STUDIES OF HEART RATE VARIABILITY INDICATORS IN WRESTLERS OF DIFFERENT WEIGHT CATEGORIES AT VARIOUS TRAINING PHASES

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Efficient organization of training and competitive actions and enhancement of athletes' physical working capacity consists in optimizing the body's functional status at different training phases. The problem of increasing capabilities and physical working capacity of the body in conditions of progressive training load during the year macrocycle at the obvious disparity in the anthropomentric indicators is a relevant task of the modern sports science [3, 4, 2].

The purpose of the study was to examine heart rate variability in wrestlers of different weight categories at various training phases.

Organization of the study. 55 judokas ranked as candidates for master of sport and masters of sport aged 16-23 years were involved in the study.

On the basis of anthropometric indices the subjects were divided into three groups: lightweight - 60-73 kg (n=24), medium weight - 73-90 kg (n=18) and heavyweight - over 90 kg (n=13).

The study of heart rate variability was conducted in accordance with the methodology of R.M. Baevsky [1] using a computer system for heart screening "Cardiovisor" and the electrocardiographic system "Valenta +", equipped with PC "Toshiba L30" with the appropriate software. While implementing this methodology on the basis of medical diagnostic system "Valenta +" cardiorhythmograms were made in the 1^{st} and the 2^{nd} standard leads. In addition, 200 cardiointervals were recorded, which helped to significantly reduce the timeline of the survey and is recommended in screening examinations. The analyzed indicators included amplitude of the mode (AMo), variation range (ΔH), tension index (TI, c.u.).

The studies were held in different periods of the year training macrocycle: pre-season (August-October), regular season (November-March) and off-season (April-July) .

Results and discussion. The study testifies to the present essential variance among wrestlers of different weight categories in respect to the heart rate variability indicators in different training phases (Tab. 1-3).

Table 1. *The heart rate variability indicators in wrestlers of various weight categories in pre-season of the training-competitive cycle*

Rhythmogram	Lightweight	Medium weight	Heavyweight

indicators			
AMo	32,9 ± 2,55	35,2±2,81	32,1±3,56
ΔX	7,2±0,45	6,2±0,49	7,3±0,85
TI, c.u.	66,5±10,6	48,9±10,87	28,3±20,05

AMo indicators did not differ much in wrestlers of various weight categories at different periods of the year training cycle. In the pre-season the highest indicators were detected in medium weight wrestlers 35,2±2,81%. Heavyweight athletes had slightly lower indicators comprising 32,1±3,56% ($p>0,05$).

The most remarkable differences in the studied groups of judokas were revealed at the basic phase of the training-competitive macrocycle (Tab. 2). The AMo indicators of lightweight wrestlers were significantly lower than in medium and heavyweight athletes. Compared with the pre-season this index decreased significantly in lightweight wrestlers, but, on the contrary, increased in heavyweight wrestlers by 26,5% on the average, indicating expressed predominance of the sympathetic channel of heart rate regulation.

Table 2. *The heart rate variability indicators in wrestlers of various weight categories in actual season of the training-competitive cycle*

Rhythmogram indicators	Lightweight	Medium weight	Heavyweight
AMo	30,1±3,21	34,4±3,85	40,6±4,26
ΔX	7,5±0,46	7,5±0.61	7,2±0,5
TI, c.u.	97,7±13,63	85,5±12,83	42,1±8,83

In the off-season the indicators of medium and heavyweight athletes decreased to 35,4 ± 3,31% and 31 ± 2,43%, respectively. In lightweight athletes the mean value of AMo significantly increased in comparison with the pre-season and the actual season 35,5 ± 2,99% ($p <0,05$).

Thus, the changes in the AMo indicator at different phases of the wrestlers' year macrocycle suggest a significantly intensified sympathetic regulatory circuit in the season for heavyweight wrestlers and in the off-season for lightweight wrestlers.

The ΔX indicators of wrestlers of different weight categories differed too. In the pre-season the ΔX indicator was 6,2 ± 0,49 for medium weight wrestlers, which was significantly lower than that of light and heavyweight wrestlers, 7,3 ± 0,85 and 7,2 ± 0,5 ms respectively ($p < 0.05$).

With the growth of fitness level the activity of vagal heart rate regulation in medium weight wrestlers increased significantly - by 21%, while in light and heavyweight wrestlers it was virtually the same, as evidenced by the ΔX indicators, registered in athletes in the pre-season. In the off-season the indicator of the variation range did not change significantly in relation to the pre-season. But, it was significantly lower in heavyweight wrestlers rather than that in light and medium weight wrestlers. The detected changes in ΔX indicate that medium weight wrestlers react most adequately to the load performed at different training phases (Tab. 3).

Table 3. *The heart rate variability indicators in wrestlers of various weight categories in off-season of the training-competitive cycle*

Rhythmogram indicators	Lightweight	Medium weight	Heavyweight
AMo	35,5±2,99	31,0±2,43	35,4±3,31
ΔX	7,5±0,43	7,5±0,35	7,1±0,78
TI, c.u.	46,8±12,65	48,0±19,03	32,7±5,27

TI (according to R.M. Baevsky) [5] characterizes the degree of tension of the central mechanisms of heart rate regulation. In the pre-season the highest indicators of tension index were detected in lightweight wrestlers - 66,5 ± 10,6%, testifying to the tension in the mechanisms of heart work regulation at the beginning of the sports season. The optimum values of TI at this phase were noted in heavyweight wrestlers (28 ± 20,05%). In medium and heavyweight wrestlers this index was significantly lower and amounted to 48 ± 19,03 and 28,3 ± 20,5% respectively. The results obtained in the actual season, retained the observed differences. The tension indices of light and medium weight wrestlers were still much higher (97 and 85 %, respectively). In comparison with the pre-season the indicators of heavyweight athletes increased significantly (42.1%). Tension indices of light, medium and heavyweight wrestlers became significantly lower and comprised 48 and 33% accordingly. In comparison with the pre-season, the indicators of heavyweight athletes have changed significantly and amounted to 11.6%. In addition, the indicators of medium and lightweight athletes differed a lot from those in the pre-season (1,2 and 25,5 %). In the off-season the TI indicators of heavyweight athletes declined significantly and amounted to 76%. The changes were not significant in medium weight wrestlers (85,5 %). The significant upward trend in the indicators was marked in lightweight representatives as compared with the actual season (18,9%), an increase was noted in medium weight wrestlers (32,4%) and a decrease in heavyweight wrestlers (80,4%). In the off-season the

indicators of medium weight athletes were significantly lower than those of light and heavyweight wrestlers.

Conclusions. Physical fatigue athletes suffer from due to the use of training load inadequate to the functional status of their body is accompanied by the decreased respiratory undulation and slow wave amplification. The stipulated changes are of predictive value and indicate fatigue or overtraining of athletes.

The studies of the relationship of heart rate variability combined with athletes' technical and tactical fitness in view of the variance in body proportions stipulated for the allocation of the most efficient techniques for wrestlers, which will promote the capacities for individualizing the process of learning and developing technical skills in the future, improving, in its turn, the quality and cutting the time of training of top wrestlers.

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