Exercise-Associated Hyponatremia and Dehydration

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Contributor: José Martínez Sanz

During the last few years, the numbers of competitors in endurance and ultra-endurance sports modalities have increased significantly. This type of competition is an extreme challenge for athletes. Therefore, they have an increased the risk of developing medical and nutritional problems like exercise-associated hyponatremia (EAH), dehydration (DH); the provision of misinformation to athletes about nutrient intake and hydration during competition was identified as the main cause. These problems can affect the performance and health status of the athlete during and post-competition. Several nutritional guidelines have been suggested that can prevent these adverse outcomes, and it is essential to individualize and adjust the nutritional intake and hydration status according to the characteristics of each competition.

Keywords: hyponatremia ; gastrointestinal diseases ; dehydration

1. Introduction

Exercise-Associated Hyponatremia (EAH) is a disorder of fluids and electrolytes that has been widely described in marathon runners[1] and competitors in other endurance and ultra-endurance events such as: cycling races of 24 h or ≥150 km[2][3][4], foot races of 24 h or ≥100 km[2][5], Ironman triathlons[6][1], or open-water swimming events[4] [43]. It seemed to be a rare problem when it was first described in the scientific literature in 1985[1]; however, the current increase in the incidence of EAH should create alarm among athletes, since it has been confirmed as the cause of at least fourteen deaths, which reaffirms the potential severity of this condition[7].

Studies suggest that ultra-endurance athletes competing in events that exceed 24 h, such as Ultraman, Titan Desert, or Sables Marathon participants, are at a higher risk of developing EAH compared to participants in shorter endurance tests, as could be the case of the marathon[1]. This is confirmed by the results obtained in different investigations, in which incidence rates of 6–18% were reported for Ironman[1][6], 6–11.5% in mountain biking events[2][4], and 15–30% in ultra-endurance running races[8][9], so the duration of the competition is a risk factor for EAH development in endurance and ultra-endurance sport modalities.

For the proper management of EAH in athletes, it is important to make an early diagnosis. However, the signs and symptoms of EAH are nonspecific and can be superimposed on or confused with those of other diseases such as EHS, GI symptoms, and hypoglycemia, which are also frequent in these types of event. Special attention should be paid to the intake of large volumes of fluid, nausea, transient confusion, or exhaustion, as they can alert us to the development of these problems[10][11].

2. Risk Factor

The risk factors that have been identified regarding the development of EAH include: female sex, alcohol consumption, excess of fluid replacement, weight gain during exercise, low body weight, slow running performance and inexperience in endurance events[10]. Another problem that is related to EAH is Dehydration (DH) in athletes—which is sometimes followed by EAH, due to excessive hypo-osmotic fluid replacement. According to the results considered in this review, EAH can be also related to the environmental conditions that occur at the time of the competition, since at high temperature or humidity a greater loss of sodium can occur, in sweat[5]. Thirst should provide adequate stimulus for preventing excess dehydration and contribute to reduce the risk of EAH[7]. The incidence of DH may also reflect limited opportunities for the ingestion of fluid during competition and/or a lack of knowledge regarding the nutritional requirements of and fluid consumption by athletes[12].

Since the water needs of athletes tend to differ depending on the individual characteristics and the type or intensity of the exercise in which they participate, individualized fluid replacement strategies are necessary. The American College of Sports Medicine (ACSM) recommends that fluid intake during exercise should limit body weight loss to <2%[13]. This view has been criticized on numerous occasions, as it may be inappropriate for athletes who begin the competition in a severe

state of DH[12]. Therefore, and in accordance with the results obtained, the nutritional advice given to endurance and ultra-endurance athletes must include, in addition to adequate personalized and contextualized nutritional information, appropriate advice on hydration that takes into account the requirements of both the individual and the competition. This should result in the prevention of adverse outcomes and an improved performance of the athletes[14].

Both the participants and the organizers of the competitions should be in possession of sufficient information and resources to help reduce the incidence of EAH and DH, ensuring above all the health and safety of all those who are encouraged to participate in endurance and ultra-endurance events.

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