Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PL-004

Research on Monitoring power endurance training effect of Synchronized Swimmers

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Objective To explore the usage of heart rate and derivative index, such as quick recovery index (QRI) and training impulse (TRIMP), to monitor and evaluate load level at physical training course. With simplified load evaluation program, we can accurately feedback load stress and recovery conditions of the athletes, so as to timely adjust training load and avoid sports fatigue.
Methods Maximum oxygen uptake is tested to determine maximum heart rate of the athletes, which can be used as the basis for monitoring assessment of physical training load. During training phase, monitoring the variation of the relative index of HR and sleeping conditions of 10 athletes by Firstbeat. The test means was High-intensity interval endurance of climbing machine in 7*20s-20s before and after stage training. The main indexes include of QRI/TRIMP/EPOC/BLa\climbing height.
Results It's shown through monitoring that maximum heart rate of the athletes in the physical training course is up to 200BPM, which prompts high load level during training. Such athletic ability is promoted to satisfy the demands for complex choreography. Characteristics of energy supply for power endurance with high intensity closely agree with physical fitness demand during synchronized swimming competition, which is general performance of strength, speed and endurance. Through comparison of data on testing power endurance of climbing machine in 7*20s-20S before and after training, average climbing height of the athletes is increased from 60.1m/20s to 62.4m/20s with increased range up to 3.8% and blood lactate level is decreased from 10.7mmol/L to 10.5mmol/L in 2 minutes after exercise, which can be regarded as slightly improvement of ability of the athletes for lactate decomposition and fatigue relief, and aerobic capacity of the athletes are improved to a certain degree. After training, heart rate QRI and TRIMP of the athletes are improved slightly. Among them, QRI is significantly improved from 19.6% to 21.6% after stage training, which shows slightly improvement of training quality and recovery capability of the athletes, i.e. adaptive capacity to training load; After physical training, research on monitoring QRI of the athletes during arrangement and relaxation shows that maximum heart rate level without voice guidance is 75.1bpm,which is higher than those with voice guidance 72.9bmp after 5-min quick recovery; QRI of the athletes is 31.9% when voice is used to guide relaxation, which is significantly higher than those without relaxation under voice guidance (QRI is 27.0%); night pressure monitoring unit (BodyGuard2) of Firstbeat is used to monitor sleeping conditions of the athletes. In the initial stage of heavy load training cycle, training load enables athletes to produce a strong stress response, which causes relatively poor sleeping and recovery conditions; with gradual adaptation of the athletes to the training load, in the middle and later stages of the cycle, stress response of the athletes during sleeping almost disappears, and their sleeping quality and recovery conditions are improved significantly.
Conclusions Through Power endurance training, lactate elimination capacity of the athletes, i.e. anti-fatigue capacity and quick recovery capability are improved; during quick recovery of the athletes, voice guidance can be used to effectively promote quick recovery of the athletes. Exercise heart rate, TRIMP and QRI can be used to perceptually and rapidly monitor completion of physical training load in a real-time way, Objective to evaluate recovery and sleeping conditions of the athletes, and effectively evaluate high-intensity interval physical training load and training effect.