphasize the need to further focus and expand educational programs, especially in areas where knowledge deficits are greatest. The implementation of such measures may contribute to the reduction of the risk of overweight, obesity, and metabolic syndrome, as well as to the improvement of the functioning of soldiers' bodies and the maintenance of physical and mental fitness over an extended period.

However, certain limitations of this study should be taken into account. The analysis focused exclusively on the level of nutritional knowledge, without a parallel assessment of actual eating behaviors, changes in body weight, or the potential impact of interventions on health and operational readiness. The cross-sectional nature of the study only allows determination of the current level

of knowledge, which may serve as a starting point for developing proper eating habits, but does not allow for the assessment of changes over time. Interpretation of the results should also consider the age difference between groups, although relatively small (average 5.3 years). Furthermore, no statistically significant differences were found in terms of education; therefore, in the authors' opinion, the potential impact of age difference is unlikely to have significantly affected the results.

In future studies, it would be worthwhile to conduct long-term observation to determine the sustainability of the effects of education and its impact on eating behaviors, nutritional status, and health parameters. An important direction for further analysis may also be to compare the effectiveness of various forms of nutrition education, including e-learning programs and mobile applications, and to conduct qualitative studies identifying barriers to the implementation of nutritional recommendations in everyday service.

## CONCLUSIONS

1. Soldiers participating in the educational intervention demonstrated greater nutritional knowledge than those who did not, indicating the potential usefulness of educational programs in the military.
2. The identified knowledge gaps highlight the need for ongoing, targeted education.
3. The results of the study may serve as a basis for the creation of comprehensive programs supporting the nutritional status of military personnel and their operational readiness.
4. Future research should focus on better understanding the relationships between nutritional knowledge, dietary behaviors and health status, as well as on assessing these variables over time using appropriate longitudinal study designs.

---

**AUTHORS' DECLARATION**

---

**Study Design:** Magdalena Krzyżanowska, Agata Gażdźńska. **Data Collection:** Magdalena Krzyżanowska, Agata Gażdźńska. **Statistical analysis:** Paweł Jagielski, Agata Gażdźńska. **Manuscript preparation:** Magdalena Krzyżanowska, Paweł Jagielski, Agata Gażdźńska. The Authors declare that there is no conflict of interest.

---

**REFERENCES**

---

1. Bębnowicz A, Bertrant B, Kler P, Bertrant J. Evaluation of nutritional knowledge level in soldiers serving in Polish Special Forces Unit "GROM". *Probl Hig Epidemiol* 2015; 96(4): 782-784.
2. Gażdźńska A, Baran P, Wyleżoł M i wsp. Assessment of the nutritional knowledge of cadets at the AirForce Univesity in Dęblin – preliminary research. *Probl Hig Epidemiol* 2013; 94(2): 368-370.
3. Gażdźńska A, Gażdźński S, Jagielski P, Kler P. Body Composition and Cardiovascular Risk: A Study of Polish Military Flying Personnel. *Metabolites* 2023 Oct; 21;13(10): 1102.
4. Gażdźńska A, Jagielski P, Turczyńska M, Dziuda Ł, Gażdźński D. Assessment of Risk Factors for Development of Overweight and Obesity among Soldiers of Polish Armed Forces Participating in the National Health Programme 2016–2020. *Int. J. Environ. Res. Public Health* 2022; 19(5), 3069.
5. Herzman-Harari S, Constantini N, Mann G, Lencovsky Z, Stark A.H. Nutrition Knowledge, Attitudes, and Behaviors of Israeli Female Combat Recruits Participating in a Nutrition Education Program. *Military Medicine* 2013; 178(5): 517–522.
6. Harpenden Anthropometer - Holtain, UK, Retrieved 20 January 2022 from <https://holtain.co.uk/anth.php>.
7. Jarosz M, Respondek W, Wolnicka K i wsp. Recommendations concerning nutrition and physical activity. Nutrition standards for the Polish population – amendment. Jarosz M (red). IŻŻ, Warszawa 2012: 154-171.
8. Jarosz M, Wolnicka K, Kłosowska J. Environmental factors associated with overweight and obesity among children and adolescents. *Postępy Nauk Medycznych* 2011; 9: 770-777.
9. Kler P, Szczesniak B, Anyzewska A, Bertrand J. Assessment of nutritional knowledge of soldiers of the Territorial Defense Force of the Polish Armed Forces. *Proceedings of The 13th European Nutrition Conference, FENS 2019*; 2019 Oct 15-18; Dublin Convention Centre.
10. Knapik J.J et al. The Medical Burden of Obesity and Overweight in the US Military: Association of BMI with Clinically Diagnosed Medical Conditions in United States Military Service Members. *J Nutr* 2023 Oct; 153(10):2951-2967.
11. Kullen C, Mitchell L, O'Connor H.T, Beck K.L. Effectiveness of Nutrition Interventions on Improving Diet Quality and Nutrition Knowledge in Military Populations: A Systematic Review. *Nutrition Reviews* 2022; 80(6): 1664–1693.
12. Obesity and Overweight Factsheet from the WHO. 2021. Retrieved 15 December 2025 from: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>.
13. Sheaffer K. A, Lee, D. M, George, B, Jayne, J. M, Cole R. E. 2023. Nutrition Knowledge Is Associated With Diet Quality Among US Army Soldiers. *Journal of Nutrition Education and Behavior* 2023 Oct; 10(55): 748–754.
14. Smith T. i wsp. Overweight and obesity in military personnel: sociodemographic predictors. *Obesity* 2012 Jul; 20(7): 1534-8.
15. Sundin J. i wsp. Obesity in the UK Armed Forces: Risk factors. *Military Medicine* 2011 May; 176(5):507-12
16. Uglem S, Kjøllesdal M.K.R, Frølich W, Wandel M. Effect of a Nutrition Intervention on Intake of Vegetables, Fruits, and Semi-Whole Grain Bread Among Low and High Consumers in the Norwegian National Guard. *Military Medicine* 2014; 179(9): 1013–1020.
17. Weker H, Barańska M, Riahi A. The problem of obesity and nutritional knowledge among young people aged 13–15. *Roczniki Państwowego Zakładu Higieny* 2007; 58 (1): 321-327.