

УДК [797.217+796.015.574]:796.015.572-055.2

COMPARATIVE CHARACTERISTICS OF THE PHYSICAL TRAINING OF WOMEN BETWEEN 30 AND 49 YEARS OF AGE BASED ON INDICATORS OF PHYSICAL TRAINING DEPENDING ON THE BODY WEIGHT FAT COMPONENT CONTENT

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Abstract

The current relevance of the research. The paper is devoted to the research of fat body content influence on the parameters of physical state at 30-years women. It was determined that increasing of fat body content at 30–49 years women negatively affects speed, active spine flexibility, explosive strength, agility, power dynamic endurance of muscles of upper limb girdle and lower extremities, speed-power endurance of abdominal muscles, static fatigue of gluteal muscles and total endurance. Goal of research is to investigate the parameters of physical preparation of 30–49 years women depending on fat body content. Results of research: It is established the dependence between speed, active spine flexibility, explosive strength, agility, power dynamic endurance of muscles of upper limb girdle and lower extremities, speed-power endurance of abdominal muscles, static fatigue of gluteal muscles, total endurance and fat body content. The increasing fat body content at 30–36 years women leads to more negative effects compare to 37–49 years women. Conclusions. It is proved the reasonability of creation of special water fitness program for 30–49 years women. The purpose of such program is improving of physical qualities.

Key words: physical preparation, physical qualities, makeup of body mass fat content.

Світлана Сальнікова. Порівняльна характеристика фізичного стану жінок 30–49 років за показниками фізичної підготовленості залежно від умісту жирового компонента маси тіла. Актуальність. У статті досліджено вплив умісту жирового компонента маси тіла на показники фізичної підготовленості в жінок 30–49 років. Установлено, що перевищення жирового компонента в жінок 30–49 років негативно вплинуло на прояв швидкості, активної гнучкості хребта, вибухової сили, спритності, силової динамічної витривалості м'язів плечового пояса й нижніх кінцівок, швидкісно-силової витривалості м'язів черевного преса, силової статичної витривалості сідничних м'язів та загальної витривалості. **Завдання роботи** – дослідити показники фізичної підготовленості жінок 30–49 років залежно від умісту жирового компонента маси тіла. **Результати роботи.** Установлено залежність прояву швидкості, активної гнучкості хребта, вибухової сили, спритності, силової динамічної витривалості м'язів плечового пояса й нижніх кінцівок, швидкісно-силової витривалості м'язів черевного преса, силової статичної витривалості сідничних м'язів і загальної витривалості від умісту жирового компонента. Перевищення вмісту жирового компонента в жінок 30–36 років призводить до більш негативних наслідків, ніж у 37–49-річних. **Висновки.** Доведена доцільність розробки програми занять аквафітнесом для жінок 30–49 років, спрямованих на покращення фізичних якостей, які зазнають найбільших інволюційних змін.

Ключові слова: фізична підготовленість, фізичні якості, компонентний склад маси тіла, жировий компонент.

Сальнікова Светлана. Сравнительная характеристика физического состояния женщин 30–49 лет по показателям физической подготовленности в зависимости от содержания жировых компонентов массы тела. Актуальность. В статье посвящена исследуется влияние содержания жирового компонента массы тела на показатели физической подготовленности у женщин 30–49 лет. Установлено, что превышение жирового компонента у женщин 30–49 лет негативно повлияло на проявление скорости, активной гибкости позвоночника, взрывной силы, ловкости, силовой динамической выносливости мышц плечевого пояса и нижних конечностей, скоростно-силовой выносливости мышц брюшного пресса, силовой статической выносливости ягодичных мышц и общей выносливости. **Задачи работы** – исследовать показатели физической подготовленности женщин 30–49 лет в зависимости от содержания жирового компонента массы тела. **Результаты работы.** Установлена зависимость проявления скорости, активной гибкости позвоночника, взрывной силы, ловкости, силовой динамической выносливости мышц плечевого пояса и нижних конечностей, скоростно-силовой выносливости мышц брюшного пресса, силовой статической выносливости ягодичных мышц и общей выносливости от содержания жирового компонента. Превышение содержания жирового компонента у женщин 30–36 лет приводит к более негативным последствиям, чем в 37–49-летних. **Выводы.** Доказана целесообразность разработки программы занятий аквафитнесом для женщин 30–49 лет, направленных на улучшение физических качеств, которые испытывают наибольшие инволюционные изменения.

Ключевые слова: физическая подготовленность, физические качества, компонентный состав массы тела, жировой компонент.

Introduction. The problem of preserving and improving the physical health of women after 30 years is due to the subsequent activation of professional, creative and social activities, and the necessity to increase their longevity and preservation prior to menopause full reproductive function [16]. According to leading experts, since 30 years, women advisable to use such means of physical training, which would improve the physical state by stimulating aerobic processes of energy, increasing energy of physical work [7; 8; 16], reducing gravitational effects on cartilage formation joints and hardening of the body [9; 10; 12].

According to the Committee of international standardization of tests, physical state characterized by a state of health, physique, constitution functional possibilities of the body, physical work and physical training [5].

However, O. Pirogov, L. Ivashchenko, N. Strapko consider the physical state, as a human willingness to do physical work at home, at work, in physical training or sport. This approach to the definition of «physical state» reveals the following factors that influence on its level: physical capacity, physical development, functional and physical training, and for its assessment should take into account age and gender [1; 5, 14; 16].

To determine the major factors that characterize the physical state, informative selection criteria, developing shades, effective training programs aimed at improving it, O. Pirogov, L. Ivashchenko, N. Strapko had done multifactorial, numerous correlation and regression analysis of the indicators that reflect the physical development, physical training and morphofunctional state of the body [9].

S. Vasilenko stresses that the most simple, affordable and informative indicators characterizing the status of nutrition and health, is a mass index of the body (BMI) and percentage fat component in the body. With increasing, mass index and amount of fat in the body worse the physical capacity and adaptive potential of the circulatory system. E. Martyrosov and colleagues noted that a body has a significant correlation with indicators of physical capacity and the ability to adapt to environmental conditions, professional and sport activities.

Some scientists believe that it is advisable to assess the physical state of qualitative parameters of motor activity, namely for endurance, strength, speed, agility, flexibility, that is, the level of physical training[15].

According to the Concept of the National Program «Health 2020: Ukrainian dimension» about 60 % of the adult population of Ukraine has poor health. According to scientific research, the level of physical health of men in terms of maximum oxygen consumption (VO_{2max}) and life expectancy is lower than of women [14].

On the other hand, according to M. Bulatov [5], the incidence rate of Ukrainian women on 12 % higher than in men it is reflected on quality of life, particularly in reducing the physical and mental capacity, reproductive function, psychological problems [2; 10; 12].

In addition, the average life expectancy of Ukrainian woman is much lower than for women in developing countries. Most scientists believe that the main reason for this phenomenon is the limited physical activity of women.

However, scientifically it had been proven that under the influence of physical training may resume physical capacity and physical training for people from 30 to 50 [9].

The goals of our scientific research is to develop the programs of aqua fitness to improve the physical properties that undergo major changes of aging because of the results of comparing the level of physical training of women 30-49 years depending on the component composition of body weight.

To achieve this goal settled the following **tasks**:

to explore the indicators of physical training of women 30–36 and 37–49 years depending on the content of fat component weight.

Methods and organization of our research:

- the method of bioimpedansometry;
- pedagogical testing of physical training;
- methods of mathematical statistics.

The investigation of physical training was conducted considering the phase of the menstrual cycle. All researches studies were conducted after the menstrual phase (6-12 days after completion of menstruation) and after ovulation phase (days 16-24 at the end of menstruation). The investigations of women are carried out in phase's ovulation and menstruation (12–13 days after cessation of menstrual phase) due to deterioration of efficiency and coordination [1].

This researches clasp 107 women aged 30–49, previously not involved of aqua fitness. 58 people are from 30 to 36 years and 49 people are from 37 to 49 year old.

For the purpose of research, we formed two age groups of women: younger (30–36 years) and older (37–49 years).

From among women 30–36 years, 19 people have «normal» content of fat component, 31 – «high» 8 – «very high». In the older age group «normal» fat component has been recorded for 11 women and «high» and «very high» have 17 and 21 respectively.

The physical capacity of studying women was evaluated by the following indicators of physical training as: speed (running at 30 meters from the high start); explosive power (long jump from their seats); agility (shuttle run 4×9 m); dynamic power endurance of muscles of the shoulder girdle (flexion-extension arms in emphasis lying on gymnastic bench) and lower limb (flexion-extension legs to a standing position, holding the chair); speed-strength endurance abdominal muscles (flexion-extension of the legs as fast as possible, lying on the gym bench times for 15 s); static strength endurance of back muscles and neck (hold «to failure» posture «lying on his stomach with raised up and slightly dilute straight legs and hands») and gluteal muscles (hold «to failure» posture «lying on his stomach with a maximum raised above the couch, at 10° parted and knees bent at an angle of 45° feet, holding hands on the couch»); active flexibility of the spine (torso forward from a standing position, fingers touching the mark of measuring instrument) and overall endurance.

According to the opinion of scientists about inappropriate of using the tests, using of which makes it possible to determine the overall endurance in untrained individuals [1;15], for the prevention of acute pathological states including complications of function of the cardiovascular system, and despite the fact that aqua fitness held in aqueous medium, we are not used running tests, replacing them the test of 12-minute swimming [8].

For evaluation and analysis of the results we compared tied sampling, where the series reflect the difference characteristics depending on age. The difference of average values of physical training was performed by the t-test of Student [6]. The difference was considered at the level of significance of $p < 0,05$.

Discussion and the results of the study. The results of physical training of women 30-36 years and 37–49 led to the conclusion about the absence of age's differences for representatives of both group in such physical qualities as strength of muscle flexor fingers and overall endurance.

The results of our research of physical training of women in both age groups depending on the component composition of body weight show some differences manifestation of motor characteristics in women 30-36 years compared with 37–49-year-old.

Women of younger age group the exceeding of fat component had affected on the active flexibility of spine, explosive strength, agility, dynamic power endurance of muscles of the shoulder girdle and legs, speed-strength endurance abdominal muscles, the static power endurance and gluteus muscles general endurance (table 1).

For the representatives of older age group on the content of fat component such physical quality as speed was depended. However, the level of fat component for women 37–49 did not effect on the expression of other indicators of physical training.

As we can see from Table 1, studying women of 37–49 years old, who had a «high» content of fat component, the result of running on 30 m from high start was at 4,45 % significantly lower than of women with «normal» content of this component.

The research of the ability to show of explosive force in women with different content of fat component had shown that exceeding of standards of this component of body weight of women 30–36 noticeably effect on the results of the test «long jump from place» than for women of 37–49 years old.

The result of the test «flexion-extension legs, lying on the gym bench for 15s.» for women of 37–49 with «very high» content of fat component is to 24,37 % significantly lower than those who had «normal» content.

The result of the test «flexion-extension legs to a standing position, holding the chair» was also significantly lower (by 24,97 %) compared with representatives of the «high» level of fat component (see. table 1).

Women 30–36 years with «normal» content of fat component have the test's result «long jump from their seats» at 8,57 % ($p < 0,05$) better than who has the «high» content of this component, and more those who have «very high» content – by 21,18 % ($p < 0,05$). And the difference between this indicator also are registered in women with a «very high» and «high» content of fat component (by 11,61 %).

On the negative impact of fat component on the manifestation of women of 30–36 years indicates the presence of probable outcome differences shuttle race 4×9 m for women with «normal» content of fat component than those whose component is much higher than normal (2,99 %) (see. table 1).

A comparative analysis of the dynamic manifestation of power endurance of muscles of the shoulder girdle by the test «flexion-extension arms in emphasis lying on gymnastic bench» also showed that

exceeding the standards of fat component increasingly has the negative influence on the results of women of 30–36 than for women 37–49 year.

Table 1

Physical Training of Women of 30-49 Years with Different Content of Fat Component

Indexes	Age, Years	Mean Values, $x \pm S$		
		Normal	High	Very High
Running on 30 m of high start, sec	30–36	6,66±0,05	6,81±0,11	7,49±0,21* ^Δ
	37–49	7,14±0,11	7,46±0,10*	7,38±0,11
long jump from place, cm	30–36	161,32±1,53	148,58±1,76*	133,13±5,04* ^Δ
	37–49	138,64±4,59	133,65±2,92	133,14±3,55
Shuttle run 4 × 9 m, sec	30–36	12,67±0,14	13,05±0,08*	13,43±0,38
	37–49	13,45±0,13	13,77±0,24	13,67±0,26
Flexion-extension arms in emphasis lying on gymnastic bench	30–36	10,42±1,02	7,81±0,61*	5,63±1,19*
	37–49	4,55±1,20	3,35±1,04	4,10±1,01
Flexion-extension feet from a standing position, holding back of a chair, many times	30–36	27,42±2,75	27,23±1,49	19,00±2,79* ^Δ
	37–49	19,27±2,29	20,35±1,46	16,29±1,12 ^Δ
Flexion-extension legs, lying on the gym bench for 15 seconds	30–36	14,89±0,70	14,61±0,40	12,13±1,06* ^Δ
	37–49	14,27±0,80	12,94±0,77	11,48±0,35*
out of 1 sec #	30–36	49,58±3,26	47,71±3,95	39,50±4,91
	37–49	40,64±3,39	32,71±1,95	34,19±2,01
out of 2 sec #	30–36	60,84±4,28	55,55±3,03	44,13±5,30*
	37–49	48,27±6,28	48,65±4,67	41,76±4,79
Torso forward from a standing position, cm	30–36	7,84±0,83	6,29±0,53	3,38±0,93* ^Δ
	37–49	3,73±0,80	2,59±0,49	2,86±0,59
The test of 12-minute swimming by K. Cooper, m	30–36	219,74±19,16	179,19±10,98	159,38±16,58*
	37–49	227,27±24,94	207,35±12,19	182,71±13,31

The result of this test was worse for individuals of 30–36 years with «high» and «very high» content of fat component compared with those who had «normal» content of fat component, respectively 33,48 and 85,24 % ($p < 0.05$).

Unlike the women of 30–36, for women of 37–49 years the content of fatty component has no significantly influence on the result of the test.

The result of the power dynamic endurance of the muscles of the lower extremities for women 30–36 years with «normal» content of fat component significantly exceeded average values of those whose content was «very high» (at 44,32 %) and «high» (43 29 %).

The index of speed-strength endurance abdominals by the test «flexion-extension of the legs as fast as possible, lying on the gym bench for 15 seconds» among the women 30–36 was to 22,80 % significantly lower in those who had a «very high» content of fat component, compared with those whose content was defined as «normal».

We found the dependence of static power endurance gluteus muscles on the content of fat component for women 30–36 years. Thus, for women in this age group who had «very high» content of these components, the duration of the maintenance posture «lying on his stomach with the highest elevated above a couch, diluted to 10° and bent at the knees at an angle of 45° feet, holding hands on the couch» was lower at 37,88 % if to compare with women whose component did not exceed the rate ($p < 0,05$).

Studying the flexibility of women 30–36 years with different content of fat component also revealed the dependence of the test's result «torso forward from a standing position, fingers touching the mark of measuring device» on the content of the component.

Thus, for the representatives of the youngest age group the «very high» content of fat component, comparing with those who had «normal» and «high» the active flexibility of the spine was worse respectively 2,31 and 1,86 times ($p < 0,05$). It should be noted that for women 30-36 exceeding of the specified component influence to the reducing of such qualities as flexibility, more than for women of 37–49 years.

Unlike for women of 37–49 years, in which the content of fat component does not affect on the result of the test of 12-minute swimming by K.Cooper, for the women of 30–36 increasing of this component to 'very

high' has negative impact on the manifestation of endurance. Thus, the result of this test was worse to 37,88 % ($p < 0,05$) in participants with «very high» content of fat component, comparing with «normal».

Conclusions. The analysis of the results of our research shows that women of 30-49 have the manifestation of physical properties from content of fat component. The exceeding of fat component in younger women leads to more negative outcomes than older women. Thus, the exceeding of fat component for women 30–36 years has negatively effect on the expression of speed, active flexibility of the spine, explosive strength, agility, dynamic power endurance of muscles of the shoulder girdle and legs, speed-strength endurance abdominal muscles, the static power endurance glutei muscles and overall endurance. For women of 37–49 with exceeding of fat component deteriorated only dynamic power endurance of muscles of the lower extremities and speed-strength endurance abdominal muscles. For women of 37–49, opposite to 30–36, the exceeding of fat component had not affect to the display of dexterity.

So, in order to improve the physical capacity of women 30–49 years old, appropriate to develop the programs of aqua fitness training that would help to improve the physical qualities.

Prospects for further research. Further studies will be used to study the dependence of physical training from the content of muscle component of body weight for women of 30–49 years old.

Джерела та література

1. Апанасенко Г. Л. Санологія (медичні аспекти валеології) / Г. Л. Апанасенко, Л. А. Попова, А. В. Магльованій. – Київ ; Львів, 2011. – 198 с.
2. Базылюк Т. А. Инновационная технология аквафитнеса с элементами баскетбола в физическом воспитании студенток : дис. ... канд. наук по физ. воспитанию і спорту / Т. А. Базылюк. – Киев, 2013. – 216 с.
3. Бекас О.О. Порівняльний аналіз існуючих методів визначення та критеріїв оцінки фізичного стану дорослого населення та молоді різного віку / О. О. Бекас, Ю. М. Фурман // Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту. – 2003. – № 9. – С. 34–42.
4. Брезденюк О. Ю. Адаптація студентів з різним компонентним складом маси тіла до фізичних навантажень аеробного й анаеробного спрямування : дис. ... канд. наук з фіз. вих. і спорту / О. Ю. Брезденюк // Івано-Франківськ. – 2016. – 201 с.
5. Булатова М. М. Сучасні фізкультурно-оздоровчі технології у фізичному вихованні / М. М. Булатова, Ю. О. Усачов // Теорія і методика фізичного виховання. – 2008. – № 2. – С. 320–354.
6. Денисова Л. В. Измерения и методы математической статистики в физическом воспитании и спорте : учеб. пособие для вузов / Л. В. Денисова, И. В. Хмельницкая, Л. А. Харченко. – Київ : Олимп. лит., 2008. – 127 с.
7. Карпман Б. Л. Тестирование в спортивной медицине / Б. Л. Карпман, З. Б. Белоцерковский, И. Л. Гудков. – Москва : Физкультура и спорт, 1988. – 208 с.
8. Купер К. Аэробика для хорошего самочувствия / К. Купер. – Москва : Физкультура и спорт, 1989. – 224 с.
9. Пирогова Е. А. Влияние физических упражнений на работоспособность и здоровье человека / Е. А. Пирогова, Л. Я. Иващенко, Н. П. Страпко. – Київ : Здоровье, 1986. – 152 с.
10. «Про схвалення Концепції Загальнодержавної програми «Здоров'я 2020: український вимір» / Розпорядження Кабінету Міністрів України, від 31.10.2011р. № 1164-р // Урядовий кур'єр. – 2011. – №218.
11. Сальникова С. В. Удосконалення процесів аеробного енергозабезпечення жінок 37–49 років шляхом комплексного застосування занять аквафитнесом і методики ендогенно-гіпоксичного / С. В. Сальникова, Ю. М. Фурман // Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту. – 2015. – № 7. – С. 59–63.
12. Сальникова С. В. Удосконалення фізичного стану жінок 30–36 років за показниками фізичної підготовленості за допомогою комплексного застосування занять аквафитнесом і методики ендогенно-гіпоксичного дихання / С. В. Сальникова, Ю. М. Фурман // Фізичне виховання, спорт і культура здоров'я у сучасному суспільстві. – 2015. – № 2(30). – С. 103–107.
13. Соорег К. Running without fear / К. Соорег. – New-York, 1985. – 125 p.
14. Круцевич Т. Ю. Теорія і методика фізичного виховання. Методика фізичного виховання різних груп населення / Т. Ю. Круцевич. – Київ, 2012. – Т. 1. – 391 с.
15. Фурман Ю. М. Анализ оздоровительных технологий, используемых в процессе физического воспитания женщин первого зрелого возраста / Ю. М. Фурман // Молодіжний науковий вісник Східноєвропейського національного університету імені Лесі Українки. – 2013. – № 9. – С. 63–67.
16. Хрипкова А. Г. Вікова фізіологія : пер. з рос. / А. Г. Хрипкова. – Київ : Вища шк., 1982. – 272 с.

References

1. Apanasenko, H. L., Popova, L. A., Mahlovanyi, A. V. (2011). Sanolohiia [Sanology]. (Medychni aspekty valeolohii). Kyiv-Lviv, 198.

2. Bazyliuk, T. A. (2013). Innovatsionnaia tekhnolohiia akvafitnesa s elementami basketbola v fizicheskomy vospitaniu studentok : dys. ... kand. nauk z fiz. vykh. i sportu [Innovative technology of aquafitness with elements of basketball in the physical education of female students]. Kyev, 216.
3. Bekas, O. O. & Furman, Yu. M. (2003). Porivnialnyi analiz isnuuichykh metodiv vyznachennia ta kryteriiv otsinky fizychnoho stanu dorosloho naselennia ta molodi riznogo viku [Comparative analysis of existing methods of definition and criteria for evaluating the physical condition of young people and adults of all ages.]. Pedahohika, psykholohiia ta medyko-biolohichni problemy fizychnoho vykhovannia i sportu, no. 9, 34–42.
4. Brezdeniuk, O. Yu. (2016). Adaptatsiia studentiv z riznym komponentnym skladom masy tila do fizychnykh navantazhen aerobnoho y anaerobnoho spriamuvannia : dys. ... kand. nauk z fiz. vykh. i sportu [Adaptation of students with different body weight component composition to physical exercise of aerobic and anaerobic direction properties]. I.-Frankivsk, 201.
5. Bulatova, M. M. & Usachov, Yu. O. (2008). Suchasni fizkulturno-ozdorovchi tekhnolohii u fizychnomy vykhovanni [Modern sports and wellness technology in physical education]. Teoriia i metodyka fizychnoho vykhovannia, no. 2, 320–354.
6. Denysova, L. V., Khmelnytskaia, Y. V. & Kharchenko, L. A. (2008). Izmereniia i metody matematicheskoi statistiki v fizicheskomy vospitaniu i sporte: Uchebnoe posobie dlia vuzov [Measurements and methods of mathematical statistics in physical education and sport]. K. : Olimp. 1-ra, 127.
7. Karpman, B. L., Belotserkovskii, Z. B. & Hudkov, I. L. (1988). Testirovanie v sportivnoi meditsine [Testing in sports medicine]. Moskva: Fizkultura i sport, 208.
8. Kuper, K. (1989). Aerobika dlia khorosheho samochuvstviia [Aerobics for well-doing]. M.: Fizkultura i sport, 224.
9. Pirohova, E. A., Ivashchenko, L. Ia. & Strapko, N. P. (1986). Vliianie fizicheskikh uprazhnenyi na rabotosposobnost i zdorove cheloveka [Influence of physical exercises on working capacity and human health]. K.: Zdorove, 152.
10. Pro skhvalennia Kontseptsii Zahalnodержavnoi prohramy «Zdorovia 2020: ukrainskyi vymir» (2011): Rozporiadzhennia Kabinetu Ministriv Ukrainy, vid 31.10.2011r. № 1164-r // Uriadovyi kurier, no. 218.
11. Salnykova, S. V. & Furman, Yu. M. (2015). Udoskonalennia protsesiv aerobnoho enerhozabezpechennia zhinok 37-49 rokiv shliakhom kompleksnoho zastosuvannia zaniat akvafitnesom i metodyky endohenno-hipoksychnoho [Improvement of aerobic energy supply processes in 37-49 yrs old women by means of complex aqua-fitness trainings' and methodic of endogenous-hypoxic breathing's application]. Pedahohika, psykholohiia ta medyko-biolohichni problemy fizychnoho vykhovannia i sportu, no. 7, 59–63.
12. Salnykova, S. V. & Furman, Yu. M. (2015). Udoskonalennia fizychnoho stanu zhinok 30-36 rokiv za pokaznykamy fizychnoi pidhotovlenosti za dopomohoiu kompleksnoho zastosuvannia zaniat akvafitnesom i metodyky endohenno-hipoksychnoho dykhannia [Aqua-fitness exercises and endogenic hypoxic respiration method complex application influence upon aerobiotic energy-supply systems indices of women aged 30–36]. Fizychnye vykhovannia, sport i kultura zdorovia u suchasnomu suspilstvi, no. 2(30), 103–107.
13. Cooper, K. (1985). Running without fear. New-York, 125.
14. Krutsevych, T. Iu. (2012). Teoriia i metodyka fizychnoho vykhovannia. Metodyka fizychnoho vykhovannia riznykh hrup naselennia [Theory and methods of physical education. Physical education methods of different population groups]. K., t. 1, 391.
15. Furman, Yu. M. (2013). Analiz ozdorovitelnykh tekhnolohii, ispolzuemykh v protsesse fizicheskoho vospitaniia zhenshchin pervoho zreloho vozrasta [Analysis of Health Technologies which are Used in the Process of Physical Education of Women of the First Mature Age]. Molodizhnyi naukovyi visnyk Skhidnoievropeiskoho natsionalnogo universytetu imeni Lesi Ukrainky, no. 9, 63–67.
16. Khrypkova, A. H. (1982). Vikova fiziolohiia [Age-specific physiology]: Per. z ros., K.: Vyshcha shkola, 272.

Стаття надійшла до редакції 26.01.2017 р.