

Nutrition and Performance: Do We Still Need to Stress Hydration?

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Introduction

At all levels of competition, anything that purportedly enhances performance is worth at least a passing consideration. In hope of gaining a competitive edge, many athletes are easily attracted to the latest nutritional ergogenic supplement or recommendation. After all, given the myriad factors that can prevent a competitor from reaching that elusive goal of playing one's best game, it's no wonder that some athletes will readily embrace and incorporate almost any seemingly promising new dietary or training strategy, whether they are substantiated or not.

From a nutritional perspective, most athletes would foremost benefit from following general guidelines established for principally promoting good health. Avoiding excessive calories, saturated fat, and alcohol, and making appropriate choices that ensure regular sufficient intake of the necessary nutrients to maintain growth and development, as well as adequate energy (via emphasizing ample carbohydrate intake) during training and competition, will go a long way in helping an athlete perform well. Beyond that, considerations such as one's age, body composition, time until competition, intensity and duration of the activity, environment, and a number of other individual physiologic characteristics and needs could also be weighed in determining a suitable and effective dietary strategy. Yet, despite the widespread availability of a variety of good nutrient-dense food choices and the educational efforts of the sports governing bodies and other recognized organizations, many athletes continually miss the mark when it comes to meeting recommended dietary standards for maintaining good health and promoting optimal performance. And, perhaps surprisingly, one of the most mismanaged yet easily rectified aspects of sports nutrition continues to be the area of hydration.

Few athletes will argue the importance of drinking plenty of fluids and the benefits of staying well hydrated. Yet, hydration-related problems persist in many competitive and training venues. For some athletes, it's mainly a matter of not

consuming enough fluid before, during, or after exercise. But hydration goes beyond regular and copious water intake. To completely rehydrate, one must sufficiently replace fluid and electrolytes. A fluid and electrolyte deficit is evident in the athlete who merely looks and feels a little "off," to the one who displays more obvious and severe symptoms. At the same time, athletes need to appreciate that excessive water intake can lead to health- and performance-threatening consequences as well.

Fluid Losses

Adults and older adolescents generally lose between 1.0 and 2.5 liters of sweat during each hour of intense competition or training in warm to hot environments, although certain people are capable of sweating much more, sometimes in excess of 3.5 liters per hour! With such a high rate of fluid loss, one is likely to readily incur a significant body water deficit during an extended exercise period, because most adults aren't able to manage or tolerate drinking much more than 2.0 liters per hour. Moreover, a comparatively greater volume is required to offset any remaining postexercise fluid deficit and restore normal fluid balance (euhydration). This requirement becomes a particularly daunting task if the athlete expects to begin a subsequent match or training session in a euhydrated condition, especially when the next game or workout is scheduled for later that same day. Typically, athletes do not fully appreciate these perspectives—the extensive volume of fluid lost and the amount that must be replaced in a relatively short period of time. Consequently, many athletes often begin competition or training with a significant fluid deficit.

Electrolyte Losses

The importance of hydration during sports and exercise, especially in the heat, is well acknowledged; accordingly, most athletes make an effort to regularly consume fluids (albeit, often not enough). Less emphasized and clarified, however, are guidelines to maintain electrolyte balance and the associated consequences of insufficient electrolyte intake.

Aside from an extraordinary water loss, extensive sweating can also lead to a concomitant large electrolyte deficit. Athletes who sweat profusely lose considerable electrolytes, particularly sodium and chloride. Notably, the rate of

sodium loss via sweating can be substantial, often anywhere between 1000 and 5000 mg per hour. Consequently, a sizable deficit in total body exchangeable sodium can readily develop over the course of several hours or repeated bouts of exercise. Following prevalent current dietary guidelines designed to prevent and treat high blood pressure, and thus maintaining a low-salt diet (*ie*, < 2400 mg/d of sodium intake), is often inappropriate when an athlete is competing or training in the heat. However, just as a very high rate of sweating can be difficult (if not impossible) to keep up with, it is also impractical to attempt to offset these accompanying high rates of sodium loss during activities. Therefore, compensatory sodium and chloride (salt) intake, in an effort to avert substantial deficits of these minerals, has to be primarily emphasized after exercise. Insufficient salt replenishment and a consequent deficit of exchangeable sodium can limit the effectiveness of postexercise rehydration efforts and increase the risk for (and often lead to) problems such as excruciating and debilitating heat-related muscle cramps. Moreover, in the presence of a significant exchangeable sodium deficit, rapid or repeated consumption of too much water (or other low-sodium or sodium-free drinks) may

readily promote hyponatremia, which is an extremely dangerous clinical condition.

Conclusions

Inadequate hydration during exercise or sports can readily lead to increased cardiovascular strain and body temperature, as well as decreased strength, endurance, and perhaps even lower mental capacity. Invariably, the resultant minimal effect is reduced performance and earlier fatigue. More severely, fluid- and electrolyte-deficient athletes run the increased risk of developing heat cramps, heat exhaustion, or more serious conditions. For athletes with sickle cell trait or other disorders, the danger may be even more prominent. Fortunately, such problems are generally easily preventable. When it comes to sports nutrition, athletes should pay attention to the factors that will likely have the greatest positive impact on performance and health. Sufficient hydration (via appropriate fluid and electrolyte intake) should be a priority for any athlete looking to compete or train well and safely. Yet, hydration is still often under-emphasized and the importance frequently underestimated.