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Original Article

Influence of the age determination and athletic training factors on respiratory rate

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Abstract:
The aim of the study was to study the influence of judo training on respiratory rate.
Materials and Methods: The study was conducted in 2009-2011 in Georgia, in a variety of specialized sport groups on 2000 male judokas of the age from 8 - to 20 years. Respiratory rate was determined visually, observing changes in thoracic volume in the process of inhalation - exhalation. The variation single-track analysis test - ANOVA was used to determine the dependence of respiratory rate decrease on age (8-20.). Level of significance was set up at $p < 0.05$.
Results and Conclusions: on the basis of the research results was evaluated the degree of age and judo training factor influence on decrease of the respiratory rate. It is established (Fleming et al., 2011), that in the 10-year period (8 - to 18-years of age), respiratory rate decreases by 18 units in average in untrained persons, which is determined by the age, and in judokas this index decreases by 23.97 units in average. Index of the respiratory rate additional decrease by 5.97 units (23.97 -18) in judokas in the given age range compared with the untrained individuals is subjected to the training factor effect.
Key words: respiratory rate, age, athletic training

Introduction: The respiratory system function significantly improves by physical training effects. It affects the intensity of air exchange, which is expressed in better oxygen supply to the body and accumulated carbon dioxide elimination in needed quantities. This factor causes the economic performance of the body functional systems (Chitashvili 2005), and creating the necessary conditions for high working capacity. Decrease of respiratory rate is the best indicator of a sportsman's body higher working capacity.
The respiratory rate significantly decreases with the age increase. In healthy persons from 6 - to 12-years of age the respiratory rate per minute varies between 18 - 26, from the age of 12 – 17 this index is stabilized and makes 12-18. In a trained body the respiratory rate decreases and breathing deepens at rest, and in adults instead of 12-18, decreases to 8-14 (and sometimes to 4-6) (Sherwood 2006). However, taking into account that training in different kinds of sports and the form of involved activity execution have different requirements to human functional system, the respiratory rate should not vary to decrease by equal units and training in particular kinds of sports should be characterized by specific level of the respiratory rate decrease.

Research Aim: To examine the impact of training in judo on respiratory rate.
Objectives:
1. To study the respiratory rate of judokas of 8 - 20 years of age at rest.
2. Comparison of the respiratory rate of judokas and untrained individuals at certain age levels.

Materials and Methods:

Participants: The study was conducted in 2009-2011 in Georgia, in a variety of specialized sport groups on 2000 male judokas of the age from 8 - to 20 years. Age distribution of judokas is provided on the Figure #1.
Measure: The respiratory rate was registered during one minute at rest, in standing position. Respiratory rate was determined visually, observing changes in thoracic volume in the process of inhalation - exhalation.
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 respiratory rate decrease on age (8-20.). Quantitative data are presented as mean value, standard deviation, maximum value 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.

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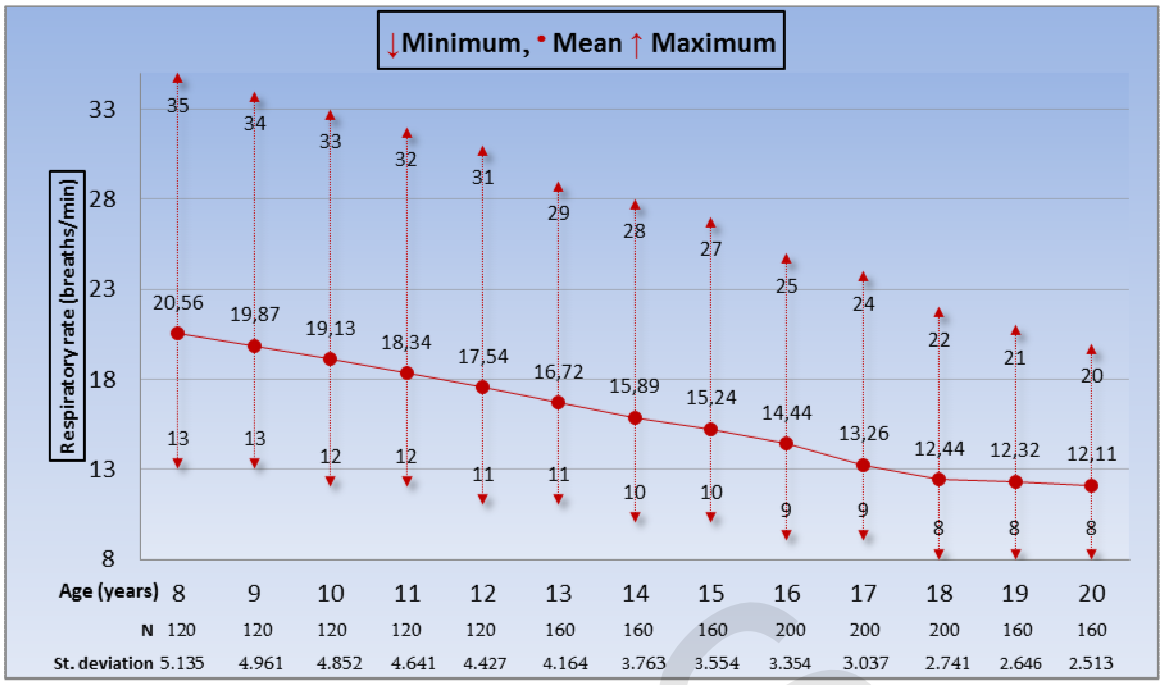

Fig. 1. Descriptive data of judokas' respiratory rates by age.

The data on the figure show that indices of respiratory rate minimum and maximum values at rest have the trend to quantitative decrease with the age increase. Their dispersion percent index is reduced as well: for example, minimum (13) and maximum (35) values of respiratory rate at rest in the 8-year-old children differ from each other by 169.2%. By 20 years of age the aforementioned data dispersion makes only 150% (8 and 20).

By mean values the highest respiratory rates are noted at the age of 8 (20.56), while the lowest are found at the age of 20 (12.11). At the age of 20, compared to the age of 8, the respiratory rate decreases by 8.45 units, meaning reduction of the respiratory rate by 69.8%.

Obtained by us respiratory rate data at rest were compared to the results, obtained by L. A. Wallis and I. Maconochie (2006) in relatively small number of untrained children at the age of 8-16 years. The data at both 8 and 16-year-old level largely coincided with each other and the error made only one unit, which could indicate the equal values of respiratory rate in trained and untrained persons.

Different results were obtained on the basis of summing up the results obtained by the latest research in 8 - to 18-year-old untrained children (Fleming et al., 2011) and our data. In case of 8-year-old age the respiratory rates in both data made almost identical amounts (20.67 and 20.56), but the difference was in pace of decline in respiratory rate in every subsequent age level. By their data for the age of 18 the respiratory rate made 15.33, and by our data it made 12.44. (Figure #1). The obtained results show that the respiratory rate in the untrained individuals from 8 - to 18-years of age reduces by 5.34 units (20.67-15.33) and 34.8%.
In judokas at the same ages the respiratory rate decreases by 8.12 units (20.56-12.44) and 65.3%.

Conclusions:
The respiratory rate mean values from 8 - to 20 years of age in judokas decreases from 20.56 to 12.11, by 8.45 units and 69.8%;
The respiratory rate from 8 - to 18 years of age in untrained persons decreases by 5.34 units, which is determined by the age. In judokas of the same age the respiratory rate decreases by additional 2.78 units (to 8.12) which are subjected to the training factor effect.

References:
Almansba, R., Sterkowicz, S., Sterkowicz-Przybycien, K., Belkacem, R. Maximal oxygen uptake changes during judoist's periodization training. (2010). *Archives of Budo,* **6**(2), pp.117-122.
Azoury, J. A descriptive study of Australian elite Judo players. (2002). *Journal of science and medicine in sport,* **5**(4), p. 36.
Beam, W. C., Adams, G. M. (2011). *Exercise Physiology (Sixth Edition)*. McGraw-Hill.
Callister, R., Callister, R. J., Staron, S. et al. Physiological characteristics of elite judo athletes. (1991). *International Journal of Sports Medicine* **12**(2), pp. 196-203.

Chitashvili, D. (2005). *Kardio-respiratoruli da kuntovani sistemebis funqcionireba fizikuri datvirtvebis dros.* Mecniereba, Tbilisi. (in Georgian).
Ebine, K., Tamura, S., Sato, K. et al. Echocardiographic analysis in elite Japanese judo athletes. (1993). *Medecine du sport* 67(1), 29-35.
Fleming, S., Thompson, M., Stevens, R. et al. Normal ranges of heart rate and respiratory rate in children from birth to 18 years of age: a systematic review of observational studies. (2011). *The Lancet,* **377**(9770), pp. 1011-1018.
Franchini, E., Del Vecchio, F., Matsushigue, K., Artioli, G. Physiological Profiles of Elite Judo Athletes. (2011). *Sports Medicine,* **41**(2), 147-166.
Krstulović, S., Zuvela, F., Katić, R. Biomotor systems in elite junior judoists. (2006). *Collegium Antropologicum,* **30**(4), pp. 845-851.
Jaraba Caballero, S., Pérez Navero, J. L., Ibarra De La Rosa, I. et al. Effects of physical exercise on the cardiorespiratory system in children. (1999). *Anales Espanoles De Pediatria,* **50**, pp. 367-372.
Laskowski, R., Wysocki, K., Multan, A., Haga, S. Changes in cardiac structure and function among elite judoists resulting from long-term judo practice. (2008). *Journal of Sports Medicine and Physical Fitness,* **48**(3), pp. 366-370.
Mcneill, M., John Wang, C. K. Psychological profiles of elite school sports players in Singapore. (2005). *Psychology of Sport and Exercise,* **6**(1), pp. 117-128.
Miller, M., Crapo, R., Hankinson, J. et al. General Considerations for lung function testing. (2005). *European Respiratory Journal,* **26**(1), pp. 153-161.
Naceur, J., Meghlaoui, F., Khelfat, K. Descriptive study of various morphological and physiological parameters among elite athletes. (1990). *Medecine du sport* **64**(3), pp. 136-141.
Ogawa, T., Spina, R. J., Martin, W. H. et al. Effects of aging, sex, and physical training on cardiovascular responses to exercise. (1992). *Circulation,* **86**(2), pp. 494-503.
Polataĭko, I. A., Radysh, I. V. Role of sport training in improving function of cardiorespiratory system. (2003). *Fiziolohichnyi zhurnal Kiev Ukraine 1994*, **49**(3), pp. 134-138.
Sbriccoli, P., Bazzucchi, I., Mario, A. et al. Assessment of maximal cardiorespiratory performance and muscle power in the Italian Olympic judoka. (2007). *Journal of Strength and Conditioning Research,* **21**(3), pp. 738-744.
Sherwood, L. (2006). *Fundamentals of Physiology*: *A Human Perspective*. Thomson Brooks/Cole.
Siddiqui, S., Patel, D. R. Cardiovascular screening of adolescent athletes. (2010). *Pediatric Clinics of North America,* **57**(3), pp. 635-647.
Steinhaus, L .A., Dustman, R. E., Ruhling, R. O. et al. Cardiorespiratory fitness of young and older active and sedentary men. (1988). *Br J Sports Med,* **22**, pp. 163-166.
Stratton, J. R., Levy, W. C., Cerqueira, M. D. et al. Cardiovascular responses to exercise: effects of aging and exercise training in healthy men. (1994). *Circulation*, **89**, pp. 1648-1655.
Thomas, S. G., Cox, M. H., LeGal, Y. M. et al. Physiological profiles of the Canadian National Judo Team. (1989). *Canadian journal of sport sciences (Journal canadien des sciences du sport),* **14**(3), pp. 142-147.
Tumilty, D., Hahn, A., Telford, R. A physiological profile of well-trained male judo players, with proposals for training. (1986). *Excel* **2**(4), pp. 12-14.
Wallis, L., Healy, M., Undy, M., Maconochie, I. Age related reference ranges for respiration rate and heart rate from 4 to 16 years. (2005). *Archives of Disease in Childhood*, **90**(11), pp. 1117-1121.
Wallis, L. A., Maconochie, I. Age related reference ranges of respiratory rate and heart rate for children in South Africa. (2006). *Archives of Disease in Childhood*, **91**(4), pp. 330-333.
Wilmore, J. H., Costill, D. L., Larry Kenney, W. (2008). *Physiology of sport and exercise (Fourth edition).* Human Kinetics.
Winter, E. M., Jones, A. M., Davison R. C. (2007). *Sport and exercise physiology testing guidelines.* Routledge.
Zimkini, N. V. (1982). *Fizikuri agzrdisa da sportis piziologiuri sapudzvlebi.* Ganatleba, Tbilisi. (in Georgian).
Zubitashvili, G. Adjusting the training process in judo according to physical and functional parameters. (2011). *Education, Physical training, Sport,* **3**(82), pp. 68-75.