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Habits of fluid and electrolytes intake in elite athletes

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ABSTRACT

Introduction: Dehydration develops when the body fluid losses exceed fluid intake. It may occur during exercise, heat stress, restricted fluid intake, or any combination of these. Marginal dehydration (loss of > 2% body weight) can compromise aerobic exercise performance, particularly in hot weather conditions, and may disturb fluid and electrolyte balance. The aim of the study was to determine the quantity, type and dynamic of fluid intake during athletic performance in endurance sports (football and basketball) in two age categories: juniors (under the age of 18) and seniors (over the age of 18).

Methods: Research included 100 athletes playing in Premier League in Bosnia-Herzegovina. We formed groups by sport type (football and basketball) and age (<18 and ≥18 years). Questionnaire with questions about the fluid intake habits was used for data collection.

Results: There were 53 football players and 47 basketball players. All the participants were male. Average age of the participants was 19.3 ± 4.58. Habit of weighing before and after training was present in less than 44% of players among all the groups. Seniors were more frequently measuring their weight compared to junior players (p=0.01). Basketball players and players younger than 18 years were most frequently taking more than 2L of water per day. Most of the players, regardless of sport type or age group were not taking at least ½ L of isotonic fluid before the training. Signs of dehydration were more frequently observed in players under 18 years old, with most frequent sign being dry throat and sudden fatigue.

Conclusion: Water and electrolytes intake before, during and after training of the athletes were inadequate regardless of type of sports and the age of athletes.

Keywords: sports; athletes; fluid intake; habits

INTRODUCTION

Dehydration can develop when the body fluid losses exceed fluid intake, and it often occurs during exercise, heat stress, restricted fluid intake, or any combination of these. Marginal dehydration (loss of > 2% body weight) can compromise aerobic exercise performance, particularly in hot weather conditions, and may disturb fluid and electrolyte balance (1). Sweat evaporation provides the primary cooling mechanism for the body, and for this reason athletes are encouraged to drink fluids to ensure continued fluid availability for evaporation and circulatory flow to the tissues (2). Because there is considerable variability in sweating rates and sweat electrolyte content between individuals,

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customized fluid replacement programs are recommended. Individual sweat rates can be estimated by measuring body weight before and after exercise (3). If an athlete is undergoing high-intensity or prolonged duration training without ingesting enough fluid, a risk of dehydration occurs because fluid loss through sweating can exceed the athlete's ability to ingest and absorb the fluid. Changes in the hydration status can, after the training, affect the ingestion of food, as well as some other aspects of recovery (4). To minimize the negative effects of dehydration, voluntary drinking to ensure a hydrated state prior to and during exercise is recommended (5). Rehydration by drinking is beneficial for reducing thermal and cardiovascular strain, stabilizing metabolic function, and decreasing fatigue. Thus, rehydrating to maintain body fluid volume is a concern when exercising in a hot environment. Although rehydration during exercise is recommended, individual variations in volume consumption and retention exist (6). Athletes should be well hydrated before exercise and drink enough fluid during and after exercise to balance fluid losses. Sports beverages containing carbohydrates and electrolytes may be consumed before, during, and after exercise to help maintain blood glucose concentration, provide fuel for muscles, and decrease risk of dehydration and hyponatremia (7). Sodium should be included in fluids consumed during exercise if the exercise lasts more than 2 hours. It should also be included in fluids consumed by individuals in any event who lose more than 3–4 g of sodium in their sweat. After exercise that has resulted in body mass loss due to sweat loss, water and sodium should be consumed in a quantity greater than those in the losses to optimize recovery of water and electrolyte balance (8). The aim of the study was to determine the quantity, type and dynamic of fluid intake during athletic performance in endurance sports (football and basketball) in two age categories juniors (under the age of 18) and seniors (over the age of 18).

METHODS

We conducted observational study which included 100 athletes, of which 53 football players and 47 basketball players, playing in the clubs of the Premier League of Bosnia-Herzegovina. All the subjects were males, age average 19.3 ± 4.58 years, actively involved in training for 9.25 ± 4.46 years. We divided subjects into two age groups juniors (under 18 year old) and seniors (over 18 years old). The questionnaire on quantity, type and dynamic of fluid intake during sport performance was used as a research instrument.

Statistical analysis

Data analysis was performed using SPSS 20.0 (IBM, USA). Chi-square test was used for comparing the data between the groups. $P<0.05$ was considered statistically significant.

RESULTS

There were 53 football players and 47 basketball players. All the participants were male. Average age of the participants was 19.3 ± 4.58; the youngest participant was 15, and the oldest was 38 years old. Among the football players, there are 75.5% older than 18 and 24.5% younger than 18. There were more basketball players younger than 18, 78.7%, and 21.3% older than 18 (Table 1).

Habit of weighing before and after training was present in less than 44% of players among all the groups. Seniors were more frequently measuring their weight compared to junior players (p=0.01) (Table 2). More than a half of subjects were not taking care of water intake 24 hours before the

TABLE 1. Age of the athletes

Type of sports	N (%)		
	Athletes under 18	Athletes above 18	Total
Football	13 (24.5)	40 (75.5)	53 (100)
Basketball	37 (78.8)	10 (21.3)	47 (100)
Total	50 (50.0)	50 (50.0)	100 (100)

TABLE 2. Habit of weighing in before and after training in relation to the type of sports and age

Habit of weighing before and after training	N (%)			
	Type of sports		Age group	
	Football	Basketball	≤18 years	>18 years
No	33 (62.3)	35 (74.5)	40 (80.0)	28 (56.0)
Yes	20 (37.7)	12 (25.5)	10 (20.0)	22 (44.0)
Total	53	47	50	50
	p=0.192		p=0.01	

training, but the differences between sport type and age group were not significant (Table 3). Basketball players and players younger than 18 years were most frequently taking more than 2L of water per day (Table 4). Most of the players, regardless of sport type or age group were not taking at least ½ L of isotonic fluid before the training. In addition, the differences between the groups were not significant (Table 5). Most frequently players were drinking water, but isotonic and energy drinks were also used by 3% of players, each (Table 6).

Signs of dehydration were more frequently observed in players age under 18 years, with most frequent sign being dry throat, than sudden fatigue (Figure 1).

TABLE 3. Water intake 24 hours before training in relation to the type of sports and age

Are you taking care of water intake 24 hours before training	N (%)			
	Type of sports		Age group	
	Football	Basketball	≤18 years	>18 years
Not taking care	39 (73.2)	32 (68.1)	33 (66.0)	38 (76.0)
Taking care	14 (26.4)	15 (31.9)	17 (34.0)	12 (24.0)
Total	53	47	50	50
	p=0.27		p=0.366	

TABLE 4. Amount of water athletes enter into the organism on a daily basis in relation to the type of sports and age

Water intake per day	N (%)			
	Type of sports		Age group	
	Football	Basketball	Younger than 18	Older than 18
< 1 L/day	9 (17)	3 (6.4)	4 (8.0)	8 (16)
1-2 L/day	26 (49.1)	19 (40.4)	21 (42)	24 (48)
> 2 L/day	18 (34)	25 (53.2)	25 (50)	18 (36)
Total	53	47	50	50
	p=0.087		p=0.263	

TABLE 5. Consumption of isotonic drinks before training in relation to the type of sports and age

Consumption of isotonic drinks before training	N (%)			
	Type of sports		Age group	
	Football	Basketball	Football	Basketball
Not drinking ½ L of isotonic fluid before training	43 (81.1)	41 (87.2)	45 (90.0)	39 (78.0)
Drinking ½ L isotonic fluid before training	10 (18.9)	6 (12.8)	5 (10.0)	11 (22.0)
Total	53	47	50	50
	p=0.263		p=0.102	

TABLE 6. Type of drinks consumed during training

Type of drinks	N	%
Pure water	94	94.0
Isotonic solutions	3	3.0
Energy drinks	3	3.0
Total	100	100.0

DISCUSSION

One of the main strategies of athletes training for endurance sports is the maintenance of normal hydration state, i.e. achieving optimal balance of body fluids. In order to maintain the state of normal hydration, fluid intake into the organism must be adequate and well-planned, before, during and after exercise. Planning of fluid intake can be successful only if the athlete knows how much fluid he or she is losing during the training. The first step in a well-designed hydration strategy is weighing the athletes before and after training, whereby the difference in their weight represents the amount of water lost from the organism. Our research has shown that the habit of weighing oneself before and after training is not statistically significant in relation to the type of sports (p= 0.191), but it is so in relation to age (p= 0.01). Research conducted in Croatia on the coaches' knowledge about hydration has shown that a large number of coaches, 71.17% of them, know that weighing in is one of the methods which can be used as an indicator of the fluid loss (9). The results of our research show that basketball players are better hydrated than football players, as 53.2% of them drink more than 2 liters of fluid a day, although at the time of intense training or competition that quantity also can be insufficient. Burke et al. conducted the analysis of the fluid balance in various team sports and established that there were great variability not only among different sports, but also among players of the same team. As a reason, there was a fact mentioned that athletes who have long-term continuous training of moderate intensity are less able to predict fluid loss through sweating (10). Type of fluid athletes enter into the organism affects their endurance and organism hydration state. Our research has shown that a large number of athletes do not have

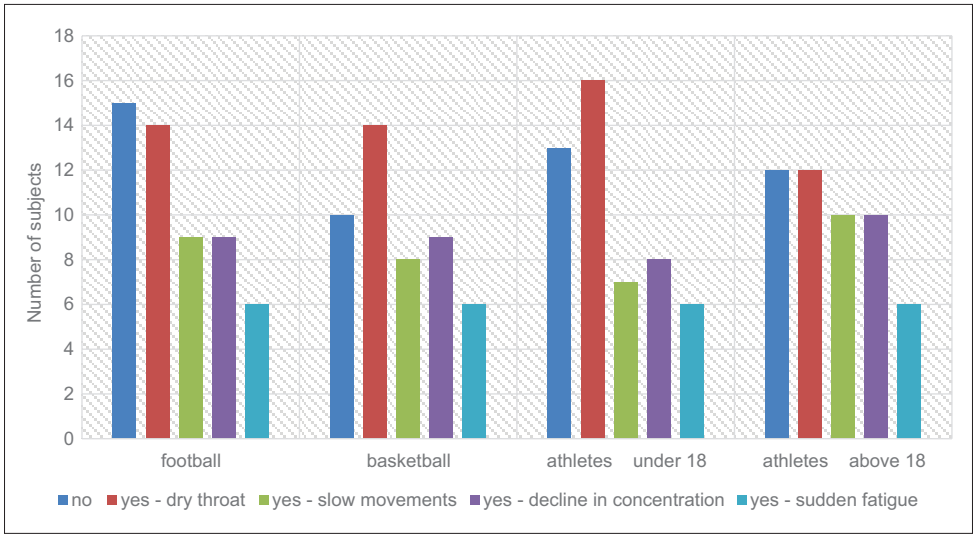

FIGURE 1. Frequency of dehydration symptoms occurrence in relation to the type of sports and age

the habit of ingesting isotonic fluid before training, more than 80% of them. Athletes who participated in our research mainly drink plain water, without added sodium, i.e., 94% of them. With this fact in mind, a large percentage of respondent athletes, more than 70%, felt some symptoms of dehydration or hyponatremia, and the most common symptom in 26.4% of football players, 29.8% of basketball players, 32% of athletes under 18 and 24% of athletes older than 18 is dry throat. Dry throat, or sensation of thirst, is the sign of dehydration, which frequently occurs when athlete has already lost 1.5-2 liters of fluid (11). Survey conducted among the basketball players of one NBA team in the season of 1999 has shown that 95% of basketball players are aware of dehydration being one of the primary reasons for the occurrence of premature fatigue (12).

CONCLUSION

Water and electrolytes intake before, during and after training is inadequate and there is no statistically significant difference in terms of the type of sports and the age of athletes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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