

Predominant influence of the age and/ or the performed work on the functional system recovery

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Abstract

Purpose: The aim of the research was to study the degree of the functional system recovery (On example of the heart rate) in younger (8) and older (20) age judokas with respect to age and performed work parameters.

Methods: The research was conducted in Georgia, on 80 male judokas' of the age of 8 (40 Judokas) and 20 (40 Judokas) years. The heart rate recovery rate was registered using BP 3AX1 with the length of one minute. The variation single-track analysis test - ANOVA was used to determine the dependence of heart rate decrease on age (8 and 20.). Quantitative data are presented as Mean, Standard Deviation, Maximum and Minimum values. Level of significance was set up at $p < 0.05$.

Research results: The obtained results in standard load conditions in the younger age (30.2 throws in average) compared to the older age (45.1 throws in average) confirmed the less working ability demonstration. As compared to the younger age subjects under the experiment, in the older age, despite a quantitatively greater volume of performed work, the recovery process went on at a faster pace (Heart rate recovery in 8 and 20 year: 125.9 and 109.7 beats / min in average).

Conclusions: 1. In the older age (20) - by 49.3% more work is performed than in the younger age (8). 2. Recovery degree in the older age is by 14.8% better compared to the younger age. 3. On example of changes in heart rate in the younger and older judokas the functional system recovery is more subjected to the age determination than to a factor of the amount of the performed work.

Key words: Judoka, Age, Training Load, HRr.

Introduction

Heart rate recovery monitoring is usually used to assess judoka's training status, being of a regular character in sporting practice. More specifically, the need for assessment of the training status is reasoned from the necessity of determination of the functional system recovery after loads, the body's physiological adaptation, training progress, growth of working ability and other characteristics.

The training factor is manifested mainly in the athlete's standard physical loading conditions, when the parameters such as age, gender, training experience, sport and others are taken into account. One of the common methods for assessment of the training quality is the heart rate monitoring after physical loading.

According to Vikulov et al. (2005), heart rate is considered as an indicator of the body's adaptive capacity, as the body's adaptation to the various environmental factors is largely dependent on the cardiovascular responses and optimal performance of regulatory mechanisms.

The team of researchers (Watanabe et al., 2001; Jouven et al., 2005; Nanas et al., 2006) reported that immediate and especially the later recovery of the heart rate is a direct indication of a possible sudden fatal result occurrence, which may be caused by a reduction in parasympathetic activity (Gibbons, 2002).

With that in mind, the International Associations of Sports regularly performs mandatory periodic screening of highly trained athletes (Andersen et al., 2010), which on the one hand, serves to exclusion of the above-mentioned cases, and on the other hand - to determination of the status of the training.

Generally it is known (Graettinger et al., 1995; Wilmore et al., 2008), that in conditions of the standard loading, in the same age pattern the more the athlete is trained the sooner heart rate reduces to the initial level (Therefore, study of the heart rate recovery is of significant clinical and sports use).

Nevertheless, the similar data are less available in different age patterns; especially poor information exists regarding to on which factors the heart rate recovery is more dependent, the standard physical activity or age.

Research aim

The aim of the research was to study the degree of the functional system recovery (On example of the heart rate) in younger (8) and older (20) age judokas with respect to age and performed work parameters.

The tasks of the research

1. Standard physical loading with maximum capacity of the persons under the experiment.
2. To determine the degree of functional system recovery on example of the heart rate (quantitative indicators).
3. To determine the predominant influence of the age and/ or the performed work on the functional system (on the example of heart rate) recovery.

Materials and Methods

Participants: The study was conducted in Georgia, on 80 male judokas of the age 8 (40 Judokas) and 20 (40 Judokas) years.

Measure: heart rate was registered by using BP 3AX1 at 5 minutes after the standard loading in continuous mode, with the length of one minute (Between 5th - 6th minutes of the loading completion)¹.

Statistical Analysis: The obtained data were processed by the statistical method by the computer program SPSS 19. The variation single-track analysis test - ANOVA was used to determine the dependence of heart rate decrease on age (8 and 20). Quantitative data are presented as Standard deviation, Mean, Maximum and Minimum values. Level of significance was set up at $p < 0.05$.

Results and Discussion

The research results are provided on the Figure # 1.

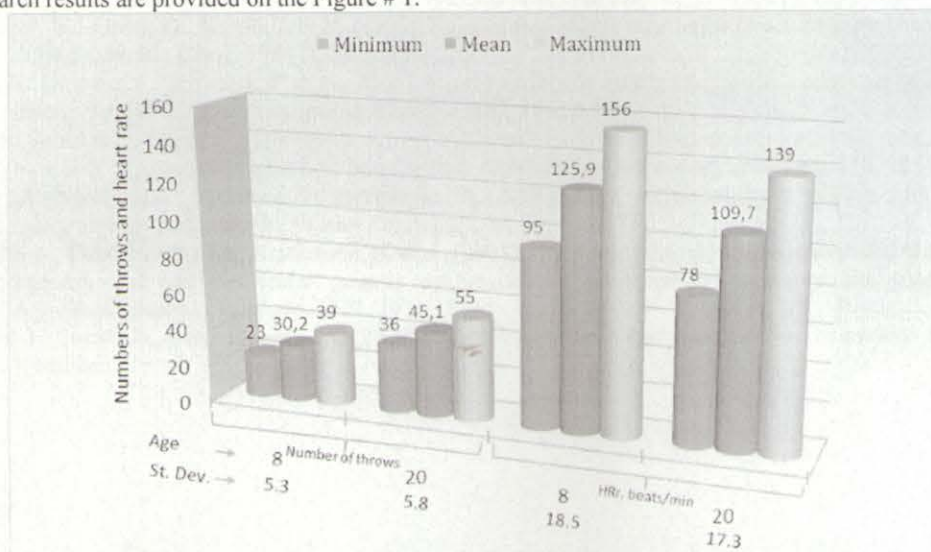


Fig. 1. Descriptive data of the test (throws) completed by judokas' and their heart rate recovery by age.

Dynamics of the data depicted on the chart shows that with taking into consideration both ages, the amount of the performed work (number of throws), as well as the recovery process gives a different picture.

According to the obtained results, in average 30.2 throws at 8 years of age, and by 49.3% more (better value) in average 45.1 throws at 20 years of age were performed, which, considering the standard time of loading - 100 seconds and the nature of the performed work, indicates to much less ability of demonstration of working ability

¹ In order to get a standard load in judokas, the speed-durability test has been developed, in which each judoka with a trainee (which did not resist him) alternately performing judo techniques (Seoi Nage, O Goshi, and Ashi Guruma), with a maximum speed performed throws during 100 seconds. It should be noted that this period of time (1.40 sec.) is much shorter in comparison with the major wrestling time duration, established by International Judo rules; and considering the trainees' body capacities the major time lasts from 3 (teen age) up to 5 minutes (adult age). Therefore, we can say that the test performance was not posing a threat to the health of the persons under the experiment.

at the younger age. This might be caused by existing deep differences of technical mastery and functional abilities of these two ages.

At 8 years of age, heart rate at 5 minutes after loading (Performance of throws during 100 seconds), decreased (recovery) in average only to 125.9 beats per minute, while at the age of 20 years by 14.8% - more as compared to it (better value) to - 109.7 beats per minute. This fact at the older age should indicate to economy of working ability and fast recovery on the basis of high-quality training.

The above mentioned determines that more volume of performed work at the older age group, which logically must have caused more fatigue and prolong the recovery process – is not a hindrance to the process of recovery at a faster pace compared with the younger age group under the experiment. This fact, considering discussed by us age and loading specific frames, underlines dominance of the age factor in the recovery process (which is viewed as an aspect of training) with respect to the amount of the performed work.

Conclusions

During a specified period of time (100 sec.) and in specific conditions of the standard physical loading (That means performance of the speed-durability test and revealing the judokas' working ability):

1. In the older age (20) - by 49.3% more work is performed than in the younger age (8).
2. Recovery degree in the older age is by 14.8% better compared to the younger age.
3. On example of changes in heart rate in the younger and older judokas the functional system recovery is more subjected to the age determination than to a factor of the amount of performed work.

References

- Andersen, L., Rasmusen, H., Madsen, J., Hansen, P. (2010). Heart screening of elite athletes. *Ugeskrift For Laeger*, 172, 3339-3342.
- Gibbons, R. (2002). Abnormal heart-rate recovery after exercise. *The Lancet*, 359 (9317), 1536-1537.
- Graettinger, W., Smith, D., Neutel, J. et al. (1995). Relationship of left ventricular structure to maximal heart rate during exercise. *Chest*, 107 (2), 341-345.
- Jouven, X., Empana, J., Schwartz, P. et al. (2005). Heart-rate profile during exercise as a predictor of sudden death. *The New England Journal of Medicine*, 352, 1951-1958.
- Nanas, S., Anastasiou-Nana, M., Dimopoulos, S. et al. (2006). Early heart rate recovery after exercise predicts mortality in patients with chronic heart failure. *International journal of cardiology*, 110, 393-400.
- Vikulov, A., Nemirov, A., Larionov, E., Shevchenko, A. (2005). Heart rate variability in subjects with increased motor activity and athletes. *Human Physiology*, 31 (6), 666-671.
- Watanabe, J., Thamilarasan, M., Blackstone, E. et al. (2001). Heart rate recovery immediately after treadmill exercise and left ventricular systolic dysfunction as predictors of mortality: the case of stress echocardiography. *Circulation*, 104, 1911-1916.
- Wilmore, J., Costill, D., Larry Kenney, W. (2008). *Physiology of sport and exercise (Fourth edition)*. Human Kinetics.