



Trabajo Original

Rapid weight gain in wrestling athletes during the Panamerican Championship, Lima, 2018

Ganancia rápida de peso en atletas de lucha durante el Campeonato Panamericano, Lima 2018

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Abstract

Introduction: to avoid rapid body mass 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 weigh-in procedure.

Methods: the body mass 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 weigh-in was carried out between 8:00 and 8:30 hours. As for the second weigh-in, this was done with the same official weigh-in 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.

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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 weight divisions or weight categories to favor fair competition in terms of body mass and size (1). However, many athletes use strategies to quickly decrease body mass (i.e., rapid weight loss or RWL) in order to compete in lighter categories and against thinner and weaker rivals (1-4). After official weigh-in, 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 body mass during the week before competition, mainly in the last 2 to 3 days prior to official weigh-in (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 weigh-in, the fighters have enough time to hydrate and eat, recovering part of their body mass 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 body mass fluctuations and the associated effects on health and performance, some combat sports federations have made changes their weigh-in regulations. For example, in the case of judo and taekwondo, the official weigh-in is done the day before the competition, however, on the same day of the competition a new random weigh-in is performed where the athlete cannot exceed 5 % of the official body mass of the division; otherwise, they are disqualified (13).

For its part, United World Wrestling has moved the official weigh-in 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 weigh-in rules. Secondly, we determined the differences in RWG between division’s body mass in different Olympic wrestling styles.

MATERIAL AND METHOD

PARTICIPANTS

The body mass 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.

Table I. Sample characteristics

<i>Greco-Roman (GR)</i>											
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
<i>Freestyle (FS)</i>											
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 (n)						4		4			8
Medal winners evaluated (n)						2		2			4
<i>Women’s wrestling (WW)</i>											
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.

MEASUREMENTS

The official weigh-in 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 weigh-in the divisions -55, -60, -63, -67, -72, -97 and -130 kg of the GR style, on May 4 the divisions -77 were weighted-in, -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 -76 kg of the WW style and -79 and -92 kg of the FS style, to end on May 6 with the weigh-in of the divisions -57, -61, -65, -70, -74, -86, -97 and -125 kg of the FS style. As for the second weigh-in, this was done with the same official weigh-in 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 mass, allocating 600 g. Equation 1 was used to calculate RWG.

$$\text{Equation 1: } \left[\frac{\text{second weigh-in} \times 100}{\text{first weigh-in}} - 100 \right]$$

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 weight division, 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, η^2 (n^2) was used, calculated as $n^2 = SS_{\text{between}} / SS_{\text{total}}$ (sum of squares between variables) / (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).

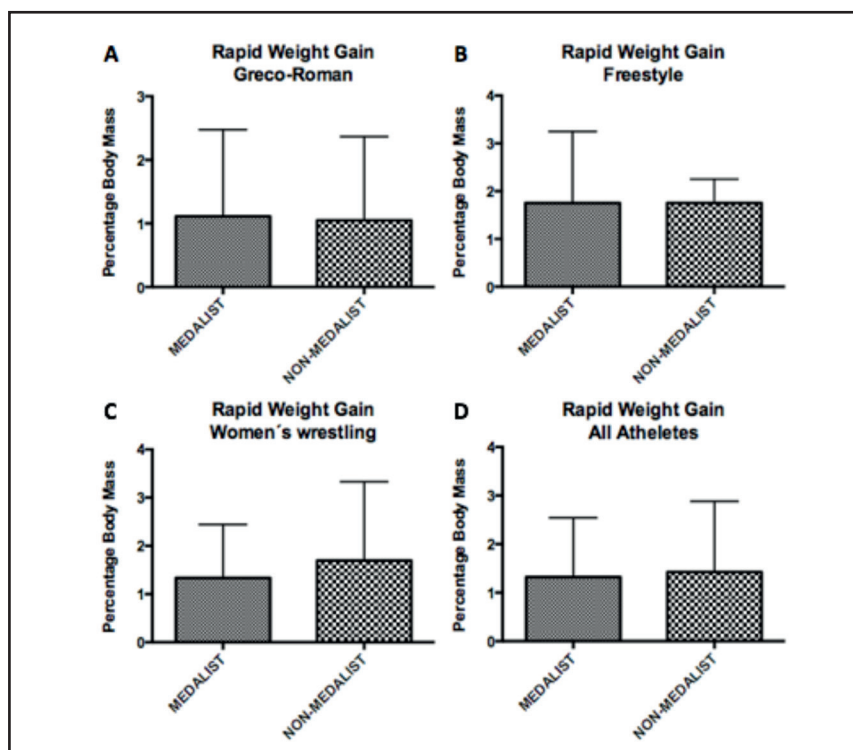


Figure 1. Percentage of body mass gained after initial weigh-in by medalist status. A. Greco-roman; B. freestyle; C. Women's wrestling; D. All athletes.

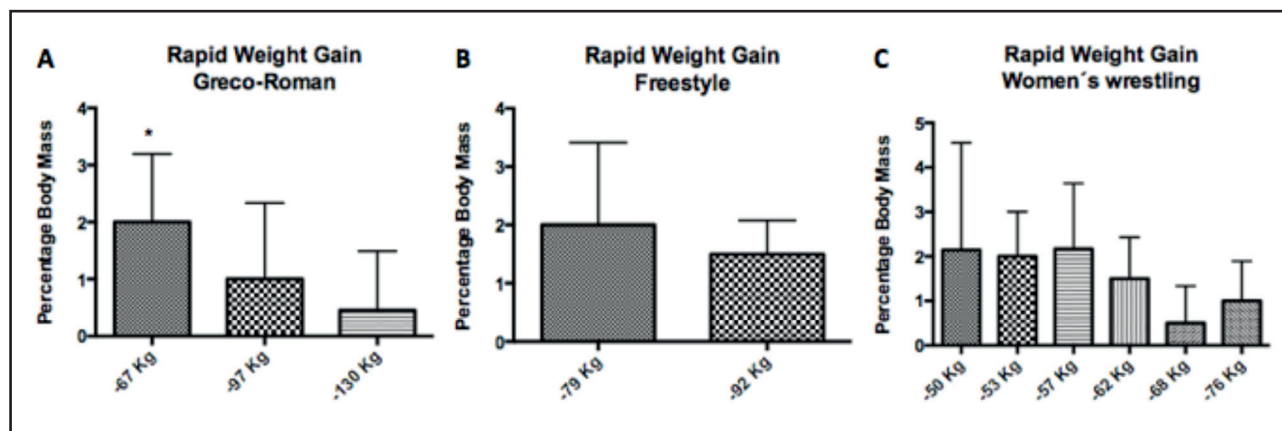


Figure 2.

Percentage of body mass gained after initial weigh-in by weight division. A. Greco-roman; B. Freestyle; C. Women's wrestling. *Significant differences, $p < 0.05$.

Among GR athletes, the 67 kg division increased its body mass to a greater extent compared to the -130 kg division ($F = 3.941$; $p = 0.032$; $r^2 = 0.233$). For FS, the Mann-Whitney U test was used. No difference between the 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 weight divisions of WW (Kruskal Wallis = 7,548; $p = 0.183$; $r^2 = 0.184$) (Fig. 2).

DISCUSSION

This is the first study that examined the difference between body mass gain between official weigh-in and competition in Olympic wrestling athletes, and sports performance under new changes in the regulations, that is, with weigh-in on the same day as the competition. As expected, the fighters did not have enough time to significantly increase the body mass between the official weigh-in 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 weigh-in, from the previous day to the same day of the competition is a useful measure by restricting severe undulations of body mass 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 weigh-in was carried out the night before the competition (17), and where the time between the official weigh-in 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 mass 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 weigh-in 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 weigh-in and the first fight; the competitive level and; by the combat modalities, since in grappling (e.g. judo, Olympic wrestling, and Brazilian jiu-jitsu), athletes must exert greater muscular force when facing their opponents and must recover more body mass with respect to striking combat sports (e.g., taekwondo, karate, and boxing), where athletes need to hit the opponent, thus maximizing body mass recovery is not a central objective (18,19).

Unlike previous studies, in our research, athletes only had between 2 and 3 hours to recover body mass 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 mass, 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 mass 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 body mass loss, rather than in the percentage of body mass 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 body mass; 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.

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