Management of recovery processes in pre-competitive training of long-distance runners.

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ABSTRACT

In this article, we examine the relationship between loading and recovery during the pre-competitive training of ultra-distance runners. In the article, it is highlighted that the correctly chosen method and efficient management of recovery are one of the main factors for achieving high results in sports competitions. The balance between training load and recovery to achieve high results is supported by scientific evidence.

Keywords: Physical loads, means of recovery, medical-biology, vitamins, balanced diet, physiological conditions.

Introduction

In middle-distance runners, pre-competition loading and recovery are considered crucial tools in modern sports.

Nowadays, the development of training methods and the management of athletes' recovery processes after workouts are rapidly evolving.

In this regard, many scientific studies have been conducted by experts in the field, and coaches actively use them in creating successful training plans.

At the same time, in athletics—especially in middle- and long-distance events—it is undeniably beneficial to closely study and analyze the training and recovery strategies of world-class and Olympic-level athletes who consistently achieve high results.

Therefore, in this article, we will also examine the role of recovery principles, explored by contemporary leading sports physiologists, in managing the recovery mechanisms within pre-competition training.

Athletes understand the importance of training for optimal performance and improvement. However, rest and recovery are also vital components of any training program, as they give the body time to repair and strengthen itself between sessions. Moreover, recovery allows the athlete to restore both physically and mentally.

What Happens During the Recovery Phase?

The body is allowed to adapt to the physical stress caused by training, replenish muscle glycogen (energy reserves), and provide time for tissue repair.

There are two types of recovery:

- Immediate or short-term recovery – This is the most common form of recovery and occurs within a few hours after a training session or event. Short-term recovery includes low-intensity exercises during the cooldown phase after a workout.
- Long-term recovery – This refers to rest periods incorporated into the seasonal training schedule and annual sports programs. These may include

days or weeks specifically allocated for recovery.

Rest and Sleep

When it comes to sports performance, rest and recovery also include sleep as a critical component.

Sleep-deprived athletes face a risk of losing aerobic endurance and may experience subtle hormonal changes, such as elevated cortisol (the stress hormone) levels, and reduced production of human growth hormone, which plays a key role in tissue repair.

All great athletes know when to push their training. They know when to go hard, and when to push their bodies to the limit.

But the best athletes also know when to stop.

Neglecting the role of recovery can be disastrous. It can lead to energy depletion, muscle damage, disrupted sleep cycles, and impaired performance.

The modern wisdom is this:

In high-performance sport, a proper recovery strategy is just as important as a proper training plan.

MAIN PART

Why is recovery so important?

The principle of recovery states that athletes need adequate time to recover from training and competition.

Many experts emphasize that even if recovery is not more important than training, it is at least equally important.

Pre-competition training imposes stress on the athlete's body; however, adaptation occurs after the training.

Therefore, what athletes do between training sessions and competitions is extremely important.

If athletes can optimize their recovery, it may lead to:

- Maximized performance
- Accelerated adaptation to training
- More consistent training sessions
- Reduced fatigue, illness, and exhaustion
- Lower risk of injuries

If we overload the body with excessive training stress, it causes micro-damage to our cells, which in turn stimulates the release of hormones necessary for growth and adaptation 【1】.

During this phase, as illustrated in Figure 1, due to fatigue and cellular damage, performance temporarily declines while the body adapts.

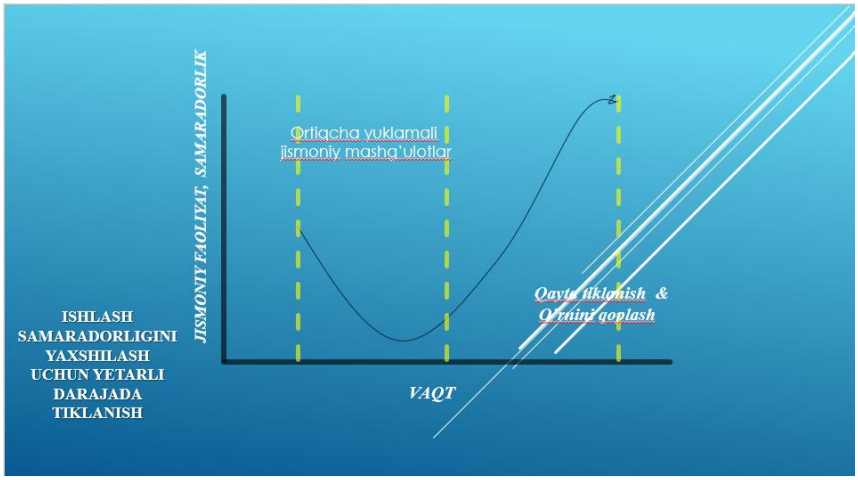

Figure 1: Adequate recovery allows for improved performance.

Coaches must allocate sufficient time for growth and adaptation within their training programs in order to prevent fatigue that can result from the accumulation of damaged cells and a decline in performance. When recovery is adequate, adaptation leads to improved performance.

If proper cycles of training stress and recovery are applied consecutively, as illustrated in Figure 2, adaptations will be optimized to maximize performance.

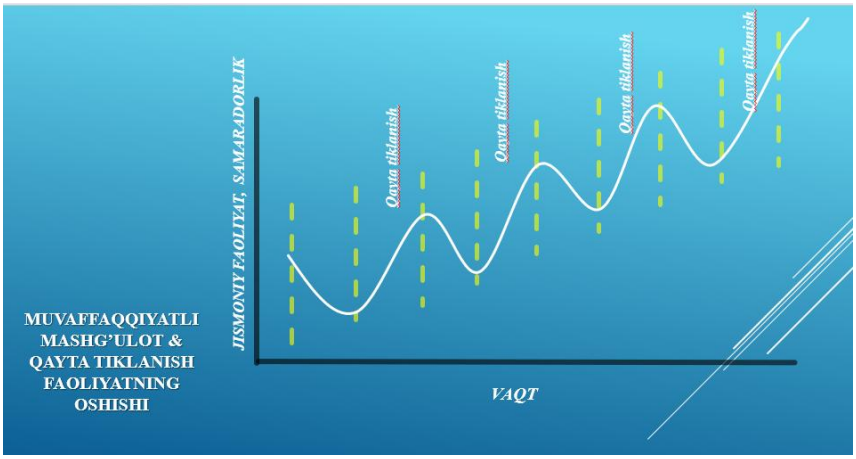

Figure 2: Consecutive balanced training and recovery periods maximize performance efficiency.

Risk of Overtraining

If training intensity is too high and insufficient time is allowed for recovery, performance will decline, as shown in Figure 3, and the risk of illness, fatigue, and injury due to overtraining will increase.

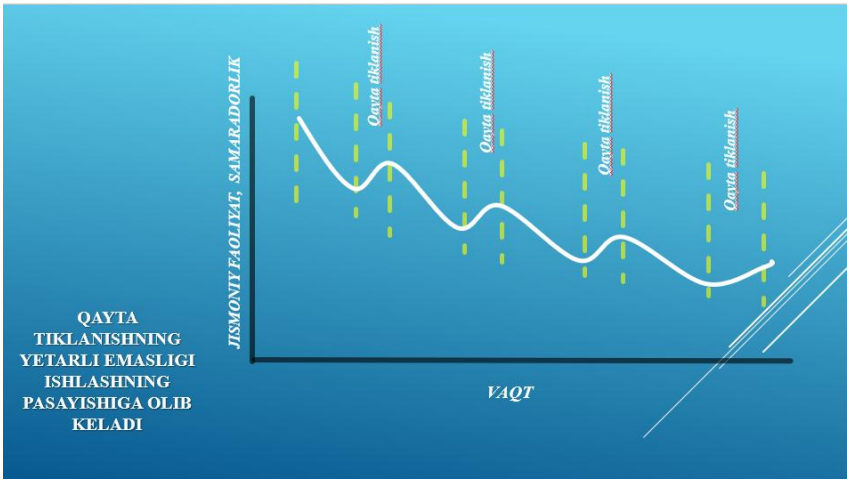

Figure 3: Inadequate recovery leads to overtraining and a decline in performance.

Recovery after training and competitions allows athletes to return to their normal physiological and psychological state as quickly as possible【2】.

To avoid performance deterioration in subsequent competitions or training sessions due to muscle soreness or fatigue, athletes use a variety of recovery methods.

There is a growing body of scientific evidence supporting the effectiveness of different recovery methods and their benefits in enhancing performance. These methods are not limited to elite athletes alone, but can be applied by all individuals engaged in sports.

Some examples of recovery methods include:

- Sleep and rest
- Nutrition
- Periodization
- Warm-up and cooldown
- Massage
- Hydrotherapy
- Compression garments
- Relaxation techniques
- Travel strategies

Below, we will review several effective methods based on recovery principles.

The principle of recovery applies both to immediate/short-term recovery, which is necessary between exercise sets, and to longer-term recovery that occurs over several hours or days between training sessions or competitions.

The following methods are used to ensure that athletes recover adequately between training and competitions and to help maximize performance.

Common Recovery Methods

Sleep

Alongside overall health, sleep is extremely important for recovery. Inadequate sleep can lead to decreased performance, and chronic poor sleep may result in numerous negative effects such as fat accumulation, increased risk of illness, reduced focus, decreased libido, and hormonal imbalances.

While we sleep, the body produces hormones that are essential for recovery, including human growth hormone (HGH). Morris et al. (2012) showed that HGH surges occur approximately every two hours during prolonged sleep.

Nutrition

What we consume fuels our body, making proper nutrition essential for effective recovery. The type and amount of food required depends on multiple factors, including the type, intensity, duration, and frequency of training, as well as individual characteristics and goals.

However, it is considered good practice to consume a balanced meal 1–2 hours before and after exercise.

Hydration

Every chemical reaction in the body requires water as a medium. Only when we are adequately hydrated can the body perform at its full potential, including effective recovery.

Recommendations suggest consuming at least 3 liters of water per day, but athletes who train regularly may require significantly more.

It is advised to replace 1.5 liters of fluid for every 1 kg of body weight lost during training. This may include water and electrolyte-containing beverages to replenish losses during physical activity.

Active Recovery

Active recovery involves performing low-intensity exercise following training—such as during cooldowns or recovery days—to help muscles recover from recent high-intensity workouts.

It is designed to aid in the removal of lactate and other metabolic by-products and to reduce muscle soreness and stiffness.

Many studies demonstrate the benefits of active recovery, although the optimal duration and intensity for maximum effectiveness remain unclear.

Stretching

Post-exercise stretching is intended to relax muscles and reduce tightness and/or soreness after intense physical activity.

Evening stretching routines can trigger a relaxation response, helping athletes sleep better and recover faster.

Thus, the timing of stretching may be important if it provides a positive effect that supports an athlete's wind-down process.

Cold Water Immersion

Cold water immersion (10–14°C) in a tub, pool, or natural body of water is intended to reduce body temperature, muscle soreness, and inflammation.

When performed immediately after exercise, it supports recovery and can have a positive effect on the following days after intense sessions.

Compression

Compression through elastic garments or inflatable devices may help relieve muscle fatigue and soreness, accelerate the removal of lactate and metabolic waste, reduce muscle stiffness, improve venous and lymphatic flow, enhance oxygenation, and speed up recovery—thus improving performance.

While studies have yet to fully validate its effectiveness, Hill et al. (2014) found that, despite minimal concerns over side effects, compression may offer some minor recovery benefits.

Massage

Massage is intended to enhance recovery by improving blood circulation and lymphatic flow, and by reducing muscle soreness and stress.

However, researchers have not definitively confirmed its benefits. Wiltshire et al. (2010) even warned that if massage is performed too aggressively or too soon after exercise, it could lead to greater muscle damage.

Despite its popularity, whether massage truly improves recovery remains uncertain, and it should not be used as the sole recovery method, but rather in combination with other strategies.

Recovery Pyramid

As mentioned above, not all recovery methods are equal—some are more effective than others and should therefore be prioritized by athletes and coaches.

The Recovery Pyramid below emphasizes sleep, nutrition, and hydration as the most effective foundations for recovery.

These are the core elements on which all athletes and amateurs should focus to make the greatest impact on their recovery.

Figure 4: Recovery Pyramid. Adapted from "Using the Recovery Principle to Help Your Athletes Recover Better and Perform at Their Peak" by the RYPT Team.

Conclusion

Recovery is often an overlooked training principle—especially among coaches working with competitive athletes who are evaluated based on results, which creates a constant temptation to schedule "just one more session." However, recovery may be even more important than training itself, as it is during recovery that the body adapts to training and improvements in performance occur.

Therefore, it is essential to properly address the foundations of recovery, including sleep, nutrition, and hydration. When necessary, these can be effectively supplemented with other recovery methods.

At the same time, considering that recovery is individual, the use of tools to manage training loads and recovery can help coaches optimize athlete recovery.

This allows for enhanced performance, faster adaptation to training, more consistent practice, reduced fatigue, illness, and exhaustion, and a lower risk of injury.

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