مجلة كلية التربية الأساسية

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The effect of high temperature climate on the hydration status of the Sudanese top league football players

Dr. Aawad Yassen Ahmad Mahmoud Dr. Afaf Aawad Yassen Ahmad Abbas Al-Jabouri

the evaporation of sweat from the skin, increases in skin and core temperature, as well as a reduction in cooling efficiency are observed. Considering that evaporation of sweat is the most important mechanism of heat loss during exercise in the heat, clothing that proposes the least amount of resistance to evaporation may prove beneficial.\(^{(18)}\)

4. Heat Acclimatisation:

It has been well established that regular exposure to hot environments results in a number of physiological adaptations that reduce the negative effects associated with exercise in the heat. These adaptations include a decreased body core temperature at rest, decreased heart rate during exercise increased sweat rate and sweat sensitivity, decreased sodium losses in sweat and urine and expanded plasma volume.\(^{(29)}\) Moreover, it is well established that heat acclimatisation improves the reabsorption of sodium from sweat resulting in a greater amount of solute in the plasma. This will result in a fluid shift from intra to extracellular compartment thereby causing a better maintenance of plasma volume.\(^{(30)}\)

Another consistent finding after heat acclimatisation is the lowering of the temperature thresholds for both sweating and cutaneous vasodilatation without the occurrence of a significant change in the slope of the relations. It is postulated that regular exposure to high temperature results in a lowering of the set point in the hypothalamus at which sweating and vasodilatation are initiated.\(^{(31)}\)

Practical Recommendations for heat acclimatisation:

The process of acclimatisation to exercise in the heat begins within a few days, and full adaptation takes 7–14 days for most individuals. It is clear from table 1 that the systems of the human body adapt at varying rates to successive days of heat exposure. The early adaptations during heat acclimatisation primarily include an improved control of cardiovascular function through an expansion of PV and a reduction in heart rate. An increase in sweat rate and cutaneous vasodilatation are seen during the later stages of heat acclimatisation.\(^{(29)}\)

Endurance – trained athletes exhibits many of characteristics of heat-acclimatised individuals and therefore thought to be partially adapted; however, full adaptation is not seen until at least a week is spent training in the heat.\(^{(32)}\)

It is not necessary to train every day in the heat as it has been shown that exercising in the heat every third day for 30 days results in the same degree of acclimatisation as exercising every day for 10 days.\(^{(33)}\)
The effect of high temperature climate on the hydration status of the Sudanese top league football players

Dr. Awad Yassen Ahmad Mahmoud Dr. Afaf Awad Yassen Ahmad Abbas Al-Jabouri

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

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

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

<table>
<thead>
<tr>
<th>The question</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you drink plenty of fluids one day ahead of the match</td>
<td>40%</td>
<td>60%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you have instructions to drink plenty of fluids before the exercise</td>
<td>46%</td>
<td>54%</td>
<td>100%</td>
</tr>
<tr>
<td>Does the coach weigh the players before and after exercise</td>
<td>20%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you drink during exercise</td>
<td>54%</td>
<td>46%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you use rehydration fluids during exercise</td>
<td>10%</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Does the technical team provide fluid during the exercise</td>
<td>60%</td>
<td>40%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you drink a lot of fluid after the exercise</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>The coach doesn't allow drinking during exercise</td>
<td>52%</td>
<td>48%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you feel that your mouth is dry during exercise</td>
<td>66%</td>
<td>34%</td>
<td>100%</td>
</tr>
<tr>
<td>Does your urine volume decreases and becomes darker</td>
<td>92%</td>
<td>8%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you have muscle cramps after exercise</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Do you have decreased attention span before and during the match</td>
<td>66%</td>
<td>34%</td>
<td>100%</td>
</tr>
</tbody>
</table>

In this study, it was found 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. While 50% drank a lot of fluid after the exercise, to compare with a scientific point of view in order to maintain adequate hydration, it is generally recommended that athletes consume fluids at a rate that closely matches their loss of water through sweating and urine losses. This generally requires the ingestion of 200–300 mL of fluid every 10–20 minutes. However, as it takes 20–30 minutes for ingested fluids to be distributed throughout the body after gastric emptying, intestinal absorption and osmotic flow, the beneficial effects of fluid intake during events lasting <20–30 minutes may be small. Athletes who compete in events lasting >30 minutes are advised to drink 200–300 mL of their preferred sport drink just before exercise and to continue drinking the same sport drink during the event until there are 20 minutes remaining after which little extra fluid is ingested.

This study also searched for the possible obstacles preventing proper rehydration, including the availability of rehydrating fluids by the technical team, and only 40% reported that the technical team didn't provide fluid during the exercise. Also 48% said that the coach didn't allow drinking during exercise.

In this study, it was found that only 20% of the players were weighed by the coach before and after exercise. Which is a commonly used and safe technique to determine the acute loss of body water is the measurement of body mass change. 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.

This study had also found that only 10% of the players used rehydrating fluids during exercise. It reported that glycerol hyperhydration increased exercise time to exhaustion in temperature climates but found no significant thermoregulatory advantages. These results are in accordance with a study by Latzka et al. 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.
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Concerning symptoms of dehydration this study had found that 66% of the players felt a dry mouth is during exercise, while 92% reported that their urine volume decreased and became darker, 50% had muscle cramps after exercise, and 66% had decreased attention span before and during a match. From a scientific point of view, thirst is a signal that your body needs fluid; however, it’s a poor indicator of your body’s fluid needs because you can lose two percent of your body weight before you feel thirsty. 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.

Those who work exercise in intense temperatures need to stay hydrated. Athletes should rely on urine output and color or checking their body weight both before and after each exercise session or event to gauge water losses. Ideally, athletes should replace approximately 1 liter of water per kg of weight lost (or ~2 cups/lb). Even mild water losses can significantly impede performance. 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.

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 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 2022 is going to be in Qatar.

References:
1. Nutrition for Football A practical guide to eating and drinking for health and performance. Publisher: Fédération Internationale de Football Association Member Associations and Development FIFA-Strasse 20, P.O. Box, 8044 Zurich, Switzerland, page:26-30, 56.
4. Douglas J, Casa, PhD, ATC, CSCS (Chair); Lawrence E. Armstrong, PhD, FACSM; Susan K. Hillman, MS, MA, ATC, PTF; Scott J. Montain, PhD, FACSM; Ralph V. Reiff, MD, ATCS; Brent S.E. Rich, MD, ATC, William O. Roberts, MD, MS, FACSM; Jennifer A. Stone, MS, ATC; National Athletic Trainers’ Association Position Statement: Fluid Replacement for Athletes, University of Connecticut, Storrs, CT; Arizona School of Health Sciences, Phoenix, AZ; US Army Research Institute of Environmental Medicine, Natick, MA; St. Vincent Hospital, Indianapolis, IN; Arthur State University, Phoenix, AZ; MinnHealth Family Physicians, White Bear Lake, MN; US Olympic Training Center, Colorado Springs, CO.