

## Nutrition and Calculation of Calorie Intake for Sportspersons

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### Abstract

Athletes no longer eat a lot more than what normal people eat. In fact, while most of them stick to the same quantity food, the types of food chosen are generally high in nutrition. The energy requirement of an individual has been defined by WHO/FAO/UNU (1985) as 'the level of energy intake from food that will balance energy expenditure when the individual has a body size and composition, and level of physical activity, consistent with long term good health, and that will allow for maintenance of economically necessary and socially desirable physical activity'. The diet recommended for an athlete is not very different from the diet recommended for any healthy person. However, the amount of each food group you need will depend on, the type of sport, the amount of training and the time you spend in the activity or exercise. Energy can be calculated by two methods. As per 1st method is Personal Energy Requirement = Basic Energy Requirement (BER) + Extra Energy Requirement (EER) and second method should be based on the energy expenditure levels as suggested by FAO/WHO/UNU.

### Introduction:

Nutrition requirements of sports persons are different than that of normal people. In most cases nutrition of the sports persons depends on the type of sport they are involved in. Each sport has uses different parts of the body and requires different levels of physical fitness and energy requirement.

Nutrition can help enhance athletic performance. An active lifestyle and exercise routine, along with eating well, is the best way to stay healthy. Eating a good diet with enough fluids can help provide the energy you need to finish a race, or just enjoy a casual sport or activity.

Sports nutrition can be described as the practice and the study of diet and nutrition and how they both relate to the athletic performance of a sports personality on the field. A sports nutritionist needs to be well versed, not just with the different foods that are good for sports personalities, but also with the type and quantity of fluids, as well as dietary nutrients, which make up an integral part of a diet for a sports person. The nutrients that should be included in high amounts in every sports diet are protein, carbs, calcium, iron, fiber, fats and other vitamins and minerals. However, it is mainly the sports diet plan for strength sports, like body building and weight lifting, along with endurance sports, like running, sprinting and cycling, which focus on adequate sports nutrition.

The ultimate goal of sports nutrition is to enhance an athlete's performance. However, before that, the athlete's body composition needs to be worked on, so that the athlete's speed, balance, mobility, strength and concentration can be sharpened. Moreover, the bodies of several athletes go through a lot of wear and tear and may also sustain injuries. The sports diet should boost their immunity system and increase their internal body strength so that they can recover from such afflictions at a faster pace. The

ideal sport diet increases the athlete's overall energy, not just on the sports field, but also during practice sessions. Therefore sports nutrition is not just eating right for particular even, but making dietary changes to meet an athlete's long term requirements.

If you are doing a lot of exercise or training each day then it goes without saying that your body will need more energy than it would if you were doing nothing. When you exercise the body must begin producing energy at a much faster rate than when it is resting. The heart will beat faster in order to pump blood more rapidly around the body, the lungs work harder, and your muscles will begin to contract. All of this will use up your stored energy at a faster rate than normal, and for this reason, individuals such as athletes who are not trying to lose weight will need to consume extra food each day so that what they eat and what they burn remains in balance.

Energy is measured in calories, a word that we should all be very familiar with as it is how our intake of food is calculated. On average a man needs around 2,500 calories a day to maintain his weight, and for a woman this figure is slightly lower at around 2,000 calories per day. These amounts are just approximates and can vary depending on a person's age, level of physical activity and a combination of additional factors.

There is no magic food or shortcut which is going to provide the body with all of the vitamins and minerals it needs, so it is important to maintain a balanced diet which incorporates a variety of food groups and nutrients.

#### **History of a diet in sport**

Although not a lot of people are aware of this, diets for sportsmen have been followed right since the time that the Romans and the Greeks began the Olympic Games. All the athletes that participated in the various events followed a special regimen that was crafted for optimal athletic performance. However, the sport diet has undergone a drastic change since then, to incorporate more performance enhancing natural foods and to eliminate steroids and drugs, which could harm the body eventually.

#### **Modern diet for a sportsman**

Fortunately, in today's world a sports person's diet is very different from what was followed in the past. Whereas earlier sportsmen were encouraged by their trainers to eat huge amounts of just about anything, athletes nowadays are extremely careful about the foods they eat as well as the quantities and frequency of their meals. It has been seen that athletes no longer eat a lot more than what normal people eat. In fact, while most of them stick to the same quantity food, the types of food chosen are generally high in nutrition. Depending on the needs and requirements of the athlete, some of them may choose to eat higher amounts of calorie dense foods, whereas other athletes may stick foods that are low in calories and fat.

The main reason that athletes turn to sports dietary supplements is that they are looking for a "magical ingredient", which may have the ability to boost their strength and stamina, which improves their performance for a while or during a particular event. While some natural energy boosting foods are acceptable, the consumption of illegal drugs and steroids like anabolic steroids should be strictly avoided. Sport nutrition is essentially the study of the science behind food and how it can benefit or impair sporting performance and fitness.

#### **Definition of Energy Requirements**

The energy requirement of an individual has been defined by WHO/FAO/UNU (1985) as 'the level of energy intake from food that will balance energy expenditure when

the individual has a body size and composition, and level of physical activity, consistent with long term good health, and that will allow for maintenance of economically necessary and socially desirable physical activity’.

**Carbohydrates:**

All the sportspersons and active people should maintain a good inflow of this nutrient as it is an important source of fuel required by the body. Carbohydrates are our key energy source. Carbohydrate raises blood glucose level in the body. The carbohydrates we consume are then converted into glucose, a form of sugar which is carried in the blood and delivered to the cells for energy. When this happens the glucose is then broken down into water and carbon dioxide and any that is unused will be converted into glycogen, another form of carbohydrate that is stored away in the muscles and liver. The body is unable to hold any more than around 350 grams of glycogen at one point, and once it has reached full capacity any excess glucose will be converted into fat.

**Fats:**

Fat is an essential component of any diet as it helps the body to absorb nutrients as well as being a great source of energy which provides the body with essential fatty acids that it is unable to manufacture independently. A low fat meal can be absorbed easily and a high fat meal must be skipped before workout. The structure of saturated and unsaturated fat is very different. Saturated fat is not considered to be healthy for the heart and is known to raise your LDL (bad) cholesterol levels. Unsaturated fats on the other hand are considered to be heart healthy, and can actually work to lower your LDL cholesterol levels as well as raising your HDL (good) cholesterol levels.

**Protein:**

These are very important in the diet plan of a sportsperson as they are responsible for carrying oxygen in the body and are also the cell damage & cell formation agents. It’s also used to make enzymes, hormones and a variety of additional body chemicals as well as forming the building blocks of bones, muscles, cartilage, skin and blood. These must be obtained from dairy, non-vegetarian, fruits and vegetable type diets.

**Minerals:**

There are many minerals required by the body for proper growth and development. The mostly required by the athlete are:

Iron: Foodstuffs rich in iron must be included in a good way as it is very important for the exercises and sustainability of the body.

Calcium: High calcium food must also be included for the bone strength.

**Roughage:**

The fibrous is needed for indigestible portion of our diet for a healthy digestive system.

**Vitamins:**

Water soluble and fat soluble vitamins are important in many of the body’s chemical processes.

**Water:**

Carries other nutrients around the body and is required for normal body functioning.

The diet recommended for an athlete is not very different from the diet recommended for any healthy person. However, the amount of each food group you need will depend on:

- The type of sport

- The amount of training
- The time you spend in the activity or exercise

To help you perform better, avoid exercising on an empty stomach. Everyone is different, so you will need to learn:

- How soon before exercising is best for you to eat.
- How much food is the right amount for you.

An appropriate nutritional diet for a person which the division from different nutrients is as follows:

- 55–65% from Carbohydrates
- 15–20% from Proteins
- 20–30% from Fats

For the purposes of the following examples and calculations, use the following values: Fat 27%, Carbohydrates 52%, and Protein 21% per calorie.

60 Kg athletes require in terms grams of carbohydrates, fats, protein.

Carbohydrates- 52% of 2924 =1529 calories – at 4.2 calories/gram =1529 ÷4.2 = 364 grams

Fats - 27% of 2941 = 794 calories – at 9.5 calories/gram = 794 ÷ 9.5 =84 grams

Protein - 21% of 2941 =617 calories – at 4.1 calories/gram =617 ÷ 4.1 = 151 grams

60 Kg athlete requires 364 grams of Carbohydrates, 84 grams of Fat and 151 grams of Proteins.

#### **Daily Energy Requirement:**

An optimal diet may be defined as one in which the supply of required nutrients is adequate to cover energy expenditure, and for tissue maintenance, repair and growth. The nutritional needs differ from individual to individual based on age, sex, body size and composition, occupation, physiological condition etc. Nutritional requirements of athletes should take into consideration the specific energy requirements of a particular sport and phase of training as well as by the athlete's dietary preferences. There is no "one particular diet" for optimal sports performance. We can calculate the daily energy requirement by following two methods:

##### **1<sup>st</sup> Method:**

Personal Energy Requirement = Basic Energy Requirement (BER) + Extra Energy Requirement (EER)

Every person requires Basic Energy Requirement (BER) = Basic Metabolic Rate (BMR) + General Daily Activities.

For every kg of body weight approximately 1.334 calories is required every hour. (An athlete weighing 60 kg would require  $1.334 \times 24 \text{ hours} \times 60 \text{ kg} = 1921 \text{ calories/day}$ )

Sportsperson requires Energy Requirement = Basic Energy Requirement (BER) + Extra Energy Requirement (EER).

Extra Energy Requirement (EER) = For each hour training require approximately an additional 8.5 calories for each kg of body weight. ( For a two hour training session 60 kg athlete would require  $8.5 \times 2 \text{ hours} \times 60 \text{ kg} = 1020 \text{ calories}$ )

An athlete weighing 60 kg who trains two hours would require an intake of approximately 2941 calories. (BER + EER = 1921 +1020 = 2941)

**2<sup>nd</sup> Method:**

The initial National Institute of Nutrition (NIN), Hyderabad recommendations of 1983 on sports nutrition were based on theoretical values and assumptions made by the experts in the field. Subsequently, in the year 1987, a sports nutrition workshop was held at NIN in collaboration with SAI. During this workshop it was decided that the sport events should be divided into five categories instead of two categories (power and non-power events) and that energy allowances for Indian athletes should be based on the energy expenditure levels as suggested by FAO/WHO/UNU (1985). This gave the direction to carryout systematic studies to evaluate the energy expenditure pattern of Indian athletes. During this time the Committee had used the available information on the energy costs of sports activities largely from the western literature. The information is under:

**Classification of Sports and Games According to Energy Expenditure**

CATEGORY	EVENT
GROUP-I	Power Events of Higher Weight Category (80 Kg and above) Weight Lifting, Boxing, Wrestling, Judo, Throwing Events
GROUP-II	Endurance Events: Marathon, Long Distance Running, And Walking Road Cycling, Rowing Middle And Long Distance Swimming
GROUP-III	Team Events, Athletics And Power Events Of Middle Weight Category (65kg): Hockey, Foot Ball Volley Ball, Basketball, Tennis, Sprints, Jumpers, Boxing Wrestling Weight Lifting, Judo And Swimming
GROUP-IV	Events Of Light Weight Category: Gymnastics, Table Tennis, Yachting, Boxing, Wrestling, Weight Lifting And Judo
GROUP-V	Skill Games Shooting, Archery And Equestrian

**Average Body Weight and Energy Expenditure Levels Assumed and Allowance Suggested**

Event Category	Body Weight. (Kg)	Energy Allowances		Calories Ratio Cho : Prot : Fat
		(Kg) kcal/kg/day	kcal/day	
Group-I	85	70	6000	55 : 15 : 30
Group-II	65	80	5200	60 : 15 : 25*
Group-III	65	70	4500	60 : 15 : 25 64 : 15 : 21*
Group-IV	60	60	3600	65 : 15 : 20
Group-V	60	50	3000	55 : 15 : 30

\*= Glycogen Loading

**Fluid Intake Guidelines:**

Intake	Training	Competition				
		Before		During	After	
	Daily	2-4 hours	1 hour	15-60 min	20 min	1-4 hour
Fluids	> 1 liter	500 ml	300-500 ml	150-350 ml	300-500	>1 liter

					ml	
Carbs	6-10 g/kg	200-300 g	1-4.5 g/kg	30-60 g/hr	1 g/kg	1 g/kg
Protein	1.2-1.6 g/kg	Med Protein	Not required	-	8-10 g	8-10 g/hr
Fat	> 1 g/kg	Low Fat	None	None	Low Fat	Low Fat
	Low-Med	Low-Med	Low	Med-High	High	Med-High

Low Carbs =10% caloric intake, Med Carbs =60% caloric intake, High Carbs =90% caloric intake.

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