

Inadequate hydration: causes, symptoms and impact on the performance of the Sudanese top league football players

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Abstract:

The study aimed at identifying the causes, symptoms and impact of inadequate hydration on the performance of the Sudanese top league football players. A descriptive approach was used, and the study sample included 50 of the Sudanese top league football players who were randomly selected. Questionnaires were used for data collection. Important results were that 60% of the players didn't drink plenty of fluids one day ahead of the match, and 46% didn't drink during exercise, and also 54% didn't have instructions to drink plenty of fluids before the exercise, and so as a result 50% had muscle cramps after exercise, and 66% had decreased attention span before and during a match, which significantly affected their performance. Moreover, only 20% of the players were weighed by the coach before and after exercises. It was also found that only 10% of the players used rehydrating fluids during exercise. And finally, reduced urine volume was the most common symptom of dehydration, since 92% of the players had it.

Important recommendations were: To raise awareness about the importance of proper hydration among the players, the staff, and others who are responsible for them, To implement the FIFA instructions regarding playing in hot climates, that is to pause a match allowing time for fluid replacement and rehydration, and finally to use this study for future visions along with other studies concerning hydrations and hot climates, with special regards that the football world cup 2022 is going to be in Qatar.

Introduction:

When players work hard, they lose sweat – in a game on a hot day, sweat losses may reach 3 liters. On a cold day though, some players will lose very little sweat. Every player's hydration needs are different and will vary with the weather over the season. Just as general training and competition strategies should be tailored for individual athletes in accordance with their unique needs and preferences, so should their drinking and eating choices during exercise.

Players should limit dehydration during training and matches by drinking water or a sports drink. Obvious opportunities to drink during a match include warm-

up and at half time. During training, the coach or manager should organize drink breaks according to the weather and intensity of the session.⁽¹⁾

Justification:

The researchers had found that it was necessary to focus on this topic, since the Sudanese top league football season was running during the summer time , in which a high temperature weather that reaches above 35°C, this in turns lead to consumption of water to replace the sweat and other losses . The researchers also noticed that there was poor attention to rehydration among the clubs, which led to the inappropriate handling of the losses, this in turns causes negative physiological effects, this affect the training programs for the players. Also since the FIFA had instructed all the football associations to stop the match so as to replace the losses with the fluids in the high temperature weather that is above 32°C, so it was of paramount important to do this study and to raise the suggestions to the Sudanese top league football association.

Objectives:

To identify the causes, symptoms and impaction of Inadequate hydration on the performance of the Sudanese top league football players

Question of the study:

What are the causes, symptoms and impaction of Inadequate hydration on the performance of the Sudanese top league football players?

Literature review:

Water is the most important nutrient for the body. On average, the human body is 60 percent water by weight, depending on certain factors such as age, gender, and body weight. The average 70 kilogram (kg) (154 lb.) man is made up of 42 liters (l) (or ~11 gallons) of water while the average 55-kg (121 lb.) adult female is made up of 27.5 l (~7.2 gallons) of water.⁽²⁾

It performs numerous important biological functions in the body. First, at the cellular level, it provides structural firmness.1 Second, water makes up blood, lymph, gastric secretions, and urine. It helps lubricate our joints (synovial fluid), which allows bones to move freely against each other.⁽³⁾

Training allows opportunities for players to get a feel for sweat rates and fluid needs so that drink practices can be adjusted accordingly. It is not necessary to drink enough to match sweat loss, but the amount of dehydration should normally be limited to a loss of less than about 2% of body weight (i.e., 1.0 kg for 50 kg person, 1.5 kg for a 75 kg person, and 2 kg for a 100 kg person). The negative effects of dehydration on high intensity performance are greater in warm environment so drinking practices in these conditions should be

upgraded to reduce the overall fluid deficit. This may include drinking at the side-line when match play is interrupted, or having extra drink breaks during training sessions. There should never be a need to drink more than the sweat loss so that weight is gained during exercise. This will not help performance and is likely to cause gut discomfort.⁽¹⁾ Depletion of fuel stores can be an issue for football matches, especially for players in mobile positions or with a running game style. Rehydration after exercise and recovery after exercise is part of the preparation for the next exercise session, and replacement of sweat losses is an essential part of this process. Both water and salts lost in sweat must be replaced. Aim to drink about 1.2-1.5 liters of fluid for each kg of weight lost in training or matches. Drinks should contain sodium (the main salt lost in sweat) if no food is eaten at this time, but most meals will contain adequate amounts of salt. Sports drinks that contain electrolytes can be helpful, but many foods can also supply the salt that is needed. A little extra salt may be added to meals when sweat losses are high, but salt tablets should be used with caution.

⁽¹⁾When working hard, the body produces heat at high rates, causing its temperature to increase. A small rise in body temperature may be beneficial, but if it increases by more than about 2-3°C, performance is likely to suffer and there is a real risk of developing heat illness. During exercise, evaporation is usually the primary mechanism of heat dissipation. The evaporation of sweat from the skin's surface assists the body in regulating core temperature. If the body cannot adequately evaporate sweat from the skin's surface, core temperature rises rapidly. A side effect of sweating is the loss of valuable fluids from the finite reservoir within the body, the rate being related to exercise intensity, individual differences, environmental conditions, acclimatization state, clothing, and baseline hydration status. Athletes whose sweat loss exceeds fluid intake become dehydrated during activity. Therefore, a person with a high sweat rate who undertakes intense exercise in a hot, humid environment can rapidly become dehydrated. Dehydration of 1% to 2% of body weight begins to compromise physiologic function and negatively influence performance. Dehydration of greater than 3% of body weight further disturbs physiologic function and increases an athlete's risk of developing an exertional heat illness (i.e., heat cramps, heat exhaustion, or heat stroke). This level of dehydration is common in sports; it can be elicited in just an hour of exercise or even more rapidly if the athlete enters the exercise session dehydrated. The onset of significant dehydration is preventable, or at least modifiable, when

hydration protocols are followed to assure all athletes the most productive and the safest athletic, experience.⁽⁴⁾

Defined, dehydration is the loss of body water and important ions (blood salts like potassium and magnesium). It simply means your body doesn't have as much water and electrolytes as it should have, which interferes with normal body processes. The current RDA for water for adults at rest under average conditions of environmental exposure is 1 ml/kcal of

energy expenditure.⁽⁵⁾Electrolytes are certain minerals (*i.e.*, calcium, chloride, magnesium, potassium, sodium ions) essential to human health. As an essential mineral, an electrolyte cannot be substituted by any other nutrient in the diet. Besides maintaining fluid balance, electrolytes help your muscles to contract and relax and assist in the transmission of nerve impulses from your nervous system to different body parts. ⁽⁶⁾A balance of all electrolytes is necessary to maintain optimal hydration and endurance. ⁽⁷⁾

Factors Influencing Thermoregulation:

- a. **The Environment:** Heat loss by radiation and convection depends on the maintenance of a large temperature gradient between the skin and the surrounding air. When the temperature of the air exceeds 36°C, the gradient for heat exchange is reversed and the body now gains heat by radiation and convection instead of losing it. This means that when the relative humidity in the air is low (dry air), sweat will evaporate relatively fast. On the other hand, if the relative humidity of the surrounding air is high, the evaporation of sweat will be hindered and sweat will accumulate with little loss of body heat.^(8,9,10)
- b. **Dehydration:** When sweating becomes the primary mean of heat dissipation, sweat loss must be matched by fluid consumption to avoid dehydration. This is often difficult because the stimulus to drink is not initiated until an individual has incurred a water deficit of approximately 2% of body mass.⁽¹²⁾

Mild Dehydration⁽¹³⁾

The symptoms of mild dehydration are as follows: Dry lips and mouth, Thirst, Inside of mouth slightly dry, Low urine output; concentrated urine appears dark yellow.

Moderate Dehydration⁽¹⁴⁾

The signs of moderate dehydration include: Thirst, Very dry mouth, Sunken eyes, Low or no urine output, Not producing tears.

Severe Dehydration⁽¹²⁾

Signs of severe dehydration include: All signs of moderate dehydration, Rapid and weak pulse, Cold hands and feet, Rapid breathing, Lethargic, comatose & seizures, it requires immediate hospitalization.

Research methodology:

This was a cross sectional community based ,descriptive study.

Study population : all Sudanese top league football players.

Study sample: 50 players who were randomly selection from the Sudanese top league football players.

Data collection tools: were the questionnaires, which were designed , judged and approved by experts in physical education, and then were distributed among the players randomly.

Data analysis: using an SPSS program

Ethical considerations: study subjects were informed that the information they gave were only used for research purposes keeping the confidentiality.

Results &discussion:

In this cross sectional community based study a descriptive approach was taken & the sample size was 50 players, to whom questionnaires were given for data collection and then those were analyzed manually using percentages.

Table number(1) shows the answers of the Sudanese top league football players about hydration &hot climates:

The question	yes	no	Total
Do you drink plenty of fluids one day ahead of the match	20	30	50
Do you have instructions to drink plenty of fluids before the exercise	23	27	50
Does the coach weigh the players before and after exercise	10	40	50
Do you dink during exercise	27	23	50
Do you use rehydration fluids during exercise	5	45	50
Does the technical team provide fluid during the exercise	30	20	50
Do you drink a lot of fluid after the exercise	25	25	50
The coach doesn't allow drinking during exercise	26	24	50
Do you feel that your mouth is dry during exercise	33	17	50
Does your urine volume decreases and becomes darker	46	4	50
Do you have muscle cramps after exercise	25	25	50
Do you have decreased attention span before and during the match.	33	17	50

Figure (1) : shows the percentage of players who experienced muscle cramps

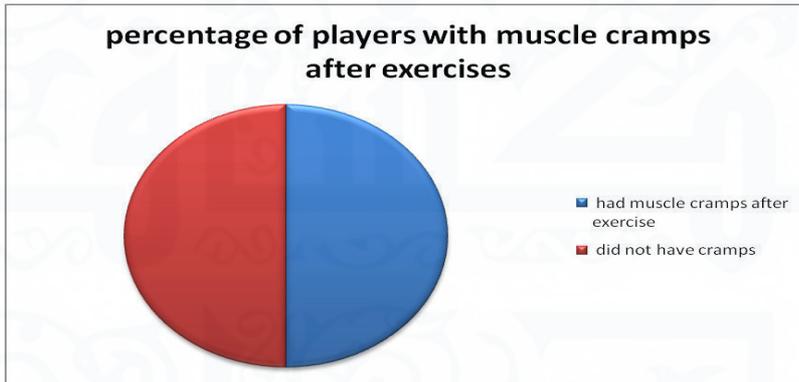


Figure (2): shows the attention span and percentage of players affected

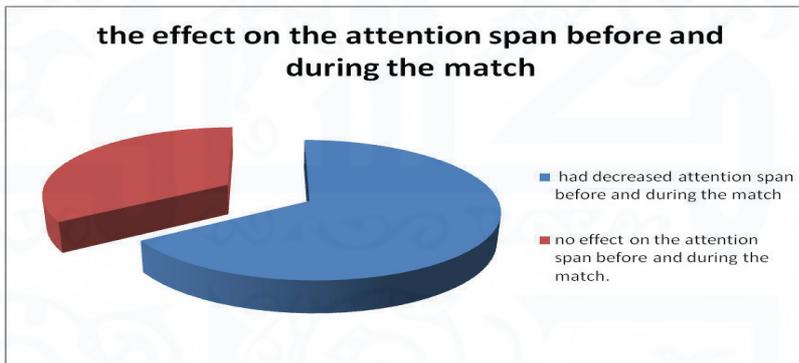
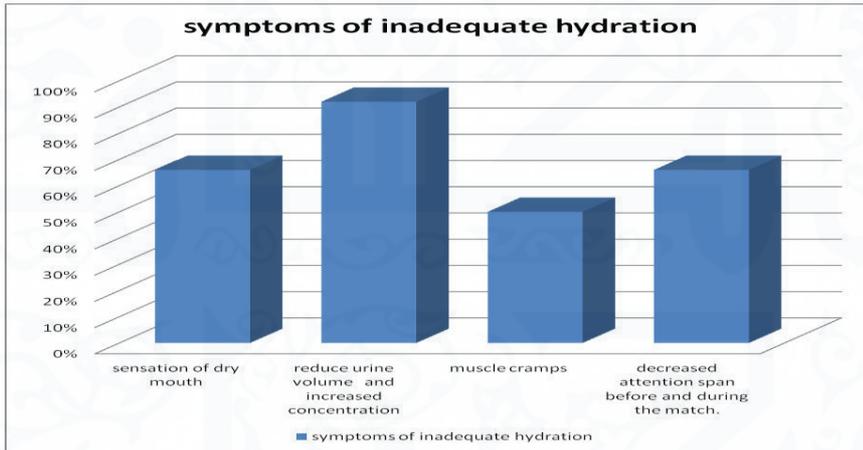


Table number(2) shows the percentages of the answers of the Sudanese top league football players about hydration & hot climates:

The question	yes	no	Total
Do you drink plenty of fluids one day ahead of the match	40%	60%	100%
Do you have instructions to drink plenty of fluids before the exercise	46%	54%	100%
Does the coach weigh the players before and after exercise	20%	80%	100%
Do you use rehydration fluids during exercise	10%	90%	100%
Does the technical team provide fluid during the exercise	60%	40%	100%
The coach doesn't allow drinking during exercise	52%	48%	100%

Figure (3): shows the symptoms of inadequate hydration in percentages**Previous studies:**

1. Hydration assessment techniques by (Armstrong LE).. mentioned that :The loss of body mass over the course of exercise essentially equals water loss because no other body constituent is lost at such a high rate. When body mass measurements are made with an interval of >4 hours, the body mass difference should be corrected for the net utilization of endogenous glycogen and fat stores.⁽⁴²⁾

2. A study by Latzaka et al.⁽⁴⁴⁾ had reported that glycerol hyperhydration increased exercise time to exhaustion in temperature climates but found no significant thermoregulatory advantages. These results are in accordance with who found that glycerol hyperhydration extended endurance time (from 30 to 34 minutes) in subjects exposed to uncompensable heat stress, but that it had no beneficial effect on thermoregulation compared with maintenance of euhydration. In summary, there are some indications that hyperhydration reduces thermal strain during exercise, but data supporting this notion are not very robust.

3. Another study by Taylor PN, Wolinsky, I., Klimis DJ (1999). (Water in Exercise and Sport in Macroelements) demonstrated that a better way to gauge your hydration status is to monitor the output and color of your urine. A well-hydrated individual should void 1,000 to 1,500 ml/day, and urine color should be no darker than a pale yellow color. If your urine is darker, it is a sign you are dehydrated, and you need to increase your fluid intake.⁽⁴⁵⁾

4. A study conducted by Wilmore JH and Costill DL (1994). In Physiology of Sport and Exercise demonstrated that For every one percent of body weight lost, blood volume decreases by 2.5 percent, muscle water decreases by one

percent, and the body's core temperature can increase 0.4 to 0.5° C. Changes in blood volume during prolonged exercise impair the body's ability to deliver oxygen and key nutrients to active muscles, organs, and glands and negatively affect thermoregulation (the body's ability to regulate core body temperature) by diminishing the body's ability to expel heat. Losses of three percent are associated with physiological changes, such as decreased blood volume, decreased urine output, diminished performance, and decreased endurance, while losses of nine to twelve percent are fatal.⁽⁴⁷⁾

Recommendations:

1. To raise awareness about the importance of proper hydration among the players, the staff, and others responsible for them.
2. Adequate care to maintain good level of hydration before and during football matches and exercises.
3. Promoting the use of sport drinks and their importance as an efficient method of rehydration, and to try to make them available as well.
4. To implement the FIFA instructions regarding playing in hot climates, that is to pause a match allowing time for fluid replacement and rehydration.
5. To use this study for future visions along with other studies concerning hydrations and hot climates, with special regards that the football world cup 2022 is going to be in Qatar.

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