



# IMPACT OF MICRO AND MACRONUTRIENT ON PERFORMANCE OF SOMATIC FUNCTIONS OF PROFESSIONAL ATHLETES

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## ABSTRACT

**Background:** The physical health is a key to an active lifestyle for an athlete. Athletes depend on their own strength, skill, and endurance. Nutrition has an important multi-dimensional effect on athletes' physical and mental health and well-being. Special care to be taken to get enough of the calories, vitamins, and other nutrients that provide energy. An athlete's diet is not much different than that of any person striving to be healthy. They need to include choices from each of the healthy food groups such as micro and macro nutrients. Macro- and micro-nutrients play an important role in metabolism, energy production, hemoglobin synthesis, lean mass and bone mass maintenance, immunity, health, and protection against oxidative damage. However, athletes may need to eat more or less of certain foods, depending upon the type of sport, the amount of training they do and the amount of time they spend in training. The amount of food they need also depends on age, height and weight. Most people need between 1,500 and 2,000 calories a day. An athlete, this number can increase by 500 to 1,000 more calories. Good nutrition can enhance sporting performance. A well-planned, nutritious diet should meet most of an athlete's vitamin and mineral needs and provide enough protein to promote muscle growth and repair. Athletes require a lot of energy and nutrients to stay in shape.

Key words; Sporting ,Athlete, Micro&Macro nutrients ,Endurance and Nutrition.

## INTRODUCTION

As an athlete, the physical health is a key to an active lifestyle. Athletes depend on their own strength, skill, and endurance. Special care to be taken to get enough of the calories, vitamins, and other nutrients that provide energy. An athlete's diet is not much different than that of any person striving to be healthy. They need to include choices from each of the healthy food groups such as micro and macro nutrients.

**Macronutrients** are the nutrients that our body needs in larger amounts, namely carbohydrates, protein, and fat. These provide energy, or calories. **Micronutrients** are the nutrients our body needs in smaller amounts, which are commonly referred to as vitamins and minerals. Good nutrition can enhance sporting performance. A well-planned, nutritious diet should meet most of an athlete's vitamin and mineral needs, and provide enough protein to promote muscle growth and repair. Foods rich in unrefined carbohydrates, like wholegrain breads and cereals, should form the basis of the diet. Water is a great choice of fluid for athletes to help performance and prevent dehydration. The link between good health and good nutrition is well established. Interest in nutrition and its impact on sporting performance is now a science in itself.

*We need macronutrients to help with energy and we need micronutrients to help our body be healthy and digest those macronutrients--* Doctor Donald Hensrud, the Mayo Clinic

Working together, both macro and micronutrients provide your body with what it needs to be healthy.

### **Daily Diet requirements for an Athlete Training;**

The basic training diet should be sufficient to provide enough energy and nutrients to meet the demands of training and exercise, enhance adaptation and recovery between training sessions, include a wide variety of foods like wholegrain breads and cereals, vegetables (particularly leafy green varieties), fruit, lean meat and low-fat dairy products to enhance long term nutrition habits and behaviours, enable the athlete to achieve optimal body weight and body fat levels for performance, provide adequate fluids to ensure maximum hydration before, during and after exercise and promote the short and long-term health of athletes. Many research studies also proven that the special diet for an athlete based on their activity enhanced their

performance and endurance.

## The athlete's diet

An athlete's diet is similar to that recommended for the general public, with energy intake divided into:

- more than 55 per cent from carbohydrates
- about 12 to 15 per cent from protein
- less than 30 per cent from fat.

Evidenced based studies shown that Athletes who exercise strenuously for more than 60 to 90 minutes every day may need to increase the amount of energy they get from carbohydrates to between 65 and 70 per cent. Athletes should also aim to minimise intake of high-fat foods such as biscuits, cakes, pastries, chips and fried foods.

### Role of Carbohydrates -- essential for fuel and recovery

Current recommendations for carbohydrate requirements vary depending on the duration, frequency and intensity of exercise. Foods rich in unrefined carbohydrates, like wholegrain breads and cereals, should form the basis of the athlete's diet. More refined carbohydrate foods (such as white bread, jams and lollies) are useful to boost the total intake of carbohydrate, particularly for very active people.

### Link between Sporting performance and glycaemic index

The glycaemic index (GI) ranks food and fluids by how 'carbohydrate-rich' they are and how quickly they affect the body's blood sugar levels. The GI has become of increasing interest to athletes in the area of sports nutrition. More research is required to confirm the best recommendations for sports nutrition. However, there is a suggestion that low GI foods may be useful before exercise to provide a more sustained energy release.

Moderate to high GI foods and fluids may be the most beneficial during exercise and in the early recovery period. However, it is important to remember the type and timing of food eaten should be tailored to personal preferences and to maximise the performance of the particular sport in which the person is involved

### **Need of Pre-event meal –scientifically proved**

The pre-event meal is an important part of the athlete's pre-exercise preparation. A high-carbohydrate meal three to four hours before exercise is thought to have a positive effect on performance. A small snack one to two hours before exercise may also benefit performance.

### **Role of Protein in sporting performance**

Protein is an important part of a training diet and plays a key role in post-exercise recovery and repair. Protein needs are generally met by following a high-carbohydrate diet, because many foods, especially cereal-based foods, are a combination of carbohydrate and protein. The amount of protein recommended for sporting people is only slightly higher than that recommended for the general public. For example:

- General public and active people – the daily recommended amount of protein is 0.8–1.0 g/kg of body weight (a 60 kg person should eat around 45–60 g of protein daily).
- Sports people involved in non-endurance events – people who exercise daily for 45–60 minutes should consume between 1.0–1.2 g/kg of body weight per day.

Sports people involved in endurance events and strength events – people who exercise for longer periods (more than one hour) or who are involved in strength exercise, such as weight lifting, should consume between 1.2–1.7 g/kg of protein of body weight per day.

## Primary studies on the role of macronutrients on athletes -A COLLECTIVE REPORT

First Author	Nutrient Design	Results
Josse et al., 2011	Protein Design 90 healthy, premenopausal, overweight, and obese women were randomized to 3 groups ( $n = 30$ /group): high protein, high dairy, adequate protein, medium dairy, and adequate protein, low dairy hypocaloric diets.	Diet- and exercise-induced weight loss with higher protein and increased dairy product intakes promotes more favorable body composition changes in women characterized by greater total and visceral fat loss and lean mass gain.
Hartman et al., 2007	Protein Design 56 healthy young men who trained 5 days/week for 12 weeks randomly assigned to consume fat-free milk. (Milk; $n = 18$ ); fat-free soy protein (Soy; $n = 19$ ) that was isoenergetic, isonitrogenous, and macronutrient ratio matched to Milk; or maltodextrin that was isoenergetic with Milk and Soy (control group; $n = 19$ ).	Post-exercise consumption of milk promotes greater hypertrophy during the early stages of resistance training in novice weightlifters when compared with isoenergetic soy or carbohydrate consumption.
Areta et al., 2013	Protein Design 24 healthy trained males were assigned to three groups of 8 and undertook a bout of resistance exercise followed by ingestion of 80 g of whey	20 g of whey protein consumed every 3 h was superior to either more frequent (every 1.5 h) or less

First Author	Nutrient Design	Results
	protein throughout 12 h recovery in one of the following protocols: 8 × 10 g every 1.5 h, 4 × 20 g every 3 h; or 2 × 40 g every 6 h.	frequent (every 6 h) feeding patterns for stimulating MPS (muscle protein synthesis) throughout the day.

### Using nutritional supplements –micronutrients to improve sporting performance

A well-planned diet will meet vitamin and mineral needs. Supplements will only be of any benefit if your diet is inadequate or you have a diagnosed deficiency, such as an iron or calcium deficiency. There is no evidence that extra doses of vitamins improve sporting performance. Supplements should not be taken without the advice of a qualified health professional. It's best if dietary imbalances are adjusted after analysing and altering the diet, instead of by using a supplement or pill.

### Role of Water in sporting performance

Dehydration can impair athletic performance and, in extreme cases, may lead to collapse and even death. Drinking plenty of fluids before, during and after exercise is very important. Don't wait until thirsty. Fluid intake is particularly important for events lasting more than 60 minutes, of high intensity or in warm conditions.

Water is a suitable drink, but sports drinks may be required, especially in endurance events or warm climates. Sports drinks contain some sodium, which helps absorption. A sodium content of 30 mmol/L (millimoles per litre) appears suitable in sports nutrition.

## Conclusion

A dietary strategy should be tailored to the athlete's needs, considering amounts, frequency, type and, most of all, protein quality. During rehabilitation, simultaneous carbohydrates and protein intake can inhibit muscle breakdown and muscle atrophy. Adequate intakes of macronutrients and micronutrients can play a major role supporting athletes' anabolism.

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