

ORIGINAL ARTICLE

HEALTH STATUS OF INSTRUCTIONAL STAFF OF HIGHER EDUCATION INSTITUTIONS WITH SPECIAL TRAINING CONDITIONS

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ABSTRACT

The aim is to study the level and dynamics of instructor officers' somatic health during the course of employment at Ukrainian higher education institutions with special training conditions

Materials and methods: The study involved male instructor officers of the National Academy of Internal Affairs (Kyiv, Ukraine) of different age groups (n=103), who conduct training sessions with cadets – future police officers. The first age group (up to 25 years of age) comprised 8 instructors, the second one (26-30 years of age) – 11 instructors, the third one (31-35 years of age) – 14 instructors, the fourth one (36-40 years of age) – 16 instructors, the fifth one (41-45 years of age) – 19 instructors, the sixth one (46-50 years of age) – 17 instructors, and the seventh one (over 50 years of age) – 18 instructors. The study was conducted in 2017-2019. The level of instructor officers' health was examined according to the methodology of G. L. Apanasenko, which provides for the calculation of body mass, vital, strength, and Robinson indices, as well as the duration of recovery of heart rate after standard exercise. The research methods: theoretical analysis and generalization of literature sources, pedagogical testing and observation, methods of mathematical statistics.

Results: Insufficient level of health was revealed among instructor officers of all age groups – the level of somatic health of the vast majority of instructional staff (over 75 %) is assessed as "low" and "below average", more than 95 % of instructors are below the "safe zone" according to the methodology of G. L. Apanasenko.

Conclusions: The research shows that the current system of physical training of higher education institutions with special training conditions is ineffective and needs to be refined in order to strengthen the health of instructor officers, increase their efficiency and, in general, improve the effectiveness of training future police officers at higher education institutions.

KEY WORDS: somatic health, instructors, physical training

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INTRODUCTION

In the course of official (teaching) activities, there is a significant number of negative factors on the body systems of instructor officers of higher education institutions, including: low functional mobility, length of working day and week, emotional and mental strain, etc. [1, 2, 3]. These factors lead to a decrease in mental and physical performance, deterioration of a body's major systems (especially cardiorespiratory), and under systematic impact can worsen health and cause various diseases (atherosclerosis, hypertension, coronary heart disease, etc.), which determines the need to exercise in order to prevent their negative effects.

Scientific studies [4, 5] show that over the last decade, the average life expectancy of men has decreased by 2.4 years. The difference in life expectancy of the male population in Ukraine and in Western Europe is 12.8 years, and premature mortality, especially among *working-age* men, is 3-4 times higher than in Europe. More than 70 % of the

adult population of Ukraine has low and below average levels of physical health [6, 7]. The structure of morbidity is dominated by chronic non-communicable diseases (cardiovascular diseases, malignant neoplasm, mental and endocrine disorders, allergic manifestations), which are characterized by negative dynamics. The prevalence of cardiovascular pathology has increased 1.9 times over the last decade, oncological pathology – by 18 %, bronchial asthma – by 35.2 %, diabetes mellitus – by 10.1 %. The increase in these diseases is caused primarily by a sedentary lifestyle [8, 9]. At present, the fact of pathology of internal organs as a result of the impact of limited motor activity on the human body is widely recognized – there are virtually no such organs or systems which functions would not change under its influence. Hypodynamic mode of activity causes a person a set of functional disorders that go beyond the locomotor system. They influence the functions of cardiovascular, respiratory, and musculoskeletal systems, as well as change some metabolic processes [10, 11]. Insufficient

Table I. The level and dynamics of indicators that characterize the state of somatic health of instructor officers of different age groups during the course of employment (n=103, $\bar{X} \pm m$)

Age groups	n	Years of the research		
		2017	2018	2019
Body mass index, kg/m ²				
1st	8	23.51±0.51	23.80±0.48	23.96±0.52
2nd	11	23.79±0.49	23.99±0.50	24.12±0.51
3rd	14	24.02±0.47	24.25±0.48	24.53±0.50
4th	16	25.87±0.46	25.96±0.48	26.17±0.49
5th	19	26.21±0.45	26.58±0.49	26.79±0.51
6th	17	26.30±0.48	26.42±0.50	26.84±0.52
7th	18	26.71±0.46	26.85±0.47	26.94±0.49
Vital index, ml/kg				
1st	8	56.19±2.06	55.65±1.88	54.75±1.66
2nd	11	54.79±1.43	54.32±1.47	53.79±1.42
3rd	14	52.81±1.50	51.77±1.53	51.48±1.49
4th	16	53.46±1.34	52.26±1.28	51.17±1.27
5th	19	52.31±1.31	51.45±1.25	51.02±1.26
6th	17	51.89±1.42	51.44±1.40	51.11±1.39
7th	18	51.35±1.39	51.19±1.36	50.89±1.38
Strength index, %				
1st	8	61.94±2.20	60.98±2.36	60.05±1.96
2nd	11	60.38±1.43	58.67±1.39	58.39±1.40
3rd	14	58.26±1.41	58.14±1.42	57.42±1.44
4th	16	57.38±1.45	56.86±1.46	56.25±1.48
5th	19	56.01±1.44	55.67±1.43	55.10±1.43
6th	17	55.31±1.42	55.06±1.40	54.84±1.39
7th	18	54.28±1.38	54.11±1.37	54.02±1.36
Robinson's index, c.u.				
1st	8	80.36±1.95	80.37±1.93	81.20±1.98
2nd	11	81.75±1.37	82.01±1.58	82.80±1.51
3rd	14	83.68±1.45	84.27±1.46	84.57±1.49
4th	16	84.30±1.40	84.72±1.45	85.02±1.52
5th	19	84.81±1.41	85.36±1.40	85.45±1.41
6th	17	85.59±1.44	86.10±1.48	86.37±1.49
7th	18	86.62±1.40	87.23±1.42	87.51±1.43
Heart rate recovery, s				
1st	8	140.43±5.62	139.81±5.69	141.14±5.70
2nd	11	153.44±5.64	156.78±5.73	161.11±5.78
3rd	14	165.56±5.31	171.38±5.29	178.03±5.32
4th	16	167.26±5.40	170.44±5.41	172.25±5.46
5th	19	170.21±5.02	177.79±4.95	180.33±4.93
6th	17	179.37±4.89	181.04±4.86	181.27±4.90
7th	18	181.50±5.13	182.29±5.24	182.84±5.20

physical activity, which is common to educators, leads to a significant reduction in energy consumption, nutrient excess, and, as a consequence, to excess weight [12, 13].

According to the World Health Organization (WHO), the approximate ratios of various factors that ensure and shape human health nowadays include: genetic factors

(heredity) – 20 %, the state of the environment (climate, environmental circumstances) – 20 %, the level of health care (medical care) – 8 %, living conditions and lifestyle (rational work, physical activity, nutrition, personal hygiene, abandonment of bad habits) – 52% [14]. It is the conditions and lifestyle with the use of various elements that relate to all aspects of health – physical, mental and spiritual – which can be considered the key to improving health and efficiency [15, 16]. Physical exercises are of great importance for health promotion and disease prevention [17, 18, 19]. Scientists argue that physical education should provide an excellent level of health, high productivity of law enforcement officers and a range of recreational and rehabilitation measures [20, 21, 22].

However, the analysis of normative documents on the organization of physical training of instructional staff in higher education institutions (HEIs) with special training conditions revealed a number of reasons for reducing the positive impact of physical training on the health of instructor officers, including: insufficient consideration of job factors of scientific and pedagogical staff in directive documents; insufficiently clear order of organization of classes; inefficient use of time spent on physical training; a significant percentage of absences from physical education classes; performance of official duties, orders of commanders in the hours intended for physical training; giving in classes preference to improving the indicators of special physical training and preparation for inspections, etc. The foregoing determines the relevance of the research topic.

THE AIM

The aim is to study the level and dynamics of instructor officers' somatic health during the *course of employment* at Ukrainian higher education institutions with special training conditions

MATERIALS AND METHODS

The study involved male instructor officers of the National Academy of Internal Affairs (Kyiv, Ukraine) of different age groups ($n=103$), who conduct training sessions with cadets – future police officers. The first age group (up to 25 years of age) comprised 8 instructors, the second one (26-30 years of age) – 11 instructors, the third one (31-35 years of age) – 14 instructors, the fourth one (36-40 years of age) – 16 instructors, the fifth one (41-45 years of age) – 19 instructors, the sixth one (46-50 years of age) – 17 instructors, and the seventh one (over 50 years of age) – 18 instructors. The study was conducted in 2017-2019. The level of instructor officers' health was examined according to the methodology of G. L. Apanasenko, which provides for the calculation of body mass, vital, strength, and Robinson indices, as well as the duration of recovery of heart rate after standard exercise. The research methods: theoretical analysis and generalization of literature sources, pedagogical testing and observation, methods of mathematical statistics.

RESULTS

The study of body mass index, which characterizes constitutional peculiarities of instructor officers and is one of the signs of a healthy person, suggests that between 2017 and 2019 there was a tendency to an increase in body weight and, consequently, to deterioration of body mass index among officers of all ages groups. However, no significant difference was found between the average rates of officers within age groups during the study period ($p>0.05$) (Table I). The best values were recorded among instructor officers of the first age group. Comparing the body mass index of officers under 25 and over 50, it can be noted that for instructors of the older age group the value of the index is significantly worse ($p<0.001$). Analysis of the body mass index in comparison with the reference table of ranking values shows that officers from the 1st – 3rd, 6th and 7th age groups have a body mass index at the average level for men, and it corresponds to the age norm. However, a detailed analysis of the data shows that the index values of the officers of these groups are at the lower limit, which allows us to predict that in the near future these officers will be overweight. Instructors of the 4th age group in 2019 and the 5th age group at all stages of the study were “overweight”. Studies confirm that the professional activity of instructor officers is characterized by a hypodynamic regime and weight gain during service. This indicates the need to improve the physical training of the teaching staff of HEIs with special training conditions in order to stabilize body weight.

The vital index – the ratio of vital capacity of lungs to body weight – is an important criterion for the reserve of external respiration. A study of the dynamics of this index for instructional staff during the *course of employment* gives us the right to argue that the performance of instructor officers of all ages tend to decrease, but did not change significantly during the study ($p>0.05$) (Table I). Comparing the indicators of the studied index in officers of different age groups, it can be noted that a significant difference was found only between the values of instructors under 25 and over 50 years of age ($p<0.05$; $p<0.01$). The highest indicators of the vital index were recorded among instructor officers of the first age group (up to 25 years of age) – at the beginning of the study the value was assessed as “average” (56.19 ml/kg), and at the end – as “below average” (54.75 ml/kg). For officers of other age groups, the vital index was below average. All this indicates a weakening of the functional capabilities of the respiratory systems of the instructional staff, both in the teaching process and with age increment.

Analysis of the strength index (the ratio of the dynamometry of the stronger hand to body weight) found that its values for instructor officers of all ages are reduced in the course of service, but do not differ significantly at the beginning and the end of the study ($p>0.05$) (Table I). Teachers over 50 have the lowest strength index. Analyzing the strength index, it can be noted that only for instructors under 25 its value is below average, and in all other groups, the level of reserves of muscular system functions is assessed as “low”.

Table II. The level and dynamics of somatic health of instructor officers during the course of employment at HEIs with special training conditions (n=103, X±m)

Age groups	n	Years of the research		
		2017	2018	2019
1st	8	4.24±0.91	4.09±0.87	3.97±0.89
2nd	11	3.61±0.54	3.52±0.52	3.54±0.57
3rd	14	3.24±0.50	3.11±0.59	2.98±0.64
4th	16	3.17±0.49	3.15±0.50	3.12±0.51
5th	19	3.08±0.43	2.96±0.48	2.94±0.48
6th	17	2.87±0.51	2.76±0.52	2.69±0.54
7th	18	2.45±0.43	2.46±0.48	2.38±0.46

According to the value of the Robinson index (product of resting heart rate and systolic blood pressure divided by 100), we can characterize the criteria for reserve and economization of cardiovascular functions. The decrease of the indicator determines the improvement of a particular system. The study of the value of the Robinson index of instructor officers for the study period found a deterioration in indicators from 2017 to 2019 in all age groups, but there is no significant difference in indicators ($p>0.05$) (Table I). Studies of the dynamics of the Robinson index showed that with increasing teaching experience, the cardiovascular system of instructor officers deteriorates – the value of indicators among officers over 50 is significantly worse than among instructors under 25 ($p<0.001$). Indicators of the functional capabilities of the cardiovascular system of the instructional staff from the 1st – 4th groups are at the average level, and from the 5th – 7th – at a level below average.

A study of the dynamics of the time of heart rate recovery to baseline after 20 squats for 30 seconds shows a decrease in the rate of instructor officers of all ages during the study (Table I). With the increase of the age group of instructor officers there is a deterioration of this indicator, which indicates the weakening of the cardiovascular systems of instructors during the *course of employment*. Thus, in 2018 for officers under 25 years of age the average rate of heart rate recovery to baseline was 2 min 21 s comparing to instructors over 50 with the result – 3 min 02 s ($p<0.001$) (Table 1). For instructors of all study groups, the level of functional capabilities of the cardiovascular system in terms of heart rate recovery time is estimated as “below average”.

A study of the level of somatic health of instructional staff shows that its value for officers of all ages was decreasing during the study, but no significant difference between the indicators of 2017-2019 was found ($p>0.05$). With increasing age, the level of health of instructors decreases as well ($p>0.05$), but the worst value of the level of physical health was found among instructors over 50 years of age (Table II). It was found that the vast majority of instructors have a level of health below average and low – the overall score according to the method of Professor Apanasenko ranges from 2.38 to 4.24 points.

Analysis of the level of somatic health of the entire surveyed contingent in 2019 showed that 45 officers (43.7 %) had a lower than average level of health, 34 instructors (33.1

%) had a level assessed as “low”, 21 instructors (20.4 %) – as “average” and health level of only 3 instructor officers (2.9 %) was higher than average (mostly members of national teams who regularly attended sports clubs) (Fig. 1). It is important to emphasize that during the study period, no instructor was found to have a high level of physical health.

The study suggests that the level of somatic health of instructor officers of HEIs with special training conditions is insufficient to perform the tasks of official activity and needs to be improved.

DISCUSSION

Health is the most important factor in the implementation of an individual life program, which largely determines the implementation of social tasks [23]. According to the World Health Organization, health is defined as a state of a person, which is characterized not merely by the absence of disease or infirmity, but also complete physical, mental and social well-being. Only a person who has a harmonious physical and mental development and is well adapted to the surrounding physical and social environment can be considered healthy [14]. A.V. Maglovanyi et al. [24] present the concept of physical health as a state of the body in which the integral indicators of the basic physiological systems are within the physiological norm and change adequately during an individual's interaction with the environment. Other scientists [25, 26] state that health is the *amount* of reserves of a body, the maximum productivity of vitals while maintaining the quality limits of their functions. Thus, based on the above, it can be stated that a healthy person is able to fully realize their physical and mental abilities and fulfill their social purpose.

Currently, in Ukraine there is a critical situation with the health of the population due to a rapid increase in morbidity, mortality, genetic disorders, rising crime, reduced physical fitness of schoolchildren and students, increasing negative phenomena in politics and international realm, as well as many other factors [27]. In his research papers, G. L. Apanasenko, argues that there is a safe level of physical health (on the border of the third and fourth levels – according to the express method it is 12 points), above which there are almost no endogenous risk factors for chronic somatic diseases, nor the diseases themselves or

mortality caused by them [28]. The scientist notes that over the past 20 years in Ukraine the share of the population in the “safe zone” of health has decreased from 8 to 1 %. For comparison, in the United States up to 80 % of Americans aged 20-59 are in the “safe zone” [6, 28]. The current level of development of society largely actualizes the scientific problems associated with finding ways to preserve and improve public health, including instructional staff of HEIs.

According to many researches [10, 13, 19, 29], physical exercise plays an important role in the prevention of occupational diseases and improving the health of various segments of the population. However, the results of our research indicate a low level of somatic health of instructor officers of HEIs with special training conditions, which is insufficient to perform the tasks of teaching and needs to be improved.

CONCLUSIONS

The research results indicate the negative factors of service activities, as well as inadequate impact of the current system of physical training on the level and dynamics of physical health of instructional staff of HEIs with special training conditions. Most of the surveyed instructor officers (over 75 %) have low and below average physical health, more than 95 % are below the “safe zone”. All this requires improving the organization of physical training with research and teaching staff in order to strengthen their health and increase efficiency during the course of employment.

Directions for future research. It is planned to investigate the state of physical health of female instructor officers at HEIs with special training conditions.

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