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Dependence of physical qualities on aerobic and anaerobic body productivity in women aged 25-35

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Abstract

Purpose: to reveal the relationship between indicators of functional fitness and indicators of physical fitness in women aged 25-35.

Material and methods. 392 women aged 25-35 took part in the study. Functional fitness was determined by indicators of anaerobic lactate, anaerobic lactate and aerobic productivity of the body. The power of aerobic processes of energy supply was studied by the indicator of maximum oxygen consumption. The indicator of maximum oxygen consumption was determined using the cycle ergometric version of the test. The threshold of anaerobic metabolism was determined by a test with a gradually increasing load on a bicycle ergometer. To determine the capacity of anaerobic lactate energy supply processes, the maximum amount of external mechanical work per 1 min was determined. The power of anaerobic lactate and lactate processes of energy supply was determined using the 10-second and 30-second Wingat anaerobic test. Physical fitness was determined by tests that characterize all physical qualities or their combination.

The results. Among indicators of aerobic productivity, the highest degree of correlation was found between the relative indicator of maximum oxygen consumption and the performance of running for 2000 m (r=-0.6833); by the relative indicator of the threshold of anaerobic metabolism and the performance of the 2000 m run (r=-0.6003). Indicators of anaerobic productivity are most correlated with the strength of the right and left hand. At the same time, the degree of correlation does not exceed "noticeable".

Conclusions. No "high" and "very high" degree of correlation was found between indicators of functional fitness and indicators of physical fitness in women aged 25-35 who had no experience in sports. According to the level of development of indicators of physical fitness, it is not possible to draw objective conclusions about the functional fitness of women aged 25-35. The degree of correlation is influenced by the methods used to determine indicators of physical and functional fitness, the age and gender of the subjects, the level of sportsmanship and the chosen type of motor activity.

Key words: physical, functional fitness, women, correlation

Анотація

Вячеслав Мірошніченко, Вікторія Богуславська, Оксана Швець, Іван Губар. Залежність фізичних якостей від аеробної та анаеробної продуктивності організму у жінок 25-35 років.

Мета дослідження: Виявити зв'язки показників функціональної підготовленості із показниками фізичної підготовленості у жінок 25-35 років.

Матеріал і методи. У дослідженні взяли участь 392 особи жіночої статі віком 25-35 років. Функціональну підготовленість визначали за показниками анаеробної алактатної, анаеробної лактатної та аеробної продуктивності організму. Потужність аеробних процесів енергозабезпечення досліджували за показником максимального споживання кисню. Визначали показник максимального споживання кисню використавши велоергометричний варіант тесту. Поріг анаеробного обміну визначали за тестом із ступінчасто зростаючим навантаженням на велоергометрі. Для визначення ємності анаеробних лактатних процесів енергозабезпечення визначали максимальну кількість зовнішньої механічної роботи за 1 хв. Потужність анаеробних алактатних та лактатних процесів енергозабезпечення визначали за допомогою 10-секундного і 30-секундного Вінгатського анаеробного тесту. Фізичну підготовленість визначали за тестами які характеризують усі фізичні якості або їх поєднання.

Результати. Серед показників аеробної продуктивності найвищий ступінь кореляції виявлено між відносним показником максимального споживання кисню та результативністю бігу на 2000 м (r=-0.6833); відносним показником порогу анаеробного обміну та результативністю бігу на 2000 м (r=-0.6003). Показники анаеробної продуктивності найбільше корелюють із силою правої і лівої кисті. Ступінь кореляції при цьому не перевищує «помітний».

Висновки. Між показниками функціональної підготовленості та показниками фізичної підготовленості у жінок 25-35 років які не мали досвіду занять спортом не виявлено кореляції «високого» та «дуже високого» ступеня. За рівнем розвитку показників фізичної підготовленості не можливо зробити об'єктивні висновки про функціональну підготовленість жінок 25-35 років. На ступінь кореляції впливають методи застосовані для визначення показників фізичної та функціональної підготовленості, вік і стать досліджуваних, рівень спортивної майстерності та обраний вид рухової активності.

Ключові слова: фізична, функціональна підготовленість, жінки, кореляція

Аннотация

Вячеслав Мирошниченко, Виктория Богуславская, Оксана Швец, Иван Губарь. Зависимость физических свойств от аэробной и анаэробной продуктивности организма у дам 25-35 лет.

Цель исследования: Выявить связки показателей функциональной подготовленности с показателями физической подготовленности у женщин 25-35 лет.

Материал и методы. В исследовании приняли участие 392 человека женского пола в возрасте 25-35 лет. Функциональную подготовленность определяли по показателям анаэробной алактатной, анаэробной лактатной и аэробной продуктивности организма. Мощность аэробных процессов энергообеспечения исследовали по показателю максимального потребления кислорода. Определяли показатель максимального потребления кислорода, использовав велоэргометрический вариант теста. Порог анаэробного обмена определяли по тесту со ступенчато возрастающей нагрузкой на велоэргометре. Для определения емкости анаэробных лактатных процессов энергообеспечение определяли максимальное количество наружной механической работы за 1 мин. Мощность анаэробных алактатных и лактатных процессов энергообеспечения определяли с помощью 10-секундного и 30-секундного Вингатского анаэробного теста. Физическую подготовленность определяли по тестам, характеризующим все физические качества или их сочетания.

Результаты. Среди показателей аэробной производительности наивысшая степень корреляции обнаружена между относительным показателем максимального потребления кислорода и результативностью бега на 2000 м (r=-0.6833); относительным показателем порога анаэробного обмена и результативностью бега на 2000 м (r=-0.6003). Показатели анаэробной производительности больше коррелируют с силой правой и левой кисти. Степень корреляции при этом не превышает «заметную».

Выводы. Между показателями функциональной подготовленности и показателями физической подготовленности у женщин 25-35 лет, не имевших опыта занятий спортом, не выявлено корреляции «высокой» и «очень высокой» степени. По уровню развития показателей физической подготовленности невозможно сделать объективные выводы о функциональной подготовленности женщин 25-35 лет. На степень корреляции влияют методы, применяемые для определения показателей физической и функциональной подготовленности, возраст и пол исследуемых, уровень спортивного мастерства и выбранный вид двигательной активности.

Ключевые слова: физическая, функциональная подготовленность, женщины, корреляция

Introduction

Sports physiologists claim that the ability to show strength, speed, and endurance is determined by the level of development of the body's functional capabilities: aerobic, anaerobic lactate, and anaerobic alactate [1]. It is believed that the connection of physical qualities with the functional capabilities of the body is stronger in athletes than in untrained individuals [2]. V. Platonov believes that as sports skill grows, the connection between the level of sports achievements and the functional capabilities of the body, which are not specific to this type of sports activity, decreases. At the same time, such a connection increases in relation to specific functional capabilities [3]. Kozina et al. established that strength, speed and endurance are inversely related [4]. At the same time, strength and speed depend on one mode of energy supply of muscle activity - anaerobic lactate [5]. Therefore, information on correlations between physical qualities and functional fitness needs to be clarified.

Interrelationships of functional indicators with physical qualities are studied mainly in athletes. Utku Alemdaroğlu investigated the correlation between strength tests and the 30-second Wingat anaerobic test in basketball players [6]. Sunde et al. investigated the correlations of maximum oxygen consumption and the threshold of anaerobic metabolism with the performance index in competitions among women aged 16-25 who specialize in ski races [7]. Since performance in ski races depends mainly on the development of endurance, the obtained data can be conditionally extrapolated to endurance.

Significantly less research is conducted to identify the relationship between indicators of functional fitness and physical qualities in people who do not play sports. Serorez investigated the relationship between aerobic and anaerobic performance and the ability to show endurance in students [8].

In our previous studies, we established the level of physical and functional fitness of female students aged 17-19 [9]. The dependence of the manifestation of physical qualities on the aerobic and anaerobic productivity of the body of girls aged 17-19 with different somatotypes was studied [10]. The peculiarities of the manifestation of aerobic and anaerobic productivity of the body in women in the first period of adulthood were revealed [11]. Based on these data, models of functional readiness were developed for the entire spectrum of energy supply modes [12]. We studied the correlations of indicators of functional fitness with body composition, body weight, and body mass index in women aged 25-35 of different somatotypes [13] and in men [14].

The available information on the connection of physical qualities with indicators of aerobic, anaerobic lactate and anaerobic lactate productivity of the body in people who do not play sports does not cover all age groups.

We put forward a hypothesis that the correlation between indicators of functional and physical fitness in women aged 25-35 will have differences from the data obtained from other age and gender groups.

The purpose of the study is to reveal the relationship between indicators of functional fitness and indicators of physical fitness in women aged 25-35.

Material and methods

Participants

392 women aged 25-35 years (the first period of adulthood) took part in the study. All the subjects had no experience of sports in the past. Each subject gave written consent to participate in the experiment.

Research organization

Functional fitness was determined by indicators of anaerobic lactate, anaerobic lactate and aerobic productivity of the body. The power of aerobic processes of energy supply of muscle activity was studied by the indicator of maximum oxygen consumption (VO2 max). It was determined by the method of Karpman et al. [15]. The cycle ergometric version of the PWC 170 test was used. Based on the obtained data, the maximum oxygen consumption was calculated. It was expressed in ml•min-1. The technology of performing the test is described by Furman et al. [5, Art. 30-33].

Threshold of anaerobic metabolism (TAM) was determined by the Conconi test in Furman's modification. The subjects performed loads on a cycle ergometer of gradually increasing power. At the end of each stage, heart rate was recorded. The threshold level of anaerobic metabolism corresponded to the inflection point on the graph of the increase in heart rate. The value of the threshold of anaerobic metabolism was

expressed in W. The technology of the test is described in detail by Furman et al. [5, Art. 37-38].

To determine the capacity of anaerobic lactate energy supply processes, the method developed by Shogy & Cherebetin [16] was used. This method involves determining the indicator of the maximum amount of external mechanical work per 1 minute (MQMK). This test consists in performing a bicycle ergometric load lasting 60 seconds with the maximum possible frequency of pedaling. The technology of the test is described in detail by Furman et al. [5, Art. 42].

The power of anaerobic alactate energy supply processes was determined by the 10-second Wingat anaerobic test (WAnT 10) [17]. This test consists in performing a bicycle ergometric load lasting 10 seconds with the maximum possible frequency of pedaling. The number of complete revolutions of the pedals was counted. By means of mathematical calculations, the result was expressed as ukgm•hv-1.

The power of anaerobic lactate processes of energy supply was determined by the 30-second Wingat anaerobic test (WAnT 30) [17]. The conditions of this test are similar to the WAnT 10 test. The difference is in the duration of the load, which is 30 seconds. The results were expressed as hcm•min-1. The technology for performing Wingat anaerobic tests is described by Furman et al. [5, Art. 40-42].

Absolute and relative indicators were studied to increase informativeness. All tests were performed on a Christopeit Sport AX-1 bicycle ergometer.

Physical fitness was determined by tests that characterize all physical qualities or their combination. The strength of the right and left hand was determined by the method of hand dynamometry. Explosive power was determined by the "standing long jump" test. Dexterity was determined by the "shuttle run 4x9 m with the transfer of cubes" test. Flexibility was determined by the test "forward bending of the torso in a sitting position." Speed-power endurance was determined by the test "raising the trunk in a sitting position from a lying position in 1 minute." Strength endurance was determined by the test "flexion and extension of the arms in a supine position." Speed endurance was determined by the "run 100m" test. Endurance was determined by the "run 2000m" test.

Statistical analysis

First, in the STATISTICA 13 program, data series were checked for compliance with the law of normal distribution. The Shapiro-Wilk test was used. If the actual value of P according to the Shapiro-Wilk test does not exceed $p<0.05$, then the hypothesis of a normal distribution of data was rejected. If at least one series of data did not correspond to the normal distribution law, Spearman's rank correlation coefficient was used. Arithmetic mean (Means), standard deviation (Std.Dev.), Spearman's pairwise correlation coefficient (pxy) and relationship reliability (p) were determined. The relationship was considered reliable at $p<0.05$. The degree of correlation was assessed by the Chaddock test (Table 1).

Table 1

The value kharasteristic of the correlation coefficient

Degree of correlation	The value of the correlation coefficient
Very tall	$0.90 \le r_{xy} \ge 0.99$
High	$0.7 \le r_{xy} < 0.9$
Notable	$0.5 \le r_{xy} < 0.7$
Moderate	$0.3 \le r_{xy} < 0.5$
Weak	$0.1 \le r_{xy} < 0.3$

Results

The results of the study of the functional and physical fitness of women in the first period of adulthood are shown in Tables 2, 3. The analysis of indicators of functional fitness for compliance with the law of normal distribution of data revealed that none of the indicators corresponds to this according to the Shapiro-Wilk criterion (Table 2).

Table 2

Functional fitness of women aged 25-35 (n=392)

Indicators of functional readiness	Means	Standard Deviation	Criterion value Shapiro-Wilk	Level of significance p
Maximum oxygen consumption, ml/min	2529.539	192.8351	W=0.99132	0.02127
Maximum oxygen consumption, ml/min·kg^{-1}	41.9967	4.75772	W=0.98397	0.00025
Threshold of anaerobic metabolism, W	139.592	14.4582	W=0.94600	0.00000
Threshold of anaerobic metabolism, W·kg^{-1}	2.314	0.2711	W=0.99107	0.01809
The maximum amount of external mechanical work in 1 min, kg·min^{-1}	1488.303	278.3556	W=0.97763	0.00001
The maximum amount of external mechanical work in 1 min, kg·min^{-1}·kg^{-1}	24.408	3.2372	W=0.94160	0.00000
30-second Wingate anaerobic test, kg·min^{-1}	2115.315	514.0542	W=0.98252	0.00011
30-second Wingate anaerobic test, kg·min^{-1}·kg^{-1}	34.360	5.4210	W=0.98452	0.00033
10-second Wingate anaerobic test, kg·min^{-1}	2351.145	516.3271	W=0.98525	0.00050
10-second Wingate anaerobic test, kg·min^{-1}·kg^{-1}	38.273	4.9021	W=0.96352	0.00000

The data in Table 3 indicate that the data do not conform to the normal distribution for all indicators of physical fitness. This means that non-parametric criteria should be used for correlation analysis between indicators of functional and physical fitness. Therefore, Spearman's paired correlation coefficient was used for correlation analysis.

Table 3

Physical fitness of women aged 25-35 (n=392)

Indicators of physical fitness	Means	Standard Deviation	Criterion value Shapiro-Wilk	Level of significance p
The strength of the right hand, kg	29.0587	3.70858	W=0.98439	0.00031
Strength of the left hand, kg	27.0791	3.50613	W=0.97364	0.00000
Long jump from a standing position, cm	167.4923	18.77352	W=0.98649	0.00104
Shuttle run 4x9m, s	11.3324	0.86008	W=0.91298	0.00000
Leaning the body forward in a sitting position, cm	0.86008	7.37450	W=0.91193	0.00000
Lifting the trunk in a sitting position from a lying position in 1 minute, times	37.5434	7.63376	W=0.99090	0.01614
Flexion and extension of the arms in a resting position, times	9.4847	6.37007	W=0.95522	0.00000
Running 100 m, s	17.7666	1.33247	W=0.92809	0.00000
Running 2000 m, s	12.4378	1.61667	W=0.97347	0.00000

On the basis of the obtained data, a correlation analysis of indicators of aerobic productivity with indicators of physical fitness was carried out (table 4).

It was established that the correlation of the absolute indicator of maximum oxygen consumption with most indicators of physical fitness is characterized as moderate or weak. The correlation with the indicators "long jump from a place", "shuttle run 4x9 m", "body forward tilt in a sitting position" and "100 m run" is not reliable - $p>0.05$.

The study of the correlation of the relative indicator of maximum oxygen consumption with indicators of physical fitness revealed an inverse relationship of a noticeable degree with the indicator "running 2000 m". The strength of correlation with other indicators of

physical fitness is characterized as moderate or weak. It should be noted that according to the tests that involve covering the distance in time (4x9 m shuttle run, 100 m run, 2000 m run), a shorter time to cover the distance indicates a higher level of preparedness. Accordingly, the inverse correlation means that higher values of the relative indicator of maximum oxygen consumption cause a better result in these tests.

The study of the correlation of the absolute indicator of the threshold of anaerobic metabolism with indicators of physical fitness revealed that the correlation does not exceed a moderate degree. The correlation with the indicators "shuttle run 4x9 m" and "run 2000 m" is unreliable ($p>0.05$).

The relationship between the relative indicator of the threshold of anaerobic metabolism and the indicator of "running 2000 m" is characterized as inverse to a noticeable degree. Correlation with the indicator "body forward tilt in a sitting position" is unreliable ($p>0.05$). The relationship between the relative indicator of the threshold of anaerobic metabolism and other indicators of physical fitness is characterized as moderate or weak.

Table 4

The relationship between indicators of aerobic productivity of the body and indicators of physical fitness in women aged 25-35 (n = 392)

Indicators physical fitness	$VO_{2\ max\ abs.}$		$VO_{2\ max\ rel.}$		$TAM_{abs.}$		$TAM_{rel.}$	
	p_{xy}	p	p_{xy}	p	p_{xy}	p	p_{xy}	p
The strength of the right hand, kg	0.4378	<0.05	-0.3858	<0.05	0.4760	<0.05	-0.1756	<0.05
Strength of the left hand, kg	0.4076	<0.05	-0.3326	<0.05	0.4461	<0.05	-0.1491	<0.05
Long jump from a standing position, cm	0.0891	>0.05	0.3920	<0.05	0.1378	<0.05	0.4662	<0.05
Shuttle run 4x9m, s	-0.0123	>0.05	-0.4321	<0.05	-0.0091	>0.05	-0.4496	<0.05
Leaning the body forward in a sitting position, cm	0.0017	>0.05	0.1521	<0.05	-0.1464	<0.05	-0.0167	>0.05
Lifting the trunk in a sitting position from a lying position in 1 minute, times	0.2020	<0.05	0.1990	<0.05	0.2082	<0.05	0.2831	<0.05
Flexion and extension of the arms in a resting position, times	0.1614	<0.05	0.2778	<0.05	0.2000	<0.05	0.3436	<0.05
Running 100 m, s	-0.0231	>0.05	-0.3612	<0.05	-0.1527	<0.05	-0.4841	<0.05
Running 2000 m, s	-0.1835	<0.05	-0.6833	<0.05	-0.0621	>0.05	-0.6003	<0.05

Notes: VO2 max rel. – relative indicator of maximum oxygen consumption; TAM abs.– absolute indicator of anaerobic metabolism threshold; TAM rel. – relative indicator of anaerobic metabolism threshold; pxy– Spearman's correlation coefficient.

The study of the correlations of the indicators of the anaerobic lactate productivity of the body with the indicators of physical fitness did not reveal a connection of a high and very high degree (table 5).

A direct relationship of a noticeable degree was found between the absolute indicator of the maximum amount of external mechanical work in 1 minute and the strength of the right and left hand. The relationship with performance in the tests "lifting the trunk to a sitting position from a lying position in 1 minute", "flexing and extending the arms in a lying position", "shuttle run 4x9m" and "running 2000m" is characterized as weak. Unreliable correlation with the tests "long jump from a standing position", "tilting the body forward in a sitting position", "running 100m" ($p>0.05$).

Correlation of the relative indicator of the maximum amount of external mechanical work per 1 min with indicators of physical fitness is characterized as moderate and weak. The correlation with the performance in the test "tilting the torso forward in a sitting position" is unreliable ($p>0.05$).

A direct correlation of the noticeable degree of the absolute index of the 30-second Wingat anaerobic test with the strength of the right and left hand was revealed. Correlation with other indicators of physical fitness is characterized as moderate or weak. With the "long jump from a standing" test, the correlation is unreliable (p>0.05).

A correlation study of the relative index of the 30-second Wingat anaerobic test revealed a significant degree of direct correlation with the strength of the right hand. The degree of correlation with the strength of the left hand is moderate, but the value of r=0.4973 is very close to a noticeable degree. Correlation with other indicators of physical fitness is characterized as weak. The correlation with performance in the "shuttle run 4x9m" test is unreliable (p>0.05).

Table 5

The relationship between indicators of anaerobic lactate productivity of the body and indicators of physical fitness in women aged 25-35 (n = 392)

Indicators physical fitness	MQMK abs.		MQMK rel.		WAnT30abs.		WAnT30rel.	
	p_{xy}	p	p_{xy}	p	p_{xy}	p	p_{xy}	p
The strength of the right hand, kg	0.5741	<0.05	0.2562	<0.05	0.6499	<0.05	0.5693	<0.05
Strength of the left hand, kg	0.5349	<0.05	0.2419	<0.05	0.5813	<0.05	0.4973	<0.05
Long jump from a standing position, cm	0.0130	>0.05	0.3716	<0.05	-0.0618	>0.05	0.1734	<0.05
Shuttle run 4x9m, s	0.1014	<0.05	-0.2994	<0.05	0.1770	<0.05	-0.0507	>0.05
Leaning the body forward in a sitting position, cm	-0.0829	>0.05	-0.0192	>0.05	-0.1334	<0.05	-0.1284	<0.05
Lifting the trunk in a sitting position from a lying position in 1 minute, times	0.2052	<0.05	0.4158	<0.05	0.1321	<0.05	0.2845	<0.05
Flexion and extension of the arms in a resting position, times	0.1225	<0.05	0.3447	<0.05	0.1059	<0.05	0.2895	<0.05
Running 100 m, s	0.0614	>0.05	-0.2737	<0.05	0.1235	<0.05	-0.1065	<0.05
Running 2000 m, s	0.2060	<0.05	-0.2524	<0.05	0.3483	<0.05	0.1508	<0.05

Notes: MQMK abs. – absolute indicator of the maximum amount of external mechanical work in 1 minute; MQMKrel. – relative indicator of the maximum amount of external mechanical work in 1 minute; WAnT30abs.– the absolute index of the 30-second Wingat anaerobic test; WAnT30rel. – relative index of the 30-second Wingat anaerobic test; pxy– Spearman's correlation coefficient.

The results of the study of correlations of indicators of anaerobic lactate productivity of the body with indicators of physical fitness are shown in Table 6.

A positive correlation of the noticeable degree of the absolute index of the 10-second Wingat anaerobic test with the strength of the right and left hand was revealed. The correlation with performance in the "standing long jump" test is unreliable (p>0.05). The relationship between the absolute index of the 10-second Wingat anaerobic test and other indicators of physical fitness is characterized as weak or moderate.

The calculation of the index of the 10-second Wingat anaerobic test per kg of body weight did not change the trends. A significant positive degree of correlation was found between the relative index of the 10-second Wingat anaerobic test and the strength of the right and left hand. The correlation is unreliable with the test "tilting the torso forward in a sitting position" (p>0.05). The connection with other indicators of physical fitness is characterized as weak and moderate.

Table 6

The relationship between indicators of anaerobic lactate productivity of the body and indicators of physical fitness in women aged 25-35 (n = 392)

Indicators physical fitness	$WAnT10_{abs.}$		$WAnT10_{rel.}$	
	p_{xy}	p	p_{xy}	p
The strength of the right hand, kg	0.6677	<0.05	0.5999	<0.05
Strength of the left hand, kg	0.6030	<0.05	0.5282	<0.05
Long jump from a standing position, cm	-0.0545	>0.05	0.2457	<0.05
Shuttle run 4x9m, s	0.1767	<0.05	-0.1138	<0.05
Leaning the body forward in a sitting position, cm	-0.1036	<0.05	-0.0930	>0.05
Lifting the trunk in a sitting position from a lying position in 1 minute, times	0.1565	<0.05	0.3698	<0.05
Flexion and extension of the arms in a resting position, times	0.1211	<0.05	0.3754	<0.05
Running 100 m, s	0.1152	<0.05	-0.1760	<0.05
Running 2000 m, s	0.3755	<0.05	0.1390	<0.05

Notes: WAnT10abs.– the absolute index of the 10-second Wingat anaerobic test; WAnT10rel.– relative indicator of the 10-second Wingat anaerobic test; pxy– Spearman's correlation coefficient

Discussion

It is known that loads of maximum power (intensity) that are performed for no longer than 6-8 seconds occur due to the anaerobic lactate system of energy supply [1, 2]. These criteria are met by the "dynamometry of the right and left hand" and "long jump from standing" tests. The data obtained by us on the correlation of indicators of functional fitness with the strength of the right and left hands demonstrate a greater role of anaerobic energy supply in relation to aerobic energy. This is indicated by a higher degree of correlation of anaerobic indicators (10-second Wingat test; 30-second Wingat test; maximum amount of external mechanical work in 1 min) compared to aerobic ones (maximum oxygen consumption; threshold of anaerobic metabolism). In the literature, we did not find data on the correlation of the strength of the right and left hand with indicators of functional readiness in women of the first mature age. There are days about the correlation of indicators of functional fitness with the strength of other muscle groups. Thus, Utku Alemdaroğlu [6] did not find a significant degree of connection between the strength of the quadriceps muscle and the glycolytic system of energy supply, which was determined by the 30-second Wingat test. The authors see the reason in the leading role for the power capabilities of the anaerobic lactate energy supply system.

The data we obtained about the unreliable correlation of performance in the standing long jump test with the absolute index of the 10-second Wingat test and the weak correlation with the relative index of the 10-second Wingat test in women aged 25-35 were unexpected. This can be explained by the significant impact of mastery of the jumping technique on performance in the "standing long jump" test. If you do not move your feet forward when landing, you can lose up to 20 cm from the potential result. Therefore, women who quickly mastered the jumping technique, but had lower values in the 10-second Wingat test, could show a better result. We did not find similar studies conducted with women aged 25-35 who have no experience in sports training. There are publications that examine the correlation in athletes. Mann et al. [18] established a very high degree of correlation in soccer players between anaerobic power and standing long jump (r=0.926). The results of the correlation study with the vertical jump, which also characterizes the explosive power of the leg muscles, have also been published. Thus, Utku Alemdaroğlu did not find a significant correlation between the vertical jump and anaerobic performance determined by the 30-second Wingat test in basketball players. Radhouane Haj-Sassi et al. [19] found a significant degree of correlation of standing vertical jump with the glycolytic 30-second Wingat test and no correlation with maximal oxygen consumption in student-athletes. Somewhat different results were obtained by Darmiento Anthony et al. According

to their data, the effectiveness of vertical jumps correlates with both anaerobic and aerobic indicators [20]. Soslu et al. [21] found a significant degree of correlation between peak power (r=0.524) and average power (r=0.645), which was determined by the 30-second Wingat test with a vertical jump. Therefore, the data on the correlations of anaerobic productivity with the effectiveness of long jump from a place (or vertical jump) differ among different researchers.

The test "shuttle run 4x9 m with the transfer of cubes" characterizes only one side of coordination abilities, namely, orientation in space. According to physiologists, orientation in space depends mainly on the function of the central nervous system [1, 2]. Running speed only partially affects the result in this test. Therefore, the role of power supply systems in performing this test is significantly reduced. Considering this, the data we obtained about the moderate, weak or unreliable connection of the performance of this test with the indicators of aerobic and anaerobic productivity in women 25-35 years old is logical. We obtained similar results when examining girls aged 17-19. We found a weak relationship between the performance of the shuttle run and the indicators of the maximum amount of external mechanical work in 1 minute (r=-0.2037) and the maximum oxygen consumption (r=-0.1587) [5, Art. 142]. Serorez [8] also points out the lack of connection between dexterity and aerobic and anaerobic performance of the body.

It was revealed that there is no connection between flexibility and indicators of functional readiness. This does not indicate a weak degree of correlation or its unreliability in women aged 25-35. Such data are consistent with previous studies conducted with girls aged 17-19 [5, Art. 142]. Similar results were obtained by Serorez, who conducted research with male students [8].

Speed-strength endurance, which was determined by the test "lifting the trunk to a sitting position from a lying position in 1 min" and strength endurance, which was determined by the test "flexion and extension of the arms in a lying position" depend mainly on the glycolytic system of energy supply [5]. The data we received confirm this position. In women aged 25-35, among indicators of functional readiness, the highest degree of correlation was found with the relative indicator of the maximum amount of external mechanical work in 1 minute. Although such a relationship is characterized as moderate. In addition, a moderate degree of correlation was established with the relative index of the 10-second Wingat test. Such data are partially consistent with our previous research. In 17-19-year-old female students, we found a moderate degree of correlation of the performance of the test "rising the trunk in a sitting position from a lying position in 1 minute" with the relative indicator of the maximum amount of external mechanical work in 1 minute. (r=0.324). The correlation with the test "flexion and extension of the arms in a supine position" in girls aged 17-19 years is characterized as weak (r=0.151) [5, Art. 142]. We did not find information from other researchers about the correlation of indicators of functional readiness with these tests. But there are correlation studies with other tests that also characterize strength endurance. So Carreker et al. investigated the relationship between performance in the "Murph" exercise complex and anaerobic and aerobic performance in CrossFit athletes. The "Murph" complex consists of three strength exercises: push-ups, squats, pull-ups and two running exercises - a 1-mile run. The authors established a significant degree of inverse correlation of performance in the "Murph" exercise complex with the relative index of the 30-second Wingat anaerobic test (r=-0.436) and with the relative index of maximal oxygen consumption (r=-0.423) [22]. Effectiveness in the "Murph" set of exercises is reflected by the time to overcome the test exercises. Therefore, the inverse correlation indicates a positive influence of the anaerobic lactate and aerobic energy supply systems.

According to the "run 100 m" test, the average value of women 25-35 years old is 17.77±1.333 seconds. Since the maximum speed can be maintained for about 6 seconds, this test characterizes speed endurance. Accordingly, the predominant modes of energy supply in this test are anaerobic lactate and anaerobic lactate [1, 2, 5]. The weak degree of correlation with anaerobic performance indicators can be explained by the technical complexity of sprint running. The technique of starting, starting acceleration, relaxed running at maximum speed has a significant impact on the result. Therefore, women who quickly mastered the technical elements of sprinting demonstrated better results at a distance of 100 m than women who had a higher level of anaerobic productivity but worse technical skills. In our previous studies, we found an inverse correlation of moderate strength with the relative indicator of the maximum amount of external mechanical work in 1 minute in girls aged 17-19 (r=-0.440) [5, Art. 142]. There are data on the inverse relationship of a noticeable degree of effectiveness of running 100 m with anaerobic lactate productivity and a high degree of relationship with anaerobic lactate

capacity in track and field athletes [23]. Such data indicate that a higher degree of correlation between indicators of physical and functional fitness is characteristic of people who systematically engage in physical activity. A number of other publications [3, 24] point to this feature.

According to our data, the average result for women 25-35 years old at a distance of 2000 m is 12.44±1.617 min. The main type of energy supply with such duration of muscle work is mainly aerobic [1, 5]. Correlation analysis confirms this statement. The highest degree of correlation of the performance of the 2000m run was found with the relative indicators of aerobic productivity - the maximum oxygen consumption and the threshold of anaerobic metabolism. Such data fully correspond to our previous research conducted with girls aged 17-19 [5, Art. 142] and are confirmed by the data of other researchers. Thus, Serorez found a close relationship between endurance and aerobic performance in male students engaged in health-improving types of motor activity [8]. Sunde et al. [7] investigated correlations in Norwegian skiers. Note that performance in ski races depends mainly on the level of endurance development. As a result, the authors found a high degree of correlation of performance in races with maximal oxygen consumption expressed in ml•kg-1•min-1 ($r = -0.770$; $p < 0.01$). A correlation was established with the lactate threshold at the level ($r = -0.710$; $p = 0.010$). The correlation with the absolute indicator of maximum oxygen consumption is unreliable ($r = -0.490$; $p = 0.110$) [7]. Carlson et al. established a relationship between performance in skiers aged 24.5 ± 2.8 years with maximum oxygen consumption expressed in ml•kg-1 ($r = -0.740$) and with the threshold of anaerobic metabolism expressed in W•kg-1 ($r = -0.640$) [25] . Santisteban et al. claim that among runners who specialize in long distances, the highest degree of correlation of the threshold of anaerobic metabolism with running efficiency is found in athletes who specialize in the marathon distance [26].

The study of correlations between functional fitness indicators and physical fitness indicators in women aged 25-35 did not reveal a high or very high degree of correlation. Galan et al. proved that correlation coefficients between interrelated functional and motor components increase with an increase in the level of training [24]. When evaluating the data obtained by us, it should be taken into account that the research was conducted before the beginning of the stage of training effects. This can explain the slightly lower degree of correlations than other researchers.

Conclusions

No correlation of high and very high degree was found between indicators of functional fitness and indicators of physical fitness in women aged 25-35 who had no experience in sports. Among the reasons are the factor of insufficient mastery of the technique of test exercises (in the "standing long jump" and "100m run" tests), underestimation of the body's reserves in exercises related to the manifestation of endurance (in the "2000m run" test). According to the level of development of indicators of physical fitness, it is not possible to draw objective conclusions about the functional fitness of women aged 25-35 who have no experience in sports.

The degree of correlation is influenced by the methods used to determine indicators of physical and functional fitness, the age and gender of the subjects, the level of sportsmanship, and the presence of experience in motor activity.

Conflict of interest

The authors declare no conflict of interest.

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