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ABSTRACT

Introduction: To avoid rapid bodyweight fluctuations and the associated effects on health and performance, some combat sports federations have made changes to regulations. **Objective**: the objective of this study was to analyze the impact of the Rapid Weight Gain on sporting success in elite Olympic Wrestling athletes under the new weighing modality.

Methods: the bodyweight of 75 athletes was recorded during the Pan-American Olympic Wrestling Championship (Lima, 2018), corresponding to 29 % of the total universe of competitors (n = 255). Of these, 29 were Greco-Roman style, eight Freestyle, and 38 Women´s Wrestling. The official weighing was carried out between 8:00 and 8:30 hours. As for the second weighing, this was done with the same official weighing scale, immediately before the first match (between 10:00 and 11:00 hours). Rapid Weight Gain after weigh-in was compared between medalist and non-medalist athletes.

Results: when analyzing the difference between medalists and non-medalists, no significant differences were found in Greco-Roman athletes ($t = 0.114$; $p = 0.910$; $r = 0.022$), in Freestyle (Mann-Whitney $U = 5{,}500$; $p = 0.486$; $r = 0.000$), in Women´s Wrestling (Mann-Whitney $U = 163.0$; $p = 0.774$; $r = 0.124$), and in all competitors (Mann-Whitney $U = 641.5$; $p = 0.855$; $r = 0.037$).

Conclusions: no significant differences were found between medalist and non-medalist athletes in any of the Olympic Wrestling styles.

Keywords: Martial arts. Athletic performance. Weight loss. Body weight changes.

RESUMEN

Introducción: para evitar fluctuaciones rápidas del peso corporal y los efectos asociados sobre la salud y rendimiento, algunas federaciones de deportes de combate han realizado cambios de reglamento.

Objetivo*:* el objetivo de este estudio fue analizar el impacto de la ganancia rápida de peso en el éxito deportivo en atletas de élite de la lucha olímpica bajo la nueva modalidad de pesaje.

Métodos: se registró el peso corporal de 75 atletas durante el Campeonato Panamericano de Lucha Olímpica (Lima, 2018), correspondiente al 29 % del universo total de competidores (n = 255). De estos, 29 fueron de estilo grecorromano; 8, de estilo libre y 38, de lucha libre femenina. El pesaje oficial se realizó entre las 8:00 y las 8:30 horas. En cuanto al segundo pesaje, se hizo con la misma balanza oficial inmediatamente antes de la primera lucha (entre las 10:00 y las 11:00 horas). La ganancia de peso rápida después del pesaje se comparó entre atletas medallistas y no medallistas.

Resultados: al analizar la diferencia entre medallistas y no medallistas, no se encontraron diferencias significativas en los atletas de grecorromana (t = 0,114; p = 0,910; r = 0,022), en los de estilo libre (Mann-Whitney U = 5,500; p = 0,486; r = 0,000), en los de lucha libre femenina (Mann-Whitney U = 163,0; p = 0,774; r = 0,124) ni en todos los competidores (Mann -Whitney U = 641,5; p = 0,855; r = 0,037).

Conclusiones: no se encontraron diferencias significativas entre atletas medallistas y no medallistas en ninguno de los estilos de lucha olímpica.

Palabras clave: Artes marciales. Desempeño atlético. Pérdida de peso. Cambios de peso corporal.

INTRODUCTION

Olympic Wrestling is divided into two styles for men, Freestyle (FS) and Greco-Roman (GR), and one style for women, Women´s wrestling (WW). All are classified by bodyweight divisions to favor fair competition in terms of body mass and size (1). However, many athletes use strategies to quickly lose body weight (i.e., rapid weight loss or RWL) in order to compete in lighter categories and against thinner and weaker rivals (1-4). After official weighing, there is a rapid weight gain (RWG) phase before the competition (5). RWL has been defined as a reduction of 2 to 10 % of the bodyweight during the week before competition, mainly in the last 2 to 3 days prior to official weighing (1), a situation that puts the health of the athletes in harm. Over 20 years ago, the American College of Sports Medicine has reported about the potential harm of this practice among athletes (6).

On the other hand, after the official weighing, the fighters have enough time to hydrate and eat, recovering part of their bodyweight before the competition, which would decrease the potential loss of physical performance (1).

Although there are studies that have found a relationship between RWG and sports success in Olympic Wrestling and Judo athletes (7), other research has not been able to verify the link between these variables in Olympic Wrestling (8,9), Boxing (10,11), and Taekwondo (12).

To avoid rapid bodyweight fluctuations and the associated effects on health and performance, some combat sports federations have made

changes to regulations. For example, in the case of Judo and Taekwondo, the official weighing is done the day before the competition, however, on the same day of the competition a new random weighing is performed where the athlete cannot exceed 5 % of the official body weight of the division; otherwise, they are disqualified (13).

For its part, United World Wrestling has moved the official weighing from the day before the competition, to the same day of the competition, approximately 2 hours before the first fight. An initiative that has been previously recommended (14,15) and has shown positive results in the reduction of risk behaviors during RWL (15), although athletes returned to risk behavior when they competed without these rules (16). This modification in the regulation was applied for the first time in the Pan-American Olympic Wrestling Championship (Lima, 2018); however, no studies have been conducted under the new regulation, which explore whether RWG relates to sports performance. Therefore, the objective of this study was to analyze the impact of the RWG on sporting success (medalists vs. non-medalists) in elite Olympic Wrestling athletes under the new weighing modality. Secondly, we determined the differences in RWG between division´s bodyweight in different Olympic Wrestling styles.

MATERIAL AND METHOD

Participants

The bodyweight of 75 athletes was recorded during the Pan American Olympic Wrestling Championship (Lima, 2018), corresponding to 29 % of the total universe of competitors (n = 255). Of these, 29 were GR style (corresponding to 33 %; n = 87), eight FS (corresponding to 8 %; n = 97), and 38 WW (corresponding to 54 %; n = 71) were evaluated (Table I).

All participants were informed of the purpose of the study and signed an informed consent authorizing the use of the information for scientific purposes. The research protocol was reviewed and approved by the Scientific Ethics Committee of the Santo Tomás University of Chile and was developed following the provisions of the Helsinki Declaration.

*** **INSERT TABLE I** ***

Measurements

The official weighing of the Pan American Olympic Wrestling Championship (Lima, 2018) was carried out by weight division according to the scheduled competition day, between 08:00 and 08:30 hours. To do this, the fighters had to wear only the competition mesh (without shoes). Thus, it began on May 3 weighing the divisions -55, -60, -63, -67, -72, -97 and -130 kg of the GR style, on May 4 the divisions -77 were weighed , -82 and -87 kg of the GR style and -55, -59 and -65 kg of the WW style, on May 5 the divisions -50, -53, -57, -62, -68 and -76kg of the WW style and -79 and -92kg of the FS style, to end on May 6 with the weighing of the divisions -57, -61, -65, -70, -74, -86, -97 and -125 kg of the FS style. As for the second weighing, this was done with the same official weighing scale, immediately before the first match (between 10:00 and 11:00 hours). Athletes wore the competition mesh and their fight shoes, the latter being discounted from the calculation of the final body weight, allocating 600 gr. Equation 1 was used to calculate RWG.

Equation 1: [[[second weighing × 100] / first weighing] - 100]

Statistical analysis

For the statistical analysis, GraphPad software (GraphPad Software Inc., California, United States) was used. The homogeneity variance was confirmed using the Levene test, while the normality of the data was analyzed by means of the D'Agostino & Pearson test. The differences between medalists and non-medalists were determined by the Student's t-test for parametric data or the Mann-Whitney U test when the data was non-parametric. Additionally, the statistical power was calculated as $r = t^2 / t^2 + df$, using the classification of 0.1 (small), 0.3 (medium), and 0.5 (large). To determine the differences between athletes by division of body weight, the ANOVA-1 test with posthoc Tukey tests was used when the data had a normal behavior and the Kruskal Wallis test with Dunn's posthoc test if the data was not normally distributed. To obtain the effect size, Eta^2 (n^2) was used, calculated as $n^2 = SS_{between}$ (sum of squares between variables) / SS_{total} (sum of squares of the total), using the classification of $n^2 < 0.04$ (small), $n^2 < 0.36$ (moderate), $n^2 > 0.36$ (strong). A 95 % confidence limit was established.

RESULTS

When analyzing the difference between medalists and non-medalists, no significant differences were found in GR athletes (t = 0.114; p = 0.910; r = 0.022), in FS (Mann-Whitney U = 5,500; p = 0.486; r = 0.000), in WW (Mann-Whitney U = 163.0; p = 0.774; r = 0.124), and in all competitors (Mann-Whitney U = 641.5; p = 0.855; r = 0.037) (Fig. 1).

***** INSERT FIGURE 1 *****

Among GR athletes, the 67 kg division increased its body weight to a greater extent compared to the -130 kg division (F = 3.941; p = 0.032; n^2 = 0.233). For FS, the Mann-Whitney U test was used. No difference

between the body weight divisions -79 kg and -92 kg was observed (U Mann-Whitney = 7.0; p > 0.999; r = 0.067). Likewise, no differences were found between body weight divisions of WW (Kruskal Wallis = 7,548; p = 0.183; n^2 = 0.184) (Fig. 2).

***** INSERT FIGURE 2 *****

DISCUSSION

This is the first study that examined the difference between body weight gain between official weighing and competition in Olympic Wrestling athletes, and sports performance under new changes in the regulations, that is, with weighing on the same day as the competition. As expected, the fighters did not have enough time to significantly increase the bodyweight between the official weighing and their first fight; therefore, no significant differences were observed between medalists and non-medalists in any fighting style, nor when analyzing all athletes together. These results suggest that the transfer of official weighing, from the previous day to the same day of the competition is a useful measure by restricting severe undulations of bodyweight before the first fight. Thus, RWG will likely cease to be a practice that affects the athletic performance of Olympic Wrestling athletes.

Our findings differ from other Olympic Wrestling studies, where the official weighing was carried out the night before the competition (17), and where the time between the official weighing and the first fight was 3 to 7 hours (16). Our results are also different from those reported among Judo athletes (7), where regulation stipulates that athletes cannot exceed 5 % of their division's body weight on the day of the competition. However, they are consistent with other research in university wrestlers, although they had between 20 and 24 hours

between the official weighing and the first fight (8,9). Additionally, our results are consistent with other investigations carried out among boxers (10,11) and Taekwondo athletes (12). The discrepancies between the various studies are probably due to the time between official weighing and the first fight; the competitive level and; by the combat modalities, since in those of dominance (e.g, Judo, Olympic Wrestling, and Brazilian Jiu-Jitsu), athletes must exert greater muscular force when facing their opponents and must recover more bodyweight with respect to percussion modalities (e.g., Taekwondo, Karate, and Boxing), where athletes need to hit the opponent, thus maximizing bodyweight recovery is not a central objective (18,19).

Unlike previous studies, in our research, athletes only had between 2 and 3 hours to recover bodyweight before the first fight, and all athletes were selected by their respective countries to compete in a high-level event. We did not observe differences between medalist and non-medalist athletes (1.32 ± 1.22 % and 1.43 ± 1.46 % of body weight, respectively), which is the first study with these characteristics.

We only found differences between the weight divisions in the GR style, with a higher percentage of body weight recovered for the -67 kg division compared to the -130 kg division. This may be due to the particular characteristics of the athletes in the -130 kg division, who usually have a higher body mass index and percentage of fat mass compared to the lighter weight divisions (20). Additionally, many times the fighters direct their attention more in the absolute value of bodyweight loss, rather than in the percentage of bodyweight loss, so that athletes of lighter divisions have more marked reductions (1,14,18).

Another interesting element of this study corresponds to the competition analyzed, which corresponds to a high-level event that involved the best fighters in America. Therefore, RWG after the official weigh-in with the

new regulation does not differentiate between medalists and non-medalists.

Our study can serve to discourage RWL strategies among elite fighters, and therefore, avoid the “cascade” effect on other athletes, associated with potential performance improvements (1), reducing the likelihood of health problems (6). However, we did not measure hydration levels, which could mask the changes in the bodyweight; therefore, future studies should control for this variable.

In conclusion, no significant differences were found between medalist and non-medalist athletes in any of the Olympic Wrestling styles. Therefore, RWG would not be a useful strategy to improve the real sports performance of elite fighters with the current regulation.

REFERENCES

1. Artioli GG, Saunders B, Iglesias RT, et al. It is time to ban rapid weight loss from combat sports. Sport Med 2016; 46(11):1579-84.
2. Brito CJ, Roas AFCM, Brito I SS, et al. Methods of body mass reduction by combat sport athletes. Int J Sport Nutr Exerc Metab 2012; 22(2):89-97.
3. Gann JJ, Tinsley GM, La Bounty PM. Weight Cycling: Prevalence, Strategies, and Effects on Combat Athletes. Strength Cond J 2015;37(5):105-11.
4. Yang W, Heine O, Mester J, et al. Impact of rapid weight reduction on health and performance related indicators of athletes representing the Olympic combat sports. Arch Budo 2017;13:147-60.
5. Franchini E, Brito CJ, Artioli GG. Weight loss in combat sports: physiological, psychological and performance effects. J Int Soc

Sports Nutr 2012;9(1):52.

6. Oppliger RA, Case HS, Horswill CA, et al. American College of Sports Medicine position stand. Weight loss in wrestlers. Med Sci Sports Exerc 1996;28(6):ix-xii.
7. Reale R, Cox GR, Slater G, et al. Regain in Body Mass After Weigh-In is Linked to Success in Real Life Judo Competition. Int J Sport Nutr Exerc Metab 2016;26(6):525-30.
8. Horswill CA, Scott JR, Dick RW, et al. Influence of rapid weight gain after the weigh-in on success in collegiate wrestlers. Med Sci Sports Exerc 1994;26(10):1290-4.
9. Utter A, Kang J. Acute Weight Gain and Performance in College Wrestlers. J strength Cond Res 1998;12(3):157-60.
10. Daniele G, Weinstein RN, Wallace PW, et al. Rapid weight gain in professional boxing and correlation with fight decisions: analysis from 71 title fights. Phys Sportsmed 2016;44(4):349-54.
11. Reale R, Cox GR, Slater G, et al. Weight Regain: No Link to Success in a Real-Life Multiday Boxing Tournament. Int J Sports Physiol Perform 2017;12(7):856-63.
12. Kazemi M, Rahman A, de Ciantis M. Weight cycling in adolescent Taekwondo athletes. J Can Chiropr Assoc 2011;55(4):318-24.
13. Herrera-Valenzuela T, Valdés-Badilla P, Soto-Voisier E, et al. Rapid Weight Loss: the case of combat sports. Rev Med Chil 2018;146(8):947-8.
14. Artioli GG, Franchini E, Nicastro H, et al. The need of a weight management control program in judo: a proposal based on the successful case of wrestling. J Int Soc Sports Nutr 2010;7(1):15.
15. Oppliger RA, Landry GL, Foster SW, et al. Wisconsin minimum weight program reduces weight-cutting practices of high school wrestlers. Clin J Sport Med 1998;8(1):26-31.

16. Alderman BL, Landers DM, Carlson J, et al. Factors Related to Rapid Weight Loss Practices among International-style Wrestlers. Med Sci Sport Exerc 2004;36(2):249-52.
17. Wroble RR, Moxley DP. Acute weight gain and its relationship to success in high school wrestlers. Med Sci Sports Exerc 1998;30(6):949-51.
18. Reale R, Slater G, Burke LM. Acute-Weight-Loss Strategies for Combat Sports and Applications to Olympic Success. Int J Sports Physiol Perform 2017;12(2):142-51.
19. Reale R, Slater G, Burke LM. Individualised dietary strategies for Olympic combat sports: Acute weight loss, recovery and competition nutrition. Eur J Sport Sci 2017;17(6):727-40.
20. Chaabene H, Negra Y, Bouguezzi R, et al. Physical and Physiological Attributes of Wrestlers. J Strength Cond Res 2017;31(5):1411-42.

Table I. Sample characteristics

Greco-Roman (GR)											
Weight division (kg)	-55	-60	-63	-67	-72	-77	-82	-87	-97	-130	Total
Total (n)	5	10	5	11	5	12	5	11	12	11	87
Athletes evaluated (n)				8					10	11	29
Medal winners evaluated (n)				1					4	4	9
Freestyle (FS)											
Weight division (kg)	-57	-61	-65	-70	-74	-79	-86	-92	-97	-125	Total
Total (n)	12	6	12	6	13	8	13	5	13	9	97
Athletes evaluated						4		4			8

(n)											
Medal winners evaluated (n)						2		2			4
Women´s wrestling (WW)											
Weight division (kg)	-50	-53	-55	-57	-59	-62	-65	-68	-72	-76	Total
Total (n)	10	11	3	10	4	10	2	9	4	8	71
Athletes evaluated (n)	7	5		6		8		6		6	38
Medal winners evaluated (n)	2	1		2		3		4		3	15

n = number of observations.

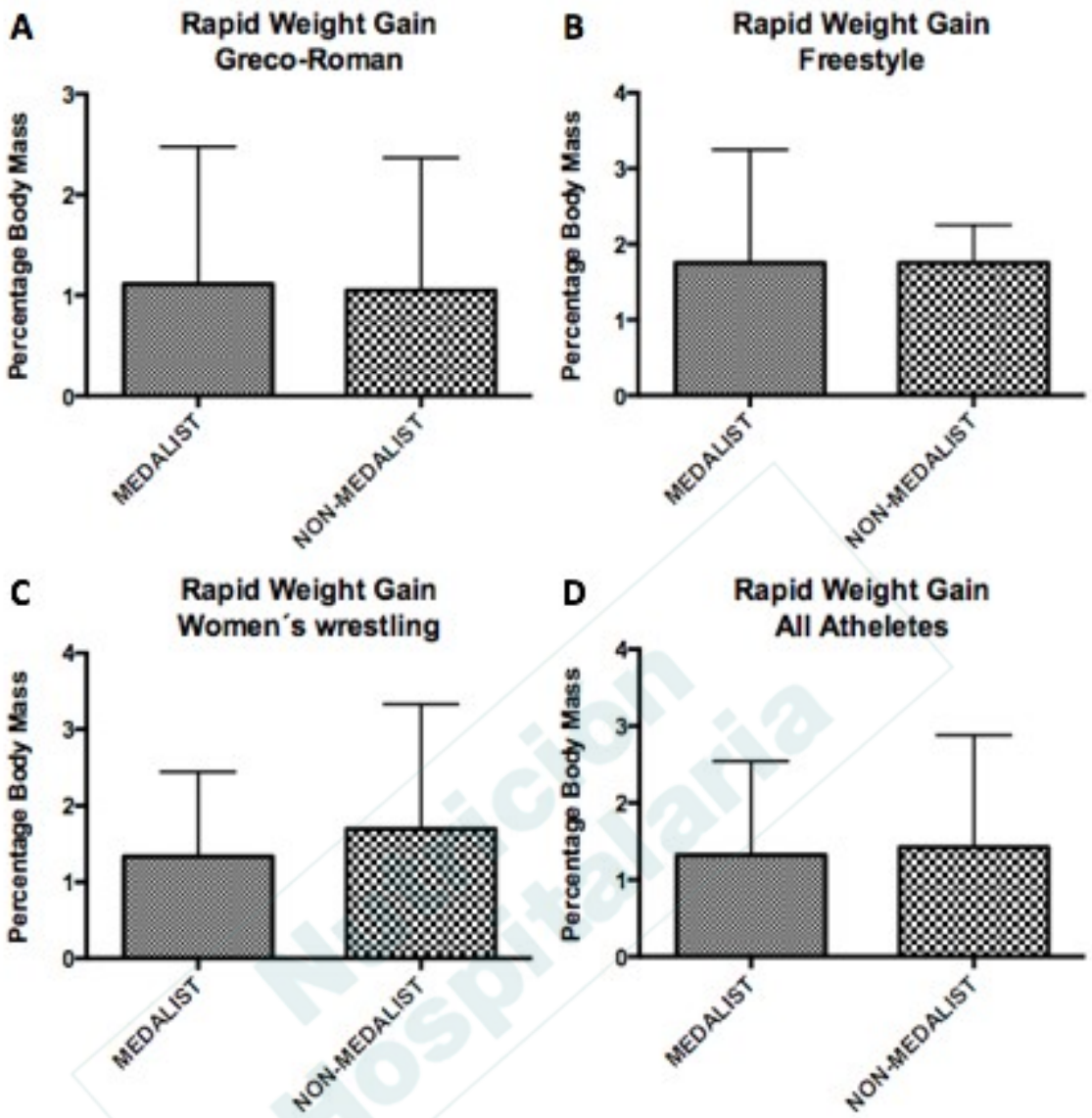

Figure 1. Percentage of body weight gained after initial weighing by medalist status. A. Greco-roman; B. Freestyle; C. Women´s wrestling; D. All athletes.

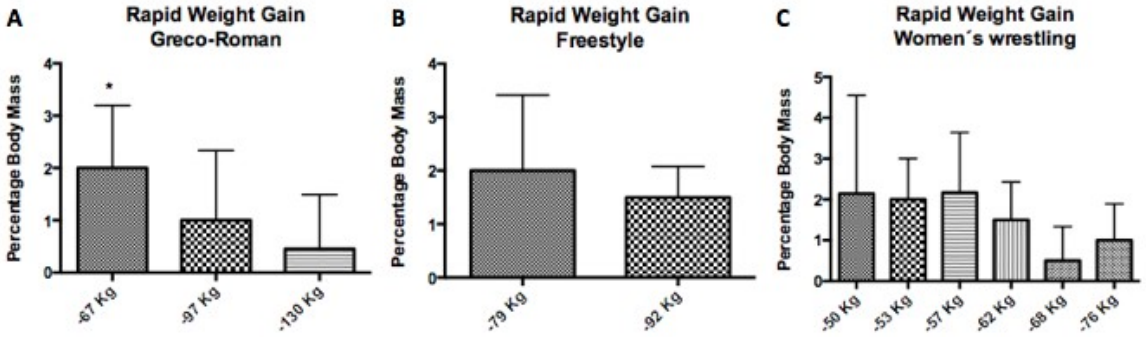

Figure 2. Percentage of body weight gained after initial weighing by weight division. A. Greco-roman; B. Freestyle; C. Women´s wrestling. *Significant differences, $p < 0,05$.