



# A Summary of the Changes and Precautions of Swimmers before and after Weight Reduction Training

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## Abstract

This article focuses on the training arrangement of swimming athletes before the competition, using literature review as the main research method. Official websites such as China National Knowledge Infrastructure (CNKI) and Google Scholar were utilized to search for relevant literature using keywords such as “swimming taper training”, “swimming training reduction” and “swimming pre-competition reduction training”. The translated and organized literature serves as the theoretical basis for writing. By extensively reviewing existing domestic and international research literature, the scientific training arrangement for swimming athletes before the competition was analyzed. The systematic literature analysis method was applied to gain valuable insights into the scientific taper training patterns for swimming athletes. Additionally, the author provides their own perspectives on the post-taper training for swimming athletes.

## Subject Areas

Sports Science

## Keywords

Weight Reduction Training, Weight Reduction before Competition, Swimming Method, Training Mode

## 1. Introduction

Swimming is another major sports event in the modern Olympic Games with the number of gold medals second only to track and field. The total number of gold medals is as high as 32. Therefore, this event has also attracted the attention

of athletes and coaches from various countries and has become a “must-have for military strategists”. But in fact, with the passage of time and the accumulation of experience in various large-scale competitions, the world’s top athletes have reached a very high level in terms of skills and tactics. At this level, the marginal benefits have gradually decreased, and it is difficult to achieve greater improvement. Therefore, coaches have to try to improve athletes’ sports level by changing training or other methods.

It is well known that long-term high-intensity training reduces an athlete’s muscle strength, which in turn reduces the athlete’s athletic performance. In order to allow athletes to compete in an optimal competitive state, some coaches usually adopt so-called “reduction training” to help improve athletes’ sports performance. The biggest feature is that during this training cycle, the training volume presents a tendency to taper decreases. According to data, in the first 7 to 21 days of a major event, gradually reducing the amount of training can help athletes improve their performance by 2% - 4%.

Competitive swimmers usually focus on optimizing their own sports performance in a single game and neglect to enter a better competitive state through pre-competition training adjustments. However, although some coaches have gradually accepted and used this training method, there are few studies to reflect the physical and mental changes of swimmers after weight reduction training and the matters needing attention. This paper intends to fill a gap in the field through multiple experiments and introductions to professional swimmers.

## **2. The Method of Weight Loss Training in Swimming**

A taper is a training phase that can generally be defined as a training cycle lasting days to weeks or even months in which the athlete gradually reduces the amount of exercise per session while maintaining training intensity. The actual principle can be understood as exercise physiology is excess recovery, by reducing the amount of exercise training, reducing the load on the muscles, and increasing the rest time to help reduce muscle fatigue. Its purpose is to help athletes recover and maximize their physiological adaptations to compete more energetically and improve athletic performance.

The main performance of sports training is training intensity, duration and training frequency. An adequate combination of these features is a prerequisite for effective training. According to the physiological and metabolic characteristics of different competitive events, different requirements for training will also be put forward. Top swimming competitions usually last from 22 seconds to 15 minutes (50 meters to 1500 meters), and the athletes’ metabolism is mainly based on anaerobic metabolism and aerobic glycolysis. Therefore, in the training process, the main purpose is to improve the metabolic capacity of athletes.

Weight reduction training is the key link between daily training and competition, and it is also an extremely important training stage to ensure that the training effect can be performed normally or abnormally in the competition [1]. However, weight loss training will result in completely different models due to

differences in athletes' gender, age, competition events, etc. Therefore, the weight loss plan cannot be simply understood as reducing the amount of training athletes before the game or stopping training. It needs to be determined by the coaches and swimmers. Athletes discuss and develop an exclusive training plan together. In terms of gender, male athletes need more reduction training than female athletes; in terms of competition types, short-distance athletes need more reduction training than long-distance athletes; in terms of muscle type and physical fitness, even two athletes of the same sport who participate in a unified training program will also produce different lactic acid and show different lactic acid tolerance during training and competition, so athletes who tend to produce more lactic acid or have higher lactic acid tolerance usually More tapers are needed.

The training volume is usually very high compared to the relatively short game time. The main part of this volume swimming training is usually performed in the low intensity range. Given the demands of competitive swimming, especially in the 50 to 400 m events, a lower overall training volume and an emphasis on high-intensity training appears to be an option.

### **3. Changes of Swimmers after Reduction Training before Competition**

#### **3.1. Physiological Changes of Swimmers after Weight Reduction Training**

1) Muscle strength enhancement of athletes [2]. A survey study on swimmers' pre-competition weight reduction took 12 college male swimmers (average age  $20.6 \pm 0.8$  years; average weight  $71.2 \pm 3.5$  kg; average body fat rate  $8.0\% \pm 0.7\%$ ) as the research subjects [3]. The usual practice runs in normal mode, and swimmers are tested twice to help them become better acquainted with the testing procedure.

Their swim taper period lasted a total of 21 days, after which the swimmers competed in a state swimming championship. According to the experimental requirements, the total distance of each training is gradually decreasing. The reduction in total distance swam was accompanied by a reduction in the amount of interval and non-interval swimming performed during swimming practice. Non-interval swimming consists of warm-up, interval swimming and warm-up. Interval swimming consists of interval swimming at an average intensity ranging from 80% - 120% of a swimmer's aerobic capacity. It should be noted that swimmers typically train using interval training. This swimming pattern continues during tapers.

They used bungee cords to test strength changes before and after tapers at the end of the season. The results show that after the reduction training, the strength of the swimmers increased by 5% on average; the distance of each stroke of the athletes increased significantly. This group of school team members also participated in another test. Five of the 12 players had their body hair removed at the beginning of training to compare the changes in each stroke force and stroke

distance before and after shaving their entire body hair. Although no significant differences were found in the athletes in terms of muscle strength, when testing their stroke efficiency, it was found that the efficiency of each stroke increased by 5% for these 5 athletes.

2) Athlete's muscles contract faster. Athletes have faster muscle contraction [4]. An experiment involving taper training for swimmers recruited six college swimmers for the study. They first went through 5 months of regular training. Every athlete needs to maintain a training volume of 6000 - 8000 meters per day, and then perform weight reduction training to compare the changes in strength and muscle fibers before and after weight reduction training. And before the state championship, the athletes' project performance, water strength, muscle slide samples and other physiological and biochemical indicators were compared with the data before weight reduction training.

Test results show several athletes with an average improvement of 7% - 20%, but this depends on the isokinetic speed of the arm stroke. The data showed no significant change in type I fiber diameter among these athletes. However, type IIa fiber diameter increased by 11% after thinning, type II a muscle fiber (for short-distance athletes, the rapid contraction and relaxation of muscles is conducive to better performance) increased by 67%, and the power has increased by about twice compared to before [5]. The most important thing is that the swimming performance of the athletes increased by 3% - 4.7%; the athletes swam faster. Another study of 14 swimmers from the São Paulo Aquatic Federation showed that after 11 days of taper training, the athletes improved their 200 m performance by an average of 1.6% (the 200 m freestyle time was about 2 seconds higher than before) [6].

3) The athlete's arms become stronger. In the study of the swimmers coached by the famous swimming coach Eddie Reese of the University of Texas [2], the results showed that their strength will reach the peak around the 20th to 21st day of weight reduction training, and the increase in arm strength is respectively This was especially evident in the first and third weeks (45%, 5%, 50% weekly strength increases).

4) The maximum oxygen uptake of athletes is improved. In swimming, VO<sub>2</sub>max is calculated from the amount of carbon dioxide exhaled by the athlete within 20 - 40 seconds after the exercise.

Maximal oxygen uptake increased by 14% - 25% with swimming training (Kires and Plauman, 1991; Neuffer *et al.*, 1987; Price *et al.*, 1983; Stronsky *et al.*, 1979). However, among nine elite swimmers, VO<sub>2</sub>max did not change with a 20-day decrease (Van Handel *et al.*, 1988).

### 3.2. Mental Changes of Swimmers after Weight Reduction Training

Athletes will first be more relaxed and excited mentally, because they are extremely eager to usher in the recovery period of the body immediately after the intense training period. In one experiment, 10 well-trained long-distance swimmers trained at their normal training volume for 4 weeks and then reduced their

training volume by 70% for the next three weeks. At the same time each week, subjects were required to complete the Profile of Moods States and the Physical Self-Efficacy Scale. During taper training, general emotional state improved precompetition and weekly, and the athletes reported fewer negative feelings about anxiety. However, compared with the pre-competition state in the second week of regular training, its pre-competition vitality decreased significantly ( $P < 0.01$ ), and then compared with the second week, the pre-competition vitality in the third week of reduced-weight training increased significantly ( $P < 0.01$ ). In week 3, pre-competition tension decreased significantly ( $P < 0.05$ ). Test-day fatigue was significantly lower ( $P < 0.01$ ) in week 1 of taper training compared with usual training. RPE was also noted during taper weeks 2 and 3 at slower running paces reduce. No differences were found for competition anxiety or physical self-efficacy. Race scores remained constant throughout the study. These results suggest that subjects do not habituate to taper training, but maintain a positive emotional state, especially when aware of no change in executive capacity.

After just one week of tapered training, the athletes reported significant improvements in mental and emotional well-being, with improvements in depression, stress and negativity. Similar to the other tests above, when athletes performed water training with bungee cords, strength continued to increase and peaked in the second week, but it is worth noting that this study only included 2 weeks of taper training [7].

#### **4. Precautions for Swimmers after Weight Reduction before Competition**

Reduced weight training is a very unique training method. The athlete's state, performance and performance during the reduced weight training period are largely determined by the athlete's training accumulation, competition events, and whether they get enough rest. Therefore, each athlete should work with his or her coach to develop a tapering program suitable for the individual and the competition.

This article also provides 7 methods and suggestions for reducing weight training to help athletes adjust their competition status before the competition: 1) choose between reducing training and resting; 2) keep practicing in water; 3) carry out a relaxed training plan; 4) race pace training; 5) small strength exercises instead of high strength exercises; 6) reduce emotional anxiety; 7) ensure sleep.

#### **5. Conclusions**

At present, although there are many studies discussing weight reduction training, there are only various possibilities at the theoretical level for weight reduction training in swimming, and no effective weight reduction training plan has been formed in practice. Things to keep in mind during weight training.

Therefore, it is urgent to conduct research and make up for the causes, motivation and content of the lack of functions, in order to solve the collaborative

problem in the practice of sports-medicine integration.

In the process of exploring the training mode, researchers and coaches scientifically reduce the training volume in the preparation period before the big competition, which can help the athletes to recover their physical fitness and stimulate the athletes to show a good game state.

### Conflicts of Interest

The author declares no conflicts of interest.

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