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OVERCOMING HYDRAULY ADOLESCENT ATHLETES: BEFORE AND AFTER FOOTBALL TRAINING

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ABSTRACT

One of the most important elements of physical exercise is the fulfillment of water needs in the body. Teen athletes with high motivation to quickly achieve often ignore the adequacy of water in their bodies, resulting in dehydration so that instead of achievement is obtained but decreased performance can even lead to prolonged illness. To avoid the risk of high dehydration the body needs to know the amount of fluid consumed. The purpose of this study is to analyze the need for fluid consumption during the period before training, during training and after training in adolescent football athletes. Participants as many as 47 young male athletes in clubs in the City of Tasikmalaya, ages ranging from 13 to 16 years. This research was observational using cross sectional design. 60 minutes of football practice. The instrument was conducted by interview, nutritional status data through the calculation of body mass index. Fluid consumption during the exercise period (before, during and after exercise) is obtained through observation and interviews using food recall, and the hydration status is determined by urine specific gravity examination. Analysis of the relationship between exercise fluid consumption, hydration status before training and hydration status after the Spearman rank test exercise previously tested data normality using the SaphiroWilk test. Teen athletes consume less fluid during exercise 75.8%. Age of athletes ranging from 13 to 16 years. Most athletes consume less fluids during training (80.9% athletes) and after training (89.4% athletes). The average fluid consumption in the exercise period (1678.77 + 457.9 ml) is lower than the recommended requirement (2400-3400 ml). Only 1 athlete (2.1%) was well hydrated before training, 68.8% experienced significant dehydration. Whereas after training all athletes experience dehydration, which is 89.4% significant dehydration, and 10.6% minimum dehydration. There is a relationship between fluid consumption in the training period ($r = -0.297$, $p = 0.043$) and hydration status before training ($r = 0.392$, $p = 0.006$) with dehydration status after training in adolescent football athletes. Hydration status before training, fluid consumption in the training period is related to hydration status after training in adolescent football athletes. The new findings of this study for adolescent soccer athletes during the process of training and competing need to be monitored by sports doctors so that the risk of lack of body fluids can be controlled, and comfortable practicing and competing. If not done clinically, many young soccer athletes are sick or even cause death due to excessive fatigue accompanied by lack of body fluids.

Keywords: *Fluid consumption, hydration status, teen athlete, training.*

1. INTRODUCTION

Football as a high-intensity sport is intermittent or stop and go that requires the support of the condition of the body during the game lasts 90 minutes or more when there is an extension of time (Kirkendall, 2004; Irawan, 2007; Silva et al., 2011). Football physical

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motion is a combination of aerobic and anaerobic activities. Aerobic activities are low intensity activities such as running short or medium distance, dribbling and passing the ball, while high intensity activities are carried out by sprinting or sprinting, running cruising, dribbling the ball, jumping, talking or kicking the ball (Marwan, 2018).

Footballers during the match 90 minutes total distance covered (distance covered) as far as 9,800 - 11,500 m. In addition, footballers in one game experience changes in running speed as much as 40 to 60 times and experience changes in body movement every 5 to 6 seconds. The average mileage of players is almost 10 km and the high level of activity in one match so that football is also categorized as endurance (Irawan, 2007; Silva et al., 2011). Even in elite football match-play, there is a tendency for a peak in high-intensity activity in the first and a decline in the final 15-min periods of play (Carling, 2013). Football, unlike continuous modalities, is an intermittent sport that allows alternating intensity during its practice, in which many actions are performed with and without changes in direction (Jakobsen et al., 2011). Football is a global phenomenon with approximately 270 million practitioners and can be used as a channel for promoting health and the prevention of chronic diseases caused by physical inactivity (Krustrup et al., 2010).

Teen athletes are different from non-athlete teens. Adolescence is a period of accelerating growth and development, namely at the age of 10-18 years (Goldberg, 2003). Its growth is faster than childhood. In adolescent athletes' growth and development include height gain, weight gain, maximum oxygen consumption (VO_2 max), aerobic capacity, and muscle strength (Lopez, 2012). These findings suggest that the present elite players coped 'physically' with commencing match-play in a fasted state yet differ to results reported in amateur players who recorded less running activity overall when performing in a fasted versus a non-fasted condition (Aziz et al., 2018). Teen athletes also have a higher risk of dehydration than adult athletes (Sawka et al., 2007; Kurdak et al., 2010). With instant motivation, adolescent athletes tend to want faster achievement compared to adult athletes, thus ignoring the availability of fluids in the body that are useful for lowering body heat (Sawka et al., 2007). Dehydration caused by decreased fluid from the body due to perspiration is also a factor that causes decreased sports performance (Marwan, 2018).

When exercising, reduced body fluids through perspiration and moisture in the respiratory process even if only by 2-3% can cause a decrease in performance of up to 10%. In football practice, the level of sweat expenditure of each player varies based on the player's position, playing style, length of play on the field, temperature and humidity of the environment and body size (Bangsbo, Magni, & Peter, 2006; Armstrong, 2007).

Research by Kurdak et.al. (2010) shows that sweat expenditure and dehydration levels become higher when football practice is carried out in hot weather. However, some studies show that not all players are well hydrated before and after practice (Coyle, 2004; Kenefick et al., 2012). The Ozolina, Inese, and Madara (2013) study of 40 football players who underwent training for 90 minutes showed that 35% were well hydrated and more than half of the players experienced hypohydration before training and that the body's hydration status deteriorated after training.

Research shows the prevalence of dehydration of 87.5% in adolescent football athletes during football practice with a specific gravity of urine > 1,020 gr/dl. Based on urine osmolality and specific gravity, it was found that football athletes experience hypohydration before and after exercise (Fink, Alan, & Lisa, 2013; Ozolina et al., 2013).

Recommended fluid intake for young men aged 14 to 18 years is 3.3 liters/day (Armstrong, 2007). While athletes must consume more fluids compared to non-athletes because of their higher physical activity. The American College of Sports Medicine (ACSM), the National Athletic Trainers Association (NATA) and the American Dietetic Association (ADA) recommend the athlete's fluid consumption before, during, and after a match is 2.4 to 3.4 liters (Armstrong, 2007). The average fluid consumption of teenage

football athletes aged 14 to 18 years during training is 1.12 to 1.7 liters. Whereas during training or matches, teen football athletes lose sweat as much as 2 to 3 liters (Maughan, 2005; Singh, 2003).

This shows that the consumption of fluids has not been able to replace fluids lost through sweating during training or competing. Inadequate fluid consumption increases the risk of dehydration in athletes, thereby decreasing athlete performance (Marwan, 2018). Several other studies have shown that dehydration has a negative effect on exercise performance (Hoch, 2008; Stang, 2012), even loss of fluid from 1 to 2% of body weight can cause strong thirst, loss of taste, discomfort, increased heart rate, and decreased sports performance by 10% (Armstrong, 2007; Silva et al. 2012). Even worse if the loss of fluid from 3 to 5% of body weight can cause dry mouth, impatience, decreased blood volume, difficulty concentrating, excessive shaking, slow physical activity, lethargy, vomiting, unstable emotions, and decreased performance by 30%.

Future research should consider improving the accuracy of self-reporting techniques in athlete populations by providing more training on portion sizes and household measures and encouraging the importance to record all food and fluid consumed on a daily basis (Martin, Lambeth, & Scott, 2006). During endurance exercise, sweat rates of athletes typically average 1.0-1.5 L of fluid per hour. The amount of sodium lost during exercise averages 0.8 grams per liter of sweat, but can vary with genetics, diet, heat acclimatization and hydration status (Sawka et al., 2007).

Thus, the purpose of the present study was to consume fluid in the training period (before, during and after training) and hydration status before and after training in adolescent football athletes.

2. METHODS AND MATERIALS

2.1 Participants and Study Design

Thirty-three young male athletes aged 13 to 16 who are members of five football clubs in the City of Tasikmalaya. Taking respondents by purposive sampling with inclusion criteria: healthy body condition, no diarrhea, no fever, no history of chronic illness, a commitment to practice football regularly, the total number of respondents was 135 athletes.

This study was an observational study using a cross-sectional design. The independent variable of this study was the fluid consumption of the exercise period (before, during and after exercise) and the hydration status before exercise, the dependent variable was the hydration status after exercise. The control variable is carried out by means of the respondent not eating soup or foods that contain a lot of water indicated as a water drink. Football practice activities for 2 times 60 minutes (15-minute break) are carried out from 15.30 to 16.55.

2.2 Measures

Measures Outcome measures were assessed by study personnel blinded to group assignments at baseline and at the end of the intervention period (6 weeks). Measurements were made by obtaining sources of data on the subject's characteristics, fluid consumption, weight loss, urine volume, sweat lost during exercise, and hydration status after exercise. Data on the subject’s characteristics were obtained through direct interviews using a questionnaire including names and birth dates. Calculation of body mass index (BMI) by direct measurement of body weight using digital scales with an accuracy of 0.1 kg and height using microtoise accuracy of 0.1 cm. Fluid consumption is the total amount of fluid that enters the body from drinks and food obtained through food recall for 1 to 24 hour

period. The measured fluid consumption is daily fluid consumption and fluid consumption during the exercise period. Daily fluid consumption is the total amount of liquid consumed both from drinks and food that is measured 24 hours before the exercise is finished.

Fluid consumption during the exercise period is the total amount of fluid consumption before, during and after exercise. Fluid consumption before exercise is the total amount of liquid consumed both from drinks and food measured 4 hours before the exercise begins. Consumption of fluids 4 hours before exercise is said to be sufficient if consuming fluids of at least 600-900 ml (Ozolina et al., 2013).

Fluid consumption during exercise is the total amount of liquid consumed both from drinks and food measured during exercise (70 minutes). Consumption during 70 minutes of exercise is said to be sufficient if consuming a minimum of 700 to 1050 ml (Bangsbo et al., 2006). Consumption of fluids after exercise is the total amount of liquid consumed both from drinks and food that is measured 1 hour after the exercise is finished.

Fluid consumption after exercise is said to be sufficient if consuming 500 to 700 ml every 0.5 kg of body weight lost during exercise. Fluid consumption during exercise is said to be sufficient if consuming 2400 to 3400 ml, while daily fluid consumption is said to be sufficient if consuming 57006700 ml (Lopez, 2012). The calculation of the total amount of fluid consumption uses the formula for adding total fluids from drinks and total fluids from food as seen from the 2009 DKBM.

Types of drinks consumed are divided into 5 namely: water, carbohydrate drinks, electrolyte drinks, carbohydrate-electrolyte drinks and carbonated drinks. With the criteria of water is a clear, tasteless and odorless drink. Carbohydrate drinks are drinks that contain sugar, for example tea, coffee, ice, fruit-flavored drinks. Electrolyte drinks are drinks that contain some electrolytes such as sodium, potassium, chloride, for example ionization drinks. Carbohydrate-electrolyte drinks are drinks that contain sugar and some electrolytes such as sodium, potassium, chloride, for example fruit or vegetable juices, milk, sports drinks. Carbonated drinks are drinks that are made by dissolving carbon dioxide gas in drinking water, these drinks are often called soda drinks. Hydration status is a condition that describes the fluid balance in the athlete's body which can be determined by urine specific gravity examination.

The urine specific gravity method was chosen because it is easy to implement, often used, short analysis time, good accuracy, affordable cost, good tool portability, and low risk for the subject. 1 Hydration status is measured twice before and after exercise. Urine sample taking 1 hour before exercise and 1 hour after exercise using a clear glass bottle. BJU examination is carried out in a laboratory using the reagent strip method. Urine Specific Gravity is categorized as well-hydrated if the Urine Specific Gravity value < 1,010 g / dl, minimum dehydration if the Urine Specific Gravity value is 1,010 - 1,020 g / dl, significant dehydration if the BJU value is 1,021-1,030 g / dl, and is seriously dehydration if the Urine Specific Gravity value is > 1,030 g / dl (Shirreffs, 2009; Ozolina et al., 2013).

2.3 Data Extraction

One form was designed for the extraction of data, which included first author, publication year, objects` features, follow-up, treatment types and outcome measurements. The selection of literature, extraction of data and quality assessment were implemented by the two authors. In case of disagreement, it was discussed and consulted with a third person.

2.4 Statistical Analysis

Univariate analysis is used to describe each variable. Analysis of the relationship between exercise fluid consumption, hydration status before training and hydration status after the

Spearman rank test exercise, which was previously tested for data normality using the SaphiroWilk test.

3. RESULTS

The number of subjects in this study were 47 teenage boys football athletes. The age of the subjects ranged between 13-16 years with an average height of 160.96 ± 8.32 cm, body weight 50.17 ± 9.24 kg, and BMI 19.21 ± 2.25 kg / m2. Characteristics of research subjects can be seen in Table 1.

Table 1: Characteristics of subjects based on age, height, and BMI

Subject Characteristics	N = 47		
	Minimum	Maximum	Average SD
Age (years)	13	16	14.47 ± 1.08
Height (cm)	136.9	173.6	160.96 ± 8.32
Weight (kg)	31.8	73.4	50.17 ± 9.24
BMI (kg / m2)	14.8	24.7	19.21 ± 2.25

Fluid Consumption of Youth Football Athletes

The daily fluid consumption of the subjects ranged from 1641.8 - 4534.6 ml with an average of 3050.92 ± 631.70 ml, while the fluid consumption of the exercise period ranged from 929.8–2846.7 ml with an average of 1678.77 ± 457.99 ml. Fluid consumption during the exercise period accounts for 55% of daily fluid consumption. The mean fluid consumption of subjects before, during and after exercise was 752.16 ± 277.58 ml, 512.02 ± 247.71 ml and 414.59 ± 197.16 ml. The fluid consumption of teenage football athletes can be seen in Table 2.

Table 2: Minimum, maximum, mean and standard deviation values of daily liquid consumption and liquid consumption period

Fluid Consumption	N = 47		
	Minimum	Maximum	Rerata SD
Daily Liquid Consumption (ml)	13	16	14.47 ± 1.08
Exercise Period Liquid Consumption (ml)	136.9	173.6	160.96 ± 8.32
Fluid Consumption Before Exercise (ml)	31.8	73.4	50.17 ± 9.24
Fluid Consumption During Exercise (ml)	14.8	24.7	19.21 ± 2.25
Fluid Consumption After Exercise (ml)	150	960	414.59 ± 197.16

Based on the results of the study, almost all subjects showed that daily fluid consumption and exercise period fluid consumption were in the poor category. More than half of the subjects (68.1%) consumed enough fluids before exercise. However, > 80% of subjects consume less fluids during and after exercise. The frequency distribution of fluid consumption categories can be seen in Table 3. Types of daily fluid consumption and exercise periods can be seen in Table 4.

Table 3: Frequency distribution of fluid consumption categories

Fluid Consumption	Category				Total	
	Less		Enough			
	n	%	n	%	n	%
Daily Liquid Consumption (ml)	47	100	0	0	47	100
Exercise Period Liquid Consumption (ml)	45	95.7	2	4.3	47	100

Fluid Consumption Before Exercise (ml)	15	31.9	32	68.1	47	100
Fluid Consumption During Exercise (ml)	38	80.9	9	19.1	47	100
Fluid Consumption After Exercise (ml)	42	89.4	5	10.6	47	100

The total consumption of fluids is obtained from water, other drinks and liquids from food. Consume more water than other drinks and liquids from food. The average consumption of water, other drinks and liquids from food in the exercise fluid consumption was 1166.70 ± 459.46 ml, 377.50 ± 318.74 ml and 134.57 ± 94.4 ml. Water consumption accounted for 69.5% of the total fluid consumption during the exercise period while other drinks accounted for 22.5% and liquid from food by 8%. Types of drinks consumed by subjects during the training period can be seen in Table 5.

Table 4: Minimum, maximum, average, and standard deviation values for daily fluid consumption and exercise period

Type of Liquid Consumption	N = 47		
	Minimum	Maximum	Average SD
Exercise Period Liquid Consumption			
Water (ml)	480	2205	1166.70 ± 459.46
Other drinks (ml)	0	1465	377.50 ± 318.74
Fluid from food (ml)	0	336.4	134.57 ± 94.4

Table 5: Frequency distribution of types of drinks consumed in the training period

Beverage Type	Before Exercise		During training		After Exercise	
	n	%	n	%	n	%
Water	39	82.9	46	97.9	44	93.6
Carbohydrate drinks	22	46.8	8	17.0	4	10.6
Electrolyte drinks	0	0	4	8,5	1	2.1
Carbohydrate-electrolyte drinks	6	12.7	0	0	0	0
Carbonated drinks	1	2.1	0	0	0	0

Fluid consumption before exercise mostly comes from water (82.9%), followed by carbohydrate drinks (46.8%), carbohydrate-electrolyte drinks (12.7%) and carbonated drinks (2.1%). The most fluid consumption during exercise comes from water (97.9%). Only a few consumed carbohydrate drinks (17.0%) and electrolyte drinks (8.5%). The consumption of fluids after exercise is also mostly derived from water (93.6%) and only a few consume carbohydrate drinks (10.6%) and electrolyte drinks (2.1%). During training and after training, no athlete consumes carbohydrate-electrolyte drinks.

Hydration Status Before and After Exercise

Based on Table 6 it can be seen that the average value of urine specific gravity after training is higher than before training, this shows that after training, athletes are more at risk of dehydration.

The results of urine specific gravity measurements before exercise showed that only 1 subject was well hydrated, 27.1% experienced minimal dehydration and 68.8% significant dehydration. While the hydration status after exercise showed that 100% of the subjects were dehydrated (BJU ≥ 1,010 g / dl). Most experienced significant dehydration (89.4%) and the rest experienced minimal dehydration (10.6%).

Relationship of Hydration Status Before Exercise and Fluid Consumption in the Training Period with Hydration Status After Exercise

The results showed that fluid consumption of fluid consumption in the training period and hydration status before training had a significant relationship with the hydration status after training in football athletes. ($p < 0.05$). More is presented in Table 8.

Table 6: Minimum, maximum, average and standard deviation of hydration status before and after exercise

Hydration Status	N = 47		
	Minimum	Maximum	Average SD
Urine specific weight before exercise (g / dl)	1.005	1.030	1.024 ± 0.006
Urine specific gravity after exercise (g / dl)	1.015	1.030	1.028 ± 0.004

Table 7: Frequency distribution of hydration status before exercise

Hydration Status	Frequency (n)	Percentage (%)
Significant dehydration	31	65.9
Minimal dehydration	11	23.4
Well hydrated	5	10.6
Total	47	100

Table 8: Frequency distribution of hydration status after exercise

Status Hidrasi	Frequency (n)	Percentage (%)
Minimal dehydration	7	14.9
Significant dehydration	40	85,1
Total	47	100

Table 9: Relationship between hydration status before exercise and fluid consumption during training period with hydration status after exercise

Variable	Hydration Status After Exercise (g / dl)	
	r	p
Exercise Period Liquid Consumption	-0.297	0.043
Hydration Status Before Exercise	-0.392	0.006

4. DISCUSSION

The results showed that the daily fluid consumption of all subjects in the less category. This shows that all athletes have not been able to meet daily fluid needs. Almost all subjects (95.7%) showed a lack of fluid consumption during the training period. Under consumption of fluids can occur due to lack of regulation of fluid consumption by athletes during the training period i.e. before, during and after training. Several studies have shown that many football athletes consume less fluids during training or competition (Silva et al., 2011; Kurdak et al., 2010; Maughan, 2005; Arnaoutis et al., 2013; Yeargin et al., 2010). Proper fluid consumption before, during and after exercise requires athletes to maintain hydration status and support sports performance. However, the need for fluids will increase if physical activity is higher and the temperature is getting hot (Aziz et al., 2018). Football is a sport with a high level of activity because in a match athlete can cover a distance of ±10 km (Marwan, 2018).

The higher the activity, the heat produced by energy metabolism will also increase. Fluid in the body will carry out its function as a heat regulator (thermoregulator). This function is carried out with the aim that the body's internal temperature (core temperature) can be maintained. Water will release excess body heat through sweat. When exercising,

water that comes out through sweat is not only water produced through metabolic processes but also water obtained through fluid consumption. So that if the process of reducing fluid from the body when exercising is left for a long period of time and is not matched with adequate fluid consumption, the body will become dehydrated (Irawan, 2007).

The results showed that most athletes consume enough fluids before exercise. This is because the measurement of fluid consumption before exercise is done 4 hours before the training begins so that athletes have many opportunities to access food and drinks. During training, many athletes were found to consume less fluids. Athletes are encouraged to consume 200–300 ml fluids every 10–20 minutes but in this study the athlete's fluid consumption time was limited because they only consumed food or drinks at rest. Almost all athletes' fluid consumption after exercise is lacking. This is because athletes are less able to take advantage of opportunities within 1 hour available to access food or drinks. Though athletes can easily access food or drinks available in the canteen. This is the same as research which shows that athletes do not maximize the opportunity to access the drinks provided (Arnaoutis et al., 2013). The athlete's fluid consumption before, during and after lack of training can also be caused by lack of knowledge regarding the importance of fluid consumption during training or competition. A study in Porto stated that athletes who have knowledge of hydration status pay more attention to the amount of fluid consumed during exercise (Carvalho, Teixeira, & Oliveira, 2009).

Athletes need proper drinking arrangements before training so they can start training with good hydration status. Before training, athletes can consume various types of drinks, including water, fruit or vegetable juices, milk, and sports drinks (Fink et al., 2013). The type of drink most consumed before exercise is water but there is one subject who consumes carbonated drinks. Carbonated drinks should be avoided because the gas in drinks can make the stomach feel full, thereby reducing the amount of fluid consumption (Fink et al., 2013).

Most of the fluid consumption during exercise comes from water. Only a few consume carbohydrate drinks and electrolyte drinks. Athletes are advised to consume drinks containing 6-8% carbohydrates and electrolytes, especially sodium, during exercise to maintain blood glucose levels and replace electrolytes lost through sweating (Fink et al., 2013). The main electrolytes that are lost through sweat during exercise are sodium and chloride. If electrolytes that are lost through sweating cannot be replaced will affect the fluid balance in the body and exercise performance. 20 Suggested drinks are fruit or vegetable juice, milk, and sports drinks (Fink et al., 2013; Kirkendall, 2004; Shirreffs, 2009). After training, athletes need to do rehydration which aims to replace fluids and electrolytes lost during training (Sawka et al., 2007; Stang, 2012).

The recommended drinks are drinks that contain carbohydrates and electrolytes, including fruit or vegetable juices, milk, and sports drinks (Fink et al., 2013; Shirreffs, 2009). However, in this study most of the subjects consumed water and only a few consumed carbohydrate and electrolyte drinks. If only consuming water does not stimulate the desire to drink and can increase the amount of urine that comes out which causes a decrease in intake and increase output. Electrolyte drinks, especially those containing sodium, will increase fluid retention and stimulate a feeling of wanting to drink (Fink et al., 2013).

The results of urine specific gravity measurements showed that all subjects were dehydrated (Urine Specific Gravity ≥1,010 g / dl). Most subjects experienced significant dehydration (89.4%) and the rest experienced minimal dehydration (10.6%). Research in Greece in adolescent football athletes showed that 94 out of 107 players were dehydrated before training with Urine Specific Gravity ≥1,020 g / dl (Arnaoutis et al., 2013). Another study in Turkey on football athletes who did exercise for 90 minutes showed that before training 60% experienced significant dehydration and 5% experienced serious dehydration,

then after exercise 55% experienced significant dehydration and 35% experienced seriously dehydration (Ozolina et al., 2013).

The results showed that fluid consumption in the training period and hydration status before training had a significant relationship with the hydration status after training in football athletes. The Ozolina et al., (2013) study of 40 football players after undergoing training for 1.5 hours in winter showed that more than half of the players experienced hypohydration before training and the body's hydration status deteriorated after training (Ozolina et al., 2013; Kenefick et al., 2012; Maughan, 2005) reports that not all football players are well hydrated before training and players who start training with the highest urine osmolality, consuming more fluids during training can compensate for fluid loss in previous training (Maughan, 2005). Then after 90 minutes of training, the player can only replace 62% of the lost fluid. This indicates that the athlete's hydration status is not optimal both before and during training.

According to the rules in football, there is no formal rest during the match that allows athletes to consume fluids so that athletes' fluid consumption is possible. If the match is conducted in hot weather, athletes will need more fluid and carbohydrate reserves. Therefore, the athlete's performance during training or competition needs to be maintained. One way is to consume enough fluids to avoid injury due to excessive body heat and restore fluid lost through sweating to prevent dehydration. Research shows the prevalence of dehydration of 90% in adolescent football athletes during football practice.19 Based on urine osmolality and specific gravity, it was found that football athletes experience hypohydration before and after training (Ozolina et al., 2013; Maughan, 2005).

Recommended fluid intake for young men aged 14 to 18 years is 3.3 liters/day. Whereas during training or matches, teen football athletes lose sweat as much as 2 to 3 liters (Maughan, 2005; Singh, 2003; Arnaoutis et al., 2013). This shows that the consumption of fluids has not been able to replace fluids lost through sweating during training or competing. Inadequate fluid consumption increases the risk of dehydration in athletes. When training, athletes should not rely on thirst but make proper drinking arrangements before, during and after exercise to maintain body fluid balance and exercise performance.

In order to have more voluntary intake of water and less fluid deficit, cool water (near 16°C) is recommended for athletes. Such water would also aid thermoregulation to some extent and increase palatability as well (Saeed, Abdollah, & Masumeh, 2011). Fluid strategies and guidelines have been introduced to help athletes rehydrate appropriately, especially for exercise in the heat. They include trivial considerations on beverage temperature (Saeed et al., 2011; Convertino et al., Sawka et al., 1996; Manning, 2010). High sodium intake during endurance exercise does not have adverse effects on thermoregulation as we had proposed. Nonetheless, it is still possible that high sodium intake during exercise may have other adverse effects, such as hypertensive blood pressure responses (Earhart et al., 2015). In order to have more voluntary intake of water and less fluid deficit, cool water (near 16°C) is recommended for athletes. Such water would also aid thermoregulation to some extent and increase palatability as well (Saeed et al., 2011).

5. CONCLUSION

Despite these limitations, the results of the current study regarding the needs of water consumption before, during and after football training for teen athletes. The athlete's fluid consumption in the training period is still less than necessary so that most athletes experience significant dehydration (87.6%) and others experience a minimum dehydration (11.8%). The fluid consumption of the training period and hydration status before training are related to the hydration status after training in adolescent football athletes.

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