Effect of a Rapid Weight Loss and Short Period Recovery Program on Anaerobic Power and Body Composition in Non-elite Wrestlers

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Abstract

Purpose: The present study was to investigate changes in body composition factors and anaerobic power performance indexes in non-elite wrestlers after a rapid weight loss involving a combination of food restriction, fluid deprivation and dehydration methods and after a short recovery period with adequate food and ad labium fluid intake.

Material and Methods: 16 male, amateur wrestlers [age 20± 1ys, BMI 23.2±.3kg/m²]with weight classes of 60 & 66 kg who participated in a province tournament, volunteered to take part in the study. Changes in body composition factors and anaerobic power performance were evaluated using caliper skin fold method and Rast field test respectively, under three conditions: 1) basal or pre-weigh cutting 2) immediately following weight loss 3) after 6 hours of recovery from weight loss by taking adequate food and fluids. Data analysis included one-way ANOVA and the significant level was set at $p \le 0.05$.

Results: Data showed that significant differences occurred in the absolute and relative peak, mean and low power values, as well as in fat percentage, total weight and BMI between the base line level, immediately following weight loss and short recovery period (6 hours)[$p \le 0.05$].

Discussion and Conclusion: The results indicated that immediately after weight loss and after 6 hours of recovery from weight loss prior to province competition, the participants lost 5% of their total body weight which is higher than ACSM and NSAA recommendations. This reduction led to a decline in anaerobic power performance and anthropometric profile of the amateur wrestlers.

Keywords: Rapid weight loss, Wrestlers, Power, Short time recovery

Introduction

Rapid weight gain and loss cycles traditionally occur among the young, amateur wrestlers, in which weight changes are usually directed by team coaches or trainers, however from a scientific view, and based on the side effects of such cycles on the wrestler,s health and performance_ including endurance and absolute power impairments, it has not been recommended by the health's experts, exercise physiologists or academic institutes (35)

In hope of more success, wrestlers frequently have competed at one or two weight classes below their unfeigned weight. Therefore, they reduce their weight in a short time primarily through food restriction and various dehydration methods [1] believing that side effects of the weight loss and consequently their physiological performance returns to normal levels after a few hours of taking adequate food and water.

According to the metabolic nature of wrestling, event wrestlers have been reported to mainly require high anaerobic power capacity particularly during the performing of explosive techniques.

Samuel, et al reported that a 7% reduction of weight in wrestlers through dehydration or intensive exercise in hot environment led to a significant reduction in anaerobic performance [23], similarly in another experiment Michael, et al showed that weight loss of 7% through food restriction caused impairment in glycolytic pathway which is in agreement with some other studies [30]. However, dehydration on the magnitude of 2-3% has little effect on muscle strength, anaerobic power, and the amount of dehydration that would result in reduced absolute muscle power/strength is still unknown[Lambert and Jones,].Thus, scientific findings indicated the dramatic role of a weight loss maneuver as high as 5%, on physical performance and metabolic profile of the athletes in the absence of a short time recovery with ad-labium fluid and adequate food intake. In addition relative power

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values (i.e. power in relation to lean body mass ,body fat)during an exhaustive performance field test with two different recovery methods was also affected by this weight loss method.. Furthermore, Hitcher et al [20] and , Webster[21] found that the wrestlers who lost %4-%5 of their weight through hot sauna- induced dehydration within a 3-day period, suffered from significantly reduced anaerobic power even after 5 hours of recovery taking fluid and food [20].

other studies regarding, the effect of rapid weight loss on the power performance are often carried out investigating 2 conditions: prior weight change and after the short time recovery [35,34,15 ,9]. However, no study has found the exact effect of short term recovery from the weight loss program on the wrestler's body composition and deteriorated anaerobic power performance resulted from rapid weight loss. To further investigate this question, we evaluated the body composition and anaerobic power capacity factors of the participants under 3 conditions including: prior to weight loss, immediately following weight loss, and after 6 hours of recovery with taking ad - labium fluid and adequate food.

Material and Methods

16 male, amateur, free-style wrestlers (*age 20±1.4ys, BMI 23.2±.36*kg/m²) with a weight classes according with a FILA,s weight gain &cutting ranking system in which, majority of subjects who chosen voluntarily had a weighting category of 60 & 66 kg during a province tournament on the spring season in HAMEDAN.

) and anaerobic power performance (absolute and relative peak, mean and low power values) were assessed under three conditions : 1)basal or pre-weight loss 2)immediately following rapid weight loss) after 6 hours of recovery from weight loss (Tables 1-2)

First health status of wrestlers was determined using PAR-Q (health questionnaire) and resting electrocardiogram (ECG).

To lose weight , approximately by 5.20 Kg the wrestlers freely restricted their food and fluid intake 3.5 ± 1.4 days before the onset of competition season. As a recovery from weight loss, the subjects had ad labium fluid and adequate food (1500 cc, and 1950kcal respectively) within 6 hours of weight loss according to ACSM and NSAA recommendations.

Body fat percentage was estimated applying

TIPTON method on 7 body spots using a Harpenden mechanical caliper.

The diameter of the distal condoyle wrist bone, and depth and width of the chest were determined using a metal Collisand, the forearm, thigh and calf circumferences on the right side of body were measured using a metallic tape [2, 12, 9].

The anaerobic power performance was evaluated applying a RAST[1] field test. RAST profile is similar to the Wingate cycle Test (WANT) in which it can predict the explosive and anaerobic powers including peak, mean , low power and fatigue indexes. In this test, the subjects should perform a shuttle running test with their maximum speed and at a given distance of 35 meters [3,14].

Statistical methods

The multivariate analysis was applied in order to compare the dependent variables under the 3 given conditions. The statistically significance level was set at $p \leq 0.05$. Normality of the data distribution and homogeneity of variances were tested applying non-parametric K-S test and Leaven's test respectively. Further, Bonferony coefficient correction was employed to adjust first type errors. Eta ²(effect size) statistical method was also applied in order to measure the impact magnitude of variables under the three given conditions.

Results

Body composition profile:

Data regarding anthropometric parameters including body weight, body mass index(BMI),and subcutaneous fat are illustrated in table 1.

According to table 1, the magnitudes of body composition were significantly lower following weight loss and after recovery period as compared to pre-weight loss condition ($P < 0.005$).

Anaerobic power performance

Table 2 depicts the power values including absolute and relative peak, mean and low power.

As seen in table 2, all values of these factors were significantly lower following rapid weight loss and after recovery period (6h) as compared to pre-weight cutting condition [$P < 0.05$].

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1. Running-based Anaerobic Sprint Test (RAST)

Table1: The Anthropometric parameters under wrestles' weight loss conditions

	Pre-weigh cutting condition	Immediately after weight loss	Short recovery (6h) period	P / value	²Eta
Body weight (kg)	69.28±2.2	64.12± 2.8 *	66.16 ±2.7 *	p < 0.00	0.95
BMI (kg/m²)	22.7±1.2	20.87 ±1.2*	21.81 ±1.3 *	p < 0.03	0.88
Subcutaneous fat (mm)	108.1±20	103.06 ±2.6*	104.46 ±2.4*	p < 0.01	0.82
Body fat (%)	9±1.7	7±2.3*	8±2.2*	P < 0.05	0.85

Data are presented as means±S.E.M

*. P<0.05 as compared to pre-weigh cutting condition

Table2: Wrestlers' power performance indexes under 3 weight loss conditions

conditions / variables	pre-weigh cutting	Immediately following weight loss	after recovery from weight loss	P / value	²Eta
Peak Power (W)	724 ±1.0	461 ±0.9*	527± 0.95*	p < 0.00	0.86
low Power (W)	465±1.2	233.3 ±0.54*	276.7 ±0.59*	p < 0.03	0.76
Mean Power (W)	591±1.1	335±0.7 *	382±0.7 *	p < 0.00	0.83
Relative weight Peak Power (w/kg)	10.44 ±1.5	7.21 ±1.2*	7.92 ±1.3*	p < 0.00	0.81
Relative weight Mean Power(w/kg)	8.5±1.3	5.25 ±1.05*	5.77 ±1.04*	p < 0.00	0.74
Relative weight low Power(w/kg)	6.7±1.6	3.6±0.7 *	4.1±0.8 *	p < 0.03	0.80
Relative BMI Peak Power (w/kg.LBM)	11.79 ±1.6	7.55 ±1.3*	8.58 ±1.3*	p < 0.00	0.86
Relative BMI Mean Power (w/kg.LBM)	7.49 ±1.8	3.7±0.8 *	4.5 ±0.9*	p < 0.00	0.77
Relative BMI Mean Power (w/kg.LBM)	9.62 ±1.6	5.5 ±1.1*	6.22 ±1.1*	p < 0.00	0.84

Data are presented as means±S.E.M.

*. P<0.05 as compared to pre-weigh cutting condition

Discussion and Conclusion

The main findings of this study indicated that the anaerobic power performance of wrestlers significantly decreased following rapid weight loss program and did not return to basal condition even after 6 hours of recovery. It seems that the recovery period is similar to tournament conditions. In other words, the interval periods between weight loss and competition event may almost approximately resemble the 6-hour recovery .

The findings show that rapid weight loss through dehydration and food restriction may significantly impair power performance and body composition profile. This result is concurrent with findings from a previous study that showed a 5%weight loss through different methods [Michael, et al] [24] a 7% weight loss through dehydration or performing intensive exercise in hot environment [Samuel, et al] [23] significantly decreased anaerobic performance in wrestlers. However studies that have investigated the dehydration styles claim that even a little weight reduction equivalent to to 2-3% of the body weight slightly affected the anaerobic power [Lambert and Jones,].

According to ACSM & UIL[1] associations and NSAA recommendations, the wrestlers of present study who were in the weight classes of 60 to 66 kg should have gradually decreased their body weight only 1 kg within 1 week prior to competition, while their weight loss was 4 to 5 times higher. Based on the NWCA2 report, Weight loss over 1.5% of total body weight during the last week before the competition   reduces anaerobic power, and explosive strength especially in the last minutes of practice or competition,   and,   leads   to inefficient performance and   techniques of the wrestler [25, 26]. The reason for this could be that

1 -Texas University Inter-scholastic League
2 - National Wrestling Coaches Association

rapid weight loss can be attributed to reductions in body fluids, muscle and liver glycogen contents, lean body mass and small amounts of fat [Robert et al,]. subsequently it probably induces a reduction in strength and power magnitudes or an impairment in athletic performance.

Often Wrestlers undergo a weight loss program in hope to replenish body fluid, electrolytes, and glycogen content in the short recovery period (30 min-20h) and to restore their power capacity between the weight-in and competition *[Robert et al]*. However, the present study showed that the power output and body composition factors did not return to their pre-weight loss levels despite having a6-hour recovery during which the wrestlers had ad- labium fluids and enough food.. This finding is in line with those of other studies [Hichner ,et al,[20] and Webster et al, [21]who reported that the anaerobic power of the wrestlers who reduced their weight by %4.5 through hot sauna- induced dehydration method, significantly remained lower than its pre-weigh cutting level, after 5 to 6 hours of recovery and having fluids [20]. The possible reasons are that reestablishing fluid homeostasis may take 24-48 hours; replenishing muscle glycogen content may take as long as 72 hours, and replacing lean tissue might take even longer *[Robert et al]* 1h between cutting weight and the match during dual meets and 2h between cutting weight and tournaments [Lambert and Jones,].Shortly weight -cutting appears to adversely influence the wrestler's energy reserves and fluid and electrolytes balances *[Robert et al,]* [21].In this regard, the scientific report of Mohammadkhni et al who examined the effects of a rapid weight loss of 4%,   using a dehydration sauna method for 1 day on the physiological parameters (ie :HG, HCT% and RBC)in elite wrestlers weighing between 65-85 kgs, indicated that this weight loss method significantly decreased physiological parameters levels. However no study on athletic performance [37], has examined the role of rapid dehydration on physical fitness of Iranian wrestlers. .Because it seems that in the dehydration group , impairment of the sport or task performance was probably induced by plasma volume decrease resulting from the rapid weight loss.[37] On the other hand, Ghnbariniaki et al investigated the effect of a single session of circuit exercise as a unique pattern, on plasma TG, TC, HDL-C and LDL-C levels in twenty young, male, elite wrestlers with a weight range of 70-75

kgs, and showed that their lipid profiles had significantly changed immediately after exercise. [38] However in the present study, changes in plasma volume , and red blood cells were not taken into account which was a limitation of the present study.[39]

Conclusion

The results of the present study indicated that a rapid weight loss (beyond ACSM recommendations) prior to province competition might adversely affect body composition factors and anaerobic performance indexes of young, free style wrestlers

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