

PHYSIOLOGICAL CONSEQUENCES AND HEALTH EFFECTS OF RAPID WEIGHT LOSS IN ATHLETES

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Abstract

This article analyzes the health risks associated with the practice of rapid weight loss among athletes. Based on scientific studies, it is shown that a sharp reduction in body weight over a short period of time through prolonged fasting, dehydration, or the use of diuretics and thermogenic substances has a negative impact on the athlete's overall condition, cardiovascular system, electrolyte balance, and psychological state. It is also noted that rapid weight loss may have not a positive but a negative effect on athletic performance.

Keywords: Rapid weight loss, athletes, dehydration, diuretics, metabolic disorders, health risk, psychophysiological state.

Introduction

Relevance of the Topic. Rapid weight loss is a widespread practice, especially in weight-category sports, and poses numerous health risks as athletes strive to achieve their competitive goals. In sports such as boxing, wrestling, weightlifting, and athletics, as well as other forms of physical activity, rapid weight reduction is often achieved through intense training, calorie restriction, fluid reduction, and sometimes the use of medications [5,7,19,20].

Although such methods may help athletes reach the desired weight class in a short period of time, they can lead to multiple adverse health consequences [2,3,17,22]. Therefore, this topic is considered highly relevant in sports medicine, physiology, and psychology. In recent years, the number of studies investigating the negative health effects of rapid weight loss among athletes and its impact on athletic performance has been increasing [4,9,10,13,19].

The health risks associated with rapid weight loss in athletes have been recognized by numerous international sports organizations, including the International Olympic Committee and major sports universities in the United States, and preventive measures are being developed. Nevertheless, this practice remains widespread among athletes, which highlights the need for in-depth scientific analysis of the issue [11,12,23].

Moreover, athletes and their coaches often prioritize competitive success without paying sufficient attention to the potential health hazards of rapid weight loss. At the same time, scientific researchers, healthcare institutions, and sports medicine specialists are increasingly emphasizing the negative outcomes of this practice and promoting safe weight management strategies [13,16,17].

Therefore, studying the adverse effects of rapid weight loss, maintaining athletes' health, and introducing safe and evidence-based approaches to weight management are considered urgent and important issues.



Materials and Methods

In the process of preparing this article, the following sources were used as the basis:

1. International scientific research studies.
2. Reputable journals and reports in the field of sports medicine.
3. The experiences and statistical data of professional athletes.
4. Clinical observations conducted in the fields of sports psychology and nutrition.

Results

The following methods are widely used by athletes for rapid weight loss [8,19,20]:

1. Calorie restriction and fasting:

This method aims to induce an energy deficit in the body by deliberately reducing calorie intake to promote fat loss. Athletes drastically decrease their daily caloric intake, placing the body under stress. This can lead to adverse effects such as muscle loss and energy deficiency [11,22].

According to the research conducted by **Janssen T.A.H. (2023)**, very low-calorie diets (800–1200 kcal per day) are considered effective for rapid weight reduction; however, they may also cause a decrease in muscle mass and pathological changes in the cardiovascular system [13,18].

Effectiveness and Adverse Effects of Calorie Restriction Methods

Calorie Restriction Methods	Effectiveness	Risks
Calorie restriction	Reduces resting metabolic rate and induces metabolic adaptation	Leads to muscle mass loss and micronutrient deficiencies
Extreme calorie restriction	Significantly reduces subcutaneous fat and results in rapid weight loss	Causes muscle wasting, electrolyte imbalance, and cardiovascular complications
Intermittent energy restriction	Helps maintain muscle mass and resting metabolic rate	Adverse effects are relatively rare

2. Dehydration (fluid restriction and active sweating): This method involves altering the body's water balance to achieve short-term weight reduction through dehydration. The active sweating approach is based on the loss of subcutaneous fluids [12,16]. It relies on increasing internal body temperature through physical exercise and promoting water loss via sweat. The use of saunas or cessation of fluid intake leads to disruption of the body's electrolyte balance [17,19].

Adverse Effects of Dehydration

Adverse Effects	Description
1. Electrolyte imbalance	Leads to cardiac arrhythmia and muscle spasms
2. Impaired attention and cognitive function	Reduces decision-making ability, reaction speed, and reflexes
3. Cardiovascular strain	Causes changes in heart rate and blood pressure
4. Impaired thermoregulation	Increases the risk of heat stroke
5. Reduced physical endurance	Results in fatigue and weakness



3. Pharmacological Agents

Diuretics (Water-eliminating agents) are pharmacological substances that enhance the excretion of sodium and water through the renal tubules. As a result, these drugs reduce the total amount of body fluid, leading to a rapid decrease in body weight. Athletes often use diuretics in the short term before competitions to meet specific weight categories. However, the use of such agents may cause several adverse effects in athletes, including:

- **Dehydration (loss of body fluids)**
- **Electrolyte imbalance** (hypokalemia, hyponatremia)
- **Cardiac arrhythmias and muscle cramps**
- **Renal dysfunction**
- **Decreased physical performance** [14,19].

Laxatives are substances that increase intestinal peristalsis or enhance water retention in the intestines, thereby inducing weight loss through fluid loss via the gastrointestinal tract. Athletes, particularly in weight-dependent sports such as wrestling and boxing, sometimes misuse these agents for rapid weight loss or “cleansing.” Such misuse can lead to the following adverse effects:

- **Dehydration and electrolyte loss**
- **Chronic diarrhea**
- **Abdominal pain and intestinal inflammation**
- **Psychological dependence with prolonged use** [19,20].

Thermogenic Fat-Burning Agents (Metabolic Activators) – these substances accelerate the burning of excess calories by increasing the body’s metabolic rate. They stimulate the sympathetic nervous system. Examples of thermogenic fat-burning agents include caffeine, ephedrine, synephrine (Citrus aurantium extract), and clenbuterol (banned) [20,22]. The adverse effects of using thermogenic stimulants may include tachycardia, elevated blood pressure, cardiac arrhythmias, insomnia, tremors, and other related symptoms.

Appetite Suppressants (Anorectics) – these are substances that reduce appetite by affecting the central nervous system. They act on the hypothalamic centers responsible for appetite control. Examples include Sibutramine (banned), Phentermine, and Liraglutide. Improper use of anorectics may lead to psychological disturbances (depression, irritability), cardiovascular disorders (increased blood pressure, tachycardia), and, in rare cases, drug dependence [18,21].

Discussion

Although rapid weight loss practices before competitions are widely used in many sports (boxing, wrestling, weightlifting, etc.), numerous scientific studies and clinical observations have proven that such methods pose serious health risks. Research indicates that these practices not only weaken the athlete’s overall physical condition but also negatively affect competitive performance.

In cases of rapid weight loss through calorie restriction and fasting, athletes often experience loss of muscle mass, metabolic adaptation (a decrease in resting metabolism), energy deficiency, and vitamin–mineral imbalance. Particularly under extreme calorie restriction, negative changes in the





cardiovascular system, reduced immunity, and psychological disturbances (irritability, fatigue, inattention) are frequently observed.

Weight loss through dehydration (e.g., using saunas, restricting fluid intake, or inducing sweating) disrupts the body's electrolyte balance, causes cardiac arrhythmias, overloads the thermoregulatory system, and can lead to serious sports injuries or health deterioration. Although such methods may temporarily help athletes meet their weight category, they impose severe stress on the body and reduce physical endurance.

The use of pharmacological agents (diuretics, laxatives, thermogenic stimulants, and anorectics) is considered even more dangerous. Artificial manipulation of fluid balance or appetite through these substances directly harms athletes' health, leading to impaired kidney function, cardiac rhythm disorders, hormonal imbalances, and even psychological disturbances such as depression, anxiety, or irritability. Consequently, WADA and international sports federations have strictly prohibited the use of such substances.

All the aforementioned issues demonstrate that short-term, aggressive weight reduction methods not only endanger athletes' health but also jeopardize their long-term professional careers. Therefore, coaches, athletes, and medical professionals must fully understand these risks and prioritize healthy weight management strategies.

Conclusion

1. Rapid weight loss among athletes is a hazardous practice that negatively affects both physical and mental health. It leads to muscle mass reduction, electrolyte imbalance, and disturbances in cardiovascular, hormonal, and nervous system functions.
2. Weight reduction through calorie restriction, dehydration, or pharmacological stimulants may produce short-term results; however, in the long term, it negatively affects athletic performance and exposes the body to chronic stress.
3. Scientifically grounded approaches—such as gradual weight loss, intermittent energy restriction (IER), balanced nutrition, and supervision by health professionals—represent safe and effective strategies for managing body weight in athletes.
4. Sports federations and medical professionals should develop clear guidelines, preventive programs, and monitoring systems to discourage unsafe rapid weight loss practices.
5. Protecting athletes' health and ensuring sustainable athletic performance require a deeper understanding of the adverse effects of rapid weight loss and the promotion of awareness regarding this critical issue in sports medicine.

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