

# Assessment of biological age and “quantity of health” of judoists-veterans at the exit stage from elite sport

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**Purpose:** the assessment of biological age and “quantity of health” of judoists-veterans that allows estimating the level of functionality of their organism at the exit stage from elite sport and to construct correctly their training and competitive processes.

**Material & Methods:** the systemic-functional approach is applied. The biological age and “quantity of health” of judoists-veterans decided with the help of tests. The group of 28 men and 19 women – judoists-veterans is tested for this purpose.

**Results:** it is proved that the research of biological age of veterans of judo at the exit stage from elite sport, continuing systematic trainings, is of great importance for sports medicine, physical therapy, gerontology, neurology, and also for professional selection in respect of age rationing of intellectual and exercise stresses, assessment of influence of the motive mode on the rate of aging; the carried-out tests allowed to estimate “quantity of health” of judoists-veterans, giving the idea of the level of functionality of their organism.

**Conclusions:** it is proved that judo classes, the correct and positive image of life positively influence health of judoists-veterans.

**Keywords:** biological age, passport age, judo, judoist-veteran, quantity of health, training activity, sport.

## Introduction

The problem of active longevity of the person is constantly under the close attention of scientists and practical men. Works of the last years in the branch of gerontology showed that aging is difficult biological process and begins long before old age and is caused by deep morphological, functional and biochemical transformations. The scientific problem of determination of biological age and “quantity of health” of judoists-veterans is actualized [7].

In recent years such characteristic as biological age (BA) is included in scientific publications on problems of training of sportsmen in the list of indicators, significant for individualization. However it should be noted that BA is seldom used in quality criterion of management of sports preparation though different authors point to its importance in this urgent quality [9, p. 56]. The research of biological age of judoists-veterans at the exit stage from elite sport, who continue systematic trainings, is of great importance for sports medicine, physical therapy, gerontology, neurology, and also for professional selection in respect of aged rationing of intellectual and exercise stresses, assessment of influence of the motive mode, on rate of aging.

The great value is given to determination of biological age at the moment in sport, medicine, in particular, in sports medicine, physical therapy, rehabilitology, pediatrics, gerontology. The works of L. M. Belozeroва [2], F. Bulyer [3], V. P. Voitenko [4], Z. G. Nuretdinov [5], E. G. Petrenko [8], V. B. Polyakova are devoted to the determination of biological age [9]. Num-

ber of works is devoted to value of studying of the biological age and methods of its assessment in sport, however, they more concern problems of children's and youthful age. Not enough attention is paid by the research of biological age of mature sportsmen and veterans of judo in modern scientific literature.

## Communication of the research with scientific programs, plans, subjects

The research is executed according to the Built plan of the research works of Kharkiv state academy of physical culture for 2011–2015 on the subject “Individualization of the training process of the qualified wrestlers”.

## The purpose of the research:

the assessment of biological age and “quantity of life” of judoists-veterans which allows estimating the level of functionality of organism at the exit stage from elite sport and gives opportunity to construct their subsequent training and competitive processes. Research tasks: to analyze results of testing of group of judoists-veterans; to prove that the subsequent classes of judo, correct and positive image of life positively influence on their health, promote progress of their competitive activity.

## Material and Methods of the research

Such methods were applied when carrying out the research: generalization of literary and documentary sources; theoretic-

cal analysis; poll (questioning, conversation, interview); expert assessment and self-assessment; studying of indicators of biological age and “quantity of life” of judoists-veterans; self-determination of indicators of biological age; statistical analysis of materials of the research. We defined biological age of “quantity of life” of judoists-veterans by tests of Cooper, Abalakov, tests of Stange, Genchi, Bondarevsky, Ruffier. We tested the group of 28 men and 19 women – judoists-veterans of Federation of judo of the Kharkiv region by the standard tables, which are calculated separately for men and for women for this purpose at first. We choose time for testing of judoists-veterans in the morning, before breakfast. When testing, we applied: stop watch, centimeter, device for measurement of pressure, ruler, and methods of mathematical statistics.

## Results of the research and their discussion

Since 1994, veterans of sport of Ukraine are constant participants of World Games of masters, the World Cups and Europe [6]. Since 2011, according to the information reference of Council of veterans of physical culture and sport, annually 700–800 leading sportsmen-veterans participate in the international competitions, where they receive many awards [1, p. 103]. Effective training of the sportsmen combines in itself physical, tactical, theoretical, moral and strong-willed aspects [7]. It is continuously improved by opening and use of new regularities and requirements. It promotes the subsequent growth of sports results of judoists-veterans. Considering the significant amount of sports competitions, both on internal, and on international, the arena, uncommon achievements of certain veterans of the Ukrainian sport and in separate types of veteran sport, in domestic scientifically-methodical literature has not enough corresponding scientific maintenance of development of the movement of veterans of sport and its different aspects. They concern separate scientific problems of development of the movement of veterans of sport. At the same time the general questions of role and the place of the movement of veterans of sport in the history and theories of domestic science in branches of physical culture, positive influence of veteran sport on human body are almost not investigated.

We used such tests for determination of biological age of judoists-veterans: systolic blood pressure; diastolic blood pressure; pulse after rise at rate of 80 steps for minute; pulse in 2 minutes after rise at rate of 80 steps for minute; Cooper's test. Its value was defined in minutes after overcoming 2400 meters on the flat area very much by fast pace or run; test of Stange; test of Genchi; Bondarevsky's test; Abalakov's test; Ruffier test; index of Robinson ( $I_{ROB}$ ). Tests allowed us to estimate also “quantity of life” of judoists-veterans which gives idea of the level of functionality of their organism.

Results of our researches showed that indicators of female judoists are 9,7% lower recorded at men in the standard table. Having collected all necessary information about groups of 28 men and 19 women – judoists-veterans of Federation of judo of the Kharkiv region, we have calculated real (settlement) biological age for each aged category, having made results of tests and having divided the sum into their quantity (18 – for men, 17 – for female judoists). We have received results: the biological age at men on average for 5,4 years, and for women on 4,8 years is smaller than actual real.

Quantity of life ( $Q_L$ ) was defined by division of the norm cor-

responding to growth (standard tabular value), – S, by the received result – R:

$$Q = S/R \cdot 100 (\%). \quad (1)$$

The norm, which is corresponding actual age, makes 100%.

If the indicator is worse than norm, then there is value less than 100% at division of two figures. For example, a male judoist at the age of 40 years has pulse, which is made not 116 blows for minute after rise on the 4th floor, as it has to be normal (100%), and 109 blows that makes 96,7% of norm (116–120). Let's say pulse in 2 minutes, after rise, has made not 100 blows for minute, and 104 that answers 106,4% of norm and, by the way, is indicator for 35-year age.

From phylogenesis position, the development of organism is determined by the difficult mechanism of change of the moments of development through consecutive interaction of chain of biochemical reactions [10, p. 55]. BA is certain milestone in ontogenesis of the person, separating sites of special specificity what we have designated for “zone of biological development” (ZBD). Through originality of structure of genome of expansion of the moments of development by terms and intensity of passing of sites of ontogenesis has especially individual character, defining speed and rhythm of developments of the sportsman. Different norm of reaction from bodies and body tissues, being shown by differences of the individual answer to incentives of the internal and external environment, is reflected respectively and different training effect.

We recommend for use the simpler technique of definition of BA of the judoist-veteran. Formulas, below-mentioned, allow to carry out rather precisely to the judoist-veteran of determination of the biological (true) age. The biological age of men ( $BA_M$ ) and women ( $BA_W$ ) is calculated by us by such formulas.

$$BA_M = 26,985 + 0,215APS - 0,149BHB - 0,151SB + 0,723SHA, \quad (2)$$

where BHB (breath holding duration after deep breath) is measured three times with interval of 5 minutes by means of stop watch. The largest size of BHB, which is measured in seconds, is considered.

SB – static balancing. It is defined when standing the examinee on the left leg, without footwear, eyes are closed, hands are lowered along trunk. This indicator needs to be measured without the previous training. Duration of SB is measured three times by means of stop watch with interval of 5 minutes. The best result is considered. SB is measured in seconds;

SHA – subjective health assessment. It is carried out by means of the questionnaire which includes 29 questions. It is measured in points.

$$BA_W = -1,463 + 0,415AP_p - 0,140SB + 0,248BW + 0,694SHA, \quad (3)$$

where  $AP_p$  (pulse arterial pressure). It is so called the difference between  $AP_s$  (systolic arterial pressure) and  $AP_d$  (diastolic arterial pressure).  $AP_p$  is measured in mil. of mer; BW – body weight. It is decided on the help of weights. Weighing is carried out in light clothes, in the morning, without footwear. It is measured in kilograms.

SHA – subjective health assessment was carried out by us by means of the questionnaire which includes 28 questions.

Such answers are may be on question 28 in the questionnaire: "good", "satisfactory", "bad" and "very bad". One of two last answers was considered as adverse.

The total of adverse answers is counted after answers to question of the questionnaire (it can fluctuate from 0 to 28). The number of adverse answers, which is expressed by figure from 0 to 28, enters formula for definition of BA, instead of letters SHA, which stand in formula.

Any judoist-veteran will be able independently to define the biological age by the formulas.

Only rather prepared people were tested by Cooper's test for power endurance during our research. About 10 people in each age group were examined (5 – men who do not play sports regularly, 5 – judoists-veterans who play sports regularly). We began preparatory trainings of men, who do not play sports regularly, with walking, which gradually accelerates, then watch of walking with run, and then races. Physical fitness was defined by means of 12-minute to Cooper's test and only in 6 weeks of systematic classes during, which every time the distance not less than 1,5 kilometers was overcome.

Results of the 12-minute running test of Cooper for men are

provided in tab. 1.

Further we have carried out the 12-minute test of swimming of Cooper. It estimates condition of physical fitness of organism on the basis of distance (in meters) which the person is capable to swim in 12 minutes. Style of swimming at execution of the test is – any. During testing, breaks for rest during, which the stop watch continued to count 12 minutes, became. The more breaks were, the test results were worse. Results of the 12-minute running test of Cooper have shown the essential advantage of judoists-veterans. Results the 12-minute test of swimming of Cooper for men have also found the essential advantage of judoists-veterans (tab. 2).

The main indicators of biological age at men of advanced years and judoists-veterans are provided in tab. 3.

The data of the table 3 demonstrate that indicators of biological age are much better at judoists-veterans, than at men of advanced years.

## Conclusions

1. The assessment of biological age and «quantity of life» of judoists-veterans gives idea of the level of functionality of their

**Table 1**  
Results of the 12-minute running test of Cooper for men (distance, km)

Age	Men of the corresponding age	Results			Preparedness assessment	
		Judoists-veterans	Deviation	Men of the corresponding age	Judoists-veterans	
30–34 (n=9)	2,26	3,09	+0,83	satisfactory	excellent	
35–39 (n=7)	1,89	2,91	+1,02	satisfactory	excellent	
40–44 (n=6)	1,57	2,63	+1,06	bad	good	
45–49 (n=6)	1,43	2,51	+1,08	bad	good	
50–54 (n=5)	1,21	2,18	+0,97	very bad	good	

**Table 2**  
Result 12-minute to the test of swimming of Cooper for men (distance, m)

Age	Men of the corresponding age	Results			Preparedness assessment	
		Judoists-veterans	Deviation	Men of the corresponding age	Judoists-veterans	
30–34 (n=9)	465	634	+169	satisfactory	excellent	
35–39 (n=7)	432	576	+144	satisfactory	good	
40–44 (n=6)	352	523	+171	bad	good	
45–49 (n=6)	327	511	+184	bad	good	
50–54 (n=5)	268	487	+219	very bad	good	

**Table 3**  
The main indicator of biological age at men of advanced years and judoists-veterans

Indicators	Men of the corresponding age (n=34)	Judoists-veterans (n=34)	Reliability of differences
Test of Cooper, km	1,57±0,12	2,21±0,19	<0,05
Test of Stange, s	43,8±2,7	62,4±5,2	<0,05
Test of Genchi, s	6,4±0,4	11,6±0,6	<0,05
Bondarevsky's test, s	16,3±1,2	20,7±1,4	<0,05
Index of Ruffier-Dickson, s.u.	13,7±1,3	14,8±1,4	<0,01
Static balancing, s	6,2±0,5	9,3±0,7	<0,05
SHA (subjective health assessment), points	14,2±1,4	9,3±0,9	<0,05

organism at exit stage from elite sport. It gives opportunity to construct training and competitive processes of judoists-veterans.

2. We generalized results of testing of group of judoists-veterans. Having translated all received results of tests as a percentage in relation to norm, we have removed arithmetic average of these indicators. It also became «quantity of life» of judoists-veterans. It was 4,2–11,7% higher than norm by all age groups both at men, and at women.

3. It is proved that judo classes, the correct and positive image of life positively influence on health of judoists-veterans; promote the progress of their competitive activity. Data of our researches for 2009–2015 demonstrate that other effective remedies of development of functional reserves and decrease in biological age, except judo, is swimming (though 2–3 times for week); run (though 20 minutes for day or 40 minutes every other day); in the winter – skiing and skates, in the summer – riding by bicycle, rowing, work in kitchen garden; all the year round – gymnastics (if to carry out it with elementary apparatuses, the improving effect doubles); sports; accelerated walking. It is also necessary to note that, despite

of the existence of shortcomings of development of veteran and amateur judo in Ukraine, it should be noted the achievement of this category of sportsmen on the world scene. So, the Ukrainian sportsmen took prizes (in the aged categories) in the European championship, in the World Cup Ion judo only in 2011–2015. The obtained during the research data prove that judo classes, the correct and positive image of life positively influence on health of judoists-veterans, promote effectiveness of competitive activity.

4. The discrepancy to necessary scientifically-methodical requirements of the existing system of development of veteran judo, lack of model of development of veteran judo in Ukraine does such scientific perspective urgent.

**Prospects of the subsequent researches.** It is necessary to finish efficiency of mental conditioning on optimization of mental conditions of judoists-veterans due to: application of means of psychophysiological training, application of means of positive emotional influence in game method, techniques of muscle relaxation, acquaintance with questions of self-control of the mental state.

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