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Original Article

Physiological characteristics of cadet girls while studying at the military academy

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Abstract
The aim of the study was to establish features in the physiological characteristics of cadet girls during each year of study at the military academy. *Material and Methods*. The study involved 108 girls who were 17-18 years old at the beginning of the study. Physiological characteristics were studied annually throughout the four-year period of study of the same girls in the military academy. Characteristics were recorded at the beginning and end of the first, as well as at the end of each subsequent year during routine medical examinations. The following functional characteristics were studied: blood pressure (systolic and diastolic); heart rate; vital capacity; Ruffier index; Robinson index; vital capacity index; index maximum isometric strength. Empirical data obtained during the surveys of girls were processed by adequate methods of mathematical statistics; used the software package SPSS 20. *Results.* The analysis of changes in the state of the studied functional characteristics of cadet girls shows their dependence on the period of study and factors related to motivation and parameters of physical activity used in physical education classes at the military academy. At the present stage, the first and last years of study of cadet girls are marked by a positive result in the development of the studied functional characteristics. Some of the leading reasons for this result in the first case is the presence of a generalized stage of adaptation syndrome, in the second case - the motivation of girls to improve their functional characteristics to achieve the highest possible level of their development before starting a career. *Conclusions*: The results indicate areas for improving the organization, content of physical education of girls - cadets to improve their functional characteristics to the highest possible level, but above all efficiency in the cardiovascular system at rest, respiratory in full oxygen supply, skeletal muscle in excess accumulation in the muscles of structural and energy potentials that increase their working capacity and physical performance.
Keywords: girls - cadets, physical education, state of development, body systems, physical performance

Introduction

Today, functional characteristics are an important component in establishing the readiness of the individual to perform professional tasks in military affairs (Milliken, Auchterlonie, Hoge,2007; Vogt, Vaughn, Glickman, 2011; Adams, Hu, Figley, & Boscarino, 2021). This fully applies to military women, and one of the proofs of the great attention to this issue is the United States Department of Defense (DoD) Health Affairs Women in Combat symposium addressing physiological, musculoskeletal injury, and optimized physical training considerations from the operational physical performance section (Plavina, 2011; Bradley, Nindl, Jones, & Kraemer, 2016).

Here, researchers note the importance of influencing the motor skills and functional capabilities of servicemen for the successful performance of their professional tasks. These researchers also emphasize the need to take into account their findings and recommendations regarding to the direction and content of physical training of servicemen. Some of the main ones are as follows: to increase attention to the development of

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functional capabilities of the muscular system; emphasis on activities that involve the muscles of the upper body, and the development of strength endurance when performing cyclic work in a dynamic mode; to pay attention to the development of other types of power qualities, in particular explosive and speed force; increase the number of classes, diversify the means and equipment used to improve the functional characteristics of servicemen.

In addition, it is very important for military experts to take into account that there are physiological differences and features between men and women. In particular, they relate to such important characteristics as body composition, namely the ratio of fat and muscle components, as well as the following functions: musculoskeletal, cardiovascular, metabolic, thermoregulatory (Charkoudian, Joyner, 2004; Wilmore, Costill, Kenney, 2012; Knechtle, Rosemann, Lepers, Rust, 2014; Wheatley, Snyder, Johnson, Olson, 2014).

The study of the physiological characteristics of girls and women - the military is a very important issue, as it allows to determine, compared with men: the degree of effectiveness of actions in the performance of military tasks; degree of risk of harm to the body during training, exercise, combat (Bradley, Nindl, Jones, & Kraemer, 2016). This is important because physical education classes for military girls are in most cases no different from those used by boys (Kennedy and Neilson, 2002; Duncan, 2016). In addition, the content of physical education for girls - future officers, which takes into account the peculiarities of changing different psychophysiological characteristics during each year of study at the military academy, has not been formed yet (Bradley, Nindl, Jones, & Kraemer, 2016).

This does not increase the effectiveness of the content of physical education in achieving high values of such indicators and other important characteristics that determine the readiness for professional activity (Boyarchuk, 2009; Dobrovolsky, 2017; Slyusarchuk, Panchuk, 2019).

Thus, the need to study the various characteristics of girls - military and studying in special military institutions is not in doubt. There is almost no information on the latter, and this applies to both NATO member countries and domestic military academies

The aim of the study was to establish features in the physiological characteristics of cadet girls during each year of study at the military academy.

Materials and methods

Participants. The study involved 108 girls, their age at the beginning of the study was 17-18 years. At the beginning of the study, the girls began studying at a military academy (MA). The research was conducted in compliance with the World Medicine Association declaration of Helsinki: Ethical principles for medical research involving human subjects (World Medicine Association declaration of Helsinki, 2013). The study protocol was approved by the Ethical Committee of the National University "Chernihiv Collegium" named after T.G. Shevchenko.

*Procedure.*Physiological characteristics were studied annually throughout the four-year period of study of the same girls in the military academy. Characteristics were recorded at the beginning of each school year during routine medical examinations. The studied characteristics were related to the activity of the cardiovascular, respiratory, and neuromuscular systems of girls. Used well-known functional tests recommended by the American College of Sport Medicine (American College of Sport Medicine, 2017) and researchers, including O. Bar-Or, T. W. Rowland (2004), J. H. Wilmore, D. L. Costill, L. W. Kenney (2012), and others. Determined: blood pressure (systolic - SBP and diastolic - DBP); heart rate (HR); vital capacity (VC); Ruffier index (Ruffier test index - RTI); Robinson index (RI = SBP x HR / 100); vital capacity index (VCI = VC / body mass), index maximum isometric strength (IMIS = maximum isometric strength / body mass). All necessary requirements were met during the tests. In this case, HR reflected the state of the heart, and together with blood pressure and RI - the state of the cardiovascular system at rest; the value of VC indicated the ability of the lungs to receive oxygen, the value of VCI - the state of the respiratory system in terms of full supply of oxygen to the body. The value of IMIS allowed to establish the state of development of skeletal muscles of girls, which indirectly indicates the state of excessive accumulation in the muscles of structural and energy potentials that increase their working capacity. We used certified equipment: to determine the blood pressure - Santamedical Adult Deluxe Aneroid Sphygmomanometer, to determine the IMIS - handgrip Camry dynamometer, to determine the VCI - NDD EasyOne Plus System 2000-2 spirometer. Initially we got permission to participate in the study from each girl and her parents. Data for the study were quantitative values of functional samples. Each year, each of the studied characteristics was set to its values, then compared those that were obtained: at the beginning and end of the first year of study, at the end of the first and second years, the second and third, third and fourth. So determined the increase, decrease in the value of a particular functional characteristic or its manifestation at the achieved level.

Statistical analysis. All statistical analyzes were performed using SPSS Version 20. For each characteristic, the mean value (M), standard deviation (SD), mean error (m), asymmetry (As), excess (Ex), Kolmogorov-Smirnov λ-test, for necessary - the value of Z. The latter allowed to determine the Wilcoxon T-test, which was used in case of impossibility to apply Student's t-test for related samples. The reason for using the

latter was the conclusion that the distribution of values of the indicator in the sample is different from normal. The 0.05, 0.01, 0.001 levels of probability were used to indicate statistical significance (Vincent, 2005).

Results

The data obtained for each functional characteristic were checked for compliance with the normal distribution in the sample. Features were identified that were related to the presence of a normal distribution and one that differed from it. Specifying such features, they noted that during the first year of study differed from the normal distribution of the values of the following functional characteristics of girls: at the beginning of the school year - SBP, DBP, VC (Table 1); at the end of the school year - DBP, VC (Table 2).

Table 1. Computational experiment results: elementary statistics. Beginning of the first year of study girls (n = 108)

The name of the characteristic	M	SD	A_s	E_x	λ (p)
HR at rest, bpm^{-1}	80,7	5,29	0,504	0,175	p <0.20
SBP, mmHg	114,6	5,02	-0,163	-0,474	p <0.01*
DBP, mmHg	74,7	4,78	0,398	-1,350	p <0.01*
VC, ml	1,94	0,24	0,709	0,482	p <0.05*
VCI, $ml \cdot kg^{-1}$	34,86	5,68	0,664	0,483	p <0.10
IMIS, %	30,51	5,55	0,251	-0,501	p >0.20
RTI, conditional units	10,84	0,7	0,031	-0,684	p >0.20
RI, conditional units	92,64	5,89	0,053	-0,578	p >0.20

Note: indicates indicators in which the distribution of values differs from normal

Table 2. Computational experiment results: elementary statistics. At the end of the first year of study girls (n = 108)

The name of the characteristic	M	SD	A_s	E_x	λ (p)
HR at rest, bpm^{-1}	74,5	4,99	0,611	0,755	p >0.20
SBP, mmHg	117,4	4,68	-0,212	0,167	p >0.20
DBP, mmHg	78,2	4,73	-1,766	12,584	p <0.05*
VC, ml	2,69	0,25	0,838	0,878	p <0.05*
VCI, $ml \cdot kg^{-1}$	41,18	5,63	0,801	0,840	p >0.20
IMIS, %	41,66	6,14	0,063	-0,613	p >0.20
RTI, conditional units	9,76	0,81	-0,013	-0,446	p >0.20
RI, conditional units	84,42	5,61	-0,164	-0,356	p >0.20

Note: «*»indicates indicators in which the distribution of values differs from normal

Taking into account the data at the beginning and end of the first year of study, when comparing the two averages of each of these three functional characteristics of girls, the T-test was used for related samples. This criterion should be used even when at least one mean is marked by a different than normal distribution of individual values in the sample [15].

At the end of the second year of study, only one indicator, namely the functional characteristics of VC, was marked by the fact that the distribution of individual values in the sample differed from normal (Table 3).

Table 3. Computational experiment results: elementary statistics. At the end of the second year of study girls (n = 108)

The name of the characteristic	M	SD	A_s	E_x	λ (p)
HR at rest, bpm^{-1}	73,5	4,08	0,464	0,760	p >0.20
SBP, mmHg	119,3	4,01	-1,002	2,132	p <0.20
DBP, mmHg	78,3	3,27	0,308	-0,540	p <0.10
VC, ml	2,7	0,25	0,818	0,798	p <0.05*
VCI, $ml \cdot kg^{-1}$	40,01	5,13	0,878	1,114	p >0.20
IMIS, %	44,83	5,89	-0,054	-0,814	p >0.20
RTI, conditional units	9,72	0,71	-0,105	-0,667	p >0.20
RI, conditional units	83,81	5,29	-0,041	-0,477	p >0.20

Note: «*» indicates indicators in which the distribution of values differs from normal

The comparing the average values of functional characteristics, which were observed in girls at the end of the first and second years of study, the T-test was used not only for VC, but also for DBP. This was due to the fact that the distribution of DBP values differed from normal at the end of the first year of study.

At the end of the third year of study, the distribution of HR, SBP and VC values in the sample differed from normal (Table 4). But when comparing the average values obtained at the end of the second

Table 4. Computational experiment results: elementary statistics. At the end of the third year of study girls (n = 108)

The name of the characteristic	M	SD	A_s	E_x	λ (p)
HR at rest, bpm^{-1}	76,1	3,96	-0,778	0,757	p <0,01*
SBP, mmHg	122,3	3,57	-0,952	1,427	p <0,05*
DBP, mmHg	78,5	2,92	-0,492	0,531	p >0.20
VC, ml	2,65	0,29	0,670	0,864	p <0,05*
VCI, $ml \cdot kg^{-1}$	37,74	4,84	0,984	1,380	p >0.20
IMIS, %	44,99	5,64	-0,008	-0,758	p >0.20
RTI, conditional units	9,95	0,71	-0,715	-0,153	p <0.20
RI, conditional units	84,7	5,54	-0,114	-0,336	p >0.20

Note: «*» indicates indicators in which the distribution of values differs from normal

and third years of study, it should be borne in mind that in both cases the number of indicators that are different from normal distribution of values, was five, but given in both cases the same indicator (VC), there were four such indicators: DBP, HR, SBP, VC

At the end of the last, fourth year of study, four indicators were found in which the distribution of individual values in the sample differed from normal. These were indicators of the following functional characteristics of girls: HR, DBP, VC and VCI (Table 5). But when comparing the values of the

Table 5. Computational experiment results: elementary statistics. At the end of the fourth year of study girls (n = 108)

The name of the characteristic	M	SD	A_s	E_x	λ (p)
HR at rest, bpm^{-1}	75,4	3,42	-0,975	0,762	p <0.01*
SBP, mmHg	122,6	2,75	-0,664	0,901	p <0.10
DBP, mmHg	77,8	3,41	-1,114	2,725	p <0.05*
VC, ml	2,97	0,31	0,574	1,160	p <0.05*
VCI, $ml \cdot kg^{-1}$	38,6	4,83	1,249	2,711	p <0.05*
IMIS, %	45,86	5,54	-0,164	-0,450	p >0.20
RTI, conditional units	9,17	0,60	-0,377	-0,554	p >0.20
RI, conditional units	83,65	5,50	-0,163	-0,338	p >0.20

Note: «*» indicates indicators in which the distribution of values differs from normal

indicators obtained at the end of the third and fourth years of girls' education, it was taken into account that in addition to these four, SBP was also noted as different from the normal distribution of individual values. Therefore, in general, the T-test was used in the analysis of the values of the five indicators.

The analysis of the average values of the functional characteristics studied showed a change in the results during each year of training of cadet girls in the military academy. At the same time, such a change was positive, negative, in some cases - statistically insignificant; the latter was interpreted as a manifestation of the value at the previously achieved level.

Given the above, it was found that during the first year of study in girls improved all the studied functional characteristics (Table 6). Indicators in which the value decreased also testified about the

Table 6. Dynamics of functional indicators of girls - cadets during the 1st year of study in MA (n = 108)

The name of the characteristic	At the beginning		At the end		$M_1 - M_2$	t (Z)
	M_1	m	M_2	m		
HR at rest, bpm^{-1}	80,7	0,51	74,5	0,48	– 5,2	7,43 ***
SBP, mmHg	114,6	0,48	117,4	0,45	2,8	7,03 +
DBP, mmHg	74,7	0,46	78,2	0,46	3,5	7,96 +
VC, ml	1,94	0,02	2,69	0,02	0,75	9,02 +
VCI, $ml \cdot kg^{-1}$	34,86	0,55	41,18	0,54	6,32	8,21 ***
IMIS, %	30,51	0,53	41,66	0,59	11,15	14,11 ***
RTI, conditional units	10,84	0,07	9,76	0,08	– 1,08	10,8 ***
RI, conditional units	92,64	0,56	84,42	0,54	– 8,22	14,4 ***

Note: t-critical value for related samples (n = 108) at the level of p <0.001 - 3.39 (marked "***");

the value of Z is denoted by "+" at the level of p = 0.0001

improvement of functional characteristics, because for HR, RTI and RI less value is evidence of better functioning of the corresponding body system. When converting the obtained results into percentages, it was found that VC and IMIS improved the most in girls, as the value of their indicators changed by 38.7% and 36.5%, respectively. The improvement in VCI (18.1% increase) and RTI (10% increase) was smaller but also statistically significant. The change in the indicators of other functional characteristics was slightly smaller than

in these characteristics, but also statistically significant.During the second year of study, the same girls received a different result. Thus, the change in IMIS was positive, and the increase in values was 3.17 conditional units or 7.6% (Table 7).

Table 7. Dynamics of functional indicators of girls - cadets during the 2nd year of study in MA (n = 108)

The name of the characteristic	At the beginning		At the end		$M_1 - M_2$	t (Z)
	M_1	m	M_2	m		
HR at rest, bpm^{-1}	74,5	0,48	73,5	0,39	– 1,0	1,61
SBP, mmHg	117,4	0,45	119,3	0,39	1,9	3,22 **
DBP, mmHg	78,2	0,46	78,3	0,31	0,1	0,94 +
VC, ml	2,69	0,02	2,7	0,02	0,01	2,67 ++
VCI, $ml \cdot kg^{-1}$	41,18	0,54	40,01	0,49	– 1,17	1,6
IMIS, %	41,66	0,59	44,83	0,57	3,17	3,86 ***
RTI, conditional units	9,76	0,08	9,72	0,07	– 0,04	0,4
RI, conditional units	84,42	0,54	83,81	0,51	– 0,61	0,82

Note: t-critical value for related samples (n = 108) at the level of p <0.01 - 2.63 (marked "**"), at the level of p <0.001 - 3.39 ("***"); the value of Z is denoted by "+" at the level of p = 0.346762, "++" at the level of p = 0.007686

The increase in SBP and VC was smaller, but also statistically significant. The change in values in the remaining indicators showed that the corresponding functional characteristics remained at the level they had reached earlier, as these changes were statistically insignificant.

During the third year of study, a negative trend was found in the change in the functional characteristics of girls. This characteristic was HR at rest: the value of the indicator increased by 2.6 bpm-1 or by 3.5% (T ≤0.001); this result indicates a negative trend in changes in heart function (Table 8). In addition, on 1.9% deteriorated VC (T ≤0.005971), 5.7% - VCI (t <0.01).

Table 8. Dynamics of functional indicators of girls - cadets during the 3rd year of study in MA (n = 108)

The name of the characteristic	At the beginning		At the end		$M_1 - M_2$	t (Z)
	M_1	m	M_2	m		
HR at rest, bpm^{-1}	73,5	0,39	76,1	0,38	2,6	7,39 +
SBP, mmHg	119,3	0,39	122,3	0,34	3,0	7,95 +
DBP, mmHg	78,3	0,31	78,5	0,28	0,2	0,36
VC, ml	2,7	0,02	2,65	0,03	– 0,05	2,75 ++
VCI, $ml \cdot kg^{-1}$	40,01	0,49	37,74	0,47	– 2,27	3,34 **
IMIS, %	44,83	0,57	44,99	0,54	0,16	0,2
RTI, conditional units	9,72	0,07	9,95	0,07	0,17	1,7
RI, conditional units	83,81	0,51	84,7	0,53	0,89	1,2

Note: t-critical value for related samples (n = 108) at the level of p <0.01 - 2.63 (marked "**"); value Z is marked "+" at the level of p = 0.001, "++" at the level of p = 0.005971

Regarding the rest of the studied functional characteristics, they were marked only by a certain tendency to change, as the obtained values were statistically insignificant (p> 0.05). In other words, functional characteristics such as DBP, IMIS, RTI and RI remained at the previously achieved level.

During the last, fourth year of training of girls - cadets, the received data testified to a tendency of change in the investigated indicators different from the previous one. First of all, the absence of a significant negative change was noted, as well as a significant improvement in RTI and VC: the first functional characteristic improved by 7.8% (p <0.001), the second functional characteristic - by 12.1% (T ≤0.001). The positive change in HR, DBP and VCI was smaller, but also statistically significant (Table 9).

Table 9. Dynamics of functional indicators of girls - cadets during the 4th year of study in MA (n = 108)

The name of the characteristic	At the beginning		At the end		$M_1 - M_2$	t (Z)
	M_1	m	M_2	m		
HR at rest bpm^{-1}	76,1	0,38	75,4	0,33	– 0,7	6,17 +
SBP, mmHg	122,3	0,34	122,6	0,26	0,3	0,7
DBP, mmHg	78,5	0,28	77,8	0,33	– 0,7	8,18 +
VC, ml	2,65	0,03	2,97	0,03	0,32	7,66 +
VCI, $ml \cdot kg^{-1}$	37,74	0,47	38,6	0,46	0,86	5,86 +
IMIS, %	44,99	0,54	45,86	0,53	0,87	1,14
RTI, conditional units	9,95	0,07	9,17	0,06	– 0,78	8,67 ***
RI, conditional units	84,7	0,53	83,65	0,53	– 1,05	1,4

Note: t-critical value for related samples (n = 108) at the level of p <0.001 - 3.39 (marked "***");
the value of Z is denoted by "+" at the level of p = 0.001

Discussion

Information about changes in the functional characteristics of those who exercise is important for physical education teachers, fitness instructors, other professionals, as it allows you to adjust the content of this process to achieve the best positive result (Bar-Or, Rowland, 2004; Wilmore, Costill, Kenney, 2012; American College of Sport Medicine, 2017; Wiium, Säfvenbom, 2019). This fully applies to cadet girls while studying at the military academy (Bradley, Nindl, Jones, & Kraemer, 2016; Boyarchuk, 2009; Dobrovolsky, 2017; Slyusarchuk, Panchuk, 2019). The study conducted in this regard showed the existence of peculiarities in changing the functional characteristics of cadet girls when they use the current content of physical education in the military academy.

The identified features were associated with a complex of reasons. Thus, a significant improvement in all the studied characteristics of girls during the first year of study was associated with the manifestation of the isolated G. Selye generalized stage of the adaptation syndrome (Selye, 1952). Here, the body responds to a specific load with a wide range of nonspecific reactions, ie targeted impact on a particular functional characteristic leads not only to its improvement, but also some others that were not affected by the "cross-effect". This effect is due to at least several reasons: one of them is the low initial level of development of the studied functional characteristics, the other is the involvement in the implementation of the content of physical education mechanisms and systems of the body that require different functional characteristics (Wuest, Bucher, 2005; Astha, 2011; Anneke, Stuart, 2017).

To some extent, this is confirmed by the data of other researchers on the low and below average level of development of functional characteristics of girls - cadets during their studies at the military academy (Boyarchuk, 2009; Dobrovolsky, 2017). In the following years of training, the girls adapt to the proposed specific loads, and thus the cross-effect almost disappears. This was associated with one of the reasons for the result, namely the girls' performance during the third year of study. This result was generally described as negative in terms of the development of the studied systems of the body. One of the reasons for this was the discrepancy between the low parameters of physical activity offered to girls in physical education classes and their increased abilities. As a result, deadaptation has occurred, resulting in deterioration of functional characteristics (Boyarchuk, 2009; Lukavenko, Iedynak, 2012; Dobrovolsky, 2017; Melnykov, Iedynak, Galamandjuk, & Mazur, 2018; Slyusarchuk, Panchuk, 2019).

Some positive changes were revealed during the last year of training of cadet girls. One of the reasons could be related to the increased motivation of girls to increase physical activity, because their functionality was different from high, and therefore needed to be adjusted accordingly (Buns, 2015; Bliznevsky, Kudryavtsev, Kuzmin, & Yermakova, 2016; Duncan 2016; Coimbra, Cody, Kreppke, Gerber, 2021). It is additional physical activity that is the leading means of solving such a problem (Kennedy, Neilson, 2002; Boychuk, Iedynak, Galamanzhuk, & Skavronsky, 2019).

To some extent, this position was confirmed by data on the dynamics of another studied functional characteristic, namely RTI. Changes in the value of this characteristic testified to its significant improvement during the first and fourth years of study by 10% and 7.8%, respectively ($t = 10.8$ and $t = 8.67$; $p < 0.001$). That is, the improvement of the general physical performance of girls occurred in the period when the body responded to specific physical activity with a wide range of nonspecific reactions (the first year of study - the presence of a generalized stage of adaptation syndrome), as well as during the increase characteristics that were characteristic of the fourth year of study.

Another reason for the changes in the indicators of functional characteristics was associated with the peculiarities of the dynamics of morphological parameters of girls. Thus, the tendency to decrease VCI revealed during the second year of study and its significant ($t = 3.34$; $p < 0.01$) deterioration during the third year of study was due to weight gain in the absence of VC growth in girls. This result testified to the tension in the activity of the respiratory system, because its ability to provide the body with oxygen grew at a slower pace than the increase in body weight of the girl. In other words, there was a discrepancy in the coordination of the capabilities of the respiratory system and the parameters of the body, which it must fully provide oxygen (Bar-Or, Rowland, 2004; Astha, 2011; Anneke, Stuart, 2017). The need to eliminate this discrepancy is emphasized by a significant number of researchers and suggests the use of special programs of physical activity (Charkoudian, Joyner, 2004; Boyarchuk, 2009; Leard, Smith, Smith, Wells, Ryan, 2009; Wheatley, Snyder, Johnson, Olson, 2014; Sliusarchuk, Iedynak, 2015; Bradley, Nindl, Jones, & Kraemer, 2016; Dobrovolsky, 2017).

At the same time, it was noted that although changes in blood pressure occurred, the achieved values corresponded to the age norm, namely SBP did not exceed 100-140 mmHg, DBP - outside 60-100 mmHg. This indicated a normal state of functioning of the cardiovascular system, because, in addition to pressure, also the activity of the heart at rest (HR) was a positive trend, as evidenced by the change in the values of the indicator.

Conclusions

The analysis of changes in the state of the studied functional characteristics of cadet girls shows their dependence on the period of study and factors related to motivation and parameters of physical activity used in physical education classes at the military academy.

At the present stage, the first and last years of study of cadet girls are marked by a positive result in the development of the studied functional characteristics. Some of the leading reasons for this result in the first case is the presence of a generalized stage of adaptation syndrome, in the second case - the motivation of girls to improve their functional characteristics to achieve the highest possible level of their development before starting a career.

During the second year of study, only the activity of the nervous and muscular system improves, during the third - the general tendency to change the characteristics is negative, primarily describing the activity of the cardiovascular and respiratory systems. We attribute this change to the shortcomings of the content of physical education and, to some extent, the motivation of girls to use it in their free time.

The obtained results indicate the directions of improving the organization, content of physical education of girls - cadets to increase their functional characteristics to the highest possible level, but above all efficiency in the cardiovascular system at rest, respiratory in full oxygen supply, skeletal muscles in excess accumulation in muscles of structural and energy potentials that increase their working capacity and physical performance.

Conflict of interest

The authors declare no conflict of interest.

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