THEORETICAL AND APPLIED ASPECTS OF PHYSICAL CULTURE, SPORT AND TOURISM

RELATION OF SUSTAINABLE AND LABILE INDICATORS OF BODY COMPOSITION SPORTSMEN HIGH QUALIFICATIONS CYCLIC SPECIES SPORT

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Morphological features of athletes are manifested as in stable (total) signs, among which is the length and body weight, and in changeable (labile), for example, the girths of various parts of the body, due to the ratio fat free mass (FFM) and fat mass (FM) [1]. It has been established that labile indicators can serve as markers in monitoring the adaptation response of the organism to high physical activity, requiring changes in the management of enzymatic processes of energy and plastic metabolism [1]. Previously, the authors found that in the group of male athletes candidates for the master of sports of cyclic and speed-power sports, the correlation coefficient (0.42) between BMI and LM was not statistically significant [2]. It is of interest to determine how the total and labile indicators of body composition in this group correlate with each other.

The aim of the study: the establishment of the ratio of stable and labile indicators of the body composition of athletes of the Vitebsk region, depending on gender and level of athletic qualifications.

Material and methods. Athletes were examined on the basis of the Vitebsk regional sports clinic. The body composition of the examined individuals was determined by the results of bioelectric impedance analysis, conducted using the apparatus BODY Analyzer 2040 (Italy). Athletes were divided into groups by gender and sports qualifications: candidates for master of sports (CMS) and master of sports (MS). Cyclic species sports are represented, for the most part, by athletes in athletics, swimming, rowing and speed skating. When analyzing body composition, a two-component model was chosen, according to which the whole body mass is represented as fat mass and fat free mass. The difference in the results was determined by the option "Ttest" Excel. Results were considered statistically significant with a probability of $p < 0,05$.

Findings and their discussion. The group of height-weight indicators (Table 1), except for height and weight, includes indicators obtained in impedancemetry: ideal weight and BMI, calculated by the ideal mass - BMI (ideal-weight). It turned out that men MS are significantly higher in height of athletes of the CMS, do not differ in real weight, but differ in the ideal. This can

be explained by different age, but it is noteworthy that the real and ideal BMI in these groups is no different, This means that these indicators are sustainable.

Table 1- height-weight indicators athletes of the studied groups

	Age (years)	Height (cm)	Weight (kg)	BMI (kg / m2)	Ideal-weight (kg)	BMI (ideal-weight) (kg / m2)
Men CMS (n=22)	16 ±0,4	179±2,1	69,7±2,31	21,7±0,50	71,0±1,64	22,2±0,17
Men MS (n=22)	20 ±0,7	185±2,1	75,7±3,38	22,0±0,78	75,5±1,35	22,1±0,17
Test CMS– MS	0,0001	0,050	0,155	0,734	0,040	0,844
Women CMS (n=20)	17±0,4	166±1,4	57,4±1,38	20,9±0,38	54,7±0,75	19,9±0,15
Women MS (n=15)	20±0,9	167±2,5	58,1±2,03	20,9±0,61	55,9±1,13	20,1±0,29
Ttest : CMS MS	0,04	0,70	0,79	0,99	0,37	0,60
Test : Men.–Women. CMS	0,04	0,00001	0,0001	0,20	0,000000	0,000000
Test : Men.–Women. MS	0,88	0,00001	0,0001	0,26	0,000000	0,00001

Women of the two groups do not differ among themselves in all indicators, except for BMI. In the CMS group, women have a significant excess of the real body mass index over the ideal, despite statistically insignificant indicators of real and ideal mass. Thus, an ideal mass BMI may be more informative. Women CMS and MS are lower in height, lighter in terms of real and ideal mass than men.

The percentages of (FM) and (FFM) turned out to be independent of age and sports qualification, both in men and women (Table 2). In women, the percentage of fat is greater than in men , this is especially noticeable on a relative indicator: FFM / FM. This indicator is significantly higher in men by 2 times than in women in the CMS group and 2.8 times higher in the MS group. When comparing the percentage of fat with the masters of sports of Russia in these sports, it turned out that it is 1.5 times higher in men in the Vitebsk region (for sportsmen of Russia 9.8 ± 0.44), for women - 2 times (for sportsmen of Russia 13 ± 0.56) [1, p. 91].

From table 3 it follows that most male athletes to achieve an ideal mass, you must remove the percentage of fat, about the same as a percentage of fat free mass which should be added.

Table 2 – Labile components of body weight of athletes of the studied groups

	Free-fat-mass(%)	Fat-mass (%)	Free-fat-mass /Fat-mass
Men CMS (n=22)	84,2±0,93	15,8±0,93	5,81±0,434
Men MS (n=22)	85,95±1,341	14,03±1,341	7,8±1,21
Ttest : CMS MS	0,29	0,28	0,13
Women CMS (n=20)	73,9±0,87	26,1±0,87	2,83±0,124
Women MS (n=15)	73,9±1,1	26,1±1,1	2,83±0,177
Ttest : CMS MS	0,98	0,97	0,90
Test : Men.–Women. CMS	0,000000	0,000000	0,000001
Test : Men.–Women. MS	0,00000	0,00000	0,00064

In women, it is recommended to remove a higher percentage of fat than add the percentage of lean mass.

Table 3 – Recommended Changes to Achieve an Ideal Mass of Athletes of the Groups under Study

	Free-fat-mass-add	Free-fat-mass-dec	Fat-mass-add	Fat-mass-dec
Men CMS	6,62±0,908	8,63±6,184	–	6,38±1,732
n	20	3	1	21
Men MS	6,76±0,459	6,1±1,71	3,03±1,602	5,29±1,707
n	18	4	3	18
Ttest : CMS MS	0,89	0,73	–	0,66
Women CMS	2,65±0,240	–	–	5,09±0,80
n	19	1	1	19
Women MS	3,42±0,71	1,45±0,35	2,0±1,5	5,3±1,08
n	13	2	2	13
Ttest : CMS MS	0,32	–	–	0,89
Test : Men.–Women. CMS	0,0004	–	–	0,506
Test : Men.–Women. MS	0,0007	0,070	0,672	0,996

Conclusion. In addition to the real BMI indicator, the ideal BMI proved to be informative for women gender informative indicator - “FFM / FM”. There is a great potential in regulating the training load of athletes of the Vitebsk region in cyclic sports using markers such as percentages of fat and fat free mass.

Reference list:

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