



## Role of Nutrition in Improving the Performance and Prevention of Injuries in Endurance Athletes

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### Abstract

It is well studied that how right nutrition plays an important role in the wellbeing of non-athletic individuals. However, the importance of right nutrition becomes more important when individuals are athletes, who spend lot of their energy in training and performing well. Moreover, drinking plenty of fluids is important to avoid dehydration. Thus, it becomes very critical to spread awareness and educate endurance athletes to eat right amount of nutrition and drink plenty of fluids to remain healthy and perform well in their sports.

**Keywords:** Nutrition; Healthy; Athletes; Fluids intake

### Introduction

It is well known that eating right amount of nutrition is essential for individual's wellbeing. This becomes more important when person is an athlete and using a lot of energy. If the body's demand exceeds the energy supply, it results either in a poor performance or an injury. The athletes participating in endurance sports like marathon, triathlon, and road cycling, need constant supply of energy. It has been seen that many athletes get injured during their training or sport events. So, it is important to see how nutrition plays a role in improving their performance and prevention of injuries.

Jeukendrup [1] reviewed the nutrition in endurance sports – marathon, triathlon, and road cycling. Endurance exercises are those which last for 30 min or more. The two most important substrates for the contraction of muscle are- muscle glycogen and blood glucose. Exercise for longer duration always leads to fatigue, which is further related to decrease in muscle glycogen and blood glucose level. So, it was always thought that high levels of pre-exercise muscle and liver glycogen levels were important for a good performance. The earlier idea of super compensating muscle glycogen levels by eating high carbohydrate before competition, to improve performance, is not always true. It is highly dependent upon intensity and duration of exercise. Earlier, it was shown that the intake of high carbohydrate rich diet, 30-60 min before exercise, could have adverse effect on performance. It could lead to hyperglycemia and hyperinsulinaemia, and then hypoglycemia after 15-30 min of exercise. But, now it has been demonstrated that carbohydrate intake, one hour before exercise, can improve performance. The glycemic and insulinaemic response to exercise can be decreased by delaying carbohydrate ingestion until 5-15 min before the start of the activity and by using low-to-moderate

glycemic index carbohydrates. Similarly, it is essential to prevent dehydration (>2%-3% of body weight) for preventing fatigue. So an adequate amount of fluid intake is important for improving performance. It has been suggested that hyper hydration before exercise can improve exercise performance. But it can decrease plasma sodium resulting into dilutional hyponatremia, when there is aggressive replacement of fluids during exercise.

During competition, intake of carbohydrates increase the exercise capacity and improve performance. In an exercise for more than 2 h, carbohydrates are important fuel for energy. It has been recommended that athletes should take between 30 and 60 g of carbohydrates for endurance exercise. The intake of carbohydrates improve the athlete's performance in a dose-dependent manner with maximum improvement seen at intake between 60 and 80 g per hour. There is a strong positive correlation between carbohydrate intake and performance of athletes.

In cycling, muscle glycogen intake is unaffected by carbohydrate ingestion during the event. But, on the other hand, muscle glycogen break down is decreased in type 1 muscle fibers during running. Intake of carbohydrates improve performance in running and cycling. It has also been recommended to add sodium and carbohydrates in sports drink for increasing the water absorption. Caffeine in the dose range of 3-6 mg/kg, 1 hour before exercise, is also shown to improve performance in endurance sports.

Thus, high carbohydrate rich diet and adequate amount of hydration is necessary for improving performance in endurance sports. It is important to develop an individualized nutritional plan for enhancing performance, depending upon the type and duration of the sport. So, if adequate nutrition is provided to muscles, and dehydration is avoided, then it will prevent over-stress on muscles. It will lead to prevention of injuries. It will further elongate the career span of the athletes [1].

American children performed poorly than European children in physical fitness tests. So, it led to the need of awareness about right nutrition and fitness level among people. Former president Obama had recently formed "President's Council on Fitness, Sports, and Nutrition" to spread this awareness. Further, the concept of homeostasis and exercise tells about how exercise disrupts inner homeostatic level.

With high intensity exercise, there is an increase in oxygen requirements of the muscle and production of large amounts of carbon dioxide. It leads to increase in breathing to remove excessive carbon dioxide from the body. The prolonged alteration in homeostatic levels results in fatigue. Also, the exercise training leads to more production of heat shock proteins, which repair damaged proteins and help in restoration of homeostasis. Further, various energy systems are used in different sports. The creatine phosphate system is essential for power athletes providing ATP for 6-8 ss. The anaerobic glycolytic system provides energy up to 3 min. The aerobic system provides energy for longer periods and is especially useful for endurance sports. After 2 h of aerobic activity for a continuous period of time, the muscle glycogen stores are used up and fat becomes power source for ATP production. Thus, carbohydrates, fat, and sometimes proteins, along with oxygen are used for ATP production.

## Critical Discussion

Earlier, the athletes were trained according to the type of endurance activity they were involved in. But, not much emphasis was put on nutrition of the athletes. But, after understanding the importance of nutrition, and how it helps in fuelling different energy systems of the body, it is equally important to educate athletes about eating the right amount of nutrition. Similarly, having adequate amount of fluid intake is important to prevent dehydration. Since, there is a limited awareness about eating right nutrition among athletes, it makes them more prone to injuries. Then, they come for treatment in physical therapy clinic

and are away from their sports during the rehabilitation phase. But, as a physical therapist, after understanding the importance of nutrition now, I would educate the athletes about it, along with training their muscles for their endurance sports. Thus, it will enhance their performance and prevent injuries.

## References

1. Jeukendrup AE (2011) Nutrition for endurance sports: marathon, triathlon, and road cycling. *J Sports Sci* 29: 91-99.