DYNAMICS OF CHANGES IN THE FUNCTIONAL STATE OF QUALIFIED VOLLEYBALL PLAYERS DURING MACROCYCLE

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Abstract:

To achieve maximum results in sport necessary to optimize the functioning of the cardiovascular system, that is an indicator of adaptive responses of physical exercises. Knowledge of the formation of the functional state of athletes in their preparation for the season as well as during the season has important meaning for the rational construction of the training process and the possibility of adjustment in order to achieve optimal results (Briskin Yuriy, Pityn Maryan & Tyshchenko Valeria, 2016).. In this context, the aim was to determine the nature of the changes to operational readiness of qualified Volleyball players in the preparatory periods of training and competition. In this article were gotten characteristics of the functional state of cardiorespiratory system, the analysis of heart rate variability of qualified Volleyball players was tested. It wasfound that for the control of the functional state of the athletes it is advisable to use the method of analysis of heart rate variability as the most objective and informative.

Dynamics of the functional state of cardiorespiratory system of qualified Volleyball players showed during the year that at the beginning of the preparatory period were recorded average for this type of sport, the absolute values of almost all functional parameters, characterizing the level of their overall physical capacity, aerobic endurance, muscular activity energy supply. In preparation for the season, a marked optimization of the functional readiness of the qualified Volleyball players. At the end of the competition period from the Volleyball team recorded deterioration in the level of functional readiness, caused by the build-up to this period signs of the natural fatigue of the body. The studies were carried out during an annual work and competition macrocycle at the start and at the end of pre-season and at the start and at the end of contest season. 32 players of both teams (Sanest KH and HL Long An-A1) aged 18-32 – were involved in study.

***Key words**: capacity, Volleyball players, annual macrocycle, physiological indicators.*

1 INTRODUCTION

Biomedical support of sports activity is very important today (Phuong LQ, Bao DQ, 2002). Track and field and endurance sports, which include volleyball, differ from other kinds of sports due to the rapid movement and very heavy motor activity. There is no doubt that the main functional systems that provide activity during out-of-session sessions and competitions include the central nervous system, the peripheral nervous system and the locomotive system (Malíkov, M.V. et al. 2006).

Cardiorespiratory system is a system that is responsible for energy requirements, especially during short breaks not connected with game activity (Hiep LQ, Uyen PT,1995), . This question requires deeper research, and that is why the determination of the fitness aspect of cardiorespiratory system of top players is of particular relevance.

Analysis of recent research and publications

Currently the heart rate variability test becomes very popular during cardiological tests (Sysoyev, A.V. & Popova, I. Ye. 2012). This test is based on determination of sequence of RR intervals on electrocardiogram. This method allows you to get information about the impact of vegetative nervous system and a number of humoral and reflex factors on heart performance. The heart rate variability test allows you to

assess the fitness shape of an athlete and to follow the dynamics and detect the pathological conditions (Bayevskiy, R.M. 2004; Mikhaylov, V. M. 2008). Besides, this test provides the possibility to foresee the malfunctions of cardiovascular system and to get information about adaptation reserves of the body. Reduction of parameters indicates a violation of interaction of vegetative nervous and cardiovascular systems as well as results in pathologies associated with heart performance (Sheykh-Zade, YU.R. & Kudryashova, Ye.A. 2009). The athletes have the highest parameters of heart rate variability and high parasympathetic tonus.

Rhythm and heart force are very sensitive to any stress and contain data about the state of regulatory and adaptive abilities of organism, and force increase depend on the increase of parasympathetic regulation link during work-out session (Blokhin, A.V. 2003; Godik, M.A. 1981). This method allows you to register the shift of neurohumoral balance, involvement of sympathetic and parasympathetic, nerval and humoral links of cardiac beat rhythm regulation and the degree of centralization of its control. Investigating the indicators of heart rate variability within the dynamics of annual cycle and the effectiveness of competitions activity of qualified Volleyball players, it was found out that at final stage of competitions the objects of control showed the worsening of vegetative regulation of heart rate (Kudrya, O.N. & Verner, V.V. 2008). It indicates that the players have accumulated a significant uncorrected fatigue that becomes stronger by the end of specific period and is accompanied by a decrease in efficiency during the games (Suslov, F.P. & Shepel', S.P. 2009; Ivanova, N.I. 2010). It concerns both individual athletes and a team as a whole.

The aim of the research: Examinetion the peculiarities and dynamics of functional state qualified Volleyball players during the annual macrocycle.

The object of research: The system of training in Volleyball.

2. Results

The beginning of the preparatory period shows average and below average levels of indicators of overall physical efficiency and energy security of athletes going in for Volleyball. At the end of the preparatory period, there was a significant increase in the level PWC_{170}, (25%), both absolute (aPWC_{170}) (P<0.01), and relative (rPWC_{170}) (P<0.001) compared with the initial values. Thus PWC_{170} increase in compare with start of pre-season was 36% (P<0.001). According to V. Ignatyeva (Ignat'yeva, V.YA. et al. 2005) the ideal indicator of relative physical efficiency for top qualified Volleyball players was 20 kgm/min/kg that is rather high value for Volleyball players. MCS level tended to increase 14% (P<0.05). At the same time the most significant changes were noted in respect to parameters characterizing anaerobic, specifically for Volleyball, endurance of team players. Significant increase was noted as for indicators of anaerobic alactic (on 60%, (P<0.05)) and lactic (on 29%, (P<0.01)) power *(Figure.2.1).*

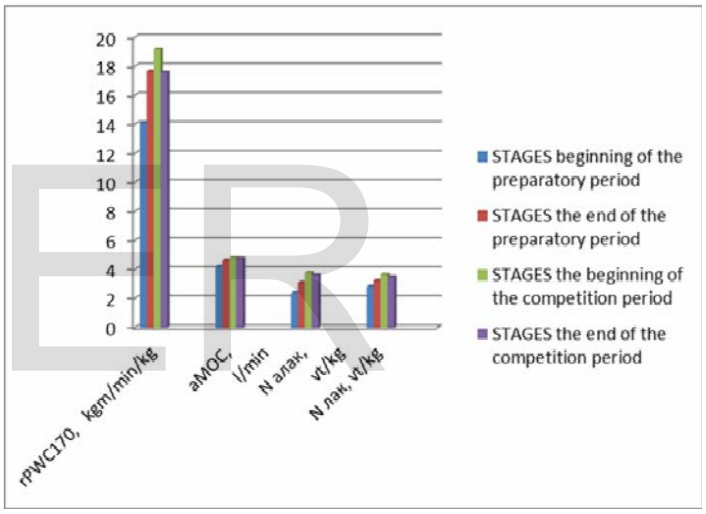

Figure.2.1 Indicators of functional readiness from qualified Volleyball players in the research stages

The analysis of central hemodynamic parameters at start of pre-season indicated the matching of system arterial level with standard indicators. Normocardia and volume indices of central hemodynamics (SBV, ml; MBV, l/min) are within the upper limits of age and physiological norms. Arterial pressure behavior throughout the study does not seem to be statistically reliable, but it shows a clear tendency to decrease of all indicators from the start of pre-season to the start of contest season as well as stabilization of these figures until the end of the contest season, which corresponds to available reference datum. It was confirmed that there was a faster growth of anaerobic endurance combined with significant positive changes of their overall physical performance and aerobic endurance.

Chronotropic heart function was significantly

reducing by the end of pre-season and by the start of contest season it shifts to the mode of functional sports brachycardia – decrease in heart rate compared to the start of pre-season by 19%, followed by stabilization till the end of the contest season. It was registered that 52% of Volleyball players have high level of myocard capacity. As for the myocard metabolic reserve there were no low indicators. The relative myocad metabolic reserve indicator was at normal lever by 96% of Volleyball players.

Reduction of minute blood volume MBV can be treated as optimization of volume central hemodynamics, intense economization of myocard performance under the influence of correct training program. It is known that too MBV volume gives so-called "volume load", that loads the heart above the norm, reduces blood flow velocity and normal hemodynamic functioning of the body. The tendency to its increase by the end of contest season along with performance decrement is interrelated. By the start of contest season there was steady although nonsignificant decrease of stroke volume. Increase of stroke blood volume SBV by the end of contest season to the level of pre-season had no significant nature either. Minute blood volume behavior was of the same nature as stroke volume behavior, which indicated the economization in vascular blood circulation.

Electrocardiographic parameters of cardiac output were rated as 4 according to five-grade scale at the moment of examination. This indicated the absence of maximum values. Single arrhythmias due to dysfunction of automatism were defined. These arrhythmias were very often during the pre-season, during the contest season that was connected with dysfunction of transition. The analysis of heart rate variability at start of pre-season indicates the balanced regulatory vegetative mechanisms and reflects a high degree of centralization of heart rate regulation.

Currently the heart rate variability test becomes very popular during cardiological tests. This test is based on determination of sequence of RR intervals on electrocardiogram. This method allows you to get information about the impact of vegetative nervous system and a number of humoral and reflex factors on heart performance. The heart rate variability test allows you to assess the fitness shape of an athlete and to follow the dynamics and detect the pathological conditions. Besides, this test provides the possibility to foresee the malfunctions of cardiovascular system and to get information about adaptation reserves of the body. Reduction of parameters indicates a violation of interaction of vegetative nervous and cardiovascular systems as well as results in pathologies associated with heart performance. The athletes have the highest parameters of heart rate variability and high parasympathetic tonus.

The most probable lever of functioning of cardiovascular system in terms of minute volume from physiologic point of view (RR interval value which is most common and indicates the dominant level of sinus node functioning) let us to evaluate the actual condition of regulatory systems. Mode performances at sympathotony are minimal, at vagotony they are maximal. The mode performances of Volleyball players varied within the macrocycle. The degree of variability of variation range (dRR, ms) cardiointervals values in studied statistical series showed the decrease during the contest season. There was an increase of activity of sympathetic section of vegetative nervous system and of stress index central regulation loop condition.

SDNN (standard deviation normal to normal) is an integral indicator of heart rate variability and depends on the influence of sympathetic and parasympathetic sections of vegetative nervous systems on sinus node. The findings showed that there was a stress of systems responsible for compensation and adaptive abilities in relation to heavy physical activity during the sub-season. The researchers observed a few cases of upper performance limits that indicate an increased parasympathetic activity of vegetative nervous system. Differently directed changes of SDNN indicate a shift of vegetative balance towards the predominance of various section of vegetative systems. 17% of Volleyball players had a significant growth of SDNN that indicates the increased activity of vegetative regulation loop. Combined effect of SDNN vegetative blood circulation regulation (reflects all periodic components of variability of heart rate variability consolidated figures) decreased as well.

Mode amplitude (AMo, %), reflecting the stabilizing effect of centralization of heart rate control, which depends on activation degree of sympathetic

section of vegetative nervous system, and reflecting the degree of rhythm rigidity, was changing in sinuous manner. A single increase of mode amplitude was an indicator of predominance of sympathetic influences on sinus mode and significant rhythm rigidity *(Figure.2.2)*.

3. Conclusions

Reduction of parameters indicates a violation of interaction of vegetative nervous and cardiovascular systems as well as results in pathologies associated with heart performance. The athletes have the highest parameters of heart rate variability and high parasympathetic tonus.

This study made it possible to conduct a longitudinal study of fitness shape and functional status of qualified athletes, Volleyball players, of the same type and using one method. Dynamics of physical performances and energy systems condition shows positive influence on the work-out processes during and before the contest seasons as well as shows relative lack of tools for maintaining the high level of physical efficiency and preventing the signs of fatigue in energy supply systems during the contest season. Cardiovascular system performance and its dynamics during the whole testing period indicate the maintaining a high level of hemodynamic servicing the athletes' bodies. However, at the end of contest period there is a hyperkinetic syndrome, which is a sign of lack of tools to not only maintain the optimal regulation of cardiovascular system but to increase its performance capabilities. Maintaining a high level of vegetative homeostasis indicates the certain fitness level of athletes, sufficient to maintain the high potential of sympathetic-adrenal system and to overcome fatigue processes during activity. The findings suggest the necessity to search for the methods and tools that can adjust and optimize the athletes' performance capabilities at more effective level just at the right period of competitions.

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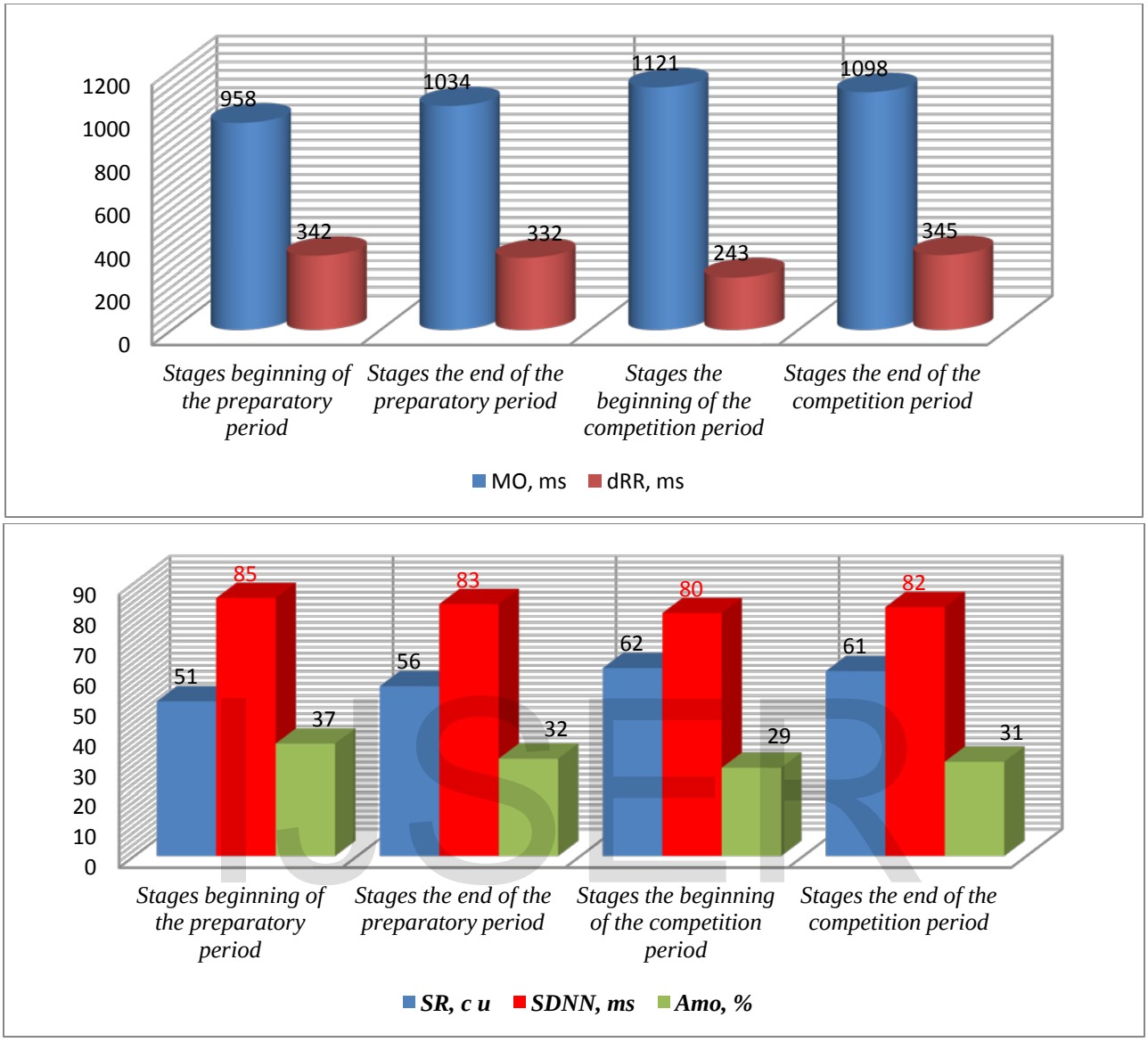

Figure:2.2 Indicators of autonomic regulation from qualified Volleyball players in the research stages