Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi
http://dergipark.gov.tr/tsed
Year: 2020 - Volume: 22 - Issue: 1 - Pages: 150-153
DOI: 10.15314/tsed.657490

ISSN: 2147-5652

Monitoring Hydration Status of Elite Judo Athletes During a Competition Day

Bayram CEYLAN[1A], Mustafa Şakir AKGÜL[1B], Veli Volkan GÜRSES[1C], Bilgehan BAYDİL[1D], Latif AYDOS[2E]

[1]*Department of Coaching Education, School of Physical Education and Sport, Kastamonu University*
[2] *Department of Physical Education and Sport Teaching, Faculty of Sport Sciences, Gazi University*

Address Correspondence to B. Ceylan: e-mail: b.ceylan42@gmail.com

(Received): 10.12.2019/ (Accepted): 26.04.2020

A:Orcid ID: 0000-0002-6753-1848- B:Orcid ID: 0000-0002-9696-6541C:Orcid ID: 0000-0002-6249-3504

D:Orcid ID: 0000-0002-9161-2381-E:Orcid ID: 0000-0002-1378-2537

Abstract

Dehydration is defined as deficit in total body water and has been suggested to have adverse effects on athletic performance as well as health. Despite ongoing efforts to inform the athletes, especially weight-classified athletes present higher level of dehydration. As judo is a weight-classified sport and athletes are exposed to rapid weight loss methods, hydration status of judo athletes should be monitored for athletes' health and implications for future precautions. Thus, the aim of this study was to monitor hydration status of elite judo athletes during a competition day. Eighteen (13 males, 5 females) elite judo athletes voluntarily participated in this study. Following body composition measurements, USG and urine color measurements were carried out before and after the competition in order to determine their hydration status. Athletes' pre-match USG value was 1,021 while it was found 1,019 after competitions. As for urine color, it was 5,17 before competitions and 4,87 after competition. According to these results elite judo athletes presented higher level of dehydration during a competition day despite ad libitum fluid intake. Judo athletes and coaches should be informed about adverse effects of dehydration and individual water intake prescriptions for these athletes can be advised. Further research is also advised to confirm that dehydration negatively affects judo specific performance.

Keywords: hyphohydration, combat sports, judo, dehydration

INTRODUCTION

Judo is an Olympic combat sport where high level of aerobic and anaerobic fitness, muscular endurance, strength and agility are of great importance for successful judo performance. Judo is a weight classified sport and athletes compete according to their ages and weight categories. Judo athletes apply rapid weight loss methods to make weight just a few days before the competition and even hours before the official weigh-in time (13). Both increased sweating and fluid restriction are used by judo athletes during rapid weight loss period (13). Refraining from fluid intake as well as being exposed to increased sweating lead to dehydration.

Enough water intake is of great importance for water induced functions such as transportation of food and waste products, regulation of body temperature, maintenance of blood pressure via regulating blood volume, maintenance of acid-base

balance and supporting cardiovascular functions (4). It has been obviously proven that even moderate level of dehydration increases physiological strain, with leading to lower energy availability (5), impairment in thermoregulation (8, 14), alterations in plasma and intracellular electrolyte levels (3, 9). Furthermore, dehydration of 5% of body mass or greater has been indicated to have effects on blood composition up to following seven days (11, 12). Progressive weight loss over five days has been reported to decrease total body water, blood volume, extracellular water and plasma volume (16).

There is evidence to suggest that dehydrated judo athletes are not adequately rehydrating before their competitions (6, 19). According to urine specific gravity (USG) and measure of body mass 15 h before the competition and 2 h before the competition, athletes gained 2.04% of their body mass and 54.8% of the athletes were significantly dehydrated (Usg>1.021) 2 h before the competition. Another supporting finding of this situation is that judo athletes were as dehydrated as wrestlers despite 15 h recovery period between weigh-in and match in contrast to wrestlers (19). Although there are some studies about hydration status of judo athletes (6, 13, 18) there is limited study investigating hydration status of judo athletes during a competition day. Thus the aim of this study was to monitor hydration status of elite judo athletes during a competition day.

MATERIAL AND METHOD

Experimental Approach to the Problem

As a result of abovementioned information, there is a need of information about hydration status of elite judo athletes during competition day where they present their highest level of performance. As adverse effects of dehydration have been obviously presented by the literature, it is very important that athletes compete under euhydrated condition for performance but more importantly for their health.

Subjects

Thirteen males (age=21,5±3, weight=70,3±10,1, height=1,71±0,08, BMI=23,6±1,5) and 5 females (age=21,2±1, weight=76,4±23,2, height=1,74±0,12, BMI=24,6±4,2) elite judo athletes voluntarily participated in this study. The criteria to participate in the study included competing at international tournament for the last two years and not going through menstrual period for female participants. All the subjects were informed about the nature of the study and they gave written informed consent.

Data collection

Data collection was carried out during European Universities Games in 2018 and Grand Prix Antalya in 2019. On arrival to the competition hall, subjects were instructed to urinate into a plastic cup for urine specific gravity (USG) and urine color measurement. Body composition was determined for only descriptive purposes. After weighing the subjects their stature was determined with a stadiometer (Seca, 213, Hamburg, Germany) to the closest 1 cm. Hydration status of the athletes were assessed via USG and urine color which are generally accepted markers of hydration status in the field (17). The analysis for USG was carried out with a digital refractometer (ATAGO, PAL-10S, Tokyo, Japan). Hydration status of the participants were classified according to the suggestion of National Athletic Trainers' Association Position Statement (15) (≤1.020 g/mL euhydrated, ≥1.020 g/mL dehydrated). The same measurement for USG and urine color was repeated after the subjects completed their competitions. Urine color was graded from 1 to 8 (1).

Statistical Analysis

All data was given mean and standard deviation. The data normality was verified with Shapiro-Wilk test. The Paired Sample t test was used to compare USG values and urine colors. According to their USG values athletes were classified either euhydrated or dehydrated and percentages were given for pre and post-match conditions. SPSS 20 was used for the analysis and p value was set at $p<0,05$.

RESULTS

USG and urine color changes are presented in table 1. No statistically significant difference was found between measurements.

Table 1. Changes in USG and Urine Color

Variable	Pre-match	Post-match	t	p
USG	1,021±0,007	1,019±0,004	0,964	0,349
Urine color	5,17±1,79	4,83±1,04	0,766	0,454

Despite no significant difference found between the measurements, according to USG and urine color most of the athletes were found dehydrated (66,6%) and they completed the competition day in dehydrated condition (55,5%). Percentages of

euhydrated and dehydrated athletes can be found in Figure 1.

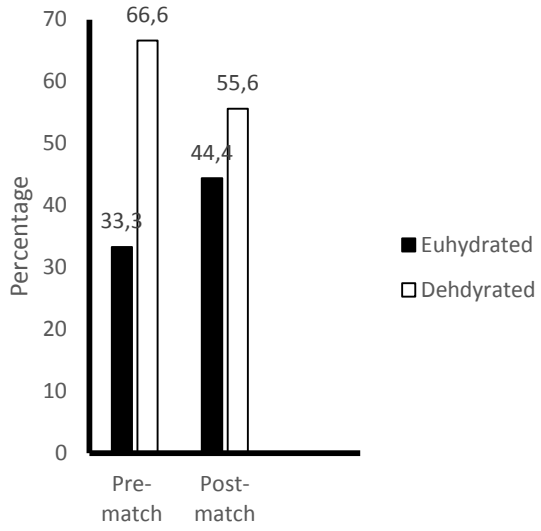

Figure 1. Percentages of athletes according to their hydration status

DISCUSSION

The main findings of this study included: 1) athletes started the competitions in dehydrated state (USG≥1,020 g/mL), 2) they also completed the competition day in dehydrated condition, 3) before the competitions athletes' urine color was higher than 5 which indicates significant dehydration, 4) athletes' urine color or USG did not decrease in contrast to expectations.

Maintaining hydration status is of great importance for performance. Dehydration adversely affects performance due to elevation in heart rate, decrease in stroke volume, rapidly increase in body temperature and perception of exertion and leading to fatigue, dizziness, low blood volume and suboptimal performance (4, 14, 15).

According to suggestions by NATA (15), six of the athletes were euhydrated while 12 of the athletes presented significant dehydration before the competitions. Petterson and Berg (10) investigated the effect of weigh in time on hydration status of combat sport athletes and indicated a mean USG value of 1,029 for all athletes before competition while it was 1,027 and 1,031 for evening weighed athletes and morning weighed athletes, respectively. As weigh-in time was changed in 2013 (7), now athletes have more time to rehydrate between the official weigh-in and competitions. However, our findings stated that almost 15 h recovery was not enough for judo athletes to rehydrate following weigh-in given that some authors indicated that most of the judo athletes resort to rapid weight loss methods (2). Moreover, the findings of Ceylan at al. (19) supported ours as they compared hydration status and acute weight gain of wrestlers and judo athletes and stated that judo athletes presented high level of dehydration in the match morning despite 15 h of rehydration period. Riviera-Brown and Felix Davila (13) monitored changes in hydration status of adolescent judo athletes during training in the heat and in accordance with our findings they stated that most of the athletes started and finished a training session with a significant level of dehydration and experienced symptoms of dehydration despite availability of water during training. Another study by Gürses et al. (6) investigated acute weight gain and dehydration in judo athletes and highlighted that judo athletes could not compensate the gap of dehydration between official weigh-in and match time which was approximately 15 hours. They stated that athletes competed under dehydrated condition. In the current study, after the competitions, 8 of the athletes were euhydrated whilst ten of the athletes were dehydrated. It can be concluded that athletes did not consume enough water to minimize the dehydration.

CONCLUSIONS

In the current study athletes presented higher level of dehydration during a competition day. This study had some limitations; weight loss of the athletes was not determined on the weigh-in day, hydration status was not monitored on the weigh-in day to compare the changes with competition day. Another limitation was that we did not monitor fluid intake of the athletes which surely affects the changes in hydration status. Therefore, it can be suggested that fluid intake, body mass changes and hydration status on the weigh-in day should be thought for further studies as well as including and comparing different age groups and genders. Coaches and athletes should pay high attention to keep hydration values between normally accepted ranges and hydration status check can be included in the competitions before weigh-in to preserve health of weight-classified athletes. Further research is warranted to clarify whether dehydration directly and negatively affects judo specific performance.

REFERENCES

1. Armstrong LE, Soto JAH, Hacker FT, Casa DJ, Kavouras SA, & Maresh CM.. Urinary indices during dehydration, exercise, and rehydration. International Journal of Sport Nutrition and Exercise Metabolism, 1998; 8(4), 345-355.
2. Artioli GG, Gualano B, Franchini E, Scagliusi FB, Takesian M, Fuchs M, Lancha Jr AH. Prevalence, magnitude, and methods of rapid weight loss among judo competitors. Med Sci Sports Exerc, 2010; 42(3), 436-442.
3. Barr SI, Costill DL, & Fink WJ. Fluid replacement during prolonged exercise: effects of water, saline, or no fluid. Medicine and Science in Sports and Exercise, 1991; 23(7), 811-817.
4. Casa DJ, Armstrong LE, Hillman SK, Montain SJ, Reiff RV, Rich BS, Stone JA. National Athletic Trainers' Association position statement: fluid replacement for athletes. Journal of athletic training, 2000; 35(2), 212.
5. Coswig VS, Fukuda DH, & Del Vecchio FB. Rapid weight loss elicits harmful biochemical and hormonal responses in mixed martial arts athletes. International journal of sport nutrition and exercise metabolism, 2015; 25(5), 480-486.
6. Gurses VV, Ceylan B, Akgül MS, Baydil B, Al Hussein H, & Badau D. Dehydration and Acute Weight Gain of Athletes Before Sport Competitions. REVISTA DE CHIMIE, 2018; 69(11), 4096-4098.
7. International Judo Federation (2019). www.ijf.org. retrieved on 01st of December 2019.
8. José GA, Mora-Rodriguez R, Below PR, Coyle EF. Dehydration markedly impairs cardiovascular function in hyperthermic endurance athletes during exercise. Journal of Applied Physiology, 1997; 82(4), 1229-1236.
9. McConell GK, Burge CM, Skinner SL, Hargreaves M. Influence of ingested fluid volume on physiological responses during prolonged exercise. Acta Physiologica Scandinavica, 1997; 160(2), 149-156.
10. Pettersson S, & Berg CM. Hydration status in elite wrestlers, judokas, boxers, and taekwondo athletes on competition day. International Journal of Sport Nutrition and Exercise Metabolism, 2014; 24(3), 267-275.
11. Reljic D, Feist J, Jost J, Kieser M, Friedmann-Bette B. Rapid body mass loss affects erythropoiesis and hemolysis but does not impair aerobic performance in combat athletes. Scandinavian Journal of Medicine & Science in Sports, 2016; 26(5), 507-517.
12. Reljic D, Hässler E, Jost J, Friedmann-Bette B. Rapid weight loss and the body fluid balance and hemoglobin mass of elite amateur boxers. Journal of Athletic Training, 2013; 48(1), 109-117.
13. Rivera-Brown AM, & De Félix-Dávila RA. Hydration status in adolescent judo athletes before and after training in the heat. International Journal of Sports Physiology and Performance, 2012; 7(1), 39-46.
14. Sawka MN. Physiological consequences of hypohydration: exercise performance and thermoregulation. Medicine and Science in Sports and Exercise, 1992; 24(6), 657-670.
15. Sawka MN, Burke LM, Eichner ER, Maughan RJ, Montain SJ, Stachenfeld NS. American College of Sports Medicine position stand. Exercise and fluid replacement. Medicine and Science in Sports and Exercise, 2007; 39(2), 377-390.
16. Schmidt W & Prommer N. Impact of alterations in total hemoglobin mass on VO2max. Exercise and Sport Sciences Reviews, 2010; 38(2), 68-75.
17. Shirreffs, S. M. (2000). Markers of hydration status. Journal of Sports Medicine and Physical Fitness, 40(1), 80-84.
18. Stefanovsky M, Clarys P, Cierna D, Matejova L. Hydration status of youth Judo athletes during an off-season training camp. Ido Movement for Culture. Journal of Martial Arts Anthropology, 2019; 19(3), 56-62.
19. Ceylan B, Eyuboğlu E, Genç İ. Hydration status and acute weight gain of judokas and wrestlers before competition. 17th International Sport Sciences Congress Abstract Book, 2019.