

WHOLE-BODY SWEATING RATE AND PERCENTAGE OF WEIGHT LOST BY DEHYDRATION IN TWO DIFFERENT VOLLEYBALL TRAININGS



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ABSTRACT:

PURPOSE: To compare the whole-body sweating rate and percentage of weight lost by dehydration in two different types of indoor training in male college volleyball players.

METHODS: 8 male college volleyball players were evaluated from February to March 2017. We calculated the whole-body sweating rate and the percentage of weight lost by dehydration in two different training session [Volleyball training (VO) and Volleyball training plus resistance training (VR)]. To evaluate the whole-body sweating rate, body and sport bottle were weighted before and after training to calculate changes in body mass and fluid intake (subjects were allowed to drink ad libitum during trainings). Subjects had to wear minimal clothing, to dry their skin with towels and to void their bladders before being weighed. Active time of each training was evaluated employing a stopwatch. Results are shown in median, minimum and maximum.

RESULTS: The active time for VO were 117 min (72 - 135); on the other hand, for VR were 107 min (97 - 126) (p= 0.96). A higher whole-body sweating rate was found from VO (11.8 ml/min, 5.7 - 13.3) than VR (10.1 ml/min, 7.0 - 12.3) but were not significantly different (p= 0.42). Conversely, a lower percentage of weight lost by dehydration was found from VO (0.7, 0.3 - 1.4 %) than VR (0.8, 0.2 - 1.3 %), but again were not significantly different (p=0.69).

CONCLUSIONS: In this study we found the sweating rate and body weight loss by dehydration were similar despite the training sessions were different. Maybe this happened because the active time was the same. However, it is known that intensity also plays a role in sweating rate, but it wasn't measured here, and therefore, the differences in training intensity may soft the differences in sweating rate and body weight loss despite there were the same active time.

INTRODUCTION

In general, it is accepted that dehydration is a limiting factor in those high intensity activities in which endurance also plays a fundamental role, like tennis, soccer or volleyball (1). In team sports, the level of dehydration can vary among members of the same team, depending on their position on the field. The loss of liquids that causes a decrease of 1 to 2% of body weight can compromise physiological and cognitive functions of athletes, causing a reduction in their performance (2). The monitoring of body weight change is accepted as a valid, simple and non-invasive way to detect water differences before and after exercise (1, 3). Whole body sweating rate (WBSR) helps to estimate fluid and electrolyte losses during exercise (3, 4) and it enables the development of hydration protocols that allow to optimize the performance and prevent the appearance of injuries (1). It is important to assess the state of hydration and fluid intake during training, in order to standardize and establish the best water strategies according to each individual (5) and/or training type. Thus, the purpose of this study was to compare the WBSR and percentage of weight lost by dehydration in two different types of indoor trainings in male college volleyball players.

METHODS

Subjects

Eight volleyball players belonging to the representative male sport team of the University of Guadalajara were evaluated in the period from February to March 2017. We evaluated the WBSR (ml/min) and the percentage of weight lost by dehydration (%WLBD) on two different types of training: Volleyball training (VO) and Volleyball plus resistance training (VR).

Whole-body sweating rate

To evaluate the WBSR, the volleyball players were weighed before and after the exercise with a different short than the one they wore during training. Before being weighed, both before and after exercise, players were instructed to empty their bladders if necessary. The players were instructed to dry the sweat before being weighed after the exercise. To determine the weight before and after the exercise, a TANITA TBF 300A scale was used (Hamburg, Germany), and the technique of the International Society for the Advancement of Kinanthropometry (6) was used to measure body weight. In the same way, drinking bottles were weighed before and after the exercise, using a kitchen digital scale (TANITA KD-160). Players were allowed to drink water *ad libitum* during training and were instructed to avoid spitting the drink. To determine the active time of the trainings, a stopwatch was used. The following equations were used to estimate the WBSR (ml / min) as well as to determine the %WLBD, respectively:

WBSR (ml/min) = (Pre exercise body mass – Post exercise body mass + Fluid intake during exercise) / Exercise duration

%WLBD = 100 - ((Post exercise body mass * 100) / Pre exercise body mass)

Statistics

Results of both the WBSR and %WLBD of each type of training (VO and VR) are shown in median, minimum and maximum. We used a Mann-Whitney test for comparing variables between both training types, assuming a p value <0.05 as significant. We analyzed the data with GraphPad Prism v7.03.

RESULTS

The active time for VO were 117 min (72 - 135); on the other hand, for VR were 107 min (97 - 126) (p=0.96). A higher whole body sweating rate was observed for VO (11.8 ml/min, 5.7 - 13.3) than VR (10.1 ml/min, 7.0 - 12.3) but were not significantly different (p=0.42) (Table 1). Conversely, a lower percentage of weight lost by dehydration was found from VO (0.7 %, 0.3 - 1.4) than VR (0.8 %, 0.2 - 1.3), but again were not significantly different (p=0.69) (Table 1).

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Volleyball players	WBSR (ml/min)		%WLBD	
	VO	VR	VO	VR
Subject 1	11.3	9.5	0.6	0.3
Subject 2	12.0	10.5	0.8	0.9
Subject 3	13.3	11.8	0.8	1.1
Subject 4	11.7	12.3	1.4	1.3
Subject 5	13.0	8.3	0.6	0.2
Subject 6	12.0	12.0	1.2	0.7

Table 1. Whole-body sweating rate and weight lost by dehydration per each type of

%WBLD: Percentage of weight lost by dehydration; WBSR: Whole-body sweating rate; VO: Volleyball training; VR: Volleyball plus resistance training.

CONCLUSIONS

Subject 7

Subject 8

Minimum

Maximum

In this study we found the WBSR and %WLBD were similar despite the training sessions were different. However, there are several factors that may affect the sweating rate (1) (2) (3). One of them, intensity, may explain the lack of differences between these two training sessions, despite the active time was the same. This is, VO trainings might show a buoyant intensity, but VR not, showing a lower intensity in volleyball training and higher in resistance training. However, we did not measure intensity for this study, which should be assessed in future research comparing WBSR and %WLBD in different training sessions.

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