

PHYSICAL FITNESS AND NUTRITIONAL STATUS OF POLISH GROUND FORCE UNIT RECRUITS

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ABSTRACT: The purpose of the work was to conduct an examination of the physical fitness and nutritional status of recruits (221 men beginning military service in the infantry unit). Soldiers' physical efficiency was estimated using 4 tests: standing long jump, pull-ups on bar, 30-second sit-ups and 1000-metre run. The nutritional status assessment was done based on anthropometric measurements including measurements of body height, body mass and selected skin fold thickness. The study group of soldiers were the best at sit-ups (46.33 points). They got over 40 points for the 1000-metre run (43.68 points) and for pull-ups on bar (41.69 points). They obtained the lowest scores for standing long jumps (30.77 points). About 14% of recruits were overweight and 4.1% underweight. Recruits enrolling in the infantry unit present a low physical fitness level. Overweight and obesity occurrence, and particularly underweight, in recruits testify to improper nutrition before beginning military service.

KEY WORDS: soldiers, physical fitness, nutritional status, military training, conscript soldiers

INTRODUCTION

Fitness level testifies to the biological value of society, its efficiency at work as well as in fulfilling military duties. Changes in lifestyle observed in the last decades, particularly the increase in time spent being less active, cause systematic deterioration in physical condition of Polish youths, despite profitable somatic development [16]. A similar tendency was also observed among American and German youths [3,11,13]. It is an alarming situation, for these young people are prospective candidates for military service. Effective fulfilment of military tasks requires above average fitness [18,19]. Worse physical fitness is a basis for less effective fulfilment of military duties.

Nutritional status is a reflection of nutritional habits, absorption and utilization of nutrients, human energetic load and activity of factors that are unprofitable for keeping a good state of health. Long-lasting, unbalanced daily energy balance always leads to particular disturbances in nutritional status that result, in the case of positive balance, in overweight and obesity, while in the case of a negative balance they result in malnutrition and its physiological consequences.

Overweight and obesity, as well as underweight, unprofitably influence fitness and physical endurance of the body. It is particularly

significant in the case of soldiers, as it can considerably impair efficiency of military training as well as impede or preclude them from performing complicated military tasks, causing, in specific situations, a threat to soldiers' life and health.

The aim of the work was to conduct an examination of physical fitness and nutritional status of young men beginning compulsory military service in one of the infantry units of the Polish Ground Forces.

MATERIALS AND METHODS

A total of 221 men beginning military service underwent an examination. Average age of men was 20.1 ± 1.6 years. A majority of the subjects (56.1%) came from rural areas, and 43.9% came from cities. Education levels of the study group were as follows: 55.2% primary education, 25.8% secondary education, and 19.1% higher education.

Soldiers' physical fitness was estimated using 4 out of 8 fitness tests included in the International Physical Fitness Test (IPFT). The method of scoring for Polish youths was used [15]. The select tests

included: standing long jump (leg muscle power), pull-ups on bar (arms and shoulder girdle muscle power), 30-second sit-ups (abdominal muscle power) and 1000-metre run (racing endurance). The following classification was accepted arbitrarily according to obtained points (p):

High physical fitness	≥ 240 points
Average physical fitness	200-239 points
Low physical fitness	160-199 points
Very low physical fitness	≤159 points

Fitness tests were done before midday, at least 2 h after a meal. A 10-minute warm-up was done directly before tests, and proper performance of each test was presented.

The nutritional status assessment was done based on anthropometric measurements including measurements of body height, body mass and selected skin fold thickness. Outcomes of body mass and body height measurements were a basis to calculate the BMI (body

TABLE 1. AVERAGE RESULTS OF FITNESS TESTS OF THE INFANTRY UNIT RECRUITS (N=221)

Fitness test	Result	Scores
1000-m run [s]	250.90 ± 29.87 (9-63)	43.68 ± 12.03
Sit-ups [number]	23.81 ± 4.11 (0-35)	46.33 ± 9.69
Standing long jump [cm]	179.45 ± 16.48 (2-50)	30.77 ± 8.43
Pull-ups on bar [number]	4.39 ± 3.27 (0-70)	41.69 ± 16.95

Note: Data are presented as arithmetic mean ± SD and min - max in parentheses.

TABLE 2. ARM CIRCUMFERENCE, SKIN FOLD THICKNESS AND FAT CONTENT OF THE INFANTRY UNIT RECRUITS (N=221)

Arm circumference [cm]	29.2 ± 2.93
On biceps [mm]	2.83 ± 0.44
On triceps [mm]	3.10 ± 0.56
Under scapula [mm]	12.34 ± 5.17
Over iliac [mm]	19.89 ± 10.14
Fat content [%]	14.8 ± 4.4

Note: Data are presented as arithmetic mean ± SD and min - max in parentheses.

TABLE 3. AVERAGE RESULTS OF FITNESS TEST (CONVERTED INTO POINTS) OF RECRUITS ENROLLED IN DIFFERENT MILITARY UNITS [6,20,23]

Fitness test	Soldiers from Infantry unit n=221	Soldiers from Air force unit n=30	Soldiers from Artillery unit n=60	Soldiers from Air cavalry n=50
1000m run	43.68	42.60	49.00	51.36
Sit-ups	46.33	49.00	29.00	57.16
Long jump	30.77	37.30	46.00	47.00
Pull-ups	41.69	15.60	48.00	56.50
TOTAL	162.47	144.5	172.0	212.22

mass index), which helped to estimate overweight and obesity occurrence [2,7]. The body fat content was calculated using thickness of four skin folds – biceps, triceps, subscapular and suprailiac [7]. The anthropometric measurements and physical fitness tests were done in 2007.

RESULTS

Results of fitness tests as well as their conversion into scores are presented in Table 1.

Acceptance of the score method enabled, in further analysis, detailed comparison of obtained results gained by infantry soldiers with results presented by other authors who carried out their research on soldiers doing compulsory military service.

The study group of soldiers was the best at sit-ups (46.33 points). They got over 40 points for the 1000-metre run (43.68 points) and for pull-ups on bar (41.69 points). They obtained the lowest scores for standing long jumps (30.77 points).

Average body mass of men after enrolment was 70.6±10.1 kg, and body height was 175.9±6.7 cm. Based on the BMI value examined men were divided into the following groups: underweight (BMI 17.0-18.4 kg·m⁻²), normal weight (BMI 18.5-24.9 kg·m⁻²), overweight (25.0-29.9 kg·m⁻²) and obese (30.0-39.9 kg·m⁻²) [7].

Improper nutritional status at the beginning of military service was found among 19.9% of all examined men while underweight was found in 4.1%, overweight in 14.0%, and 1.8% of examined soldiers were obese (Figure 1).

Average fat content in soldiers' bodies was about the norm and amounted to 14.8% (Table 2) [4].

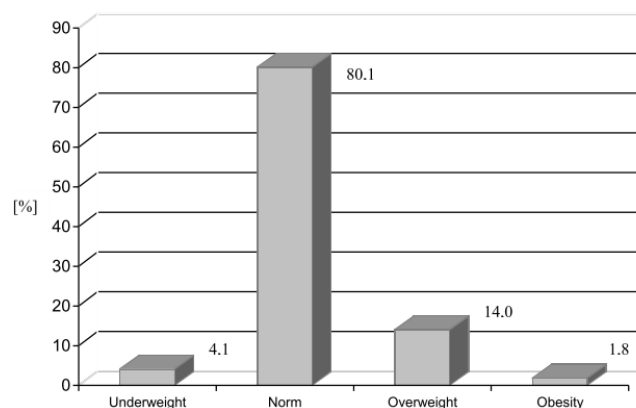


FIG. 1. PERCENT UNDERWEIGHT, OVERWEIGHT AND OBESE AMONG EXAMINED SOLDIERS

The results indicate that the occurrence of overweight among soldiers beginning military service is generally muscle overweight, as average fat content was normal. Only 4 men were obese due to excessive fat content in the body.

No significant correlation was found between anthropometric parameters (Table 2) and fitness test results (Table 3).

DISCUSSION

Soldiers serving in the infantry unit underwent four general fitness tests. Selection of the test was directed at motor abilities that land force soldiers should possess. Accuracy of the selection is confirmed by fitness tests that were carried out during the entrance examination for the Polish Military Academy of Land Forces. Preferred motor abilities (one could get additional exam scores) are racing endurance measured by the time in which a distance of 1000 metres is run and shoulder girdle muscle power measured by the number of pull-ups on a bar. There are a lot of reports on soldiers' fitness published in Polish specialist literature [20,22,23]. Its main topic is analysis of changes in fitness level within different periods of military service. Examinations were carried out using different fitness tests. In some works the International Physical Fitness Test (IPFT) was used to carry out these tests, converting the results according to fitness scoring worked out for Polish youths. This test was used in 1996 to assess physical fitness of ground staff soldiers serving in one air base [20] as well as soldiers doing compulsory military service in an artillery unit [6]. In 2002 these tests were carried out among soldiers from a shock troop sub-unit of the air cavalry [22]. Results of recruits' fitness assessment are presented in Table 3.

Data analysis revealed that in a 1000-metre run fitness test soldiers beginning military service in the infantry unit got poor scores, at the same level as soldiers from the air base ground staff [20]. Higher scores were obtained by soldiers from the air cavalry and artillery units. Soldiers from the infantry unit revealed the weakest leg muscle power. The most skilful group of examined men was recruits from the air cavalry. They presented the highest level of racing endurance and dynamic strength. It is an important observation, because in the former Soviet Union army, during selection of soldiers for special units, particular attention was paid to leg muscle power – jumping ability measured with the standing long jump and racing endurance. Interesting information was obtained by comparing these results with the results of fitness tests performed during the entrance examination for the Polish Air Force Academy. Students beginning their studies got 60 points in a 1000-metre run and in pull-ups on bar 64 points according to MTSF, which made a very good score. These results are much higher (about 25%) than those obtained by examined soldiers from the infantry unit or recruits from other forces' military units. Comparative analysis of results on racing endurance and arm and shoulder girdle muscle power of Polish recruits enrolled in 1960–1991 showed that the lowest strength of arm and shoulder girdle muscles was observed in 1967. The highest scores were obtained in the 1970s and 1990s [23] (Table 4).

TABLE 4. AVERAGE RESULTS OF PULL-UP TEST OF POLISH RECRUITS IN DIFFERENT YEARS OF ENROLMENT

Recruits enrolled in:	1967	1975	1985	1990	2007 (Infantry unit)
Number of pull-ups	4.5	6.1	4.8	5.9	4.4

TABLE 5. AVERAGE RESULTS OF THE 1000-METRE RUN OF POLISH RECRUITS IN DIFFERENT YEARS OF ENROLMENT

Recruits enrolled in:	1960	1971-1972	1984	1990	2007 (Infantry unit)
Run time [s]	234.0	218.5	243.0	235.0	250.9

The highest scores in the racing test were obtained in the early 1970s and the poorest in the 1980s [23] (Table 5).

Against this background examined soldiers from the infantry unit revealed the lowest fitness both in pull-ups on bar and in the 1000-metre run. A similar tendency to decreasing racing endurance within the last 15-20 years has been observed among Finnish conscripts [17]. The main fitness tests in many armies are: 1-mile run, push-ups and 2-minute sit-ups. Among racing events are 1.5-mile run, 2-mile run and 12-minute run [12,14]. Trank, Ryman, Minagava, Trone & Shaffer [21] carried out a fitness test in order to estimate racing endurance among American Navy recruits. A 1.5-mile run was a test. The average result for all examined men was 10 minutes and 51 seconds, which, according to accepted criteria, testified to good racing endurance. Fitness tests of soldiers beginning military service in two US Army basic training battalions were carried out by Knapik and coworkers [12]. During the entrance fitness test that included push-ups, sit-ups and 2-mile run it was found that about 11% of recruits presented such low fitness that before the Basic Combat Training (BCT) they had to undergo special physical training, lasting 8 weeks, and held in the Fitness Training Unit (FTU). These data show that, similarly as in the Polish Army, also in the US Army conscripts presenting low physical fitness are an increasingly serious problem. It requires implementation of changes in the physical training process, greater involvement of qualified specialists in physical education in conducting physical education classes, and, first of all, a change in mentality of the young generation.

The occurrence of overweight and obesity in the Polish population, as in other European countries, is more and more often a serious health and economic problem [1,5]. Results of previous research on the nutritional status of 2390 Polish soldiers beginning military service in different types of forces revealed overweight among 23.2% of subjects examined, while 10.0% were obese [11]. During examination of the nutritional status of young men beginning compulsory military service in the Air Cavalry units in 2005, it was found that 32.7% of them were overweight, and 18.9% were obese [10].

Research carried out by the National Food and Nutrition Institute revealed that among the population of men aged 19-29 years, 27.6% were overweight and 4.3% were obese [8,9]. Janik and Zatoński [8], performing their research on body mass in the Polish population and its social-demographic determinants, found that every third Pole was overweight, while 16% showed some features of obesity and 2% features of underweight. The authors stated that obesity is most common among higher educated men. They pointed out that together with increase of income the frequency of overweight occurrence was raised [8].

CONCLUSIONS

1. Recruits enrolled in the infantry unit present a low level of physical fitness.
2. Overweight and obesity occurrence, and particularly underweight, in recruits testify to improper nutrition before beginning military service.
3. Low physical fitness and disturbances in nutritional status among recruits may significantly affect military training and fulfilment of military duties.

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