

Weight loss methods and effects on the different combat sports athletes

Adem Çolak¹, İbrahim Şahin², Yusuf Soylu³, Mine Koç⁴, Tuncay Öcal⁵

¹Faculty of Sport Science, Aksaray University, Aksaray, Turkey; ²Faculty of Sport Science, Yalova University, Yalova, Turkey; ³School of Physical Education and Sports, Siirt University, Siirt, Turkey - E-mail: soylusyusuf@gmail.com; ⁴Ministry of Youth and Sports, Adiyaman, Turkey; ⁵Sakarya University of Applied Sciences, Graduate Education Institute, Department of Physical Education and Sport Teaching, Sakarya/Turkey

Abstract. *Study Objectives:* This study was carried out to determine the weight reduction methods of athletes engaged in weight sports. The sample of the study consists of 99 judo players, 89 taekwondo players, 74 wrestlers and 262 athletes in Ankara. *Methods:* In this study, Athlete weight reduction methods and effects scale was developed by Yazar et al. (2016) and personal information form developed by the researcher were used as data collection tools. Independent sample test and one-way ANOVA were used for percentage, frequency, arithmetic distributions, and Tukey HSD and Spearman Correlation test, which are the second level tests, were used for significant differences between ANOVA analyzes. *Results:* As a result, judo, taekwondo and the wrestling athletes were slightly affected by the diet size. There was a difference in weight reduction behaviors according to gender. Again, male athletes were more affected by fluid loss than girls. Significant differences were found in case of physiological, Psychological and fluid loss sub-dimensions. It was determined that wrestlers used Psychological methods. According to the age variable of the athletes, the sub-dimensions are mostly used by athletes aged 19 and over. *Conclusion:* It is a point that regularly athletes' bodyweight must be controlled to prevent their loss of weight in pre-competitive. Such an approach is beneficial for both athletes' health and performance. In cases where adult athletes must lose weight, it would yield better results to determine the percentage of body fat and to lose weight by reducing the rate of fat.

Keywords: Weight Loss, Combat Sports, Wrestling, Judo, Taekwondo

Introduction

In the Olympics –the highest level of sports organizations- the elite level of many athletes focuses on their physical performance before the competition. Athletes who increasingly fall short of physical demands make efforts to raise their performance in methods with minimum side effects (1).

To maintain body composition and weight loss before the competitions, athletes use several methods in combat sports (2). Weight loss induces negative energy balance in athletes- which results in a diet other than the usual (3). In the recent Olympic games, 53 out of 306 gold medals were won by combat sports athletes (4). Therefore before the competition, combat athletes

(judo, karate taekwondo, boxing, etc.) have dietary restrictions for weight loss and to classifying for different weight levels (5,6). Rapid weight loss is a strategy that combat sports athletes commonly use to compete in weight classes which are not appropriate to their body composition (7). Thus, athletes try to obtain physical and mental advantages by losing weight rapidly (8). Those athletes lose approximately 2-10% weight 2 or 3 days before the competition to compete in lighter weight and thus to get an advantage. They use various common methods such as doing high intensity exercise, diets, hypohydration, and/or hunger to lose weight rapidly and in such a short time (9,10). Athletes who wish to lose weight rapidly and in a short time use several methods (sauna, highly intensive exercise, and food and

liquid diet), and thus they lose liquid and electrolyte and suffer from dehydration (11,12). Dehydration generally causes a physical and physiological loss in liquid in the body and brings about changes in organisms by limiting liquid intake, using the sauna, and with or without warm clothes on (13-16).

It is argued that this situation has negative effects (2) on combat sports athletes in terms of nutrition (17), immune functions (18,19), and hormones (20). In addition to that, it is also pointed out that it will not be appropriate in terms of ethical concerns because such an athlete competes in a lighter category with his voluntary loss of weight (21). According to the codes of the World anti-doping agency (WADA), using such substances or methods which remove the soul of sport and which causes risks to athletes' health is a major issue that violates the sense of fair play (22). It is known that rapid loss of weight causes hypohydration and a decrease in the volume of plasma which increases blood viscosity acutely and it causes serious problems chronically (23). It is said that those acute responses will give harm to the cardiovascular system and that they will also cause serious cardiovascular risks (24). Even if the amount of water lost through dehydration is low (25), the body can suffer from intense hypohydration because the body has difficulty in adjusting body temperature (26). Along with this irregularity in adjusting body temperature, clothes made of materials such as plastic or rubber and saunas cause more heat stress (27). Heat stress and dehydration, which create the major factors of hypothermia (24), pose a vital risk for combat sports athletes (21). Therefore, this study aimed to identify weight loss methods- which have physical and physiological consequences for athletes- used by combat sports athletes, to determine the physiological, psychological ergogenic support and the types of changes that occur in athletes performance with diet and loss of water and to find appropriate solutions to the problems.

Materials and Method

Participants

The research sample was composed of 262 combat sports athletes (155 male and 107 female) of different branches such as wrestling ($f=74$), taek-

wondo ($f=84$) and judo ($f=99$) who were elites ($\bar{X} \pm SD = 168.16 \pm 9.45$ cm; $\bar{X} \pm SD = 65.01 \pm 16.30$ kg before competition; $\bar{X} \pm SD = 63.20 \pm 16.40$ kg at the weigh-in time; $\bar{X} \pm SD = 2.04 \pm 1.78$ kg weight loss amount). The athletes included in the study were given the necessary information before completing the scales. The scales were given to the participants who were volunteers before and after measuring their weight before the competitions. First, the participants were asked to answer questions about personal information. They were allowed approximately 20-25 minutes to answer the questions.

Data Collection

For the current study, 'Athlete Weight Loss Methodology and Effects Scale' (Yarar et al. 2016) is a 19-item self-report measure used to assess an athlete's weight loss method and effects with five sub-dimensions (physiological effect, psychological effect, ergogenic support, diet, and fluid loss) (28). Also personal information forms were used. The Cronbach's alpha coefficient was found as .74 for the scale. The scale is a 5-point Likert type (Never=1, Rarely=2, Sometimes=3, Often=4, Always=5).

Statistical analysis

SPSS 20 statistics program was used in analyzing the data. Whether or not the variables had normal distribution or not was analyzed with Kolmogorov-Smirnov and the variables had normal distribution ($p > 0,05$). Comparisons among the groups were performed using an independent sample t-test for two groups and Analysis of variance (ANOVA) for more than two groups. Moreover, the Tukey HSD post-hoc test was used for multiple comparisons of groups. A Pearson correlation analysis was used to determine the relationship between variables. Significance was set at $p < 0.05$ and $p < 0.01$ respectively.

Results

The descriptive information about the study group, athletes' weight loss methods and their effects, and the statistics for the variables about judo athletes, wrestlers, and taekwondo athletes are described in this section.

On examining the means for athletes' weight loss before competitions according to branches, statistically, significant differences were found ($p < 0.05$). Judo athletes' mean for weight loss ($\bar{X} = 1.35 \pm 1.32$) was smaller than taekwondo athletes' ($\bar{X} = 2.1 \pm 1.63$) and wrestlers' ($\bar{X} = 2.78 \pm 2.12$) means (Table 1).

According to Table 2, an examination of athlete weight loss methodology and effects and its sub-dimensions makes it clear that statistically significant dif-

ferences are available in athletes' score means for physiological ($p < 0.05$), psychological ($p < 0.05$), dehydration ($p < 0.05$), and weight loss methods and effects ($p < 0.05$). Accordingly, judo athletes' effect means ($\bar{X} = 1.38$) in the sub-dimension of physiological effects is smaller than taekwondo athletes' ($\bar{X} = 1.59$) and wrestlers' means. Judo athletes' means in the sub-dimension of psychological effect ($\bar{X} = 1.76$) is smaller than taekwondo athletes ($\bar{X} = 2.14$) and wrestlers' means ($\bar{X} = 2.05$) in the sub-factor of a psychological effect. In the sub-dimension of dehydration, however, wrestlers' mean ($\bar{X} = 2.61$) is higher than taekwondo athletes' ($\bar{X} = 2.19$) and judo athletes' ($\bar{X} = 2.26$) means. The mean for weight loss methods and effects ($\bar{X} = 1.86$) is smaller than taekwondo athletes' ($\bar{X} = 2.01$) and wrestlers' ($\bar{X} = 2.13$) means. On examining the athletes' means for the sub-dimensions of ergogenic support effects and diet according to branches, no statistically significant differences were found ($p < 0.05$).

Table 1. Comparison of Athletes' Weight Loss means before the Competitions according to Branches

Branches	N	$\bar{X} \pm S.D$	F	P
Judo	99	1.35 ± 1.32 ^{ab}		
Taekwondo	89	2.18 ± 1.63 ^a	15.754	0.000*
Wrestling	74	2.78 ± 2.12 ^b		

* $p < 0.05$; a,b: Different letters represent the difference between groups

Table 2. Comparison of Scores Received from Athletes' Weight Loss Methods and Effects Scale according to Branches

	Branches	N	$\bar{X} \pm S.D$	F	P
Physiology	Judo	99	1.39 ± .48 ^{ab}	5.403	0.005*
	Taekwondo	89	1.60 ± .54 ^a		
	Wrestling	74	1.62 ± .55 ^b		
Psychology	Judo	99	1.77 ± .63 ^{ab}	6.943	0.001*
	Taekwondo	89	2.15 ± .86 ^a		
	Wrestling	74	2.05 ± .64 ^b		
Ergogenic support	Judo	99	1.10 ± .29	2.634	0.074
	Taekwondo	89	1.23 ± .56		
	Wrestling	74	1.13 ± .41		
Diet	Judo	99	3.20 ± .88	1.855	0.159
	Taekwondo	89	3.26 ± 1.18		
	Wrestling	74	3.57 ± 1.84		
Dehydration	Judo	99	2.27 ± .69 ^a	5.813	0.003*
	Taekwondo	89	2.19 ± .96 ^b		
	Wrestling	74	2.62 ± .86 ^{ab}		
Weight loss method and effects	Judo	99	1.87 ± .41 ^{ab}	8.724	0.000*
	Taekwondo	89	2.02 ± .40 ^a		
	Wrestling	74	2.13 ± .47 ^b		

* $p < 0.05$; a,b: Different letters represent the difference between groups

Table 3. Analysis of the Correlations between Athlete Weight Loss Methods and Effects Scale and the weight Lost before the Competitions

n=262	Physiology	Psychology	Ergogenic support	Diet	Dehydration	Weight loss method and effects
Weight lost before the competition	r	.194	.103	.183	.037	.118
	p	.002**	.095	.003**	.547	.057

$p < 0.01$

Positive and low correlations were found between the weight loss before the competitions and the sub-dimensions of physiological effects by 19.4% ($r=.194$; $p<0.01$). Positive and low correlations were found between the weight loss before the competitions and the sub-dimensions of the ergogenic support effect by 18.3% ($r=.183$; $p<0.01$). Again, positive and low correlations were found between the weight loss before the competitions and weight loss methods and effects scale by 18.9% ($r=.189$; $p<0.01$). No significant correlations were found between the weight loss before the competitions and the sub-dimensions of psychological, diet, and dehydration ($p>0.05$).

Discussion and Conclusions

Weight loss methods and their effects are an indispensable part of combat sports. So it is argued that there are several weight loss methods used by athletes (6,27,29) and that the methods are used at the rate of 60-70% although the methods have negative effects on athletes' performance and health (6,30). On examining the averages for athletes' weight loss before competitions according to branches, statistically, significant differences were found. Accordingly, it was found that wrestlers lost more weight than other athletes. Similarly, other studies also found that wrestlers lost more weight than athletes of other combat sports (12,31). Yazar et al. (28) found that wrestlers generally started to lose weight two weeks before competitions whereas Brito et al (32) found that judo athletes started to lose weight 14.5 days ago, karate athletes started to lose weight 14.8 days ago and taekwondo athletes started to lose weight 9.7 days ago. It is stated that starting to lose weight as the competition is approaching can affect athletes physiologically and psychologically (33) and that dehydration in a short time and great amounts can result in an imbalance in the cardiovascular system and electrolyte levels, can cause problems in heat functions and failure in kidney functions (34-36). Significant differences were found according to branches and the sub-factors of physiological, psychological, and dehydration between groups. Thus, it was found in the sub-factors of physiological and dehydration that wrestlers used

the methods more than the athletes of other branches and that taekwondo athletes used the psychological method more than the athletes of other branches. According to several studies (6,37-39), wrestlers are influenced negatively by physical and physiological problems stemming from dehydration. Similarly, Aslan (40) states that wrestlers use physiological and dehydration methods more frequently than the athletes of other branches. Researchers said that taekwondo athletes are influenced psychologically more in weight loss before competitions (41,42). On examining the correlations between the scale of competition weight and weight loss methods and effects and the competition weight, positive correlations were found between the sub-factors of physiological, psychological, diet, and dehydration. It is stated that athletes lose more weight during competitions by using those methods. In parallel to this current study, some studies found a fall in oxygen consumption, loss in performance, and decrease in liver glycogen storage due to weight loss in athletes who are to measure their weight soon (16,28,34,43). Imamoglu et al (44) also obtained similar results and said that other combat sports athletes used a method or several methods in combination to lose weight for competitions. Therefore, families and experts look at methods such as nylon training clothes, diet pills, diuretics, and laxatives with hesitation and fear (32).

As a result of this study, athletes regularly body-weight controls to prevent their loss of weight in pre-competitive. Such an approach is beneficial for both athlete's health and their performance. In cases where adult athletes must lose weight, it would yield better results to determine the percentage of body fat and to lose weight by reducing the rate of fat. The fat rate should not fall below 5% for men and below 12% for women. Methods that can be harmful to health and to performance (such as remaining hungry for long, using the medicine, sauna, etc.) should be avoided.

Conflicts of interest

The authors declare that there is no conflict of interest in this manuscript.

References

1. Elsayy G, Abdelrahman O, Hamza A. Effect of choline supplementation on rapid weight loss and biochemical variables among female taekwondo and judo athletes. *J. Hum. Kinet*, 2014; 40 (1), 77-82.
2. Pettersson S, Ekström MP, Berg CM. The food and weight combat. A problematic fight for the elite combat sports athlete. *Appetite*, 2012; 59(2), 234-242.
3. Enns M, Drownowski A, Grinker J. Body composition, body size estimation, and attitudes towards eating in male college athletes. *Psychosomatic Medicine*, 1987; 49(1), 56-64.
4. Reale R, Slater G, Burke LM. Acute-weight-loss strategies for combat sports and applications to Olympic success. *Int J Sport Physiol*, 2017; 12(2), 142-151.
5. Yagmur R, Isik O, Kilic Y, et al. Weight loss methods and effects on the elite cadet Greco-Roman wrestlers. *Journal of Teaching, Research, and Media in Kinesiology*, 2019; 5, 33- 40.
6. Franchini E, Brito CJ, Artioli GG. Weight loss in combat sports: Physiological, psychological and performance effects. *J Int Soc of Sport Nutr*, 2012; 9(1), 52-57.
7. Artioli GG, Saunders B, Iglesias RT, et al. It is time to ban rapid weight loss from combat sports. *Sports Medicine*, 2016; 46(11), 1579-1584.
8. Gann JJ, Grant TM, La Bounty PM. Weight cycling: prevalence, strategies, and effects on combat athletes. *J Strength Cond Res*, 2015; 37(5):105-111.
9. Pettersson S, Berg CM. Hydration status in elite wrestlers, judokas, boxers, and taekwondo athletes on competition day. *Int J Sport Nutr Exerc Metab*. 2014; 24(3):267-75.
10. Berkovich BE, Eliakim A, Nemet D, et al. Rapid weight loss among adolescents participating in competitive judo. *Int J of Sport Nutr Exe*, 2016; 26(3), 276-284.
11. Cicioglu H I, Isik O, Yildirim I, et al. The effects of dehydration before competition upon body composition, leptin hormone, and ghrelin hormone among elite wrestlers. *Biomedical Research*, 2017; 28(10), 4335-4341.
12. Oppliger RA, Steen SAN, Scott JR. Weight loss practices of college wrestlers. *Int J of Sport Nutr Exe*, 2013; 13(1), 29-46.
13. Shirreffs SM. Markers of hydration status. *J Sport Med Phys Fit*, 2000; 40(1), 80-84.
14. Silva AM, Fields DA, Heymsfield SB, Sardinha L B. Body composition and power changes in elite judo athletes. *Int J Sports Med*, 2010; 31: 737-741.
15. Demirkan E, Kutlu M, Koz M, Özal M, Güçlüöver A, Favre M. Effects of hydration changes on body composition of wrestlers. *Int J Sport Studies*, 2014; 4: 196-200.
16. Alpay CB, Ersoz Y, Karagoz S, et al. Comparison of weight loss, body composition and some mineral levels before competition in elite wrestlers. *International Journal of Science Culture and Sport*, 2015; 3(4), 338-348.
17. Horswill CA, Park S, Roemmich JN. Changes in the protein nutritional status of adolescent wrestlers. *Med Sci Sport Exe*, 1990; 22(5), 599-604.
18. Ohta S, Nakaji S, Suzuki K, et al. Depressed humoral immunity after weight reduction in competitive judoists. *Luminescence*, 2002; 17(3), 150- 157.
19. Shimizu K, Aizawa K, Suzuki N, et al. Influences of weight loss on monocytes and T-cell subpopulations in male judo athletes. *J Strength Cond Res*, 2011; 25(7), 1943-1950.
20. Karila TA, Sarkkinen P, Marttinen M, et al. Rapid weight loss decreases serum testosterone. *Int J Sports Med*, 2008; 29(11), 872-877.
21. Guilherme G, Fernanda B, Viviane O, et al. Magnitude and methods of rapid weight loss in elite judo athletes. *Rev Nutr, Campinas*, 2007; 20(3): 307-315.
22. World Anti-Doping Agency. World anti-doping code 2015. 2015. Available from: <https://wada-main-prod.s3.amazonaws.com/resources/files/wada-2015-world-anti-doping-code.pdf>. Accessed 12 Aug 2015.
23. Reljic D, Hässler E, Jost J, et al. Rapid weight loss and the body fluid balance and hemoglobin mass of elite amateur boxers. *Journal of Athletic Training*, 48(1), 2013; 109-117.
24. José GA, Mora-Rodriguez R, Below PR, et al. Dehydration markedly impairs cardiovascular function in hyperthermic endurance athletes during exercise. *J Appl Physiol*, 1997; 82(4), 1229-1236.
25. Sakurai M, Hamada K, Matsumoto K, et al. Plasma volume and blood viscosity during 4 h sitting in a dry environment: effect of prehydration. *Aviat Space Envir MD*, 2004; 75(6), 500-504.
26. Sawka MN, Latzka WA, Matott RP, et al. Hydration effects on temperature regulation. *Int J Sports Med*, 1998; 19(S 2), S108-S110.
27. Artioli GG, Gualano B, Franchini E, et al. Prevalence, magnitude, and methods of rapid weight loss among judo competitors. *Med Sci Sport Exer*, 2010; 42(3), 436-442.
28. Yazar H, Eroğlu H, Uzum H, et al. Sporcu Kilo Dusme Yöntemleri ve Etkileri Ölcegi: Gecerlik ve guvenirlik calismasi. *Journal of Human Sciences*, 2016; 13(3), 6164-6175. doi:10.14687/jhs.v13i3.4212
29. Isik O, Gokdemir K, Bastik C, et al. A study on elite wrestlers: weight loss and depression. *Journal of Physical Education & Sports Science*, 2013; 7(3), 216-223.
30. Yagmur, R., Isik, O., Kilic, Y., & Akyuz, M. (2019). The hydration status and thyroid hormones levels among elite wrestlers. *Prog Nutr*, 21(4), 952-957.
31. Bradley DD. Prevalence and Effects Rapid Weight Loss among International style Wrestlers. Dept. HPER, Northern Michigan University, Marquette, MI, USA 1401 Presque Isle Marquette, 1-17, 2006.
32. Brito CJ, Roas AFCM, Brito ISS, et al. Methods of body-mass reduction by combat sport athletes. *Int J Sport Nutr Exe*, 2002; 22(2), 89-97.
33. Yalcin, I., Ayhan, C., & Dugenci, A. Müsabaka Oncesi Elit Yıldız Greko-Romen Güreçcilerin Oz Güven Düzeylerinin Cesitli Degiskenler Acısından Incelenmesi. (2019). *OPUS Uluslararası Toplum Araştırmaları Dergisi*, 11(18), 2040-2054.
34. Horswill CA. Applied physiology of amateur wrestling.

- Sports Medicine, 1992; 14(2), 114-143.
35. Sawka MN, Young AJ, Francesconi RP, et al. Thermoregulatory and blood responses during exercise at graded hydration levels. *J Appl Physiol*, 1995; 59(5), 1394-1401.
 36. Steen SN, Brownell KD. Patterns of weight loss and regain in wrestlers: has the tradition changed?. *Med Sci Sport Exer*, 1990; 22(6), 762-768.
 37. Isik O, Dogan I. Body components changes and depression scores before competitions among elite female wrestlers. *Acta Kinesiol*, 2017; 11(1), 23-27.
 38. Isik O, Gumus H. Evaluation of effective demographic variables in competition performances of Turkish wrestling referees. *J Hum Sport Exerc*, 2018; 13(1), 60-71.
 39. Isik O, Yildirim I, Ersoz Y, et al. Monitoring of pre-competition dehydration-induced skeletal muscle damage and inflammation levels among elite wrestlers. *J Back Musculoskelet*, 2018; 31(3), 533-540.
 40. Aslan H. Agirlik Kategorisindeki Sporcularda Kilo Verme Yöntemleri Ve Beslenme Davranışları. *Journal of International Social Research*, 2018; 11(60), 1355-1358.
 41. Seyhan S. Evaluation of the Rapid Weight Loss Practices of Taekwondo Athletes and Their Effects. *Journal of Education and Training Studies*, 2018; 6(10), 213-218.
 42. Choma CW, Sforzo GA, Keller BA. Impact of rapid weight loss on cognitive function in collegiate wrestlers. *Med Sci Sport Exer*, 1998; 30(5), 746-749. <https://doi.org/10.1097/00005768-199805000-00016>
 43. Yang WH, Heine O, Pauly S, et al. Rapid rather than gradual weight reduction impairs hemorheological parameters of Taekwondo athletes through reduction in RBC-NOS activation. *PloS one*, 2015; 10(4), 1-14.
 44. Imamoglu O, Agaoglu SA, Kishali NF. Erkek Milli Judoçularda Aerobik, Anaerobik Güç, Vücut Yag Oranı, El Kavrama Kuvveti ve Vital Kapasite Aralarındaki İlişki. *Beden Eğitimi ve Spor Bilimleri Dergisi*, 2001; 1(3), 96-101.
-
- Correspondence:
Yusuf Soylu
School of Physical Education and Sports, Siirt University, Siirt, Turkey
E-mail: soylusyusuf@gmail.com