



**THE INFLUENCE OF WEIGHT-LOSS STRATEGIES ON THE PHYSICAL AND FUNCTIONAL READINESS OF KARATEKAS**

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A B S T R A C T	KEY WORDS
<p>This article analyzes the impact of weight-loss strategies on the physical and functional fitness of karatekas in the discipline of kumite. The prevalence and classification of rapid weight loss (RWL) strategies are examined, as well as the main physiological mechanisms of their impact on athletes' performance. It is shown that dehydration and depletion of energy substrates are key factors in the reduction of strength and speed-strength indicators, and even moderate weight loss (<math>\approx 2\%</math>) can negatively impact the competitive effectiveness of karatekas. The advisability of prioritizing gradual weight management and limiting aggressive weight-loss practices is substantiated.</p>	<p>Karate, kumite, rapid weight loss, dehydration, glycogen, strength, power, repeated performance, hydration, weighing.</p>

**Introduction**

The scientific novelty of the article lies in the karate-specific analysis of the influence of weight-loss strategies on the physical and functional readiness of athletes, with an emphasis on the consequences of even moderate dehydration and their significance for competitive activity in kumite , as well as in the practical systematization of body weight management strategies according to risk level.

Karate (in the WKF competitive format) is a weight-class sport in the kumite discipline , where body weight is both a formal eligibility criterion and a potential tactical advantage. This creates conditions for the widespread use of pre-competition weight management strategies, including both gradual weight loss through changes in body composition and rapid weight loss . weight weight loss (RWL) due to dehydration, carbohydrate/glycogen manipulation, and short-term reduction in gastrointestinal contents. In the paper " Acute-weight-loss" strategies for combat sports and applications to Olympic success " emphasizes that athletes in "weight" martial arts often strive to compete in a category below their normal weight, combining chronic and acute approaches " making weight ", which has direct implications for performance and recovery [1].

Research " The current state of weight-cutting in combat Sports " points out that weight-cutting is a very common practice in combat sports, and the impact on performance is ambiguous: some studies show no significant effect, but larger " weight cuts " (approximately 5% of body weight in less than 24 hours) can impair repeat -effort performance, which is especially critical for tournament formats with multiple fights and limited recovery. The authors also identify key mechanisms for reduced performance: decreased glycogen availability and increased subjective fatigue [2].

The issue takes on additional significance in the context of WKF competition regulations: official weigh-ins for a category must be held no later than the day before the competition in that category (unless otherwise specified for a specific tournament). This means athletes often have a certain "window" to rehydrate and rehydrate after the weigh-in. While this window could theoretically partially mitigate the effects of a moderate "cut," aggressive methods (especially dehydration through overheating/saunas/ thermosuits and strict fluid restriction) carry health risks and can impair performance readiness, especially during multi-round training.

From the perspective of sports medicine and ethics in martial arts, a number of authors propose to consider RWL as a practice that potentially meets the criteria of a "dangerous method", since it can be used to gain an advantage, pose a risk to health and contradict the spirit of sport; this position is consistently argued in the article "It is time to ban rapid weight loss from combat sports" [3]. Despite the controversial question of whether weight loss ultimately provides a competitive advantage, the scientific literature consistently follows the thesis: the higher the proportion of weight loss due to water and the less time for recovery, the higher the likelihood of a decline in physical and functional performance.

Karate emphasizes not only strength and energy, but also the speed and power of technique, precision, reaction, and the ability to repeat explosive movements while fatigued. In this regard, data from karatekas is particularly interesting: a randomized crossover study in elite athletes showed that a ~2% reduction in body weight achieved through dehydration can adversely affect lower limb strength and power, which are key to dynamic movement and attacking actions in kumite.

Thus, the relevance of this topic is determined by the high prevalence of RWL practices in weight-cutting martial arts, the potential conflict between the short-term goal of "getting into a weight class" and maintaining functional fitness, and the specific nature of karate, where even minor declines in power, recovery, and cognitive stability can lead to a decrease in competitive performance. The purpose of this study is to use literature data to identify how weight-cutting strategies influence the physical and functional fitness of karatekas and which factors (the magnitude of weight loss, methods, duration, and recovery window after weigh-in) determine the risk of performance impairment.

In scientific literature, weight-cutting strategies in weight-bearing sports are defined as a set of methods aimed at reducing an athlete's body weight to meet weight category limits by the official weigh-in. In English-language sources, the terms "weight" and "weight" are more commonly used. cutting, making weight and rapid weight weight loss (RWL), while a fundamental distinction is made between gradual and rapid weight loss depending on the timing, mechanisms and consequences for the athlete's body.

Gradual weight loss is a systematic reduction in body weight through changes in body composition, primarily a reduction in fat mass while maintaining or minimizing muscle loss. This process typically takes several weeks to months and is achieved through a moderate energy deficit, optimized macronutrient composition, and appropriate training periodization.

In the study "Acute - weight - loss strategies for combat sports and applications to Olympic success" emphasizes that this approach is considered the most physiologically sound and safe, since it minimally disrupts the hydration status, hormonal balance and neuromuscular function of the athlete [1]. The authors of the article "Weight loss in combat sports: physical, psychological and performance effects" also note that gradual weight management is associated with smaller fluctuations in physical performance and a more stable psychological state compared to acute weight-

cutting methods [4]. For karatekas, this approach is especially relevant due to the high role of speed-strength qualities and repeated high-intensity activity, which are sensitive to energy deficiency and dehydration.

Rapid weight loss (RWL) is defined as an intentional reduction in body weight of 2–10% (or more) over a short period—ranging from a few hours to 7 days before an official weigh-in. Unlike a gradual approach, RWL is achieved primarily through water loss, glycogen depletion, and gastrointestinal mass reduction, rather than through actual fat loss.

Systematic reviews show that RWL is the dominant practice in most weight-based combat sports, including judo, wrestling, taekwondo and karate, particularly at the high level of sport performance. Taking into account the timing, mechanisms and potential consequences for the athlete’s body, weight loss strategies can be classified according to the level of risk and physiological effects (Table 1).

Table 1 - Classification of weight-loss strategies in weight-based martial arts (using karate as an example)

Strategy type	The main mechanism of weight loss	Typical value of mass loss	Methods used	Potential impact on physical and functional readiness	Risk level
<b>Gradual (chronic) weight loss</b>	Reduce fat mass while maintaining muscle mass	0.5–1.0% of body weight per week	Moderate energy deficit, macronutrient control, strength training	Minimal impact on strength and speed-strength indicators; high stability of performance	Short
<b>Limited fast drying (moderate RWL)</b>	Partial dehydration, decrease in glycogen and gastrointestinal contents	≤2–3% of body weight in 2–5 days	Reducing carbohydrates and salt, moderate fluid restriction	Possible reduction in repeat performance; with a sufficient recovery window, the effect may be partially mitigated	Moderate
<b>Aggressive Rapid Lightening (RWL)</b>	Severe dehydration and glycogen depletion	≥4–5% of body weight for ≤7 days	Sauna, training in thermal suits, strict fluid restriction, fasting	Decreased strength, power, endurance, recovery and cognitive function	High
<b>Extreme weight loss practices</b>	Severe dehydration, heat stress	>6–8% of body weight in 24–72 hours	A combination of all dehydration methods, pharmacological agents	Significant deterioration in functional readiness; high risk of thermal and cardiovascular complications	Very tall
<b>Combined strategies</b>	Simultaneous use of several mechanisms	Varies (often >3–4%)	Dehydration + carbohydrate restriction + reduction in food volume	Cumulative negative effect on physical and psychophysiological readiness	High

As Table 1 shows, aggressive and combined rapid weight loss strategies, primarily based on dehydration, pose the greatest risk to maintaining physical and functional fitness. At the same time, gradual weight management is characterized by minimal negative impact on performance indicators and should be considered a priority approach in karate training.

Based on the classifications proposed by scientists, RWL methods can be divided into several groups:

1. Dehydration methods. These include fluid restriction, sauna use, hot baths, training in thermal suits, and deliberate overheating. These methods provide rapid weight loss but are considered the most risky in terms of health and performance.

2. Dietary manipulation. This includes drastically restricting carbohydrates (to deplete muscle glycogen stores and associated water), reducing salt and fiber intake, and short-term fasting. A carbohydrate deficiency can negatively impact the ability to perform repeated, high-intensity actions typical of competitive karate.

3. Combined strategies. In practice, athletes most often use a combination of several methods, which leads to more significant weight loss but also increases the risk of decreased functional readiness and negative physiological effects.

From the point of view of sports medicine and physiology, all weight loss strategies can be classified as follows:

1. Low risk: gradual reduction in fat mass, minimal or no dehydration;

2. Moderate risk: limited RWL ( $\leq 2-3\%$  of body weight) provided there is a sufficient "recovery window" after weighing;

3. High risk: aggressive RWL ( $> 4-5\%$  of body weight), severe dehydration, overheating, and a combination of multiple extreme methods.

Scientists emphasize that it is the latter category of strategies that is most often associated with deterioration of physical performance, cognitive function and increased health risks, which has served as the basis for proposals to limit or ban RWL in combat sports [3].

A clear distinction between the terms and types of weight-loss strategies is crucial when analyzing their impact on the physical and functional fitness of karate athletes. Weight-loss methods varying in mechanism and intensity have varying effects on the strength, speed, energy, and cognitive components of competitive performance. This requires a differentiated approach in both scientific research and the practical training of athletes.

The practice of pre-competition weight loss is widespread in weight-bearing martial arts and is considered a "normative" element of competitive culture. According to surveys and research, between 60 and 90% of athletes in disciplines such as wrestling, judo, taekwondo, and karate regularly employ rapid weight-loss strategies before official weigh-ins, with a significant number beginning to use them as early as adolescence [2].

Systematic review of "The current state of weight-cutting in combat Sports" showed that the magnitude of rapid weight loss in martial arts athletes typically amounts to 2–5% of body weight, but in some athletes it can exceed 6–8%, especially when using dehydration and overheating methods. Moreover, a higher athletic level is associated with greater frequency and aggressiveness of weight-loss practices, which is explained by the desire for a competitive advantage [2].

Data including karatekas confirms the general trends. The authors of the study "Weight loss strategies in male competitors of combat sport" A study by the American Sports and Sports Association (ASA) showed that karate athletes use the same basic RWL methods as other martial artists: fluid restriction, carbohydrate and salt manipulation, sauna use, and training in thermal suits. The authors also noted that karate athletes, on average, demonstrate moderate weight loss, but combining several methods is quite common [5].

Experimental data obtained directly on karatekas indicate that even relatively mild dehydration can have functional consequences. For example, in the article " The effect of acute dehydration on muscle strength , power and postural balance in elite karate Athlete " showed that approximately 2% of body weight loss due to dehydration is accompanied by a decrease in lower limb strength and power in elite karatekas [6]. These results highlight that even moderate weight-loss strategies can be critical for karate, where speed-strength qualities and repeated explosive activity play a key role in competitive performance.

Taken together, the presented data indicate the high prevalence of weight cutting in karate and the similarity of the strategies used to the practices of other martial arts, while the specificity of competitive workload in kumite makes karatekas especially sensitive to the negative effects of dehydration and rapid weight loss.

Rapid weight loss ( rapid weight Loss ( RWL ) influences the physical and functional readiness of athletes through several key physiological mechanisms, which are particularly significant for martial arts and karate, where competitive activity is characterized by high intensity, repetition of actions and high demands on coordination and reaction.

The main mechanisms of the negative impact of RWL are dehydration, depletion of energy substrates, impaired neuromuscular function, and increased psychophysiological fatigue. The severity of these effects depends on the magnitude of weight loss, the methods used, and the recovery time after weighing.

Table 2 - The main mechanisms of influence of RWL on physical and functional readiness

Mechanism	Physiological essence	Major impacts on performance	Meaning for Karate
<b>Dehydration</b>	Decreased blood plasma volume, electrolyte imbalance, deterioration of thermoregulation	Increased heart rate, decreased endurance, and decreased recovery between efforts	Reduced ability to re-attack and move
<b>Muscle glycogen depletion</b>	Limiting carbohydrates and bound water	Reduction in power and repeated high-intensity activity	Decreased combat tempo and effectiveness of action sequences
<b>Neuromuscular dysfunction</b>	Changes in neuromuscular transmission and contractile properties of muscles	Decreased strength and power, impaired coordination	Reducing the speed and explosive force of strikes and movements
<b>Increased psychophysiological fatigue</b>	Increased perceived effort, worsening sleep and mood	Decreased concentration, reaction time and tactical thinking	Errors in decision making and technique

Thus, RWL affects karate athletes' readiness primarily through dehydration and a reduction in the energy supply for muscular activity. Even moderate weight loss ( $\approx 2\%$ ), especially through dehydration, can lead to a decrease in strength and speed- strength indicators, impaired recovery, and increased functional fatigue. Given the specific nature of karate ( kumite ), these mechanisms make aggressive weight-cutting strategies a potential factor in reducing competitive effectiveness.

Weight management practices for karatekas should be based on the principles of evidence-based sports science and focused primarily on maintaining physical and functional readiness for competition.

The preferred approach is gradual weight loss by reducing body fat while maintaining muscle mass. This requires advance planning for weight category entry and minimizes the need for rapid weight cutting in the pre-competition period.

Rapid weight loss strategies should be strictly limited, as aggressive methods based on dehydration and overheating are associated with decreased strength, speed-strength, and recovery capabilities. In pre-competition training, it is advisable to avoid losing more than 2–3% of body weight in a short period of time.

An important element of preparation is monitoring hydration status, including regular body weight monitoring and simple clinical markers of hydration, which helps reduce the risk of latent dehydration and functional fatigue. After the official weigh-in, it is essential to utilize a structured recovery program aimed at rehydration with electrolytes and replenishing carbohydrate stores, especially given the specifics of karate's competitive format.

weight loss is crucial : decisions about weight loss should be made jointly by the athlete, coach, and sports nutrition specialist. This approach reduces health risks, improves the sustainability of functional readiness, and promotes consistent competitive results.

Thus, weight-cutting strategies remain a significant factor influencing the physical and functional readiness of karatekas. The most significant risks are associated with dehydration and carbohydrate restriction, which can impair strength and power performance and repeated high-intensity work capacity—critical qualities for kumite . Data specifically from karate show that dehydration as low as 2% can negatively impact lower extremity strength and power in elite athletes. The WKF regulations, which typically include weigh-ins before competition, create a "recovery window," but this does not compensate for the consequences of aggressive weight-cutting. The optimal strategy is to shift the emphasis from RWL to systematic body composition management and safe, controlled recovery protocols.

## References

1. Reale R., Slater G., Burke L.M. Acute-weight-loss strategies for combat sports and applications to Olympic success // *International Journal of Sports Physiology and Performance*. – 2017. – T. 12 , No. 2. – P. 142 –151. – DOI: 10.1123/ijsp.2016-0211.
2. Barley OR, Chapman DW, Abbiss CR The current state of weight-cutting in combat sports // *Sports*. – 2019. – T. 7, no. 5. – St. 123. – DOI: 10.3390/sports7050123.
3. Artioli GG, Saunders B., Iglesias RT, Franchini E. It is time to ban rapid weight loss from combat sports // *Sports Medicine*. – 2016. – T. 46 , No. 11. – P. 1579 –1584. – DOI: 10.1007/s40279-016-0541-x.
4. Franchini E., Brito CJ, Artioli GG Weight loss in combat sports: physiological, psychological and performance effects // *Journal of the International Society of Sports Nutrition*. – 2012. – T. 9. – St. 52. – DOI: 10.1186/1550-2783-9-52.
5. Martínez -Rodríguez A., Vicente- Salar N. Weight loss strategies in male competitors of combat sport disciplines // *Medicina* . – 2021. – T. 57, no. 9. – Art . 897. – DOI: 10.3390/medicina57090897.
6. Arnaoutis G., Kavouras SA, Bardis CN The effect of acute dehydration on muscle strength, power and postural balance in elite karate athletes // *Nutrients*. – 2025. – T. 17, no. 9. – St. 1452. – DOI: 10.3390/nu17091452.