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Research about Training Monitoring during Different training periods in Chinese Elite Swimmers

Junqiang Qiu,Mingxing Li,Longyan Yi,Zhaoran Hou,Fan Yang,Yiming Yao
Beijing Sport University

Objective Training monitoring has become an integral component of total athlete training. Systematically monitoring the physiological and biochemical variables related to performance helps coaches and athletes to measure the effectiveness of their training programs and decide how to revise or update those programs, especially in swimming training. The key purpose of this study is to evaluate the physical function characteristics during preparation season and stress response during competition training sessions in 2017, and provides the helpful data for scientific training for the implementation of the preparation process.
Methods During the preparation period, the National Swimming Team athletes were planed to screen and test the physical function characteristics. There are 39 male athletes and 37 female athletes to participate in the study. Body composition was assessed with dual energy X-ray (DXA). Anthropometric characteristics were assessed using Anthroscan 3D VITUS body scanner, and pulmonary function test using CHEST portable lung function meter(HI-101). During the competition period, the training load monitoring targets were 2 elite players who participated in XVII World Aquatics Championship in Budapest-2017 and the National Games 2017. The monitoring methods mainly included: blood tests (including Hb, CK, BU, testosterone, cortisol and ferritin etc.) were used to monitor the athlete's fitness functional status, and the Z-score method was used to express the index changes of two athletes; blood lactate was used to monitor the training load of athletes, and urine indexes were used to monitor body fluid balance and fatigue.
Results 1. During the preparation period, the weight of male athletes is 78.4±8.2kg, the percentage of body fat is 15.9±2.8%, the weight of female athletes is 64.8±6.6kg, and the percentage of body fat is 24.2±3.5%. The vital capacity(VC) was 6.65±0.87 L for males and 4.86±0.69 L for females, the value of forced vital capacity(FVC) was 4.29±1.33 L for males and 3.43±0.96 L for females, and the mean value of ventilation per minute was 148.1±23.12 L for males and 110.4 ± 19.67 L for females. 2. During the competition preparation period, Z score was used to express the blood indicators of two athletes, before the XVII World Aquatics Championship in Budapest-2017, the Z score of Hb, T, T/C ratio and ferritin were (-0.5, 0, -0.4, 1.1) and (-0.8, -0.1, -1.0, 0), respectively. Before the competition of the National Games, the Z scores were (1.0, 0.3, 0.7, 0.6) and (1.4, 1.0, 0.1, -0.6) respectively. 3. Training load monitoring was carried out using the blood lactate control test, as the training load increased, the athletes' performance improved and the lactate level increased slightly. 4. The urine indicator test is used to observe the athlete's dehydration and recovery. On the second morning after the intensive training day, both athletes were negative for urine protein and with normal urine specific gravity.
Conclusions 1. The screen and tests about the physical function characteristics of swimming athletes during preparation period is useful to develop a personalized training plan; 2. Z-score is easy and feasible for the elite swimmers to monitoring physical fitness capabilities, and higher Z-score is related with better athletic performance; 3. Blood lactate control test can be used for the training intensity monitoring of swimmers, athletes show higher levels of lactic acid metabolism and higher athletic performance before the competition.