International Journal of Sport Nutrition and Exercise Metabolism, 2019, 29, 441-452
https://doi.org/10.1123/ijsnem.2018-0165

Human Kinetics
SCHOLARLY REVIEW

The Magnitude of Rapid Weight Loss and Rapid Weight Gain in Combat Sport Athletes Preparing for Competition: A Systematic Review

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Combat sport athletes typically engage in a process called making weight, characterized by rapid weight loss (RWL) and subsequent rapid weight gain (RWG) in the days preceding competition. These practices differ across each sport, but no systematic comparison of the size of the changes in body mass exists. The aim was to determine the magnitude of RWL and RWG in combat sport athletes preparing for competition. The review protocol was preregistered with PROSPERO (CRD42017055279). In eligible studies, athletes prepared habitually with a RWL period ≤7 days preceding competition. An electronic search of EBSCOhost (CINAHL Plus, MEDLINE, and SPORTDiscus) and PubMed Central was performed up to July 2018. Sixteen full-text studies (total 4,432 participants; 156 females and 4,276 males) were included, providing data from five combat sports (boxing, judo, mixed martial arts, taekwondo, and wrestling). Three studies reported RWL and 14 studies reported RWG. Duration permitted for RWG ranged 3–32 hr. The largest changes in body mass occurred in two separate mixed martial arts cohorts (RWL: 7.4 ± 1.1 kg [~10%] and RWG: 7.4 ± 2.8 kg [11.7% ± 4.7%]). The magnitude of RWG appears to be influenced by the type of sport, competition structure, and recovery duration permitted. A cause for concern is the lack of objective data quantifying the magnitude of RWL. There is insufficient evidence to substantiate the use of RWG as a proxy for RWL, and little data are available in females. By engaging in RWG, athletes are able to exploit the rules to compete up to three weight categories higher than at the official weigh-in.

Keywords: making weight, weight cutting, weight cycling

Across combat sports, athletes compete in predetermined weight categories to be matched with an opponent of equal body mass, body size, strength, and power (Franchini et al., 2012). However, for competition, athletes typically engage in a process called making weight, characterized by rapid weight loss (RWL) and subsequent rapid weight gain (RWG) in the days preceding the event. Making weight has been documented in mixed martial arts (MMA), boxing, judo, Brazilian jiu-jitsu (BJJ), karate, Muay Thai, taekwondo, and wrestling (Artioli et al., 2010b; Brito et al., 2012; Matthews & Nicholas, 2017; Reale et al., 2018). It enables athletes to compete in weight categories that are typically incompatible with their "walk-around" body mass (Smith et al., 2001). As such many athletes undergo cyclical phases of dieting, from periods of negative energy balance (precompetition) to positive energy balance (postcompetition) (Mendes et al., 2013). The duration of each cycle is dependent on the type of combat sport and competition format. For example, MMA athletes typically compete in single-bout events and may undergo RWL and RWG two to four times per year (Andreato et al., 2014). Whereas in judo, multiple-bout tournaments are held frequently, which results in the need to make weight on a fortnightly or monthly basis (Artioli et al., 2010b). This presents different patterns of weight-management behaviors, which may influence RWL and RWG.

The acute effects of RWL alone reduce physical performance in combat sport athletes, likely due to hypohydration from voluntary perspiration and fluid restriction (Filaire et al., 2001; Smith et al., 2001). However, studies allowing athletes to refeed and rehydrate ad libitum following RWL have shown no physical performance deficits in modality-specific tests (Artioli et al., 2010c; Fogelholm et al., 1993). It is possible that RWL and subsequent RWG could lead to performance enhancement, through a size and strength advantage over a lighter opponent. There is empirical research to suggest that athletes who undergo greater RWG are more successful in wrestling and judo competition (Alderman et al., 2004; Reale et al., 2016; Wroble & Moxley, 1998). However, the evidence base is equivocal, with studies in

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