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HIDDEN PHYSIOLOGICAL PARAMETERS OF DIFFERENT PERFORMANCE FEMALE JUDOKAS' BODY

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Abstract

The increased working ability of female athletes in combination with daily, normal activity of the body is the legal result of rational organization of long-lasting workouts. This will be achieved by organizing, in part, the physiological reactions directed towards maintaining relative stability of the internal body's environment and regulatory mechanisms, controlling the high sports result. Physiological parameters of female judokas' body are required to be determined based on the analysis of ergo bike testing indices, by the path of overlapping data regarding heart rate at rest, of working capacity at a H.C.R. 150 b/ mm, the ability to work in a H.C.R. 170 b/ min, the length of the "hysteresis node" of tilt cotangent angle of the growth curve during exercise and during her departure, on the "node hysteresis" surface. When analysing the physiological indices reserves of high-performance female judokas of similar state it can be observed that balancing the range of individual data is relatively lower than at previous group athletes. Generally, all parameters used by us to assess physiological reserves of female judokas, proved to be at a truthful level much higher at high-performance female judokas compared to the performance ones, fact which is predetermined by the mechanisms of adaptation to physical effort at high-performance female judokas and also by the presence at them of much more considerable functional reserves.

Keywords: Physiological parameters, female judokas, higher performance.

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1. Introduction

The mobilisations of hidden possibilities of the body, namely his physiological reserves, reflect the system formed by possibilities of different body functional subsystems (Davidenko, 1991).

It was determined that the reserves of some physical qualities such as strength consist in:

- number of myofibrils into muscle tissue;
- number of functional locomotor unities;
- activity intermuscular integration and coordination of different muscle groups included into researched muscular system;
- intensity degree of the metabolism processes into muscle tissue.

2. Problem Statement

During systematic practicing of force and force-speed exercises increase muscle mass, thickening (growth) of muscle tissue, innervations, as well as increasing the number of myofibrils in muscle tissues.

As a reserve of strength, in carrying out targeting exercises of force and force-speed is set primarily the possibility of the body to perform an enormous workload, by capacity, in anaerobic conditions of providing energy. Resistance depends on anaerobic capacity and anaerobic volume (Davidenko & Mozzhuhin, 1985).

3. Research Questions

The ability functional reserves are least researched. This is explained by the fact that the assessment of stormy processes, taking place in the central nervous system during the execution of actual locomotor acts (in our case judo methods) are possible to execute only with a super portable equipment in combination with telemetric methods. Simultaneously they were exposed to a variety of assumptions about coordinating the work and functioning of different sections of the nervous system, sense organs and others that are necessary for the organization of this quality (Manolachi, 2003; Matveyev, 2010; Gajton, 2008).

4. Purpose of the Study

The purpose of this study is to highlight the impact of physiological parameters on sports performance of the female athletes practicing judo.

5. Research Methods

The research subjects were 22 female athletes practicing judo. The sample was divided into 2 groups: 11 performance female judokas and 11 elite female judokas.

During our study, we analysed different physiological parameters like heart contractions rate (HCR), physical working capacity (PWC170) and hysteresis node surface. In order to collect all the data, ergo bike testing with linear growth of effort was used.

The research methods used were the following: testing, analysis, observation, statistical, graphical.

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6. Findings

From our perspective, for achieving complex actions, in terms of coordination, during the performance is required physical assessment of space report between the own "body form" and partner's position. This can be achieved through concomitant work of visual system and vestibular system, a small encephalon and locomotor areas of the cortex of large hemispheres, subcortical centres and the locomotor ones of medium encephalon. However each section must appropriately perceive information, to perform its processing and synthesis as well as to keep the results after processing the information. Heart contractions rate is a complex indicator that indicates the body adaptation in sports activity (Platonov, 2013).

To assess the degree of adaptation it were used H.C.R. indices under working conditions with variable capacity. Figure 1 shows us the H.C.R. dependency typical curve of effort capacity with the calculations of given parameters and equations that approximate curve direction in different stages characteristic of work fulfilment. Firstly, we should pay attention in "vegetative echo" nonlinear on increasing linear and effort decreasing. There are at least two conclusions:

- body cannot fully conform according to changes of effort;
- body can fully conform according to change of effort, but this is in contradiction with principles established in its various systems, that are appropriate in everyday life.

According to our opinion, the best is the second one. Changing strictly linear of appropriate efforts is rarely met in sports and everyday practice, so we cannot talk only about the degree of effort inadequacy and reaction to it.

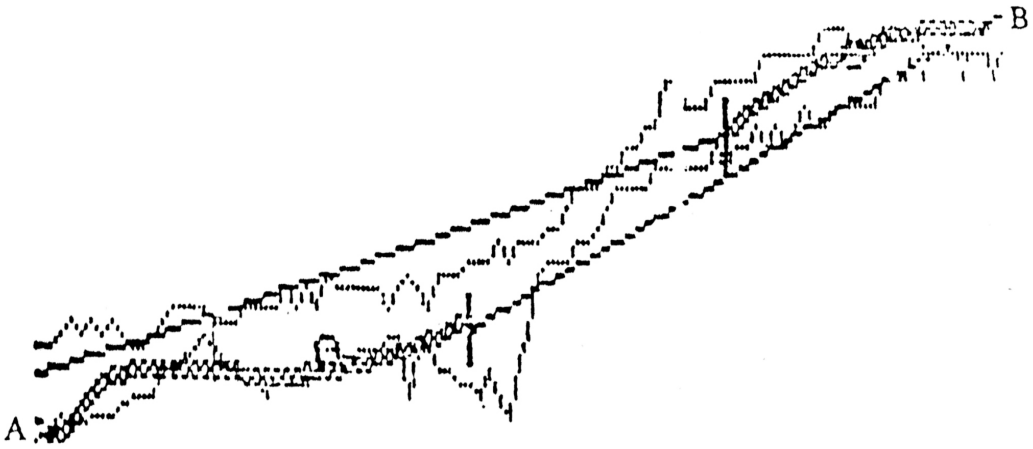

Figure 01. Heart rate dependence of the effort ability of female judokas

According to the first approach the inadequacy degree, it can be meditate on "hysteresis node" length, according to the length of the entire way that is followed by functional dependence given during the experiment. If we would compare the data shown in Tables 01 and 02, we will notice that the "hysteresis node" length to the high-performance female judokas, who participated in the experiment with identical time, differs. In high-performance female athletes the level of deviation from the linear law is more prompt expressed (the difference is in conventional units). Visually and quantitatively about what we had previously stated, we can be sure if we compare other results of other tests, almost according to execution time. In this way, it appears the possibility of assuming the consolidation with experience of the

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locomotor dynamic stereotypes that allow to appreciate the effort upon two aspects of over-providing and penury of providing with blood of muscular systems.

Table 01. Physiological parameters of performance female judokas (initial indicators)

Nr. of exp.	Initial H.C.R. b/min	Capacity of work in H.C.R. 150 b/min W	PWC_{170} W	"hysteresis node" length conv. unit.	ctg a Angle	ctg b Angle	HNS Surface
1	75	147	158	448	1.10	1.40	4877
2	81	163	172	471	1.90	2.50	6362
3	71	131	143	367	0.81	1.45	4320
4	89	180	191	514	2.10	3.20	5791
5	67	159	168	389	1.70	2.40	5107
6	73	194	202	562	0.73	2.10	5719
7	76	146	159	442	1.20	1.30	4784
8	80	169	174	478	1.50	2.20	5632
9	74	142	146	376	0.91	1.64	4230
10	72	182	192	524	1.90	2.80	5197
11	82	191	166	398	2.20	2.60	5204
$\bar{x}$	76	164	170	452	1.20	2.14	5202

Table 02. Physiological parameters of elite female judokas (initial indicators)

Nr. of exp.	Initial H.C.R. b/min	Capacity of work in H.C.R. 150 b/min W	PWC_{170} W	"hysteresis node" length conv. unit.	ctg a Angle	ctg b Angle	HNS Surface
1	72	227	236	647	2.56	4.24	2237
2	69	194	217	651	2.40	3.70	2106
3	54	183	190	703	1.90	2.80	1195
4	67	210	221	584	2.37	4.90	2361
5	61	198	232	673	2.21	3.70	2407
6	65	203	219	652	2.29	3.87	2061
7	74	192	232	674	2.46	4.42	2134
8	67	189	196	615	2.21	3.60	1192
9	72	186	212	730	1.98	2.40	2161
10	68	201	223	586	2.27	3.01	2208
11	64		207	637	2.29	2.50	2115
$\bar{x}$	67	199	217	650	2.26	3.56	2016

In the process of training we used such a mean for optimizing the effort. Thus, the "nonlinear" degree reflects, the body's ability to respond appropriately to unexpected and unforeseen signals. On the other side, we deduced also the way of locomotor actions that the athlete can perform on the basis of functional, local and central systems training of urgent responding. The used method allows emphasizing another circumstance: the performance athletes often use their anaerobic potential. This is manifested by the fact, that athletes in some segments of the test worked in "borrowing" anaerobic conditions, that had delayed returning on some much segments; finally this is reflected in the surface "hysteresis node" (HNS). The athletes increased work ability in combination with everyday normal activity of body is the legal result of rational organization of long-lasting workouts. This will be achieved by organizing, in part,

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of physiological reactions, directed towards maintaining relative stability of the internal body's environment and regulatory mechanisms, providing high sports result (Gajton, 2008).

In the dynamics of adaptive changes of the female athlete practicing judo, are improved the mechanisms and are enlarged the homeostasis boundaries, optimizing sensory-motor regulating of locomotor acts. For example, electroencephalograms (EEG) researches results and regional blood circulation in the brain of female judokas, have shown that long-term practice of this sport promotes the return to consciousness after strangulation. Normal EEG is restored in 5-6 seconds after strangulation. Regional blood circulation decreases with 4-6% in four experiments, with 15-21% in two female judokas and just in an only one athlete increases. In the process of adaptation an important role has the heart work. This, from our perspective, is the fact that the heart is forced to respond simultaneously to homeostasis changing and changing of exercise parameters, primarily the ability of sporting activity.

Meerson, Kuznecov and Saltykova (1991) argue that the process of adapting to continuous and lasting influence of environmental factors quickly connects central mechanisms. Indeed, comparison of the data from Tables 01 and 02 shows that the "hysteresis node" surface in sports qualified athletes of much lower values are considerable: at the high-performance female athletes from 1195 to 2407 conventional units, but at the performance athletes - from 4320 to 6362 conventional units. These data confirm the more efficient activity of sports masters in terms of ergo bike testing standards and on much lower inertia of their regulating heart function systems.

Table 03 presents the data that were obtained by using the forced testing method and it draws our attention to the fact that heart reaction to low effort was much delayed. This was expressed by the fact that abuse of "H.C.R. - Work ability" angle curve was more likely to the effort decrease. It is true that angle ***ctg b*** has exceeded ***ctg a*** angle value in all cases.

Table 03. Assessment indices of physiological reserves at performance and high-performance female judokas

Parameters	Performance athletes			High-performance athletes			
	X	±	±m	X	±	±m	t.r
H.C.R. initial b/min	76	4.20	1.40	67	3.80	1.20	5.2
Work capacity H.C.R. 150 b/min. W	164	8.40	2.80	199	6.80	2.25	3.8
PWC_{170} W	172	8.60	2.90	217	9.80	3.28	4.3
HNS length. conv. units	452	12.30	4.10	650	15.30	5.10	5.4
ctg a angle	1.2	0.16	0.05	2.26	0.24	0.08	5.6
ctg b angle	2.14	0.26	0.08	3.56	0.46	0.15	5.8
HNS surface	5202	156	52	2016	78	26	6.2

This fact confirms the statement that qualified female judokas prefer, in working condition, to remain at a much higher functional level with purpose to serve a route much faster to develop capacity for increased work, what happens in real conditions of their sports activity.

Beside this, it should be noted that research of cardiac activity regulation during forced testing opened much wider sporting mechanism adaptation efforts specific to judo, than the H.C.R. index independently, took at a particular period of time. For example, no significant differences were observed in H.C.R, adjusted by means of telemetry, in the performance of various processes for taekwondo. When comparing data processes made with the arm and technical combinations, we also note that there happens

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a kind of distinction. Thus, we are perfectly aware of the fact that heart contractions not only react to change in response to changing working capacity, but also the emotional and complexity of sporting situation. If we propose athletes to execute a form of intellectual activity, the Krushinsky test, and solving complex problems without physical efforts, still, there are changes of the heart activity, perspiration and temperature of some body parts.

Real situation of judo employment is as follows: here is to take into account not only the physical, mental, emotional, thermal effort and other special efforts, but also by combining it with one another. This is a separate research chapter. The stability of organism at combining factual influences (physical effort, temperature, emotional) is an identical feature and cannot be assumed as the realization of some special actions. Moreover, this goal has been confirmed by Matveev (2010), Platonov (2013) and Manolachi (2003).

Ergo bike testing with linear growth of effort allows calculating easily the work ability that the athlete can perform with a H.C.R. equal to 179 b/min (PWC170). PWC170 value that correlates positively with the tilt angle of the curve, reflecting dependence “H.C.R - working capacity” is displayed in Figure 01. The data given in Table 1, confirms the relocation within the parameters group of physiological reserves assessment at the performance judo player. Therefore H.CR minimal indices were 71 c/min and the maximal ones up to 89 b/min. The proportion of working capacity at a H.C.R 150 b/min swings in the range of 131 to 194 W. The same index in PWC170 is 143-202 W. “Hysteresis node” length is equal to 367-562 conventional units; the angle of inclination of the cotangent, which characterizes finishing drafting point "a" = 0.73-2-10; index that characterizes the beginning of restitution to point “b” from 1.4 to 3. 24. The surface of the "node hysteresis” that characterizes anaerobic processes proportion balances within the values from 4320 to 6362. Thus, it is apparent that performance female judokas according to the parameters of physiological reserves are not homogenous.

Table 02 reflects the results of physiological reserves assessment at female judokas – high-performance ones, which also confirms the considerable relocation of these parameters. Therefore, at the strongest female judoka the indices of ability to work in a HCR 150 b/min were 227 W, but at the weakest-183 W. The same indices at a frequency of 170 b/min at the strong athletes were up to 236 W, but at the weakest 190 W. Whereas working capacity is in a close correlation with the level of force and force-velocity training of female judokas, completed by the lack of the necessary level of these training sides, it put us in the predicament of explaining the relatively low clues of work competence at performance judo players, on the other hand and the height relative indices of the working capacity of the performance athletes. If we have to explain this appearance, we can notice the strong sharp specificity of judo, where the athlete obtains success on the basis of individual composition of physical qualities and may have their weak and strong aspects of training.

According to the working capacity index, four high performance athletes exceeded the entire group of performance judokas and only one high performance athlete failed at two performance judo players.

It is noticeable that PWC170 index is not decisive in assessing preparedness of female judokas, but still the body adapted to high stresses can use this superiority during its recovering period, when anaerobic opportunities of the organism allow achieving faster the shift to the initial condition of performance.

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In general, as is apparent from data shown in Table 02, all of the physiological reserves parameters of top performance athletes are at a much higher statistical value ($P < 0.01$) than at the simple performance female judokas. Thus, perspectives for increased work capacity H.C.R 150 and 170 b/min and the parameters related to the improvement of anaerobic working capacity is determined in the physical training level of performance female judokas and the top performance judokas also.

7. Conclusion

Concluding the mentioned above and generalizing their analysis, we can draw the following conclusion: female judokas body's physiological reserves are required to be determined based on the analysis of ergo bike testing indices, by the path of overlapping data regarding heart rate at rest, of working capacity at a H.C.R. 150 b/mm, the ability to work in a H.C.R 170 b/min, the length of the "hysteresis node" of the cotangent of the inclination angle of the curve growth during exercise, as well during its departure from the "hysteresis node" surface.

Indices assessment of performance female judokas physiological reserves demonstrates the presence of redeployment within group of the analysed indices. Therefore, the H.C.R. value indices during the rest was from 71 to 89 b/min, ability to work at a H.C.R. 150 b/min from 131 to 194 W, at PWC170 from 143 to 202 W, fact that differ substantially and the value of the length and "hysteresis node" surface.

When analysing the physiological indices reserves of high-performance female judokas of similar state it can be observed that balancing the range of individual data is relatively lower than at previous group athletes.

Generally, all parameters used by us to assess physiological reserves of female judokas, proved to be at a truthful level much higher at high-performance female judokas compared to the performance ones, fact which is predetermined by the mechanisms of adaptation to physical effort at high-performance female judokas and also by the presence at them of much more considerable functional reserves.

References

Davidenko, D. N. (1991). *Osobennosti integracii funkcional'nyh rezervov organizma, mobilizuemyh pri myshechnoj deyatel'nosti po mere dostizheniya sportivnogo masterstva // Mezhfunkcional'nye vzaimootnosheniya pri adaptacii organizma k sportivnoj deyatel'nosti*. L.: LNIIFK. S. 38-43.

Davidenko, D. N., & Mozzhuhin, A. S. (1985). *Funkcional'nye rezervy adaptacii organizma sportsmena*. L.: GDOIFK. S.21.

Gajton, A. (2008). *Medicinskaya fiziologiya*. M.: Logosfera. 256 s.

Manolachi, V. G. (2003). *Sporturi de luptă – teoria şi metodica: manual*. Chişinău: Tipografia centrală.

Matveev, L. P. (2010). *Obshchaya teoriya sporta i ee prikladnye aspekty: Ucheb. dlya vuzov fiz. kul'tury* (15-e izd.). M.: Sov. sport. 340 s.

Meerson, F. Z., Kuznecov, V. I., & Saltykova, V. P. (1991). *Kosmicheskaya biologiya i aviacionnaya medicina*. T. 25. № 2. S. 36-43.

Platonov, V. N. (2013). *Sport vysshih dostizhenij i podgotovka nacional'nyh komand k olimpijskim igram*. M.: Sov. sport. 311 s.