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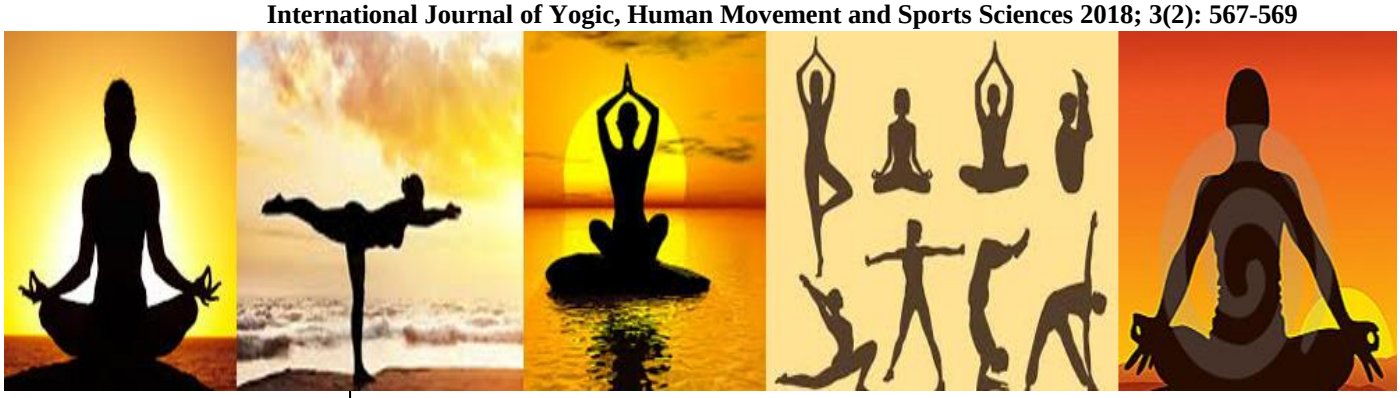

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Nutritional requirement of athletes

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Abstract
Good nutrition is important for competitive or recreational athletes to recover from strenuous physical activities refueling and re-hydrating the body, while providing nutrients to build and repair muscles, enable individuals to engage in the next bout of physical activity without adverse effects. This is especially important for athletes during sport tournaments or for any individuals who engage in strenuous physical activity on a daily or more than daily basis. The risk of injury during exercise is reduced for well fueled and hydrated athletes a individuals become fatigued and lose their ability to concentrate, as they are depleted of the substrates that help exercise. Proper nutrition can help sped the healing process for injured athletes; recovery from muscle or bone injuries or from surgery that requires extra energy and nutrients including protein, vitamins, minerals and antioxidnnts. Although athletes need to cat a well balanced basic diet, there are several nutritional factors that are difficult to obtain at a sufficient level from a normal diet since athletes require more nutrients than the recommended daily allowances. Thus, nutritional supplements containing carbohydrates, proteins, vitamins, and minerals have been widely used in various sporting fields to provide a boost to the recommended daily allowance, partly because these supplements are easily taken before, during, and/or after exercise.

Keywords: Nutritional requirement, athletes

Introduction
An adequate diet for athletes should cover energy, macronutrient, micronutrient, and hydration needs. Exercise may increase or alter the need for some nutrients through increased biochemical and metabolic demands, increased turnover of nutrients, and increased needs for repair and maintenance of lean tissue mass in athletes.

Energy: Energy needs of athletes depend on the body size, body composition, gender, training regimen and activity pattern. Energy requirements of athletes and sports persons have been estimated employing the classical procedure of direct or indirect calorimetry (Hackman, 1984; Budkirk, 1981) [1], the intake of other nutrients have however been fixed rather arbitrarily at 2-3 times for good performance (Anonymus, 1987) [3]. No systematic human metabolic studies have been done to arrive more accurately at the requirement of nutrients other than energy. There is a need for systematic studies employing the approach suggested above to determine the optimal nutrient requirements for those engaged in sports and athletic activities. Each country has recommended nutrients for their sports persons, India has adopted some of these International data to recommend nutrient intake for Indian sports persons.

Carbohydrates: Carbohydrates (CHO) should make up the largest portion of the athletes diet. Carbohydrates are an important energy source of human metabolism. Carbohydrate requirements depend on the frequency, intensity and duration of the exercise and the individual's fitness level. Sports nutrition guidelines recommend that 55–60% of total energy should come from CHO (NlN, 1985). It may be more appropriate, however, to base recommendations on body weight which is independent of energy intake (Coyle *et al*., 1993) [6]. NIN (1985) recommended that 6-8 g.kg BW/ day of CHO for Indian sports persons.

Proteins: Protein is a nutrient that is critical to both the structure and Function of the body. It is more appropriate to use the tern proteins than protein as there are a multitude of proteins in the human body. The three dimensional shape and sequence of amino acids determine the

functional role of any particular protein within the body. Proteins are required for building materials for bone, ligamentil, tendons, muscles and organs, hormones and enzymes formation, maintenance of fluid and electrolyte balance, maintain acid base balance, required for the synthesis of blood transport proteins and act as an energy source during and following exercise, particularly in situations of low CHO and energy stores.

Fat: Dietary fat make up the remainder of energy intake after CHO and protein needs are met. An adequate fat in the diet of sports and athletic individuals provides adequate energy density to the diet, to reduce bulk and to ensure intake of required high levels of energy. Dietary fat is especially important as an energy source of athletes and the ability to mobilize and use stored fat during exercise can improve exercise performance. Fat can be mobilized from muscle fat, adipose tissue, blood lipoproteins or fat consumed during exercise.

Micronutrients: Adequate intake of micronutrients (vitamins, minerals and trace elements) is essential for a number of physiological functions, including energy metabolism and maintenance and repair of body tissues. Micronutrients should be consumed through selecting varied foods.

Vitamins are a group of unrelated organic compounds to perform specific functions to promote growth and maintain health. B complex vitamins (thiamine, riboflavin, niacin, Vitamin B_6, pantothenic acid and biotin) are required for cellular metabolism. B complex enzymes serve as co factors in various enzyme systems involved in the oxidation of food and production of energy. B complex vitamins requirements are increased in athletes and active individuals due to increased turnover, metabolism or loss of the nutrient in sweat or urine; increased mitochondrial enzymes that require the nutrients as cofactors; maintenance of tissue and repair; biochemical adaptations associated with training.

Of all the nutrients related to RBC formation iron is probably the most familiar to athletes. This is because iron plays a primary role in the formation of two iron containing proteins; hemoglobin and myoglobin. Hemoglobin is the principal protein constituent of the RBC and gives blood its red color. Hemoglobin is responsible for the red cells ability to transport oxygen to the muscles and carry carbon dioxide away from the muscles to the lungs. Myoglobin, a home protein found in skeletal muscle, increases the rate of oxygen diffusion from the blood to the cells, During iron deficiency, the amount of myoglobin in the muscle is reduced, decreasing the diffusion of oxygen from the RBC's to the mitochondria. The RDA for iron is 50-85 mdday for active people (NIN, 1985).

All athletes, particularly female endurance athletes arc at risk of iron depletion and iron deficiency anemia. Iron loss is increased in some athletes, particularly heavily-training endurance athletes, due to gastrointestinal bleeding (Robertson, *et al*., 1987) [7], heavy sweating (Waller and Haymes, 1996) [8], and hemolysis (Selby and Eichner, 1985) [9]. Insufficient iron intake or reduced absorption, however, are the most probable causes of poor iron status. Snyder (1989) [10] found that female vegetarian runners had a similar iron intake but lower Iron status than non–vegetarian runners. Most of the iron in a vegetarian diet is non-home iron which has a relatively low absorption rate (2-206/0) compared with home iron (15.35%) (Craig, 1994) [11]. This may be of significance since low iron stores even without anemia have been associated with decreased endurance (Lamanca and Haymes, 1992) [12].

Fluids: Water constitutes the majority of the body weight and provides the medium within which all the nutrients may function. Exercise increases the loss of body water and electrolytes and these can impair exercise performance. Adequate fluid should be consumed before, during, and after exercise to help maintain blood glucose concentration during exercise, maximize exercise performance, and improve recovery time. Athletes should be well hydrated before exercise and drink enough fluid during and after exercise to balance fluid losses. Ingesting water alone in prolonged exercise leads to hyponatremia and a decrease in the osmotic pressure of body fluids and inhibit the release of antidiuretic hormone resulting in that water intake is suppressed and the urine output is increased (spontaneous dehydration).

Latzka *et al*., (1999) [13] suggested that during prolonged exercise lasting longer than 90 minutes; fluid drink containing electrolytes and carbohydrate should be considered to provide to sustain carbohydrate oxidation and endurance performance. Sports beverages containing carbohydrates and electrolytes may be consumed before, during, and after exercise to help maintain blood glucose concentration, provide fuel for muscles, and decrease risk of dehydration and hyponatremia. Beverages varying in composition are bound to result in varying responses during and after exercise. This requires testing the efficacy of each fluid under controlled conditions.

Conclusion

Athlete's goal during competition is to perform to their optimum level. A range of factors can impair exercise performance, including issues related to nutrition, Competition eating is based on the principle of' implementing nutritional strategies that can reduce or delay onset of factors that muse fatigue or performance impairment (Wolinsky, 1998) [14]. The nutritional needs of competitive athletes are considered herein with respect to the major time periods surrounding and including an event, namely, pre competitive and post competitive meals and the need for energy and fluids during a competition.

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