# SPORTS NUTRITION AND WEIGHT MANAGEMENT

B.P.Ed. - I

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# EC 202 SPORTS NUTRITION AND WEIGHT MANAGEMENT

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**UNIT - I**

# SPORTS NUTRITION AND WEIGHT MANAGEMENT

**Meaning of Sports Nutrition**

**Sports Nutrition** is the study and practice of nutrition and diet as it relates to athletic performance. It is concerned with the type and quantity of fluid and food taken by an athlete and deals with nutrients such as vitamins, minerals, supplements and organic substances such as carbohydrates, proteins and fats. Although an important part of many sports training regimens, it is most popular in strength sports (such as weight lifting and bodybuilding) and endurance sports. (For example, cycling, running, swimming).

Sports nutrition is a specialization within the field of nutrition that partners closely with the study of the human body and exercise science. Sports nutrition can be defined as the application of nutrition knowledge to a practical daily eating plan focused on providing the fuel for physical activity, facilitating the repair and rebuilding process following hard physical work, and optimizing athletic performance in competitive events.

All athletes consider taking dietary supplements because they are looking for the "magic ingredient" to increase performance. In the extreme case of performance-enhancing supplements, athletes, particularly bodybuilders may choose to use illegal substances such as anabolic steroids, compounds which are related to the hormone testosterone, which can quickly build mass and strength, but have many adverse effects such as high blood pressure and negative gender specific effects. Blood doping, another illegal ergogenic, was discovered in the 1940s when it was used by World War II pilots.

Dietary protein began to be consumed in the 1940s and muscle building results were found in resistance and strength training athletes. Protein intake is a part of the nutrient requirements for the regular athlete and is an important component of exercise training, because it can also aid in performance and recovery. Dietary protein intake for well-trained athletes should occur before, during and after physical activity as it is advantageous in gaining muscle mass and strength. However, if too much protein and amino acid supplements are consumed (especially by the average exerciser), it can be more harmful than beneficial; health risks include: "dehydration, gout, calcium loss, liver, and renal damage [and] gastrointestinal side effects include diarrhea, bloating, and water loss". A bountiful protein diet must be paired with a healthy, well-rounded meal plan and regular resistance exercise. Yet, characteristics such as the type of exercise, intensity, duration, the carbohydrate values of diet, the individual's sex and age and also the amount of background training and training environment.

**Definition of Sports Nutrition**

Sports nutrition is a broad interdisciplinary field that involves dietitians, biochemists, exercise physiologists, cell and molecular biologists, and occasionally psychotherapists. It has both a basic science aspect that includes such concerns as understanding the body's use of nutrients during athletic competition and the need for nutritional supplements among athletes; and an application aspect, which is concerned with the use of proper nutrition and **dietary supplements** to enhance an athlete's performance. The psychological or psychiatric dimension of sports nutrition is concerned with eating and other mental disorders related to nutrition among athletes.

Some persons who specialize in the field of sports nutrition are registered dietitians (RDs) who have pursued a master's or other advanced degree in the field of exercise physiology; the American Dietetic Association (ADA) has a dietetic practice group or DPG for sports nutritionists called Sports, Cardiovascular, and Wellness Nutritionists (SCAN).

**Purpose**

**Sports nutrition has several purposes:**

- To prepare athletes before performance or training.
- To maintain an acceptable level of performance during competition or training.
- To help the athlete's body recover after training or athletic competition.
- To provide sound information about healthy dietary practices and use of supplements.
- To monitor athletes for signs of eating disorders, doping, supplement abuse, or other unhealthful nutritional practices.
- To provide specialized nutritional advice to athletes following vegetarian, vegan, or other special diets.
- To monitor the special nutritional needs of persons with disabilities who participate in athletic activities and programs.

| Food Groups | Food Stuff |
|---|---|
| Energy yielding foods | Cereals<br>Starchy Vegetables Fats & oils<br>Sugars & Jaggery |
| Body building foods | Milk & Milk Products<br>Pulses<br>Meat & Meat Products |

| Food Groups | Food Stuff |
|---|---|
| Protective foods | Fruits<br>Green leafy vegetables<br>Other vegetables |

**DIET**

In nutrition, **diet** is the sum of food consumed by a person or other organism

Complete nutrition requires ingestion and absorption of vitamins, minerals, and food energy in the form of carbohydrates, proteins, and fats. Dietary habits and choices play a significant role in the quality of life, health and longevity.

A healthy diet may improve or maintain optimal health

**BALANCE DIET**

Definition: A diet that contains the proper proportions of carbohydrates, fats, proteins, vitamins, minerals, and water necessary to maintain good health.

- Carbohydrates
- Proteins
- Fats (also called "Lipids"), see saturated vs. unsaturated fats
- Dietary Fiber (also called "Roughage")
- Water
- Vitamins
- Minerals

| | |
|---|---|
| Carbohydrates | Carbohydrates are broken-down by the digestive system into energy in the form of glucose (which can be absorbed into the blood). Note that if the body is supplied with too much ingested energy in the form of food the excess may be laid down as fat around the body - as the body's "energy store" or "reserve" in case it is needed later. |
| | The body needs and uses energy for the following:<br>• Active transport<br>• Synthesis of biochemical macromolecules<br>• Cell division<br>• Muscle contraction |
| | There are several types of carbohydrates including monosaccharides and disaccharides (types of sugar), oligosaccharides, and some polysaccharides (specifically starches - as opposed to non-starch polysaccharides which are forms of dietary fibre). Carbohydrates collectively are found in a wide range of foods including wheat and grains, pasta, potatoes, rice, fruits and all sources of sugars - including refined sugars in processed foods. |
| Proteins | Proteins are often described as "building blocks" essential for growth (especially in the case of infants, children and body-builders) and for maintenance and repair of body tissues. After processing via the digestive system, the components of proteins are used in body tissues. |
| | Proteins are broken-down by the digestive system into amino acids (which can be absorbed into the blood). This is sometimes stated in the opposite way, i.e. in terms of proteins "containing" amino acids. There are different types of proteins found in a wide range of animal and non-animal food sources e.g. meat, fish, eggs, pulses and beans. A balanced diet includes all of the essential amino acids, which are so-called because they are needed but cannot be synthesized by the human body. |
| | The quality of proteins (foods containing one or more forms of protein) are expressed in various ways: |
| | • Biological Value (BV)<br>• Net Protein Utilization (NPU)<br>• Digestibility of Protein |

| | |
|---|---|
| Fats (=Lipids) | Some fats (also known as "lipids") are essential for a healthy balanced diet. They are broken-down by the digestive system into fatty acids and glycerol. These compounds are then used in cell membranes and as parts to form steroid hormones. |
| | In terms of their chemistry, lipids are highly reduced organic compounds; hence they can be oxidized to release energy. (As explained on the page about metabolic rate, energy is measured in calories; "high energy" = "high calorie" and if and when a person ingests more energy in food than he/she uses in bodily activities the excess energy is stored as fat in the body's tissues.) |
| | There are many different fat molecules but in general fats can be divided into two main groups:<br>• Saturated fats and cholesterol - typically derived from animal products such as meats<br>• Unsaturated fats - typically from plant sources such as soya |
| DIETARY FIBRE | Dietary Fibre (roughage) is important for a balanced diet. It consists mainly of cellulose from plant cell walls and is part of many plant-based food sources, including fresh fruits and vegetables and whole grains and pulses. The main functions of dietary fibre concern the health of the large intestine, incl. helping to form soft bulky faeces, thereby easing defecation and reducing the probability of constipation. |
| WATER | Water is an essential part of the human diet. It is necessary for the body in which it is used as a solvent, a transport medium, a substrate in hydrolytic reactions and for lubrication. Although humans need water every day it is not necessary consumed in the form of drinking water itself but as the major part of many drinks and some liquid or partially foods such as soups, sauces, dressings and ice-desserts |
| VITAMINS | There are many different vitamins. Although all vitamins are organic compounds, they have no common chemical structure or functions. Vitamins are specific chemicals needed by the body in relatively small amounts. Collectively they fulfill a wide range of functions including enabling the body to make efficient use of other parts of a balanced diet, e.g. vitamin D facilitates absorption of calcium and phosphorous. |
| | There are two important groups, or types, of vitamins:<br>• Water-soluble Vitamins e.g. C and the B vitamins - in many fruits and vegetables<br>• Fat-soluble Vitamins e.g. A, D and E - in fatty foods e.g. many dietary products |

| | |
|---|---|
| Minerals | • We need them for healthy bones and teeth, as well as the growth of other tissues<br>• Minerals include things like:<br>o Calcium for strong bones and teeth as well as muscle contraction. This is found in dairy products and vegetables<br>o Iron for hemoglobin in red blood cells. You can get iron from liver, beans and other green vegetables<br>• They are used in many chemical reactions in the body too |

**Basic Nutrition Guidelines**

**Basic Nutrients**

Foods and beverages are composed of six nutrients that are vital to the human body for producing energy, contributing to the growth and development of tissues, regulating body processes, and preventing deficiency and degenerative diseases. The six nutrients are carbohydrates, proteins, fats, vitamins, minerals, and water. These six nutrients are classified as **essential nutrients**. The body requires these nutrients to function properly; however, the body is unable to endogenously manufacture them in the quantities needed daily, and therefore these nutrients must be obtained from the diet. Carbohydrates, proteins, and fats are classified as **macro nutrients** because they have a caloric value and the body needs a large quantity of these nutrients on a daily basis. The **micro nutrients** include vitamins and minerals; the prefix micro- is used because the body's daily requirements for these nutrients are small. Water fits into its own class, and requirements for it vary greatly among individuals. These nutrients will be introduced in this section; individual chapters later in this book will provide a more thorough review of their application to athletics.

**CALORIES**

The number of calories in a meal is a measure of the amount of energy stored in that food. Your body uses calories from food for walking, thinking, breathing, and everything else it does. The average person needs to eat about 2,000 calories every day to maintain his or her weight.

A person's daily calorie intake should be based on age, gender, and physical activity level. Men generally need more calories than women, and active people need more calories than sedentary (inactive) people.

The following examples of calorie intake are based on U.S. Department of Agriculture (USDA) guidelines:

- children ages 2 to 8: 1,000 to 1,400
- active women ages 14 to 30: 2,400
- sedentary women ages 14 to 30: 1,800 to 2,000

- active men ages 14 to 30: 2,800 to 3,000
- sedentary men ages 14 to 30: 2,000 to 2,600
- active men and women over 30: 2,200 to 3,000
- sedentary men and women over 30: 1,800 to 2,200

## USDA Nutritional Guidelines plan

- Focus on fruits and vegetables: Fill has of your plate with fruits and vegetables at every meal.
- Go for low-fat dairy: Consume at least three cups of low-fat or fat-free milk each day or the equivalent in cheese, yogurt, or other calcium-rich foods.
- Choose whole grains: Get at least six to eight servings of whole grains each day. Grains should fill a quarter of your plate at each meal.
- Steer clear of trans and saturated fats, sodium (salt), sugars, and cholesterol: Limit fat to only about 20 to 35 percent of total calorie intake and avoid trans and saturated fats.
- Choose lean proteins: Fill the remaining quarter of your plate with lean protein. About 15 percent of your total calories should come from proteins, such as skin, fish, beans, nuts, and legumes.

## Six Basic Nutrients Required for Good Health

**1. Carbohydrates**

Carbohydrates can be grouped into two categories: simple and complex. Simple carbohydrates are sugars whereas complex carbohydrates consist of starch and dietary fibre. Carbohydrate provides about 4 kcal (kcal = kilocalories = Calories) per gram (except for fibre) and is the energy that is used first to fuel muscles and the brain. Soluble fibre (fruits, legumes, nuts, seeds, and brown rice, and oat, barley and rice brans) lowers blood cholesterol and helps to control blood sugar levels while providing very little energy. Insoluble fibre (wheat and corn bran, whole-grain breads and cereals, vegetables, fruit skins, nuts) doesn't provide any calories. It helps to alleviate digestive disorders like constipation or diverticulitis and may help prevent colon cancer. Most calories (55-60%) should come from carbohydrates. Sources of carbohydrates include grain products such as breads, cereals, pasta, and rice as well as fruits and vegetables.

**2. Protein**

Protein from food is broken down into amino acids by the digestive system. These amino acids are then used for building and repairing muscles, red blood cells, hair and other tissues, and for making hormones. Adequate protein intake is also important for a healthy immune system. Because protein is a source of calories (4 kcal per gram), it will be used for energy if not enough carbohydrate is available due to skipped meals, heavy exercise, etc. Main sources of protein are animal products

like meat, fish, poultry, milk, cheese and eggs and vegetable sources like legumes (beans, lentils, dried peas, nuts) and seeds.

**3. Fat**

The fat in food includes a mixture of saturated and unsaturated fat. Animal-based foods such as meats and milk products are higher in saturated fat whereas most vegetable oils are higher in unsaturated fat. Compared to carbohydrate and protein, each gram of fat provides more than twice the amount of calories (9 kcal per gram). Nevertheless, dietary fat does play an important role in a healthy diet. Fat maintains skin and hair, cushions vital organs, provides insulation, and is necessary for the production and absorption of certain vitamins and hormones. Nutrition guidelines state that Canadians should include no more than 30% of energy (calories) as fat, and no more than 10% of energy as saturated fat.

**4. Vitamins**

Vitamins help to regulate chemical reactions in the body. There are 13 vitamins, including vitamins A, B complex, C, D, E, and K. Because most vitamins cannot be made in the body, we must obtain them through the diet. Many people say that they feel more energetic after consuming vitamins, but vitamins are not a source of energy (calories). Vitamins are best consumed through a varied diet rather than as a supplement because there is little chance of taking too high a dose.

**5. Minerals**

Minerals are components of foods that are involved in many body functions. For example, calcium and magnesium are important for bone structure, and iron is needed for our red blood cells to transport oxygen. Like vitamins, minerals are not a source of energy and are best obtained through a varied diet rather than supplements.

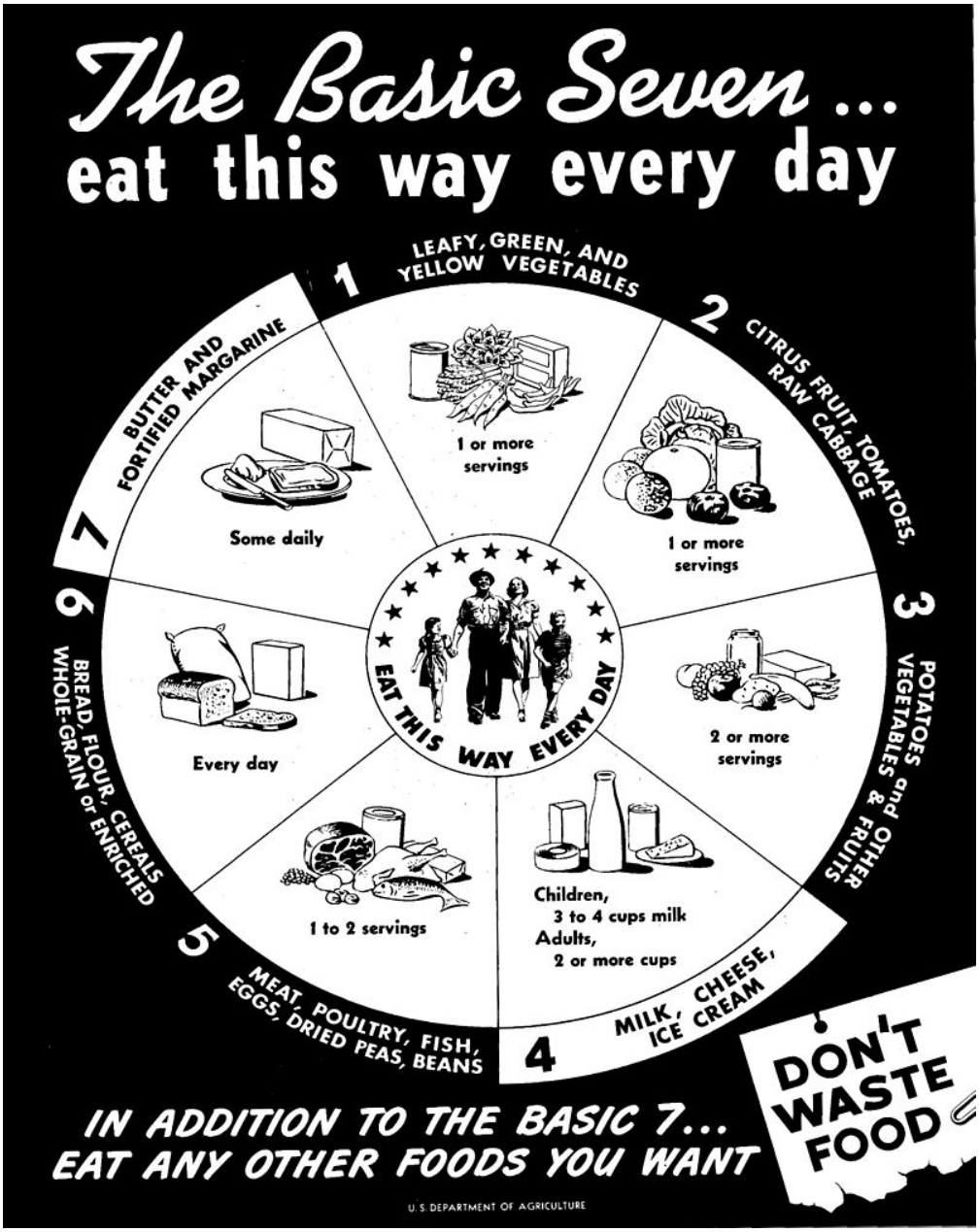
**6. Water**

Water is a vital nutrient for good health. Most of our body weight (60-70%) is made up of water. Water helps to control our body temperature, carries nutrients and waste products from our cells, and is needed for our cells to function. It is recommended that adults drink 8 glasses of fluid daily (or more in hot weather or during physical activity). This fluid does not have to be water alone. It can also be obtained from juice, milk, soup, and foods high in water such as fruits and vegetables. Caffeine-containing beverages (coffee, tea, and cola) don't count because caffeine is a diuretic, making us lose water. A great plus for water in comparison to the other fluids is that it hydrates our body without extra calories.

# FOOD PYRAMID

A **food pyramid** or **diet pyramid** is a pyramid-shaped diagram representing the optimal number of servings to be eaten each day from each of the basic food groups.

The first food pyramid was published in Sweden in 1974. The food pyramid introduced by the United States Department of Agriculture in the year 1992 was called the "Food Guide Pyramid". It was updated in 2005 and then replaced by My Plate in 2011




The "Basic Seven" developed by the United States Department of Agriculture

**Food pyramid published by the WHO and FAO**

The World Health Organization, in conjunction with the Food and Agriculture Organization, published guidelines that can effectively be represented in a food pyramid relating to objectives to prevent obesity, chronic diseases and dental caries based on meta-analysis though they represent it as a table rather than a "pyramid". The structure is similar in some respects to the USDA food pyramid, but there are clear distinctions between types of fats and a more dramatic distinction where carbohydrates are split on the basis of free sugars versus sugars in their natural form. Some food substances are singled out due to the impact on the target issues the "pyramid" is meant to address, while in a later revision, some recommendations are omitted since they follow automatically from other recommendations while other sub-categories are added. The reports quoted here explain that where there is no stated lower limit in the table below, there is no requirement for that nutrient in the diet.

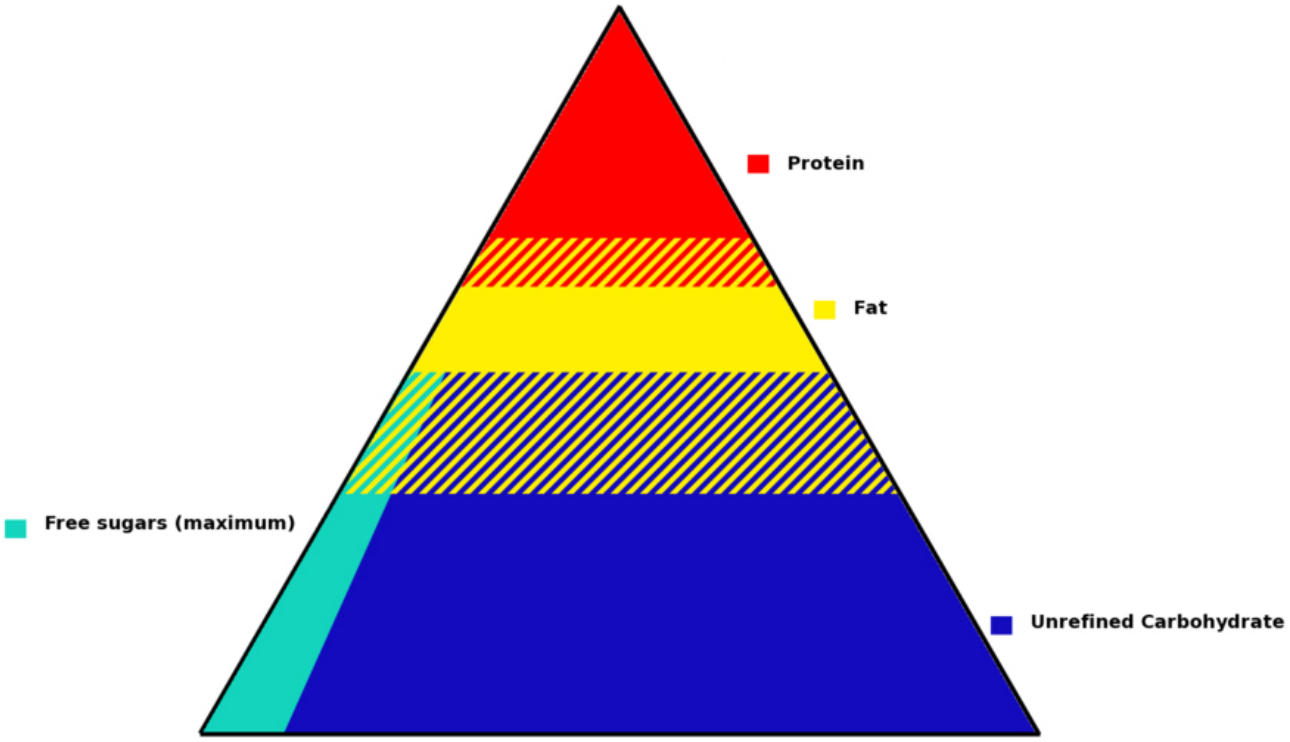
| Dietary factor | 1989 WHO Study Group recommendations | 2002 Joint WHO/FAO Expert Consultation recommendations |
|---|---|---|
| Total fat | 15–30% | 15–30% |
| Saturated fatty acids (SFAs) | 0–10% | <10% |
| Polyunsaturated fatty acids (PUFAs) | 3–7% | 6–10% |
| n-6 PUFAs | | 5–8% |
| n-3 PUFAs | | 1–2% |
| Trans fatty acids | | <1% |
| Monounsaturated fatty acids (MUFAs) | | By difference |
| Total carbohydrate | 55–75% | 55–75% |
| Free sugars | 0–10% | <10% |
| Complex carbohydrate | 50–70% | No recommendation |
| Protein | 10–15% | 10–15% |
| Cholesterol | 0–300 mg/day | < 300 mg/day |
| Sodium chloride (Sodium) | < 6 g/day | < 5 g/day (< 2 g/day) |
| Fruits and vegetables | ≥ 400 g/day | ≥ 400 g/day |
| Pulses, nuts and seeds | ≥ 30 g/day (as part of the 400 g of fruit and vegetables) | |
| Total dietary fiber | 27–40 g/day | From foods |
| NSP | 16–24 g/day | From foods |

All percentages are percentages of calories, not of weight or volume. To understand why, consider the determination of an amount of "10% free sugar" to include in a day's worth of calories. For the same amount of calories, free sugars take up less volume and weight, being refined and

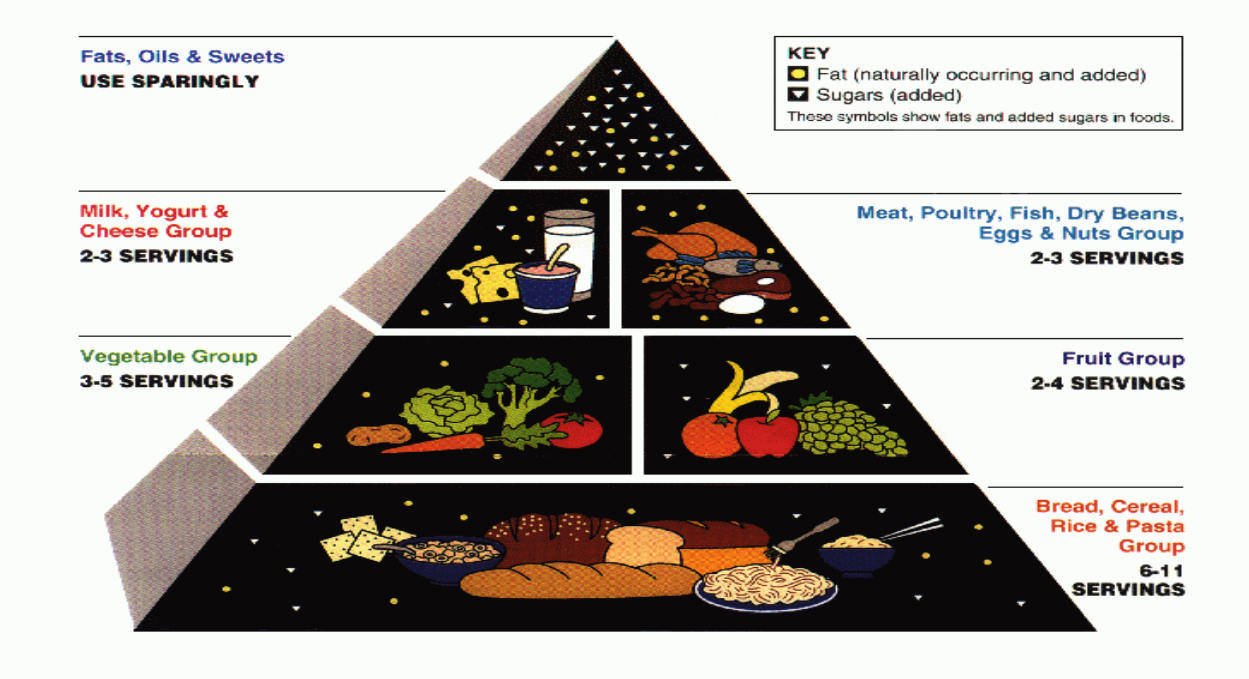
extracted from the competing carbohydrates in their natural form. In a similar manner all the items are in competition for various categories of calories.

The representation as a pyramid is not precise, and involves variations due to the alternative percentages of different elements, but the main sections can be represented.

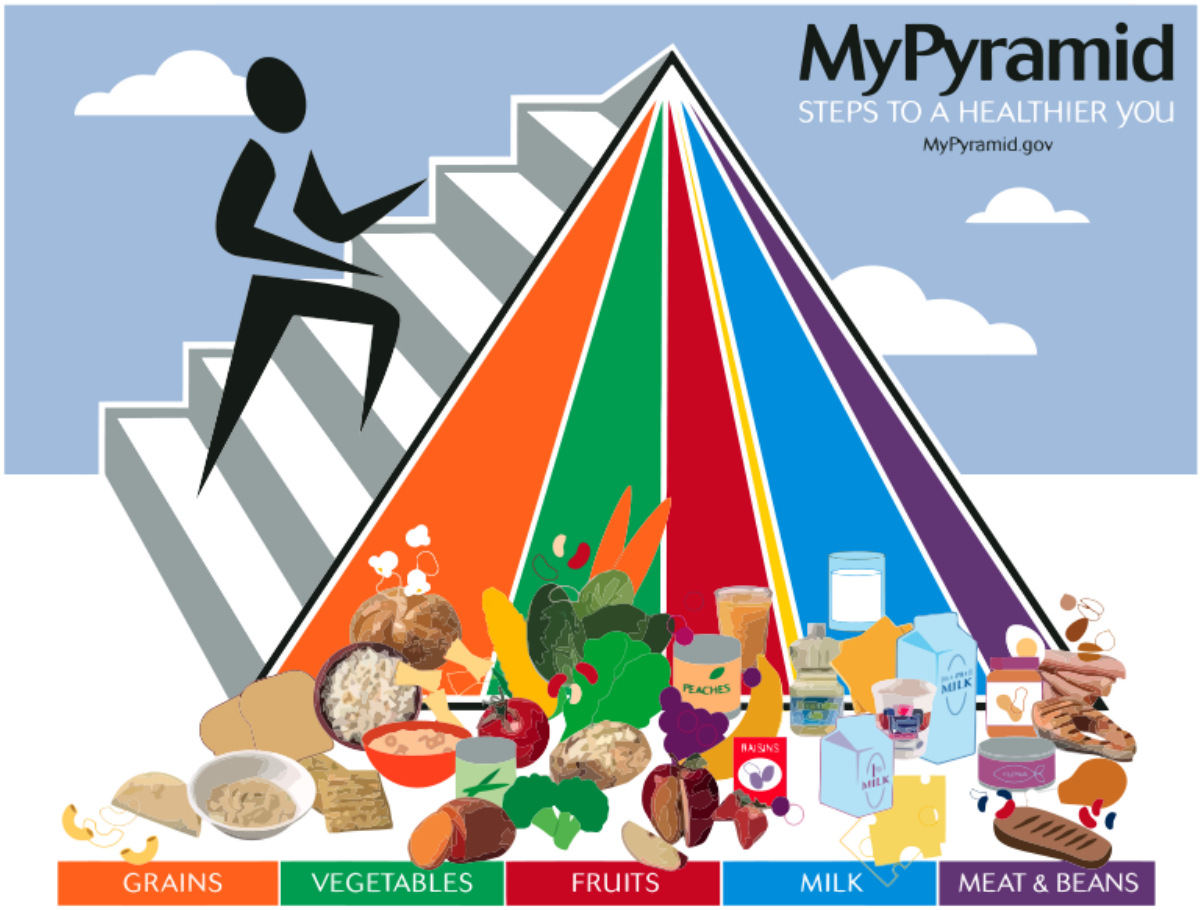
**2002 Joint WHO/FAO Expert Consultation recommendations**



## The USDA's original food pyramid from 1992



**The USDA's updated food pyramid from 2005, MyPyramid.**




The USDA food pyramid was created in 1992 and divided into six horizontal sections containing depictions of foods from each section's food group. It was updated in 2005 with colorful vertical wedges replacing the horizontal sections and renamed My Pyramid. My Pyramid was often displayed with the food images absent, creating a more abstract design. In an effort to restructure food nutrition guidelines, the USDA rolled out its new My Plate program in June 2011. My Plate is divided into four slightly different sized quadrants, with fruits and vegetables taking up half the space, and grains and protein making up the other half. The vegetables and grains portions are the largest of the four.

### Vegetables

A vegetable is a part of a plant consumed by humans that is generally called savory but is not sweet. A vegetable is not considered a grain, fruit, nut, spice, or herb. For example, the stem, root, flower, etc., may be eaten as vegetables. Vegetables contain many vitamins and minerals; however, different vegetables contain different spreads, so it is important to eat a wide variety

of types. For example, green vegetables typically contain vitamin A, dark orange and dark green vegetables contain vitamin C, and vegetables like broccoli and related plants contain iron and calcium. Vegetables are very low in fats and calories, but ingredients added in preparation can often add these.

**Grains**

Grains are small, hard, dry seeds, with or without attached hulls or fruit layers, harvested for human or animal consumption

**Cereals and Grains**

Cereal grain seeds from left to right: wheat, spelt, barley, oat.

All cereal crops are members of the grass family. Cereal grains contain a substantial amount of starch a carbohydrate that provides dietary energy.

**Warm-season ($C_4$) cereals**

- Finger millet
- fonio
- foxtail millet
- Japanese millet
- Job's tears
- kodo millet
- maize (corn)
- millet
- pearl millet
- proso millet
- sorghum

**Cool-season ($C_3$) cereal**

- Barley
- Rye grains.
- Rice grains by the IRRI.
  - Barley
  - Oats
  - Rice
  - Rye
  - Spelt
  - Teff
  - Triticale
  - Wheat
  - Wild Rice

**Pseudo cereal grains**

- Buckwheat
- Starchy grains from broadleaf (dicot) plant families:
  - Amaranth (Amaranth family)
  - Buckwheat (Smartweed family)
  - Chia (Mint family)
  - Quinoa (Amaranth family, formerly classified as Goosefoot family)

**Pulses**

Pulses or grain legumes, members of the pea family, have higher protein content than most other plant foods, at around 20%, while soybeans have as much as 35%. Proteins in pulses are typically incomplete, as they do not contain all the essential amino acids. Pulses may also contain starch or oil. Common pulses include:

- Chickpeas
- Common Beans
- Common peas (garden peas)
- Fava Beans
- Lentils
- Lima Beans
- Lupins
- Mung Beans
- Peanuts
- Pigeon Peas
- Runner Beans
- Soybeans

**Oilseeds**

Oilseed grains are grown primarily for the extraction of their edible oil. Vegetable oils provide dietary energy and some essential fatty acids. They are also used as fuel or lubricants.

**Mustard family**

- Rapeseed
  - black mustard
  - India mustard
  - rapeseed (including canola)

**Fruits**

In terms of food (rather than botany), fruits are the sweet-tasting seed-bearing parts of plants, or occasionally sweet parts of plants which do not bear seeds. These include apples, oranges, grapes, bananas, etc. Fruits are low in calories and fat and are a source of natural sugars, fiber and vitamins. Processing fruits when canning or making into juices may add sugars and remove nutrients. The fruit food group is sometimes combined with the vegetable food group. Note that a massive number of different plant species produce seed pods which are considered fruits in botany, and there are a number of botanical fruits which are conventionally not considered fruits in cuisine because they lack the characteristic sweet taste, e.g., tomatoes or avocados.

**Oils**

The food pyramid advises that fats be consumed sparingly. Butter and oils are examples of fats. Healthy sources of fat can be found in fish, nuts, and certain fruits and vegetables, such as avocados.

## Dairy

Dairy products are produced from the milk of mammals, usually but not exclusively cattle. They include milk, yogurt and cheese. Milk and its derivative products are a rich source of dietary calcium and also provide protein, phosphorus, vitamin A, and vitamin D. However, many dairy products are high in saturated fat and cholesterol compared to vegetables, fruits and whole grains, which is why skimmed products are available as an alternative. Historically, adults were recommended to consume three cups of dairy products per day. More recently, evidence is mounting that dairy products have greater levels of negative effects on health than previously thought and confer fewer benefits. For example, recent research has shown that dairy products are not related to stronger bones or less fractures.

## Meat and beans

Meat is the tissue – usually muscle – of an animal consumed by humans. Since most parts of many animals are edible, there is a vast variety of meats. Meat is a major source of protein, as well as iron, zinc, and vitamin B12. Meats, poultry, and fish include beef, chicken, pork, salmon, tuna, shrimp, and eggs.

The meat group is one of the major compacted food groups in the food guide pyramid. Many of the same nutrients found in meat can also be found in foods like eggs, dry beans, and nuts; such foods are typically placed in the same category as meats, as meat alternatives. These include tofu, products that resemble meat or fish but are made with soy, eggs, and cheeses. For those who do not consume meat or animal products (see Vegetarianism, veganism and Taboo food and drink), meat analogs, tofu, beans, lentils, chick peas, nuts and other high-protein vegetables are also included in this group. The food guide pyramid suggests that adults eat 2–3 servings per day. One serving of meat is 4 oz. (110 g), about the size of a deck of cards.

**ROLE OF NUTRITION IN SPORTS**

1. From fuelling to recovery, muscle building to weight making. Optimal nutrition ensures the best platform for your sporting success, at whatever level you participate.
2. Concepts of traditional sports nutrition, focused on exercise performance and recovery, with the concept of functional nutrition, which recognizes that every athlete responds differently to training, recovery, environmental factors and diet and therefore requires an individual approach. Our sports nutrition experts therefore apply the latest sport science theories to optimize performance and recovery within a framework that also promotes long-term health

Whether you're a professional athlete or a weekend warrior, nutrition is fundamental to your athletic performance. The right diet will optimise your energy levels and help your body recover more effectively.

**Energy - Fuelling your body**

You need to provide your body with enough energy (kilojoules) to meet the demands of training and enable proper recovery between exercise sessions. Training or competition generally increases daily energy requirements depending on duration, type and intensity of the activity. The three main nutrients from food that supply the body with energy are carbohydrate, fat and protein. These can be obtained by eating foods from the five food groups.

**Carbohydrate**

The main fuel used during exercise is carbohydrate (in the form of glucose) which is stored in muscle as glycogen. As you exercise, your muscles use the stored glycogen. Muscle can usually store enough glycogen for about 60-90 minutes of high intensity exercise, and these stores need to be replaced between exercise sessions by eating foods high in carbohydrate. Inadequate carbohydrate intake can lead to muscle fatigue which can affect performance.

Meals should be based on nutrient-rich carbohydrate foods such as cereals, breads, pasta, rice, fruits, vegetables and legumes. Milk and yogurt also provide carbohydrate in the form of the milk sugar, lactose. Foods high in refined sugar, such as lollies, soft drink, honey and jam, also contain carbohydrate. These foods can be a useful additional source of carbohydrate for athletes with very high energy requirements. However they are not a source of protein, vitamins or minerals and should not replace nutrient rich carbohydrate foods.

**Protein**

Protein helps repair and rebuild muscle after exercise and can also be used during exercise as an energy source, particularly when carbohydrate reserves are very low. Protein needs of most athletes can be met by a well-balanced diet. You should consume a wide variety of high-quality protein foods such as chicken, turkey, beef, lamb, pork, fish, eggs, dairy foods, nuts and seeds. Some athletes, such as strength trained or endurance athletes often need more protein, with requirements of 1.2-1.6g

per kilogram of body mass per day. Such intakes can generally be achieved by the overall increased food intake required to fuel training. Protein supplements and shakes can be very expensive and are not usually necessary. You can make a high-protein milk drink at home at a fraction of the cost by adding skim milk powder to your normal milk drink. Skim milk powder can also be added to other meals such as soup or cereal to further boost protein intake.

**Fat**

Fat provides the main fuel source for long duration, low to moderate intensity exercise such as marathons. Even during high intensity exercise, where carbohydrate is the main fuel source, fat is needed to help access the stored carbohydrate (glycogen).

You should include moderate amounts of 'healthy' fats into their daily diet, such as nuts, seeds, fish, reduced-fat dairy foods, lean meat and avocados. Foods high in 'unhealthy' fat and low in other nutrients such as biscuits, pastries, chips and deep fried foods should be limited. It is generally not advised to eat foods high in fat immediately before or during intense exercise as fat is slow to digest and can remain in the stomach for a long time.

**Hydration**

Good hydration is one of the most important nutrition priorities for athletes. During exercise your body produces sweat to help cool it down. Athletes who train for long intervals or in hot conditions can lose large amounts of fluid through sweat, which can lead to dehydration.

Even small amounts of fluid loss can significantly impair performance. It is essential that you drink fluid before, during and after exercise to replace fluid lost from sweating. Keep in mind that thirst is not a good indication of fluid loss. By the time you feel thirsty your body is already dehydrated.

**The best drink for sport**

For low intensity exercise lasting for a short duration, water is very good for rehydration. Water is cheap and convenient and sufficient for most recreational exercisers. For high intensity and endurance sports lasting longer than 60 minutes, a drink which contains carbohydrate and electrolytes, such as milk or a commercial sports drink, is generally more effective than water in enhancing performance. These drinks contain carbohydrate to help delay fatigue by providing glucose to the muscles, and electrolytes to replace sodium lost in sweat.

## IMPORTANT MICRONUTRIENTS FOR ATHLETES

**Iron**

Iron transports oxygen to all parts of the body, including muscles, and helps release energy from cells. If iron levels are low, you can feel tired and low in energy. Iron deficiency is a common problem for athletes, particularly women, vegetarians and adolescents. Hard training stimulates

an increase in red blood cell production, increasing the need for iron. Iron can also be lost through damage to red blood cells in the feet due to running on hard surfaces with poor quality shoes, through blood loss from injury and through sweat.

It is important to regularly eat iron-rich foods such as lean meat, chicken and seafood. Vegetarians need to eat legumes, green leafy vegetables and iron-fortified cereals to obtain adequate iron intake. These foods should be combined with vitamin C-rich foods to increase iron absorption.

**Calcium**

Adequate calcium consumption is necessary to develop and maintain strong bones that are resistant to fracture and osteoporosis in later life. Whilst most athletes will have above average bone mass, some female athletes are at high risk of developing osteoporosis prematurely. Loss of periods (known as amenorrhea) due to hard training and low body fat levels means that the body produces less estrogen, which stops bones from reaching peak mass and strength.

Most athletes need three daily serves of dairy foods to help ensure they get enough calcium. A serve of dairy could include one glass (250mL) of milk, one tub (200g) of yogurt or two slices (40g) of cheese. Teenage athletes should aim for four serves to meet their increased recommended daily intake of calcium.

## DAIRY'S ROLE IN SPORTS NUTRITION

Dairy does more than build strong bones! Dairy is ideal for athletes and recreational exercisers, who want to build lean muscle, speed up recovery and rehydrate effectively.

**Milk and rehydration**

There is increasing interest in the use of milk as a rehydration drink. Milk naturally contains water, carbohydrate and electrolytes. A recent study found that drinking milk after exercise may promote rehydration more effectively than water or sports drinks. The researchers said it was likely that the naturally high electrolyte content of milk helped restore the body's fluid balance after exercise.

**Milk speeds up recovery**

Dairy products such as milk and yogurt are useful foods for post-exercise recovery because they contain carbohydrate and protein. Studies have shown that chocolate milk may be as good, or better, than sports drinks at helping athletes recover from strenuous exercise.

**Dairy helps build lean muscle mass**

Studies have shown that the protein from dairy food can help build and maintain muscle. Milk contains about 3.5% protein made up of casein (80%) and whey (20%). The whey protein has a high concentration of the branched chain amino acid – leucine. Leucine has been shown to specifically stimulate building of new muscle protein and dairy protein has been shown to directly stimulate muscle building.

**Dairy snacks for sports**

Drinks like plain or flavored milk, smoothies and milkshakes are ideal snack options after exercise.

3. Sports nutrition plays a huge role in sports performance! Carbohydrates fuel high intensity (above 70% VO2 max) and limiting carbohydrates can negatively impact performance. Choosing high quality carbohydrates like whole grains, starchy vegetables and fruit is important because they will also provide the body with fiber, vitamins and minerals which promote overall health. Protein helps to build and maintain muscle mass although most athletes that I have worked with always get plenty (or too much) protein and neglect carbohydrates.
4. Without a good nutrition program, every aspect of your physical and mental abilities will decline. Everything from your level of hydration to the timing of your carbohydrate intake will drastically affect performance. The body simply cannot perform or function optimally without the building blocks of proper nutrition. Muscles cannot build, repair and become stronger without enough complete protein. The body's ability to endure a grueling pace for hours on end is highly dependent on its glycogen stores.
5. Additionally, your ability to train and practice for a sport is dependent on your nutrition. If your nutrition program is filled with holes, you aren't going to be able to practice and train at the intensity and duration that is needed in order to become the best. Too many people neglect the importance of nutrition. Don't make this mistake because, to a certain extent, the outcome of your training and performance is hinged upon it. Nutrition is a variable of performance that you are in complete control of, so take advantage of it!

**SPORTS NUTRITION SO IMPORTANT**

At the most basic level, nutrition is important for athletes because it provides a source of energy required to perform the activity. The food we eat impacts on our strength, training, performance and recovery. Not only is the type of food important for sports nutrition but the times we eat throughout the day also has an impact on our performance levels and our bodies ability to recover after exercising.

Meals eaten before and after exercise are the most important in sports nutrition but you should really be careful with everything that you put into your body. As a general rule of thumb athletes should eat about two hours before exercising and this meal should be high in carbohydrates, low in fat and low to moderate in protein. Carbohydrates are the main source of energy that powers your exercise regime and protein is required to aid muscle growth and repair. After exercising you need to replace the carbohydrates you have lost and you need to ensure proper muscle recovery by including protein in your post training meal.

The proportions of protein and carbohydrates that you require will vary depending on both the intensity and type of sport so to get your individual balance right you should contact a qualified

dietitian for professional help with your sports nutrition. Our expert dietitians can help all level athletes to achieve optimal sports nutrition in order to meet their performance goals.

**FACTORS TO BE CONSIDERED FOR DEVELOPING NUTRITION PLAN**

1. **Activity:**
   It is represented by the person climbing the steps of the pyramid.

2. **Moderation:**
   Graphically the food group areas narrow from the bottom to the top of My Pyramid. The wider base is depicted as foods that contain little or no saturated fats and sugars and the narrow portion contains foods with higher amounts of fats and sugars.

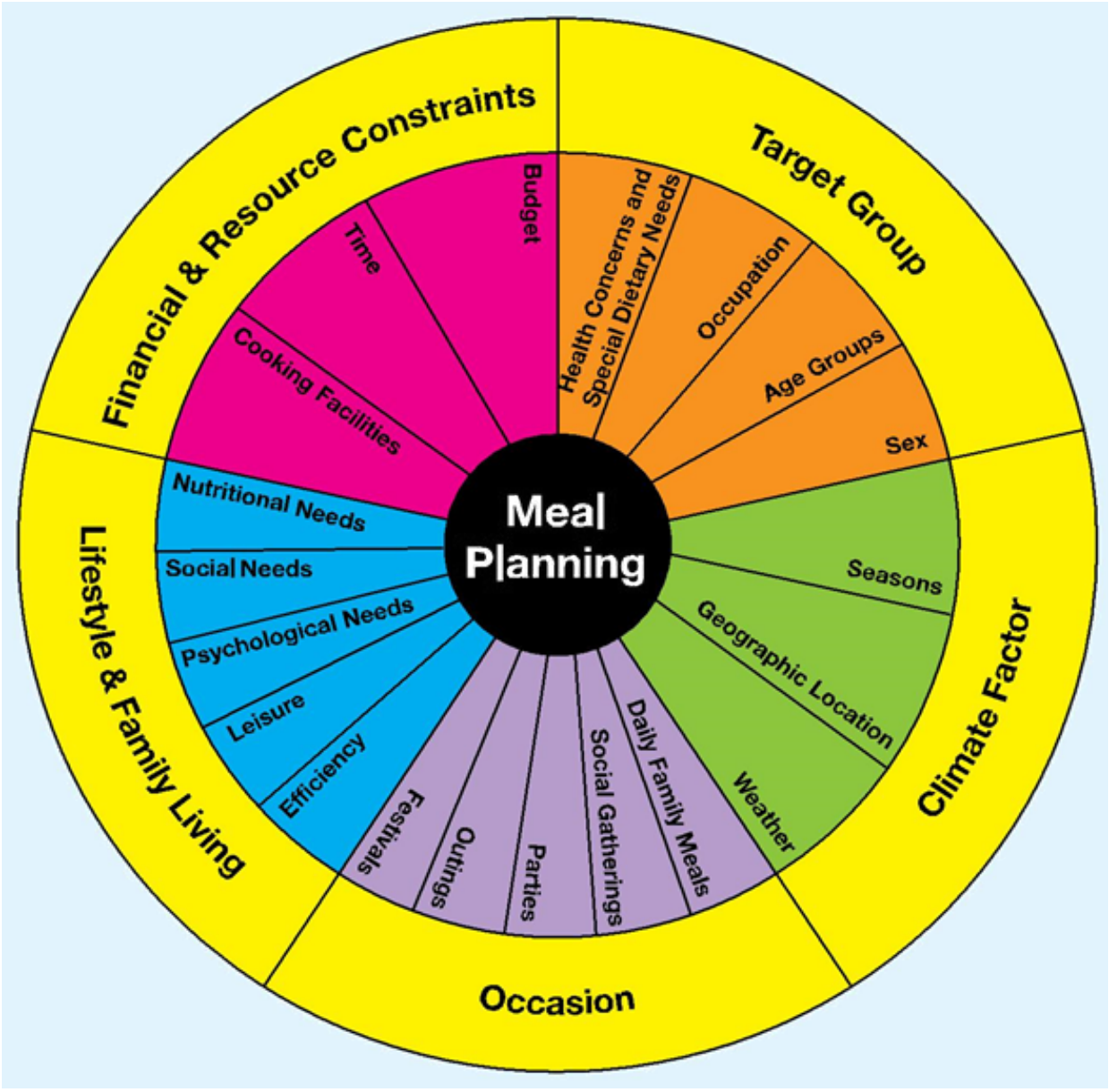
3. **Personalization:**
   The www.MyPyramid.gov pages help individuals personalize their own My Pyramid by entering age, gender and physical activity level.

4. **Proportionality:**
   The widths of the food groups on My Pyramid graphically display the proportions recommended in each food group category.

5. **Variety:**
   The six different color bands for the five food groups and oils section represent variety. Foods from each of the categories are needed each day and the educational tools that complement the graphic provide recommendations on how to obtain variety within each food group.

6. **Gradual Improvement:**
   The slogan "Steps to a Healthier You" encourages individuals to take small steps to improve their diet and lifestyle each day.

## 5.1 FACTORS TO BE CONSIDERED IN MEAL PLANNING



**UNIT-II**

# Carbohydrates, Protein, Fat – Meaning, classification and its function

## Carbohydrates Meaning

The foods we eat contain nutrients that provide energy and other things the body needs. Most of the nutrients in food fall into three major groups: proteins, fats, and carbohydrates. The two main forms of carbohydrates are sugars (such as fructose, glucose, and lactose) and starches, which are found in foods such as starchy vegetables, grains, rice, breads, and cereals. The body breaks down (or converts) most carbohydrates into sugar glucose, which is absorbed the bloodstream. As the glucose level raises in the body, the pancreas releases a hormone called insulin. Insulin is needed to move sugar from the blood into the cells, where it can be used as a source of energy.

Any of certain organic compounds, including the sugars, starches, and celluloses, which usually have the general formula C (HO): carbohydrates are subdivided into monosaccharaides, disaccharides, etc., and form an important class of foods in animal nutrition, supplying energy to the body

## CLASSIFICATION OF CARBOHYRATES

On the basis of the number of forming units, three major classes of carbohydrates can be defined: monosaccharaides, oligosaccharides and polysaccharides.

- **Monosaccharaides** or simply sugars are formed by only one polyhydroxy aldehydeidic or ketonic unit.

  The most abundant monosaccharide is D-glucose, also called dextrose.

- **Oligosaccharides** are formed by short chains of monosaccharide units (from 2 to 20) linked one to the next by chemical bounds, called glycosidic bounds. The most abundant oligosaccharides are disaccharides, formed by two monosaccharaides, and especially in the human diet the most important are sucrose (common table sugar), lactose and maltose. Within cells many oligosaccharides formed by three or more units do not find themselves as free molecules but linked to other ones, lipids or proteins, to form glycoconjugates.

- **Polysaccharides** are polymers, consisting of 20 to 107 monosaccharide units; they differ from each other for the monosaccharaides recurring in the structure, for the length and the degree of branching of chains or for the type of links between units. Whereas in the plant kingdom several types of polysaccharides are present, in vertebrates there are only a small number.

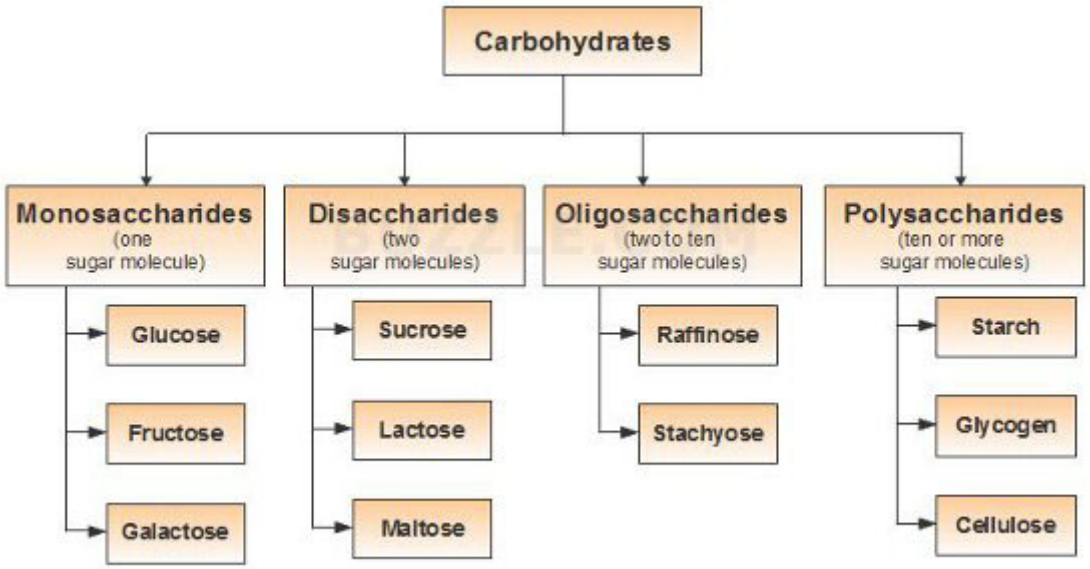
## FUNCTIONS OF CARBOHYRATES

Carbohydrates have six major functions within the body:

1. Providing energy and regulation of blood glucose
2. Sparing the use of proteins for energy
3. Breakdown of fatty acids and preventing ketosis
4. Biological recognition processes
5. Flavor and Sweeteners
6. Dietary fiber

- They are used as material for **energy storage and production**. Starch and glycogen, respectively in plants and animals, are stored carbohydrates from which glucose can be mobilized for energy production. Glucose can supply energy both fueling ATP synthesis (ATP, the cell's energy currency, has inside a phosphorylated sugar) and in the form of reducing power as NADPH. It should be noted that glucose, used as energy source, "burns" without yielding metabolic wastes, being turned in CO2 and water, and of course releasing energy. **Monosaccharaides supply 3.74 kcal/g, disaccharides 3.95 kcal/g, while starch 4.18 kcal/g; on average it is approached to 4 kcal/g**.
- They exert a **protein-saving action**: if present in adequate amount in daily nourishment, the body does not utilize proteins for energy purpose, an anti-economic and "polluting" fuel because it will need to eliminate nitrogen (ammonia) and sulfur present in some amino acids.
- Their presence is necessary for the **normal lipid metabolism**. More than 100 years ago Pasteur said: "*Fats burn in the fire of carbohydrates*". This idea continues to receive confirmations from the recent scientific studies. Moreover, excess carbohydrates may be converted in <href="http://www.tuscany-diet.net/lipids/fatty-acids/structure-classification/">fatty acids and triglycerides (processes that occur mostly in the liver).
- Glucose is indispensable for the maintenance of the **integrity of nervous tissue** (some central nervous system areas are able to use only glucose for energy production) and red blood cells.
- Two sugars, ribose and deoxyribose, are part of the bearing structure, respectively of the **RNA and DNA** and obviously find themselves in the nucleotide structure as well.
- They take part in **detoxifying processes**. For example, at hepatic level glucuronic acid, synthesized from glucose, combines with endogenous substances, as hormones, bilirubin etc., and exogenous substances, as chemical or bacterial toxins or drugs, making them atoxic, increasing their solubility and allowing their elimination.

- They are also found linked to many proteins and lipids. Within cells they act as **signals** that determine the metabolic fate or the intracellular localization of the molecules which are bound. On the cellular surface their presence is necessary for identification processes between cells that are involved e.g. in the recognition between spermatozoon and oocyte during fertilization, in the return of lymphocytes in the lymph nodes of provenance or still in the leukocyte adhesion to the lips of the lesion of a blood vessel.
- Two homopolysaccharides, **cellulose** (the most abundant polysaccharide in nature) and **chitin** (probably, next to cellulose, the second most abundant polysaccharide in nature), serve as structural elements, respectively, in plant cell walls and exoskeletons of nearly a million species of arthropods (e.g. insects, lobsters, and crabs).
- Heteropolysaccharides provide **extracellular support** for organisms of all kingdoms: in bacteria, the rigid layer of the cell wall is composed in part of a heteropolysaccharide contained two alternating monosaccharide units while in animals the extracellular space is occupied by several types of heteropolysaccharides, which form a matrix with numerous functions, as hold individual cells together and provide protection, support, and shape to cells, tissues, and organs.




## PROTEINS

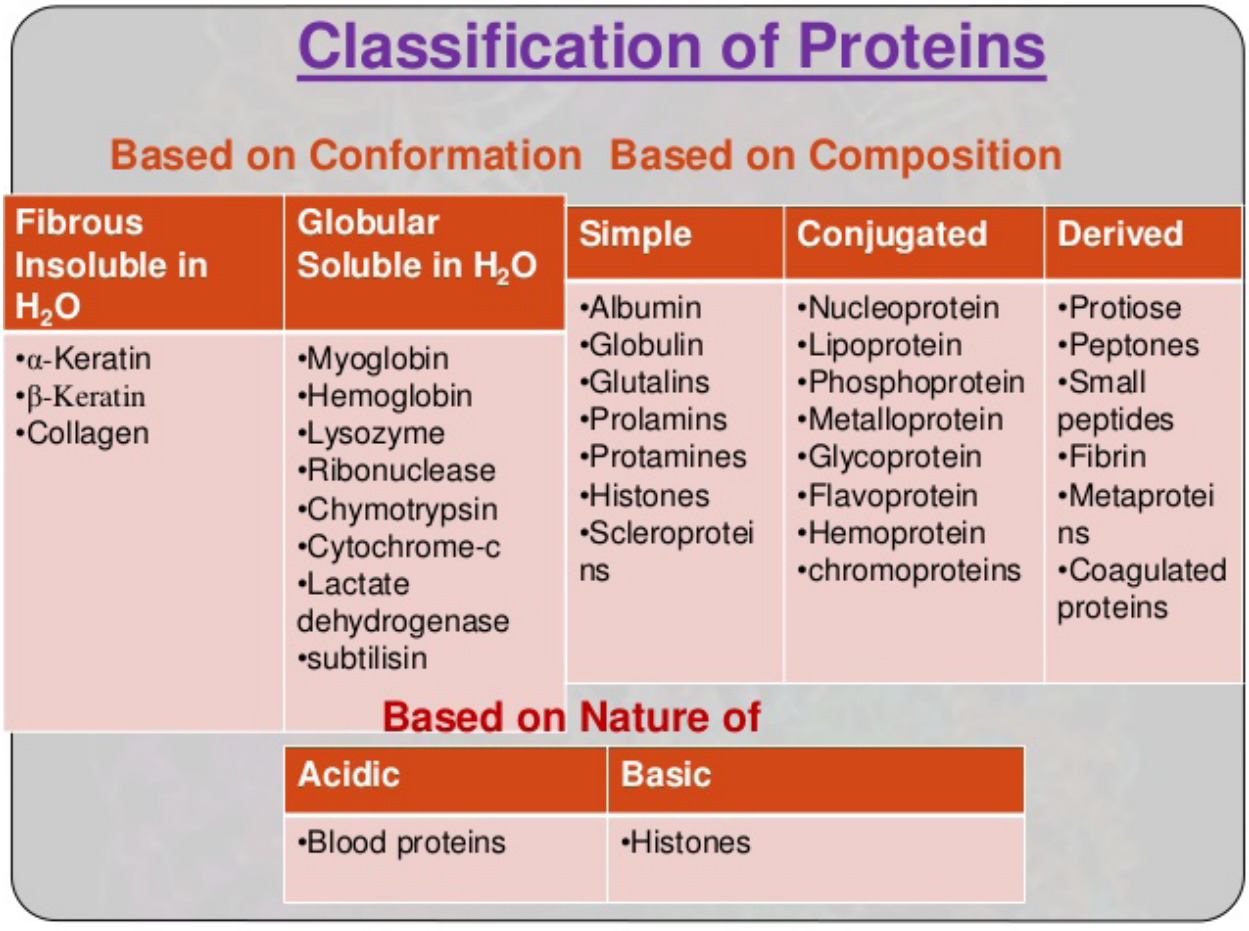
### Meaning of Protein

A group of complex organic macromolecules that contain carbon, hydrogen, oxygen, nitrogen, usually sulfur and are composed of one or more chains of amino acids. Proteins are fundamental

components of all living cells and include many substances, such as enzymes, hormones and anti-bodies that are necessary for the proper functioning of an organism. They areessential in the diet of animals for the growth and repair of tissue and can be obtained from foods such as meat, fish, eggs, milk, andlegumes.

Any of a large group of nitrogenous organic compounds that are essential constituents of living cells; consist of polymers of amino acids; essential in the diet of animals for growth and for repair oftissues; can be obtained from meat and eggs and milk and legumes;"a diet high in protein"

**CLASSIFICATION OF PROTEIN**




**Functions of protein**

**Protein** is essential to the structure of red blood cells, for the proper functioning of antibodies resisting infection, for the regulation of enzymes and hormones, for growth, and for the repair of body tissue. **Protein sources:** Amino acids are the building blocks of protein and are found in a variety of foods.

Protein can be found in meat, poultry, seafood, dairy, eggs and many plant-based foods.

Protein is an important substance found in every cell in the human body. In fact, except for water, protein is the most abundant substance in your body. This protein is manufactured by your body utilizing the dietary protein you consume. It is used in many vital processes and thus needs to be consistently replaced. You can accomplish this by regularly consuming foods that contain protein.

**Repair and Maintenance**

Protein is termed the building block of the body. It is called this because protein is vital in the maintenance of body tissue, including development and repair. Hair, skin, eyes, muscles and organs are all made from protein. This is why children need more protein per pound of body weight than adults; they are growing and developing new protein tissue.

**Energy**

Protein is a major source of energy. If you consume more protein than you need for body tissue maintenance and other necessary functions, your body will use it for energy. If it is not needed due to sufficient intake of other energy sources such as carbohydrates, the protein will be used to create fat and becomes part of fat cells.

**Hormones**

Protein is involved in the creation of some hormones. These substances help control body functions that involve the interaction of several organs. Insulin, a small protein, is an example of a hormone that regulates blood sugar. It involves the interaction of organs such as the pancreas and the liver. Secret in, is another example of a protein hormone. This substance assists in the digestive process by stimulating the pancreas and the intestine to create necessary digestive juices.

**Enzymes**

Enzymes are proteins that increase the rate of chemical reactions in the body. In fact, most of the necessary chemical reactions in the body would not efficiently proceed without enzymes. For example, one type of enzyme functions as an aid in digesting large protein, carbohydrate and fat molecules into smaller molecules, while another assists the creation of DNA.

**Transportation and Storage of Molecules**

Protein is a major element in transportation of certain molecules. For example, hemoglobin is a protein that transports oxygen throughout the body. Protein is also sometimes used to store certain molecules. Ferritin is an example of a protein that combines with iron for storage in the liver.

**Antibodies**

Protein forms antibodies that help prevent infection, illness and disease. These proteins identify and assist in destroying antigens such as bacteria and viruses. They often work in conjunction with the other immune system cells. For example, these antibodies identify and then surround antigens in order to keep them contained until they can be destroyed by white blood cells.

## FAT

### Fat Meaning

1. Any of various soft, solid, or semisolid organic compounds constituting the esters of glycerol and fatty acids and their associated organic groups.
2. A mixture of such compounds occurring widely in organic tissue, especially in the adipose tissue of animals and in the seeds, nuts, and fruits of plants.

### CLASSIFICATIONS OF FAT

A healthy diet for adults and children over 3 years old should consist of approximately 20 to 35 percent of calories from dietary fats. In order to maximize your nutritional intake and reduce your risk of chronic disease, it is best if these fat calories primarily come from healthy sources like mono- and poly-unsaturated fats as opposed to unhealthy saturated and trans fats.

### Monounsaturated Fats

Monounsaturated fat is a type of dietary fat primarily found in plant-based foods, which has been associated with lower risks of cardiovascular disease and stroke. In addition, food sources of monounsaturated fats tend to be high in other nutrients and antioxidants, like vitamin E. Olive oil, avocados, natural peanut butter and seeds are all excellent sources of monounsaturated fat. Because of the health benefits associated with monounsaturated fats, up to 20 percent of your daily calories should come from this fat. This equates to up to 44 grams of monounsaturated fat each day for a 2,000-calorie diet.

### Polyunsaturated Fats

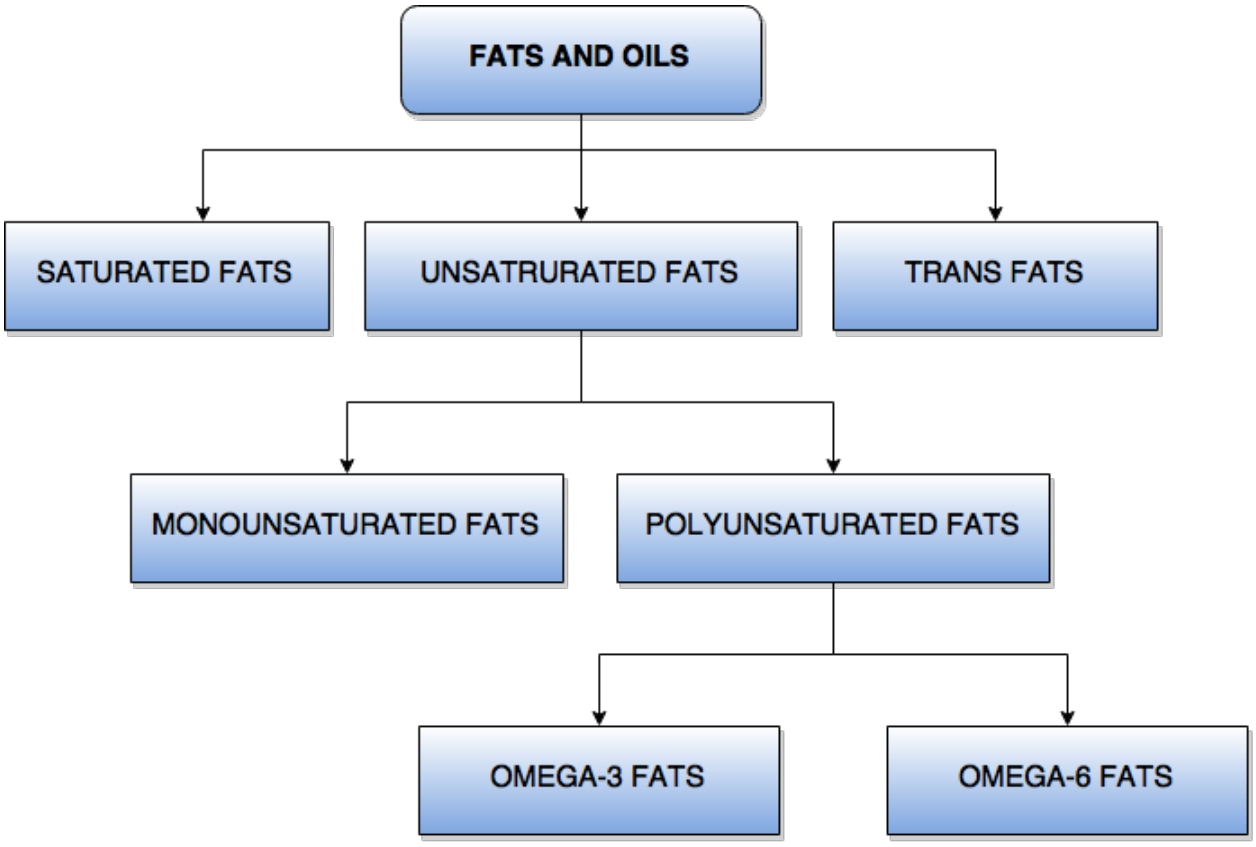
Like monounsaturated fats, polyunsaturated fats are also considered heart-healthy. Omega-3 and omega-6 fatty acids, two types of polyunsaturated fats, are considered essential because they cannot be synthesized by the human body. As such, omega-3s and omega-6s must be consumed through your diet. Walnuts, flaxseeds, flaxseed oil and salmon are excellent sources of omega-3 fatty acids, and corn, soybean and cottonseed oils are excellent sources of omega-6 fatty acids. Most adults get plenty of omega-6 fatty acids in their diets already, but to meet your recommendations for omega-3s, have fish at least two times per week.

### Saturated Fats

Saturated fats are the primary types of fats found in animal-based products and foods fried in butter or certain oils. Butter, lard, milk, cheese, poultry skin and high-fat beef are the most common sources of saturated fat. Coconut, palm kernel and palm oils also have saturated fats, even though they are plant-based and do not contain cholesterol. High intakes of saturated fat have been associated with raising blood cholesterol levels, so the American Heart Association recommends limiting saturated fat to no more than 7 percent of your daily calorie intake. This equates to only 16 grams of saturated fat per day for a 2,000-calorie diet.

**Trans Fats**

Of all the dietary fats found in food products, trans fats have been associated with the most health consequences. A trans-fat, or partially hydrogenated oil, is healthy oil which has been chemically modified for stabilization and preservation purposes. Trans fats are often used to extend the shelf life or to improve the palatability of foods, and while very small amounts are present in some dairy and meat products, most trans fats are considered an additive or unnatural ingredient. Trans fats are most commonly found in baked goods like cakes, cookies and pies, but they can also be found in stick margarine, pizza dough and crackers. The American Heart Association recommends limiting trans-fat to 1 percent of total calories.




**FUNCTIONS OF FATS**

Fat is an essential part of your diet. It provides energy, absorbs certain nutrients and maintains your core body temperature. You need to consume fat every day to support these functions, but some types of fat are better for you than others. Good fats protect your heart and keep your body healthy, while bad fats increase your risk of disease and damage your heart.

**1. Energy**

While carbohydrates are the main source of fuel in your body, your system turns to fat as a backup energy source when carbohydrates are not available. Fat is a concentrated source of energy. One gram of fat has 9 calories, which is more than double the amount of calories from carbohydrates and protein. Because fat is high in calories, you need to limit your diet to 20 to 35 percent calories from fat, reports MayoClinic.com. Based on a 1,800-calorie diet, this recommendation amounts to 40 to 70 daily grams of fat.

**2. Vitamin Absorption**

Some types of vitamins rely on fat for absorption and storage. Vitamins A, D, E and K, called fat-soluble vitamins, cannot function without adequate daily fat intake. These vitamins are essential parts of your daily diet. Vitamin A keeps your eyes healthy and promotes good vision, vitamin D assists in keeping your bones strong by boosting calcium absorption, vitamin E protects cells by neutralizing free radicals and vitamin K is important for blood clotting. If you don't meet your daily fat intake or follow a low-fat diet, absorption of these vitamins may be limited resulting in impaired functioning.

**3. Insulation**

Fat cells, stored in adipose tissue, insulate your body and help sustain a normal core body temperature. Adipose tissue is not always visible, but if you are overweight, you may be able to see it under your skin. You might notice an abundance of adipose tissue in certain areas, causing lumpy patches around your thighs and stomach. Other stored fats surround vital organs and keep them protected from sudden movements or outside impacts.

**ROLE OF CARBOHYTRATES DURING EXERCISE**

Carbohydrate is an important energy source during exercise. During short, heavy exercise it may be the only energy source for the working muscle and may be derived exclusively from the glycogen stores within the muscle fibers themselves. During prolonged, sub maximal exercise the magnitude of the contribution that carbohydrate makes to the total fuel consumed depends upon a number of factors, including

(1) The intensity of the exercise,
(2) The duration of the exercise,
(3) The state or type of training that the individual has engaged in, or both, and
(4) The diet previously consumed. Due to their limited storage in the body and the relative ease with which these stores can be manipulated by combinations of diet and/or training, knowledge

of the dynamics of carbohydrate metabolism is an important component in the arsenal of knowledge for coaches and athletes.

| | Exercise Intensity and Time | Carbohydrate Targets |
|---|---|---|
| Light | Low-intensity or skill-based activities | 2-3 g per kg BM |
| Moderate | Moderate exercise training (~1 hr / day) | 3-4 g per kg BM |
| Moderate-High | Endurance training (i.e. moderate-to-high intensity exercise of 1-3 hr / day) | 4-6 g per kg BM |
| High | Competitive Level (i.e. moderate-to-high intensity exercise of 3-4 hr / day) | 6-8 g per kg BM |
| Very High | Professional/Elite (i.e. moderate-to-high intensity exercise of >4 hr / day) | 8-10g per kg BM |

BM = Body Mass

**ROLE OF FATS DURING EXERCISE**

Fatty acid oxidation can contribute 50 to 60 per cent of the energy expenditure during a bout of low intensity exercise of long duration. Strenuous sub maximal exercise requiring 65 to 80 per cent of VO2 max will utilize less fat (10 to 45 per cent of the energy expended). Exercise training is accompanied by metabolic adaptations that occur in skeletal muscle and adipose tissue and that facilitate a greater delivery and oxidation of fatty acids during exercise. The trained state is characterized by an increased flux of fatty acids through smaller pools of adipose tissue energy. This is reflected by smaller, more metabolically active adipose cells in smaller adipose tissue depots. Peak blood concentrations of free fatty acids and ketone bodies are lower during and following exercise in trained individuals, probably due to increased capacity of the skeletal musculature to oxidize these energy sources. Trained individuals oxidize more fat and less carbohydrate than untrained subjects when performing sub maximal work of the same absolute intensity. This increased capacity to utilize energy from fat conserves crucial muscle and liver glycogen stores and can contribute to increased endurance. Further benefits of the enhanced lipid metabolism accompanying chronic aerobic exercise training are decreased cardiac risk factors. Exercise training results in lower blood cholesterol and triglycerides and increased high density lipoprotein cholesterol. High-fat diets are not recommended because of their association with atherosclerotic heart disease. Recent evidence suggests that low-fat high-carbohydrate diets may increase blood triglycerides and reduce high density lipoproteins. This suggests that the chronic ingestion of diets that are extreme in their composition of either fat or carbohydrate should be approached with caution in health-conscious athletes, as well as in sedentary individuals.

**Fat provides the highest concentration of energy of all the nutrients.**

One gram of fat equals nine calories. This calorie density, along with our seemingly unlimited storage capacity for fat, makes fat our largest reserve of energy. One pound of stored fat provides approximately 3,600 calories of energy. While these calories are less accessible to athletes performing quick, intense efforts like sprinting or weight lifting, fat is essential for longer, slower lower intensity and endurance exercise such as easy cycling and walking.

Fat provides the main fuel source for long duration, low to moderate intensity exercise (endurance sports such as marathons, and ultra marathons). Even during high intensity exercise, where carbohydrate is the main fuel source, fat is needed to help access the stored carbohydrate (glycogen).

**Using fat for fuel for exercise, however, is dependent upon these important factors:**

- Fat is slow to digest and be converted into a usable form of energy (it can take up to 6 hours).
- Converting stored body fat into energy takes time. The body needs to breakdown fat and transport it to the working muscles before it can be used as energy.
- Converting stored body fat into energy takes a great deal of oxygen, so exercise intensity must decrease for this process to occur.

For these reasons, athletes need to carefully time when they eat fat, how much they eat and the type of fat they eat. In general, it's not a great idea to eat fat immediately before or during intense exercise.

**Fats: The Long-Burning Fuel**

While carbs are the kindling to stoke the energy furnace, fat is like the slow-burning log your body uses for prolonged cardiovascular exercise. Unlike carbs, fat metabolism needs oxygen to convert into energy. The amount of fat used for fuel, which is in the usable form of triglycerides, depends on duration and exercise intensity. At low-intensity exercise, fat is the primary fuel source. As exercise intensity increases to 65 to 85 percent of your MHR, the amount of fat used also increases, but the percentage of fat use drops as the body relies more on carbohydrates. Between one to three hours of cardiovascular exercise, your body increases fat use from 75 percent to 85 percent of your energy expenditure. However, as your carbohydrate level in your muscles and liver decreases, fatigue settles in and performance diminishes, even if fat is still present.

1. Fat provides the main fuel source for long duration, low to moderate intensity exercise such as marathons. Even during high intensity exercise, where carbohydrate is the main fuel source, fat is needed to help access the stored carbohydrate (glycogen).
2. You should include moderate amounts of 'healthy' fats into their daily diet, such as nuts, seeds, fish, reduced-fat dairy foods, lean meat and avocados. Foods high in 'unhealthy' fat and low in other nutrients such as biscuits, pastries, chips and deep fried foods should be limited. It is

generally not advised to eat foods high in fat immediately before or during intense exercise as fat is slow to digest and can remain in the stomach for a long time.

**ROLE OF PROTEIN DURING EXERCISE**

Protein is responsible for rebuilding your muscle tissues after exercise and also plays a minor role in producing energy under more extreme training conditions. The complete proteins we consume (e.g. meats, fish, dairy, eggs, etc.) are made up of the same amino acids that make up our muscles. After we consume the protein, our body breaks it down to amino acids and incorporates them into our tissues as needed. Exercise causes muscles to demand more protein than under sedentary conditions because exercise, and especially unaccustomed exercise.

**Active Recreational Athletes:**

- Minimum -- 1 g/kg/d of body weight
- Adaptation period -- 1.2 - 1.8 g/kg/d

**Strength Athletes/Off-season Bodybuilders:**

- Minimum -- 1 g/kg/d of body weight
- Adaptation period -- 1.6 - 2.0 g/kg/d

**Endurance Athletes:**

- Minimum -- 1.4 g/kg/d of body weight
- Adaptation period -- 1.6 - 2.0 g/kg/d

**Unit – III**

# Micro Nutrients

## VITAMINS

### Meaning

Vitamins are the nutrients our bodies need in order to maintain functions such as immunity and metabolism. There is very little in our bodies that can be done without a vitamin being needed and it is important to know the types, fat soluble and water soluble, before learning about each one.

1) Water soluble type vitamins such as vitamin B and vitamin C
2) Fat-soluble Vitamins A, D, E, and K which are stored in the body's fatty tissue and the liver.

### Minerals Meaning

Minerals) any of a class of naturally occurring solid inorganic substances with a characteristic crystalline form and a homogeneouschemical composition

Calcium supplements are important for the health of bones. Athletes tend to have enhanced calcium status as assessed by bone mineral density, with the notable exception of female amenorrhoeic athletes. Magnesium status is adequate for most athletes, and there is no evidence that magnesium supplements can enhance performance. Phosphorus status is adequate for athletes. Phosphorus supplementation over an extended period of time can result in lowered blood calcium; however, some studies have shown that acute 'phosphate loading' will enhance performance. Athletes may have a zinc deficiency induced by poor diet and loss of zinc in sweat and urine. Limited data exist on the relationship of performance and zinc status. Widespread deficiencies in copper have not been documented, and there are no data to suggest that copper supplementation will enhance performance. There is no reason to suspect a selenium deficiency in athletes.

## Classification of vitamins

| *FAT SOLUBLE* | *WATER SOLUBLE* |
|---|---|
| *Vitamins A, D, E, K* | *Vitamins B & C* |

| S.No. | VITAMINS | SOURCES | FUNCTIONS AND USES | DEFICIENCY RESULTS |
|---|---|---|---|---|
| 1 | VITAMIN-A (Axerophthol) | Vegetables foods, carrots, tomatoes, cod, Liver oil. | *Enables an organism to resist infection<br>*Maintains the proper growth of the body | **Night blindness**, Stunted growth and skin diseases |
| 2 | VITAMIN-$B_1$ (Thiamine) | Milk, meat, and some seeds. | *Helps in the functioning of various nerves and intestines | Loss of appetite, reduction of weight, undue to fatigue. |
| 3 | VITAMIN- $B_2$ (Rifoflavin) | Green vegetables, egg and meat. | *Requirement for the body and its maintenance | Loss of eye sights and irritation in the tongue. |
| 4 | VITAMIN- $B_5$ (Nicotinamide) | Potatoes, Tomatoes, eggs, meat. | *It is needed for better digestion.<br>*And for the normal functioning of nerves | It may cause loss of appetite and some serious mental disorder. |
| 5 | VITAMIN- $B_6$ (Folic Acid) | Milk and liver of certain aminmals. | *Required for the formation of red blood cells (HEAMOGLOBIN) | It results in the general weakness of the body. It is also known as **ANEA-MIA** |
| 6 | VITAMIN-$B_{12}$ (Cyanocobalamin) | Liver of animals | *It is helpful in the formation of heamoglobin<br>*And various metabolic changes. | **SEVERE ANEAMIA** |
| 7 | VITAMIN-<br>B- Complex<br>It is a mixture of various vitamins such as<br>$B_1$, $B_2$, $B_5$ & $B_6$ | Wheat, cereals, eggs<br>Meat etc., | *Required for general growth of the body. | **BERI BERI** |
| 8 | VITAMIN- C (Ascorbic Acid) | Many vegetables, Paprika, Lemon Juice and Milk | *Resist infection, prevent fatique<br>*and formation of healthy gums<br>* teeths and bones | **SCURVY** and Dental Disorders |
| 9 | VITAMIN- D (Calciferol) | Cod liver oil, milk<br>30 minutes of evening sun light | *It helps the body to absorb calcium from digestive tract | **RICKETS** and deformation of the bones and teeth. |
| 10 | VITAMIN- E (Tocopherol) | Milk, ghee, cotton seeds, egg yolk, germinated grains | *Helps in the tissue growth<br>*Cell wall integration, RBC integration | Loss of sexual power<br>Reproduction |
| 11 | VITAMIN-K (Phylloquinone)<br>Liver having suffient amount of vitamin K | Green vegetables, Various grains, oils, fish oils, soy-abeans, coconut oil | *It assists in the maintenance of blood clotting | May increase bleeding that is blood takes a longer time for co-agulations and this result in **HEMORRHAGE** |

## ROLE OF VARIOUS MINERALS AND SALTS

| S.No. | MINERALS | SOURCES | FUNCTIONS AND USES | DEFICIENCY RESULTS |
|---|---|---|---|---|
| 1. | CALCIUM | Rich in calcium are milk, green leafy vegetables, butter, orange and eggs. | *Calcium along with the phosphorous helps in the formation of bones and teeth<br>*Clotting of blood<br>*Growth and contraction of muscles<br>*Excitability of nerves | Poor development of bones, Dental disorder, stunted growth and **Rickets** in children |
| 2. | PHOSPHORUS | Milk, egg yolk, meat fish and vegetables | *Phosphorus along with calcium is needed for formation of bones, teeth, muscles<br>*and for the activeness of many enzymes<br>*It's also plays important role in the metabolism<br>Of fats and carbohydrates. | Leads to poor development of skeleton and Retardation of growth. |
| 3. | MAGNESIUM | Various nuts, soya beans and sea foods | *Conduction of nerve impulses<br>*Normal Ionic balance | Absents of magnesium results nervousness , retarded growth and irregular heart beat. |
| 4. | POTTASSIUM | Banana and Potatoes | *Play an important role in acid-base balance in the cell<br>*And it is essential for synthesis of glycogen | Nervousness disorders and poor muscular control |
| 5. | SODIUM | Common salt, carrot, cauliflower, eggs, legume and radish | *It is essential for the regulation of osmotic pressure. | Lack of sodium results in nervous disorder. |
| 6. | IRON | Vegetables, liver, fish and meat | *Very important for the formation hemoglobin and chromatins | Deficiency of iron leads to **ANAEMIA** |
| 7. | IODINE | Drinking water, sea foods, iodized salts | *Essential for the formation of Thyroxin hormone of the thyroid gland | **GOITER** |
| 8. | SULPHUR | Sodium Chloride | *Essential for the formation body proteins | ------ |
| 9. | CHLORINE | *It is found in the body as chloride iron in combination with sodium. It is highly concentrated in cerebro-spinal fluid. Essential for water balance. | | |

## ROLE OF HYDRATION DURING EXERCISE

### Benefits of Dehydration

Water is essential to maintain blood volume, regulate body temperature and allow muscle contractions to take place. During exercise, the main way the body maintains optimal body temperature is by sweating. Heat is removed from the body when beads of sweat on the skin evaporate, resulting in a loss of body fluid. Sweat production, and therefore fluid loss, increases with a rise in ambient temperature and humidity, as well as with an increase in exercise intensity.

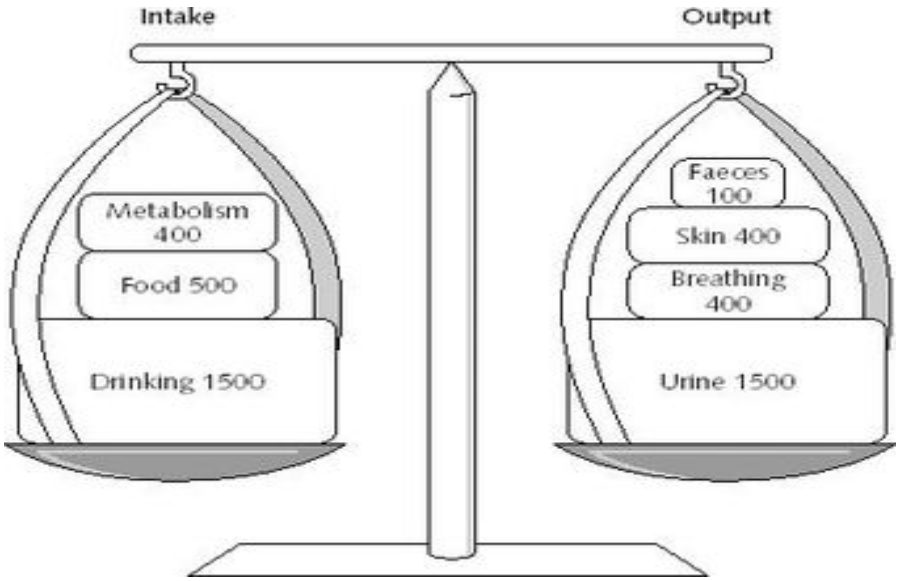
1. Two to three hours pre-exercise: 17 to 20 fluid ounces of water or sports drink.
2. Ten to 20 minutes pre-exercise: 7 to 10 ounces of water or sports drink.
3. During exercise: Fluid replacement should approximate sweat and urine losses and at least maintain hydration at less than 2% body weight reduction. This generally requires 7 to 10 ounces of water or sports drink every 10 to 20 minutes. Include carbohydrates in the beverage if the exercise is intense or lasts more then 45-50 minutes. Water alone will suffice, and save calories, if the exercise is moderate or less than 45-50 minutes. A loss of just 1% to 2% of body weight begins to compromise cardiovascular, body temperature regulation, and muscular function, and can lead to decreases in aerobic power. For example, heart rate rises an additional three to five beats per minute for every 1% of body weight loss.
4. Muscle endurance and maximal aerobic power decreases when 3% to 4% of body weight is lost. Slightly more than 2% loss of body weight can result in as much as a 35% to 48% reduction in physical work capacity.
5. Dehydration of greater than 3% of body weight increases the risk of developing exceptional heat illness (heat cramps, heat exhaustion, or heat stroke). Heat illness is common in sports and can occur after just one hour of intense exercise in the heat.

| |
|---|
| **Step 1:** Change in body mass - Measure body mass before exercise in minimum clothing (e.g. 60kg) and immediately after exercise in same clothing towel dried (e.g. 58kg). |
| **Step 2:** Fluid intake - Measure mass or volume of drink bottle/s before exercise (e.g. 800ml) and immediately after exercise (e.g. 300ml). |
| **Step 3:** Urine or toilet losses - Measure difference in mass before and after going to the toilet. |
| **Calculations: 1**. Fluid deficit(ml) = Change in body mass from before to after exercise x 1000 (e.g. 60kg-58kg=2kg x 1000 = 2000ml<br><br>**2. Fluid intake** (ml) = Change in mass of fluid bottle from before to after exercise (e.g. 800ml-300ml=500ml)<br><br>**3. Urine losses(ml**) = Change in body mass before and after toileting x 1000 (e.g. 59kg-58kg=1kgx1000=1000ml)<br><br>**4. Total sweat loss** = Fluid deficit (ml) + Fluid intake (ml) - urine losses (ml) (e.g. 2000ml+500ml-1000ml = 1500ml sweat loss).<br><br>**5. Hourly sweat rate** = Simply divide total sweat loss during exercise by the duration of the exercise.<br><br>**6. % dehydration** = Total fluid deficit (kg) divided by pre-exercise mass (kg) x 100 (e.g. 2/60x100=3.3%). |
| **Any weight loss reflects a mismatch between fluid intake and fluid loss during exercise. A deficit of one kilogram indicates that you have failed to replace approximately one litre of fluid during exercise.** |

**The best fluid to drink**

As there are many drink options available, you now need to think about which is best for you. Plain water alone is an effective drink for fluid replacement, especially in low intensity and short duration sports. However, if carbohydrate and electrolytes are added to water, as in a sports drink, performance can be enhanced, especially in high intensity and endurance sports. If a drink tastes good, athletes will consume more of it, which may assist in meeting fluid targets during competition or rehydrating more effectively. Carbohydrate in fluid provides a muscle energy source as well as enhancing flavour. This can be one advantage of a sports drink over plain water. Electrolytes such as sodium are lost in sweat.

**WATER BALANCE**




Water is essential for life, and maintaining hydration is important for physical and mental performance. The human body is largely made of water. Body water content declines with age, from about 75% in babies to 60% in adults. Although we can live for up to 50 days without food, without water we will survive only a few days, even in a cool climate. People generally drink enough water, but for specific population groups, like the elderly, or while exercising, fluid intake might become critical.

**Daily water losses**

Water leaves our bodies through skin and in breath all the time, amounting to about 700ml each day. We lose another 100ml through feces, about 1.5 liters as urine and 200ml in normal perspiration. So, even living and breathing in a temperate climate requires about 2.5 liters a day. Exercise and rises in temperature increases perspiration, loss of water and hence fluid requirements. During sickness and diarrhea, losses of water will also increase considerably.

**The effects of dehydration**

Dehydration can cause headaches, tiredness and loss of concentration. It is a problem particularly associated with aging, as older adults are less sensitive to mild dehydration; they drink less and take longer to re-hydrate. A deterioration of mental performance can also occur in mildly dehydrated younger adults. Children lose more water in perspiration in trying to keep cool so it is important to make sure they drink enough in hot weather.

**Drinking enough to maintain hydration**

We should drink enough to balance water losses. The metabolic processes in our bodies produce about 250ml, and we get another 750ml from our food. This leaves 1.5 litres to be supplied from drinks.

All water-containing drinks can contribute to the total required for hydration including fruit juice, soft drinks, tea, and coffee, dilute alcoholic drinks such as beer, as well as pure water itself. It has been shown that drink palatability is important when fluid requirement is high.

Studies have also shown that caffeine in amounts typical of a cup of coffee or tea or a cola drink do not have a dehydrating effect, so experts now agree that normal caffeine containing drinks can contribute to total water requirements. However, drinks containing 10% alcohol or more, such as most wines, do result in net fluid losses.

**Exercise in hot climates**

During exercise our bodies keep cool by evaporating fluid from our skin as sweat, so we must drink more to avoid dehydration. In cold or temperate climates young people can often tolerate a 2% loss of body weight as water without impairment of physical performance, but in the heat this amount of fluid loss will compromise performance and can result in heat illness. Losses in excess of 5% of body weight can decrease the capacity for work by about 30%. A number of studies have demonstrated that maintaining hydration before and during endurance exercise is effective in improving performance in a variety of conditions.

**Salt stimulates water absorption and aids retention during and after exercise**

Adding sodium (salt) to drinks stimulates carbohydrate absorption and this enhances water uptake. Replacing the salt lost in sweat helps to maintain blood volume. If large amounts of water alone are drunk during and after endurance exercise in the heat, dilution of body fluids may occur, leading to large losses of water in the urine. This means hydration will not be maintained and low sodium levels may cause heat cramps and exhaustion. To prevent this, drinks should contain sodium (as in sport drinks which contain amounts similar to those of human body fluids), or water should be drunk with food.

The maintenance of a correct water balance (the net difference between water gain and water losses) is essential to good health.

It is all the more essential as there is no real water storage in the body: the water we lose needs be replaced, and humans cannot survive more than a few days without water.

**We lose water on a daily basis.**

- Through the respiratory tract (by breathing)
- Through the gastro-intestinal tract (faces)

- Through the skin (perspiration and sweating)
- Through the kidneys (urine excretion)

Lifestyle and environmental conditions have a significant impact on an individual's own level of water loss, but on average, a typical adult loses about 2.6 liters (L) per day.

Table: Average daily water loss from different organs in adults

| Average DAILY WATER LOSS | |
|---|---|
| Kidneys | 1.5 L |
| Respiratory tract | 0.4 L |
| Gastrointestinal tract | 0.2 L |
| Skin | 0.5 L |
| TOTAL | 2.6 L |

Additional water losses via sweat will be induced by physical exercise and/or a hot environment and could contribute to water losses of up to several liters.

We gain water through fluid and food intake and metabolic water production mainly through food nutrient utilization by the body. Metabolic water production represents 0.3 L per day, on average, and water from foods can vary greatly according to dietary habits. Our remaining requirement needs to be provided by fluids.

**Daily caloric requirements and expenditure**

Men : 2500 calories

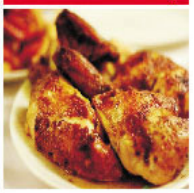
Women : 2000 calories

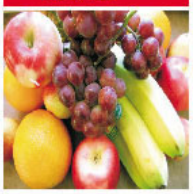
Children : 1800 calories

Calorie Available Indian Foods

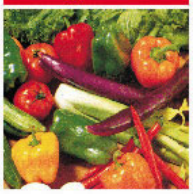
# Calorie chart of commonly used Indian food

| Snacks | Name | Quantity | Calories |
|---|---|---|---|
|  | Burger | 1 pcs | 325 |
| | Pizza | 1 portion | 375 |
| | Samosa/Kachori | 1 pcs | 256 |
| | Pakoda | 1 pcs | 200 |
| | Potato Chips | 10 pcs | 110 |
| | Dahi Wada | 1 pcs | 364 |
| | French Fries | 10 pcs | 235 |

| Name | Quantity | Calories | Meat / Poultry |
|---|---|---|---|
| Chicken | 1 cup | 220 |  |
| Tandoori Chicken | 2 pcs | 450 | |
| Mutton (Boiled) | 1 cup | 100 | |
| Fish (Boiled) | 1 cup | 100 | |
| Crab | 1 cup | 33 | |
| Egg (Fried) | 1 pcs | 100 | |
| Omlette | 1 pcs | 110 | |

| Fruits | Name | Quantity | Calories |
|---|---|---|---|
|  | Apple | 100 gms | 56 |
| | Banana | 100 gms | 95 |
| | Mangoes | 100 gms | 70 |
| | Orange | 100 gms | 53 |
| | Chikoo | 100 gms | 94 |
| | Papaya | 100 gms | 32 |
| | Peach | 100 gms | 50 |

| Name | Quantity | Calories | Bread / Rice |
|---|---|---|---|
| Bread | 1 slice | 60 |  |
| Chapati | 1 pcs | 100 | |
| Parantha | 1 pcs | 280 | |
| Rice | 100 gms | 325 | |
| Wheat Flour | 100 gms | 341 | |
| Maize Flour | 100 gms | 355 | |
| Veg. Oil | 1 tbsp | 130 | |

| Vegetables | Name | Quantity | Calories |
|---|---|---|---|
|  | Potato | 100 gms | 97 |
| | Peas | 100 gms | 93 |
| | Cauliflower | 100 gms | 30 |
| | Cabbage | 100 gms | 45 |
| | Carrot | 100 gms | 48 |
| | Mushroom | 100 gms | 18 |
| | Onion | 100 gms | 50 |

| Name | Quantity | Calories | Sweets / Misc |
|---|---|---|---|
| Barfi | 1 pcs | 100 |  |
| Gulab Jamun | 1 pcs | 100 | |
| Jalebi | 1 pcs | 200 | |
| Rasgulla | 1 pcs | 150 | |
| Sugar | 1 tbsp | 60 | |
| Honey | 1 tbsp | 30 | |
| Jam | 1 tbsp | 100 | |

| Milk & Milk Pdts | Name | Quantity | Calories |
|---|---|---|---|
|  | Milk | 1 cup | 100 |
| | Skimmed Milk | 1 cup | 45 |
| | Curd | 1 cup | 60 |
| | Butter | 1 tbsp | 120 |
| | Cheese | 1 cup | 164 |
| | Ice-Cream | 1 scoop | 114 |
| | Ghee | 100 gms | 910 |

| Name | Quantity | Calories | Drinks / Beverages |
|---|---|---|---|
| Cold Drinks | 1 bottle | 95 |  |
| Orange Juice | 1 glass | 95 | |
| Apple Juice | 1 glass | 95 | |
| Beer | 1 glass | 100 | |
| Whisky | 1 peg | 75 | |
| Rum | 1 peg | 75 | |
| Tea/Cofee | 1 cup | 35 | |

## I) CALORIE EXPENDITURE

| Inactive way | Kcals used | Active way | Kcals used |
|---|---|---|---|
| Use TV remote | <1 | Get up to change channel | 3 |
| Phone calls 30 min, reclining | 4 | Phone calls 30 min, standing | 20 |
| Hire home help | 0 | Iron 30 min, vacuum 30 min | 152 |
| Heat up a microwave meal | 15 | Cook 30 min | 25 |
| Buy pre-sliced vegetables | 0 | Prepare vegetables | 10–13 |
| Use leaf blower 30 min | 100 | Rake leaves 30 min | 150 |
| Hire a gardener | 0 | Garden or mow lawn 30 min | 360 |
| Use car wash | 18 | Wash and wax car 1 hour | 300 |
| Let dog out of back door | 2 | Walk dog 30 min | 125 |
| Drive 40 min, walk 5 min | 22 | Walk 15 min to bus | 60 |
| Email a friend, 4 min | 2–3 | Walk 1 min, stand and talk 3 min | 6 |
| Take lift up three floors | 0.3 | Climb three flights stairs | 15 |
| Park at door of supermarket | 0.3 | Park and walk 2 min | 1.6 |
| Watch TV for 1 hour | 30 | Walk and shop 1 hour | 145 |

| Inactive way | Active way |
|---|---|
| Uses **1,700** kcals per month | Uses **10,500** kcals per month |

## 2) CALORIE EXPENDITURE

| Calories Burned per 30 Minutes of Activity at Your Weight | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Activity Done for 30 Minutes at: | 100 lbs | 120 lbs | 140 lbs | 160 lbs | 180 lbs | 200 lbs | 220 lbs | 240 lbs | 260 lbs | 280 lbs |
| Aerobic Dancing | 115 | 138 | 161 | 184 | 207 | 230 | 253 | 276 | 299 | 322 |
| Aerobic Step Training | 145 | 174 | 203 | 232 | 261 | 290 | 319 | 348 | 377 | 406 |
| Backpacking (20 lb load) | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 |
| Basketball | 130 | 156 | 182 | 208 | 234 | 260 | 286 | 312 | 338 | 364 |
| Bicycling | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 |
| Dancing | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 |
| Gardening | 90 | 108 | 126 | 144 | 162 | 180 | 198 | 216 | 234 | 252 |
| Golf, walking without cart | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 |
| Housework | 90 | 108 | 126 | 144 | 162 | 180 | 198 | 216 | 234 | 262 |
| Jogging (5 mph) | 185 | 222 | 259 | 296 | 333 | 370 | 407 | 444 | 481 | 518 |
| Mowing | 135 | 162 | 189 | 216 | 243 | 270 | 297 | 324 | 351 | 378 |
| Skipping Rope | 285 | 342 | 399 | 456 | 513 | 570 | 627 | 684 | 741 | 798 |
| Stair Climber Machine | 160 | 192 | 224 | 256 | 288 | 320 | 352 | 384 | 416 | 448 |
| Swimming (25 yards per min) | 120 | 144 | 168 | 192 | 216 | 240 | 264 | 288 | 312 | 336 |
| Walking (15 minute mile) | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 |
| Weight Training (90 seconds between sets) | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 | 325 | 350 |

## CALORIE EXPENDITURE

| | MALES | | | | FEMALES | | |
|---|---|---|---|---|---|---|---|
| Activity level | Sedentary* | Mod. active* | Active* | Activity level | Sedentary* | Mod. active* | Active* |
| AGE | | | | AGE | | | |
| 2 | 1000 | 1000 | 1000 | 2 | 1000 | 1000 | 1000 |
| 3 | 1000 | 1400 | 1400 | 3 | 1000 | 1200 | 1400 |
| 4 | 1200 | 1400 | 1600 | 4 | 1200 | 1400 | 1400 |
| 5 | 1200 | 1400 | 1600 | 5 | 1200 | 1400 | 1600 |
| 6 | 1400 | 1600 | 1800 | 6 | 1200 | 1400 | 1600 |
| 7 | 1400 | 1600 | 1800 | 7 | 1200 | 1600 | 1800 |
| 8 | 1400 | 1600 | 2000 | 8 | 1400 | 1600 | 1800 |
| 9 | 1600 | 1800 | 2000 | 9 | 1400 | 1600 | 1800 |
| 10 | 1600 | 1800 | 2200 | 10 | 1400 | 1800 | 2000 |
| 11 | 1800 | 2000 | 2200 | 11 | 1600 | 1800 | 2000 |
| 12 | 1800 | 2200 | 2400 | 12 | 1600 | 2000 | 2200 |
| 13 | 2000 | 2200 | 2600 | 13 | 1600 | 2000 | 2200 |
| 14 | 2000 | 2400 | 2800 | 14 | 1800 | 2000 | 2400 |
| 15 | 2200 | 2600 | 3000 | 15 | 1800 | 2000 | 2400 |
| 16 | 2400 | 2800 | 3200 | 16 | 1800 | 2000 | 2400 |
| 17 | 2400 | 2800 | 3200 | 17 | 1800 | 2000 | 2400 |
| 18 | 2400 | 2800 | 3200 | 18 | 1800 | 2000 | 2400 |
| 19-20 | 2600 | 2800 | 3000 | 19-20 | 2000 | 2200 | 2400 |
| 21-25 | 2400 | 2800 | 3000 | 21-25 | 2000 | 2200 | 2400 |
| 26-30 | 2400 | 2600 | 3000 | 26-30 | 1800 | 2000 | 2400 |
| 31-35 | 2400 | 2600 | 3000 | 31-35 | 1800 | 2000 | 2200 |
| 36-40 | 2400 | 2600 | 2800 | 36-40 | 1800 | 2000 | 2200 |
| 41-45 | 2200 | 2600 | 2800 | 41-45 | 1800 | 2000 | 2200 |
| 46-50 | 2200 | 2400 | 2800 | 46-50 | 1800 | 2000 | 2200 |
| 51-55 | 2200 | 2400 | 2800 | 51-55 | 1600 | 1800 | 2200 |
| 56-60 | 2200 | 2400 | 2600 | 56-60 | 1600 | 1800 | 2200 |
| 61-65 | 2000 | 2400 | 2600 | 61-65 | 1600 | 1800 | 2000 |
| 66-70 | 2000 | 2200 | 2600 | 66-70 | 1600 | 1800 | 2000 |
| 71-75 | 2000 | 2200 | 2600 | 71-75 | 1600 | 1800 | 2000 |
| 76 and up | 2000 | 2200 | 2400 | 76 and up | 1600 | 1800 | 2000 |

## CALORIE REQUIREMENTS FOR DIFFERENT SPORTS AND GAMES

| GAME | K/Cal/kg/day | Kjouls/kg/day |
|---|---|---|
| Sailing | 48 | 201 |
| Archery | 50.6 | 212 |
| Gymnastics | 50.9 | 213 |
| Table Tennis | 51.3 | 215 |
| Kabaddi | 53.5 | 224 |
| Golf | 54.4 | 228 |
| Cricket | 55.3 | 232 |
| Canoeing | 57.6 | 242 |
| Equestrian | 60.0 | 252 |
| Badminton | 64.0 | 269 |
| Tennis | 64.0 | 269 |

| GAME | K/Cal/kg/day | Kjouls/kg/day |
|---|---|---|
| Ball games | 64.0 | 269 |
| Skiing | 65.0 | 273 |
| Fencing | 65.5 | 275 |
| Squash | 65.5 | 275 |
| Skating | 65.5 | 275 |
| Swimming | 67.1 | 282 |
| Cycling | 70.0 | 294 |
| Rowing | 75.5 | 317 |

**ATHLECTICS**

| EVENT | K/Cal/kg/day | Kjouls/kg/day |
|---|---|---|
| Sprint | 67.5 | 283 |
| Middle Distance | 69.0 | 290 |
| Long Distance | 64.8 | 272 |
| Steeple Chase | 64.8 | 272 |
| Marathon | 73.0 | 306 |
| Walk | 81.6 | 342 |
| Throwers | 70.0 | 294 |

**POWER EVENTS**

| EVENT | K/Cal/kg/day | Kjouls/kg/day |
|---|---|---|
| Judo | 74.0 | 311 |
| Boxing | 68.4 -79.0 | 287 – 332 |
| Weight Lifting | 76.0 | 319 |
| Wrestling | 70.7 | 297 |

Body weight of the player 65 kg

Game played Badminton 65(KG) X 64 (CALORIE) = 4160 Calorie Needed

**Pre-game meal**

| | | |
|---|---|---|
| Carbohydrates | – | 70 - 80% |
| Protein | - | 10 % |
| Fat | - | 10- 20% |
| Milk | - | (Low fat) |
| | - | Bread, Jam |
| | | Idly, Dosa, Kichadi, Chapathi |
| Fruit | - | Apple, Orange. |

- Although a meal eaten before exercise doesn't provide immediate energy, it can provide energy when your child exercises for longer than an hour.
- The carbohydrate in the meal raises blood glucose levels to provide energy for working muscles.
- The food also keeps your child from feeling hungry and weak, which can hurt athletic performance.

**When eating before training or competition, follow these guidelines:**

**Timing**

1 to 4 hours before training or competition:

- Allows enough time for food to empty the stomach.
- Exercising with a nearly full stomach can cause indigestion, nausea, and vomiting

**How Much**

Adjust the size of the meal depending on timing: reduce the carbohydrate and calorie content of the meal the closer it is consumed to exercise:

- 4 hours before exercise: a large meal (700 to 800 calories)
- 1 hour before exercise: a small meal (300 to 400 calories)

**Foods to Eat**

Familiar (tested in training), well-tolerated (easily digestible), and enjoyable (to encourage eating) carbohydrate-dense foods are best: they provide the quickest and most efficient source of energy and are rapidly digested.

**Pre-Game: –**

**Pre-Game Meal:**

**4-6 hours before game**

- High Complex/Low GI** foods; low protein and fat
- Hydrate well: fruit juices, sports drinks (gatorade/powerade), water

**2-3 Hours before game**

- Moderately-sized snack: more low GI foods; low protein and fat
- Continue to hydrate
- No caffeine* –

**1 Hour before game**

- Small snack: easily digestible foods (fruit, pretzels), sports bars and sports drink (like Gatorade or Powerade – NO "Energy Drinks" (Red Bull, etc.)
- Continue to hydrate
- No caffeine*

**30 minutes before game**

- "Top off the tank"
- High-GI** carbs that will absorb quickly and deliver glucose rapidly to working muscles
- Sports drink sports gels
- No caffeine * *Caffeine has major dehydrating effects, can make you jumpy, and raises your heart rate and blood pressure – all things you should avoid on game day!

**During the game**

Light carbohydrate

Rich breakfast with plenty of fluids

Cereal with milk

Toast and jam

Banana, Ground nut, salt biscuits, sweet biscuits

- Drink water in training sessions >30 min
- Ingest drink/foods with carbohydrate in training sessions >60 min
- Eat 30-60 grams carbohydrate/hour

- Ingest carbohydrate with high Glycemic index
- Drink enough fluid to meet fluid loss; 600-1200 ml/hour
- Drink as frequently as is practical; 150-250 ml in every 15-20 min
- Drink cooled fluids ( 5-15'c )

**Post-Game Meal**

Ingest drinks and foods rich in carbohydrate with high Glycemic Index within 30 min. after ending

Minimum 1 gram Carbohydrate/ kg body weight

Eat main meal with foods containing carbohydrate, protein and fat; within 1-2 hours after ending.

Total replenishment of body's carbohydrate stores requires a minimum of 20 hours. For rapid muscle glycogen resynthesis consume approximately 50-100 g carbohydrates within 30 minutes after exercise followed by additional carbohydrate feeding every 2-4 hour until a total approximate 600 gram has been eaten.

List of food items can be taken during and after competition/ training with their carbohydrate contents,

| Foods/Drinks | Carbohydrates ( Grams) |
|---|---|
| 1 Slice of white bread with honey | 23 |
| 1 Slice of white bread with jam | 23 |
| 1 Biscuit | 10 |
| 1 Banana | 22 |
| 1 Apple | 11 |
| 1 Orange | 9 |
| 10 gram raisins | 32 |
| 1 Sports Bar | 26 |
| 3 dl Sports Drink(7%Carbohyrate) | 21 |
| 3 dl Orange Juice | 30 |
| 3 dl Lemonade | 30 |

**Dehydration and Performance**

- Decreases the physical activity
- Increases lactate accumulation in muscles
- Increases risk of hyperthermia/ heat stroke

- Decreases sweating heat loss
- Less ability to concentrate

**Recommendations for fluid intake**

2-3 liters of basal daily fluid loss

½ - 4 liters of fluid loss /hour training

**Fluid intake for training**

| Time | Volume | Type |
|---|---|---|
| During ½-1 hour pre training | 300-500ml | water |
| During training < 1 hour | 600-1200 ml | water |
| During training >1 hour | 600-1200 ml | 4-8% carbohydrate |
| Post training | 500-750 ml | 6-8% carbohydrate |

## UNIT-IV

### Nutrition – Daily calorie intake and expenditure, determination of desirable body weight

| Group | Age | Wt. | Energy K/cal | Protein gm/d | Fat gm/d | Calcium Mg/d | Iron | Vitamin-A Retinol | Vitamin-A Carotene | thiamin | Riboflavin | Niacin | Pyidoxin | Ascorbic | Folic Acid | Vita - b -12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boys | 10-12 | 35.4 | 2190 | 54 | 22 | 600 | 39 | 600 | 2400 | 1.1 | 13 | 15 | 16 | 40 | 70 | 0.2 to 1.0 |
| Girls | 10-12 | 31.5 | 1970 | 57 | | | 29 | | | 1.0 | 12 | 13 | | | | |
| | | | | | | | | | | | | | | | | |
| Boys | 13-15 | 47.8 | 2450 | 70 | 22 | 600 | 41 | 600 | 2400 | 1.2 | 15 | 16 | 20 | 40 | 100 | 0.2 to 1.0 |
| Girls | 13-15 | 47.6 | 2060 | 65 | | | 28 | | | 1.0 | 12 | 14 | | | | |
| | | | | | | | | | | | | | | | | |
| Boys | 16-18 | 57.1 | 2640 | 78 | 22 | 500 | 50 | 600 | 2400 | 1.3 | 16 | 17 | 20 | 40 | 100 | 0.2 to 1.0 |
| Girls | 16-18 | 49.9 | 2060 | 63 | | | 30 | | | 1.0 | 12 | 14 | | | | |
| Recommended by the Nutrition Expert group in 1988 | | | | | | | | | | | | | | | | |

### Energy Requirements of Indian Children in Sports

| S. No | Game | 10-12 years | | 13 to 15 years | 16 to 18 years | 13 to 18 years |
|---|---|---|---|---|---|---|
| | | Boys | Girls | Boys | Boys | Girls |
| 1 | Sailing | 2606 | 2486 | 2899 | 3122 | 2540 |
| 2 | Archery | 2693 | 2573 | 3010 | 3265 | 2590 |
| 3 | Gymnastics | 2700 | 2577 | 3016 | 3271 | 2596 |
| 4 | Table Tennis | 2706 | 2586 | 3027 | 3285 | 2608 |
| 5 | Golf | 2777 | 2657 | 3119 | 3401 | 2710 |
| 6 | Cricket | 2798 | 2678 | 3145 | 3436 | 2740 |
| 7 | Canoeing | 2854 | 2734 | 3220 | 3530 | 2820 |
| 8 | Equestrian | 2994 | 2874 | 3400 | 3755 | 3020 |
| 9 | Badminton | 3008 | 2888 | 3416 | 3778 | 3040 |
| 10 | Tennis | 3008 | 2888 | 3416 | 3778 | 3040 |
| 11 | Ball Games | 3000 | 2900 | 3400 | 3750 | 3000 |

| S. No | Game | 10-12 years | | 13 to 15 years | 16 to 18 years | 13 to 18 years |
|---|---|---|---|---|---|---|
| | | Boys | Girls | Boys | Boys | Girls |
| 12 | Skiing | 3200 | 2902 | 3435 | 3800 | 3060 |
| 13 | Fencing | 3050 | 2930 | 3470 | 3846 | 3100 |
| 14 | Squash | 3050 | 2930 | 3470 | 3846 | 3100 |
| 15 | Skating | 3050 | 2930 | 3470 | 3846 | 3100 |
| 16 | Swimming | 3075 | 2954 | 3500 | 3866 | 3165 |
| 17 | Athletics | 3085 | 2965 | 3515 | 3903 | 3150 |
| 18 | Cycling | 3131 | 3010 | 3575 | 3980 | 3215 |
| 19 | Rowing | 3260 | 3140 | 3740 | 4188 | 3400 |
| 20 | Power Events | 3100-3300 | 3000-3200 | 3600-3800 | 4000-4300 | 3300-3500 |

## Recommended Dietary Allowances for Indians

| Group | Particulars | Wt. | Energy K/cal | Protein gm/d | Fat gm/d | Calcium Mg/d | Iron | Vitamin - A Retinol | Vitamin-A Carotene | thiamin | Riboflavin | Niacin | Pyidoxin | Ascorbic | Folic Acid | Vita - b -12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | Sedentary Work | 60 | 2425 | 60 | 20 | 400 | 28 | 600 | 2400 | 1.2 | 1.4 | 16 | 2.0 | 40 | 100 | 1 |
| | Moderate | | 2875 | | | | | | | 1.4 | 1.6 | 18 | | | | |
| | Heavy | | 3800 | | | | | | | 1.6 | 1.9 | 21 | | | | |
| Women | Sedentary | 50 | 1875 | | 20 | 400 | 30 | 600 | 2400 | 0.9 | 1.1 | 12 | 2.0 | 40 | 100 | 1 |
| | Moderate | 50 | 2225 | 50 | | | | | | 1.1 | 1.3 | 14 | | | | |
| | Heavy | | 2925 | | | | | | | 1.2 | 1.5 | 16 | | | | |
| | Pregnant | | +300 | +15 | 30 | 1000 | 38 | 950 | 3800 | +0.2 | +0.2 | +2 | 2.5 | 40 | 400 | 1 |
| | Lactate | | | | | | | | | | | | | | | |
| | 0-6 Month | | +550 | +25 | 45 | 1000 | 30 | | | +0.3 | +0.3 | +4 | 2.5 | 80 | 150 | 1.5 |
| | 6-12 Month | | +440 | +18 | | | | | | +0.2 | +0.2 | +3 | | | | |
| Infant | 0-6 Month | 5.4 | 108/kg | 2.05/kg | | 500 | | 350 | 1200 | 55 | 65 | 71 | 0.1 | 25 | 25 | 0.2 |
| | 6-12 Month | 8.6 | 98/kg | 1.65/kg | | | | | | 50 | 60 | 65 | 0.4 | | | |
| Child | 1-3 yrs | 12 | 1240 | 22 | 25 | 400 | 12 | 400 | | 0.6 | 0.7 | 8 | | 40 | 30 | 0.2 – 1.0 |
| | 4-6 yrs | 19 | 1690 | 30 | | | 18 | 400 | 1600 | 0.9 | 1.0 | 11 | 0.9 | | 40 | |
| | 7-9 yrs | 26 | 1950 | 41 | | | 26 | 600 | 2400 | 1.0 | 1.2 | 13 | 1.6 | | 60 | |

## Calorie-Burning Chart for Various Activities

*Approximate calories burned, per hour, by a 150-pound woman*

| *Exercise* | *Calories/hour* | *Exercise* | *Calories/hour* |
|---|---|---|---|
| Sleeping | 55 | Water Aerobics | 400+ |
| Eating | 85 | Skating/blading | 420+ |
| Sewing | 85 | Dancing, aerobic | 420+ |
| Knitting | 85 | Aerobics | 450+ |
| Sitting | 85 | Bicycling, moderate | 450+ |
| Standing | 100 | Jogging, 5mph | 500+ |
| Driving | 110 | Gardening, digging | 500+ |
| Office Work | 140 | Swimming, active | 500+ |
| Housework, moderate | 60+ | Cross country ski machine | 500+ |
| Golf, with trolley | 180 | Hiking | 500+ |
| Golf, without trolley | 240 | Step Aerobics | 550+ |
| Gardening, planting | 250 | Rowing | 550+ |
| Dancing, ballroom | 260 | Power Walking | 600+ |
| Walking, 3mph | 280+ | Cycling, studio | 650 |
| Table Tennis | 290+ | Squash | 650+ |
| Gardening, hoeing etc. | 350+ | Skipping with rope | 700+ |
| Tennis | 350+ | Running | 700+ |

**Balanced diet for Indian school children maintaining a healthy life style**

**a) Balanced Diet for 10 years to 14 year children's**

| S. No | Name of item | Quantity |
|---|---|---|
| 1. | Cereal & Cereal Products<br>1) Wheat Flour<br>2) Rice<br>3) Bread<br>4) Biscuits<br>5) Dalia/Porridge | 150 grams<br><br>150 grams<br>120 grams<br>4-6 grams<br>30 grams |
| 2. | Pulses | |

| S. No | Name of item | Quantity |
|---|---|---|
| 3. | Vegetables<br>a) Seasonal<br>b) Potato<br>c) Tomato<br>d) Onion<br>e) Lemon | <br>200 gram<br>100 gram<br>50 gram<br>50 gram<br>2 nos |
| 4. | Milk | 700 ml |
| 5. | Eggs | 1 no |
| 6. | Meat/Fish/Chicken | 150 gram |
| | Or( Vegetarians) | 75 gram |
| 7. | Fruits | 150 gram |
| 8. | Sugars | 60 gram |
| 9. | Cooking Oil | 40 gram |
| 10. | Buter | 20 gram |
| 11. | Jam | 20 gram |
| This diet can Provides<br>Energy 3500 calories<br>Protein – 101 gram<br>Fat - 122 gram<br>Carbohydrates – 454 gram | | |

**b) Balance Diet for 15 years and above Boys and Girls**

| S. No | Name of item | Quantity |
|---|---|---|
| 1. | Cereal & Cereal Products | 300 grams |
| | 1) Wheat Flour | 150 grams |
| | 2) Rice | 120 grams |
| | 3) Bread | 4-6 grams |
| | 4) Biscuits | 30 gram |
| | 5) Dalia/Porridge | 100 gram |
| 2. | Pulses | |
| 3. | Vegetables | |
| | a)Seasonal | 200 gram |
| | b)Potato | 100 gram |
| | c)Tomato | 100 gram |
| | d)Onion | 100 gram |
| | e)Lemon | 2 nos |
| 4. | Milk | 1000 ml |
| 5. | Eggs | 2 Nos |
| 6. | Meat/Fish/Chicken | 200 gram |
| | Or( Vegetarians) | 100 gram |
| 7. | Fruits | 150 gram |
| 8. | Sugars | 100 gram |
| 9. | Cooking Oil | 60 gram |
| 10. | Buter | 20 gram |
| 11. | Jam | 20 gram |
| This diet can Provides<br>Energy 4900 calories<br>Protein – 160 gram<br>Fat - 160 gram<br>Carbohydrates – 700 gram | | |

Obesity- definition, meaning and types of obesity- causes, hazards myths and overcoming them- weight control and body mass index.

**Definition of Obesity**

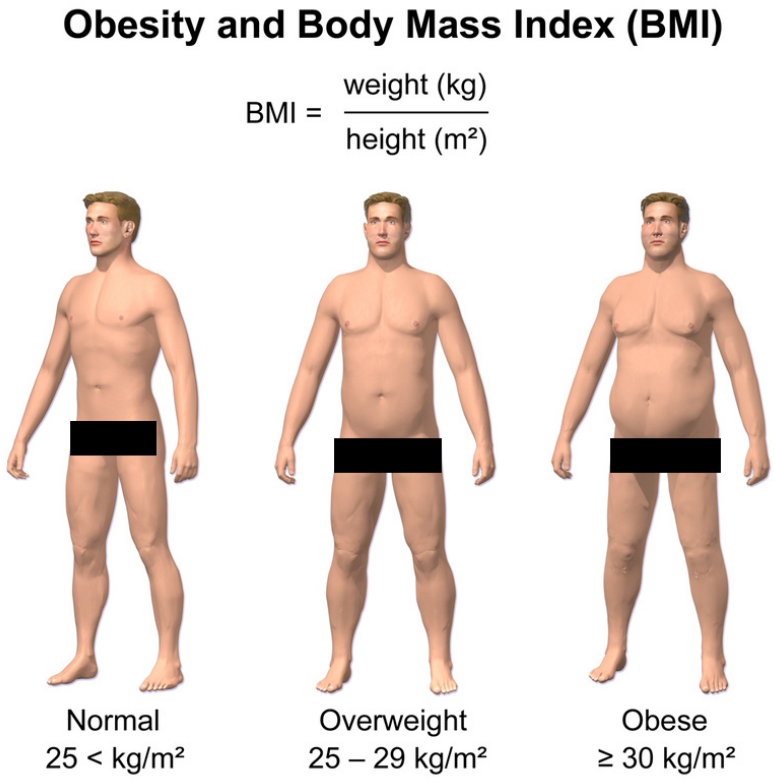
Obesity is an abnormal accumulation of body fat, usually 20% or more over an individual's ideal body weight. Obesity is associated withincreased risk of illness, disability, and death.

**Meaning of Obesity**

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems.

**Types of Obesity**

| BMI (kg/m2) | | Classification |
|---|---|---|
| from | up to | |
| | 18.5 | underweight |
| 18.5 | 25.0 | normal weight |
| 25.0 | 30.0 | overweight |
| 30.0 | 35.0 | class I obesity |
| 35.0 | 40.0 | class II obesity |
| 40.0 | | class III obesity |




**Causes of Obesity**

1. Diet
2. Sedentary lifestyle

3. Genetics
4. Other illnesses
5. Social Determinants

- Genetics. A person is more likely to develop obesity if one or both parents are obese.
- Overeating. Overeating leads to weight gain, especially if the diet is high in fat.
- A diet high in simple carbohydrates.
- Frequency of eating.
- Slow metabolism.
- Physical inactivity.
- Medications.
- Psychological factors.

**Lack of Energy Balance**

A lack of energy balance most often causes overweight and obesity. Energy balance means that your energy IN equals your energy OUT.

Energy IN is the amount of energy or calories you get from food and drinks. Energy OUT is the amount of energy your body uses for things like breathing, digesting, and being physically active.

To maintain a healthy weight, your energy IN and OUT don't have to balance exactly every day. It's the balance over time that helps you maintain a healthy weight.

- The same amount of energy IN and energy OUT over time = weight stays the same
- More energy IN than energy OUT over time = weight gain
- More energy OUT than energy IN over time = weight loss

Overweight and obesity happen over time when you take in more calories than you use.

**Other Causes**

**An Inactive Lifestyle**

Many Americans aren't very physically active. One reason for this is that many people spend hours in front of TVs and computers doing work, schoolwork, and leisure activities. In fact, more than 2 hours a day of regular TV viewing time has been linked to overweight and obesity.

Other reasons for not being active include: relying on cars instead of walking, fewer physical demands at work or at home because of modern technology and conveniences, and lack of physical education classes in schools.

People who are inactive are more likely to gain weight because they don't burn the calories that they take in from food and drinks. An inactive lifestyle also raises your risk for coronary heart disease, high blood pressure, diabetes, colon cancer, and other health problems.

**Environment**

Our environment doesn't support healthy lifestyle habits; in fact, it encourages obesity. Some reasons include:

- Lack of neighborhood sidewalks and safe places for recreation. Not having area parks, trails, sidewalks, and affordable gyms makes it hard for people to be physically active.
- Work schedules. People often say that they don't have time to be physically active because of long work hours and time spent commuting.
- Oversized food portions. Americans are exposed to huge food portions in restaurants, fast food places, gas stations, movie theaters, supermarkets, and even at home. Some of these meals and snacks can feed two or more people. Eating large portions means too much energy IN. Over time, this will cause weight gain if it isn't balanced with physical activity.
- Lack of access to healthy foods. Some people don't live in neighborhoods that have supermarkets that sell healthy foods, such as fresh fruits and vegetables. Or, for some people, these healthy foods are too costly.
- Food advertising. Americans are surrounded by ads from food companies. Often children are the targets of advertising for high-calorie, high-fat snacks and sugary drinks. The goal of these ads is to sway people to buy these high-calorie foods, and often they do.

**Genes and Family History**

Studies of identical twins that have been raised apart show that genes have a strong influence on a person's weight. Overweight and obesity tend to run in families. Your chances of being overweight are greater if one or both of your parents are overweight or obese.

Your genes also may affect the amount of fat you store in your body and where on your body you carry the extra fat. Because families also share food and physical activity habits, a link exists between genes and the environment.

Children adopt the habits of their parents. A child who has overweight parents who eat high-calorie foods and are inactive will likely become overweight too. However, if the family adopts healthy food and physical activity habits, the child's chance of being overweight or obese is reduced.

**Health Conditions**

Some hormone problems may cause overweight and obesity, such as underactive thyroid (hypothyroidism), Cushing's syndrome, and polycystic ovarian syndrome (PCOS).

Underactive thyroid is a condition in which the thyroid gland doesn't make enough thyroid hormone. Lack of thyroid hormone will slow down your metabolism and cause weight gain. You'll also feel tired and weak.

Cushing's syndrome is a condition in which the body's adrenal glands make too much of the hormone cortisol. Cushing's syndrome also can develop if a person takes high doses of certain medicines, such as prednisone, for long periods.

People who have Cushing's syndrome gain weight, have upper-body obesity, a rounded face, fat around the neck, and thin arms and legs.

PCOS is a condition that affects about 5–10 percent of women of childbearing age. Women who have PCOS often are obese, have excess hair growth, and have reproductive problems and other health issues. These problems are caused by high levels of hormones called androgens.

**Medicines**

Certain medicines may cause you to gain weight. These medicines include some corticosteroids, antidepressants, and seizure medicines.

These medicines can slow the rate at which your body burns calories, increase your appetite, or cause your body to hold on to extra water. All of these factors can lead to weight gain.

**Emotional Factors**

Some people eat more than usual when they're bored, angry, or stressed. Over time, overeating will lead to weight gain and may cause overweight or obesity.

**Smoking**

Some people gain weight when they stop smoking. One reason is that food often tastes and smells better after quitting smoking.

Another reason is because nicotine raises the rate at which your body burns calories, so you burn fewer calories when you stop smoking. However, smoking is a serious health risk, and quitting is more important than possible weight gain.

**Age**

As you get older, you tend to lose muscle, especially if you're less active. Muscle loss can slow down the rate at which your body burns calories. If you don't reduce your calorie intake as you get older, you may gain weight.

Midlife weight gain in women is mainly due to aging and lifestyle, but menopause also plays a role. Many women gain about 5 pounds during menopause and have more fat around the waist than they did before.

**Pregnancy**

During pregnancy, women gain weight to support their babies' growth and development. After giving birth, some women find it hard to lose the weight. This may lead to overweight or obesity, especially after a few pregnancies.

**Lack of Sleep**

Research shows that lack of sleep increases the risk of obesity. For example, one study of teenagers showed that with each hour of sleep lost, the odds of becoming obese went up. Lack of sleep increases the risk of obesity in other age groups as well.

People who sleep fewer hours also seem to prefer eating foods that are higher in calories and carbohydrates, which can lead to overeating, weight gain, and obesity.

Sleep helps maintain a healthy balance of the hormones that make you feel hungry (ghrelin) or full (leptin). When you don't get enough sleep, your level of ghrelin goes up and your level of leptin goes down. This makes you feel hungrier than when you're well-rested.

Sleep also affects how your body reacts to insulin, the hormone that controls your blood glucose (sugar) level. Lack of sleep results in a higher than normal blood sugar level, which may increase your risk for diabetes.

Health Hazards myths and overcoming them

**Without proper treatment, obesity can lead to other serious health problems, such as:**

- Osteoarthritis.
- Heart disease.
- Stroke.
- Diabetes.
- Sleep apnea (when you periodically stop breathing during sleep)

**HAZARDS MYTHS AND OVERCOMING THEM**

**Diet & Exercise**

The most effective way to lose weight is to adopt healthy eating habits, exercise routines, and stress management techniques. Regular exercise and healthy eating are important, and even modest weight loss will improve your health. It is also important to learn stress management tools that can be used in place of overeating or snacking during stressful times.

You should work with your doctor and a dietician to set realistic goals that will help you lose weight slowly through diet and exercise. It may be helpful to find support from friends, family, or your community in order to make lifestyle changes that will lead to long-term weight loss.

**Weight Loss Drugs**

Sometimes, weight loss drugs may be prescribed. While these medications may cause weight loss, most people regain the weight once they stop taking the medication. There are many herbal and over-the-counter supplements that claim to help you lose weight, but many of these claims have not been verified.

**Surgery**

Surgery may also be an option to treat obesity if you have tried other methods for losing weight but have not been successful in maintaining long-term weight loss. It can often help reduce the risk of other diseases (e.g. diabetes, heart disease, sleep apnea) that are associated with severe obesity.

Surgery may cause complications, and you should talk with your doctor to determine if this is an option for you. There are two common types of weight-loss (bariatric) surgeries:

Laparoscopic gastric bypass: In this procedure, the surgeon will place a band around the upper part of your stomach. This limits the amount of food you can eat at one time by making you feel full after eating small amounts of food.

Gastric bypass surgery: This surgery will change how the food you eat travels through your digestive tract by bypassing a portion of your stomach and small bowel. It will make you feel full when you've eaten less food.

**Preventing Morbid Obesity**

Obesity and morbid obesity are serious and potentially life-threatening conditions. A healthy lifestyle that includes a healthy diet and regular exercise are important for preventing obesity.

**Diet and Exercise**

People who are morbidly obese should avoid "fad" diets and focus instead on changing eating behaviors. Recommendations include:

- adding more fruits and vegetables to your diet
- eating smaller meals
- count calories
- avoid saturated fats, trans fats, and refined sugars

Physical activity is good for overall health and is especially important if you're trying to lose weight. To begin losing weight, you will need to do moderate to vigorous exercise for more than three hours per week. Vigorous activity raises your heart rate significantly. Examples include:

- running or jogging
- swimming

- jumping rope

Moderate exercises include brisk walking or biking, and can also include everyday activities like shoveling snow or yard work.

**The Effects of Obesity You Can't Always See: 5 Major Organs Damaged By Excess Body Fat**

**1. Your Heart**

A no-brainer. Excess fat tissue in the body requires oxygen to stay alive. This means your heart recruits more blood vessels to deliver oxygen-rich blood to that tissue. In addition, the fatter that accumulates inside your arteries, the harder those arteries get

**2. Your Colon**

Researchers haven't found the connection between obesity and most cancers to be all that strong — except for colon cancer. Among both men and women with obese classifications, colorectal cancers arise with startling frequency. This could be for two main reasons, experts suspect.

**3. Your Brain**

The link between body and mind isn't new, but the latest science is compelling. A 2010 study found cognitive function showed negative associations with obesity on measures. One hypothesis cites the deteriorating white matter that surrounds nerve fibers in the brain, which send signals around the organ. This white matter sheathing has been found more damaged in the brains of the obese.

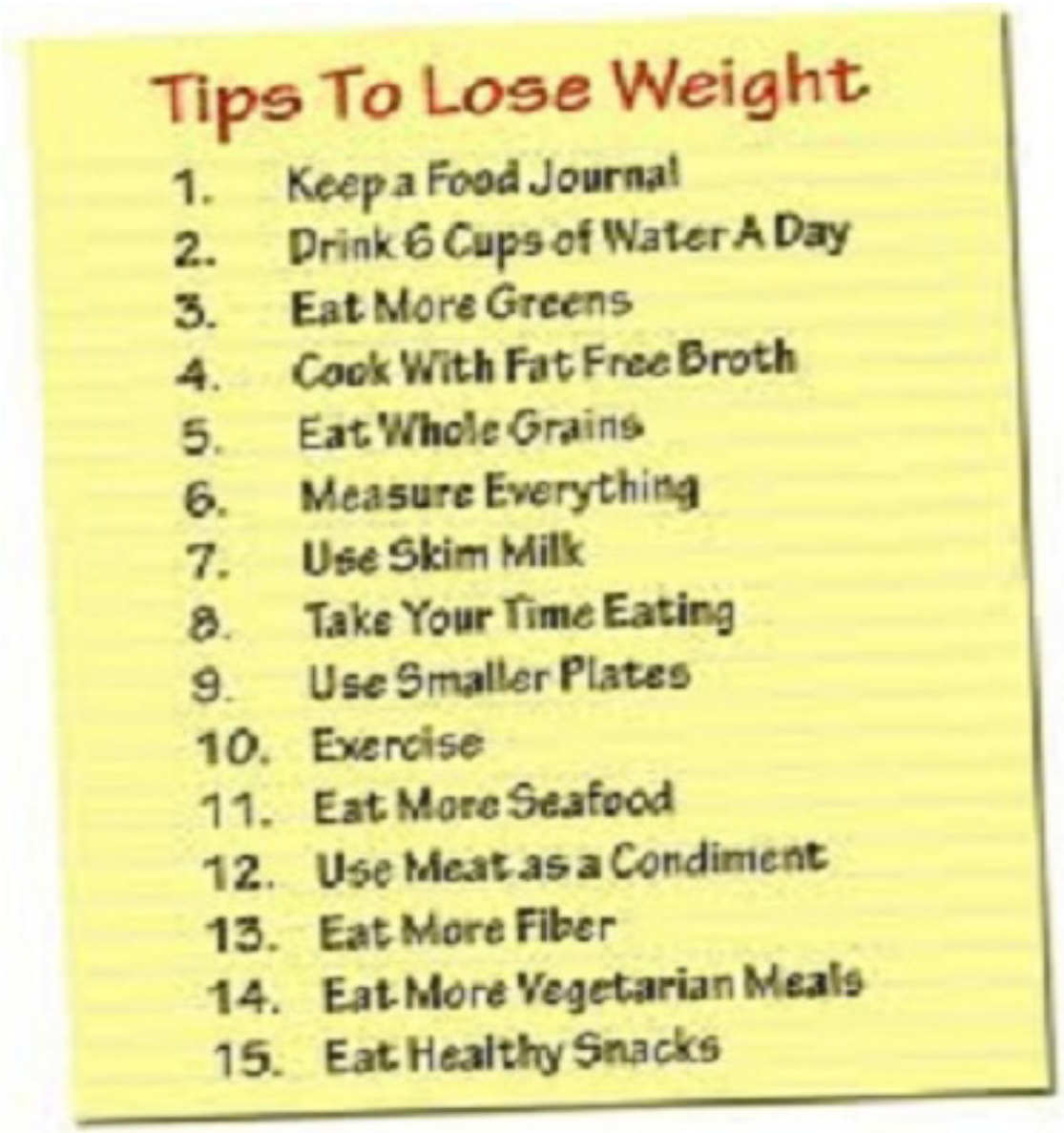
**4. Your Skin**

It's easy to forget how much obesity can damage the skin, and contrary to popular opinion, cosmetic blemishes like stretch marks aren't the only consequence. Hormone changes can cause acanthosis nigricans, a thickening and darkening of the skin; swelling and stretching of the skin can cause redness and irritation, known as stasis dermatitis; and poor vein function can lead to ulcers, found most often in ankles as a result of lacking blood flow.

**5. Your Lungs**

Like the arteries surrounding your heart, your lungs face great risk in the presence of excess fat. A study published in 2010 showed large amounts of adipose tissue diminishes the organs' overall capacity for air. This in itself poses significant risk for poor ventilation, which can both exacerbate existing respiratory diseases or produce the same side effects even in the absence of those diseases.

Poor lung function means blood vessels may not be getting enough oxygen. Similarly, obese people face a far greater risk for obstructive sleep apnea than non-obese people, further limiting the oxygen their bodies take in.

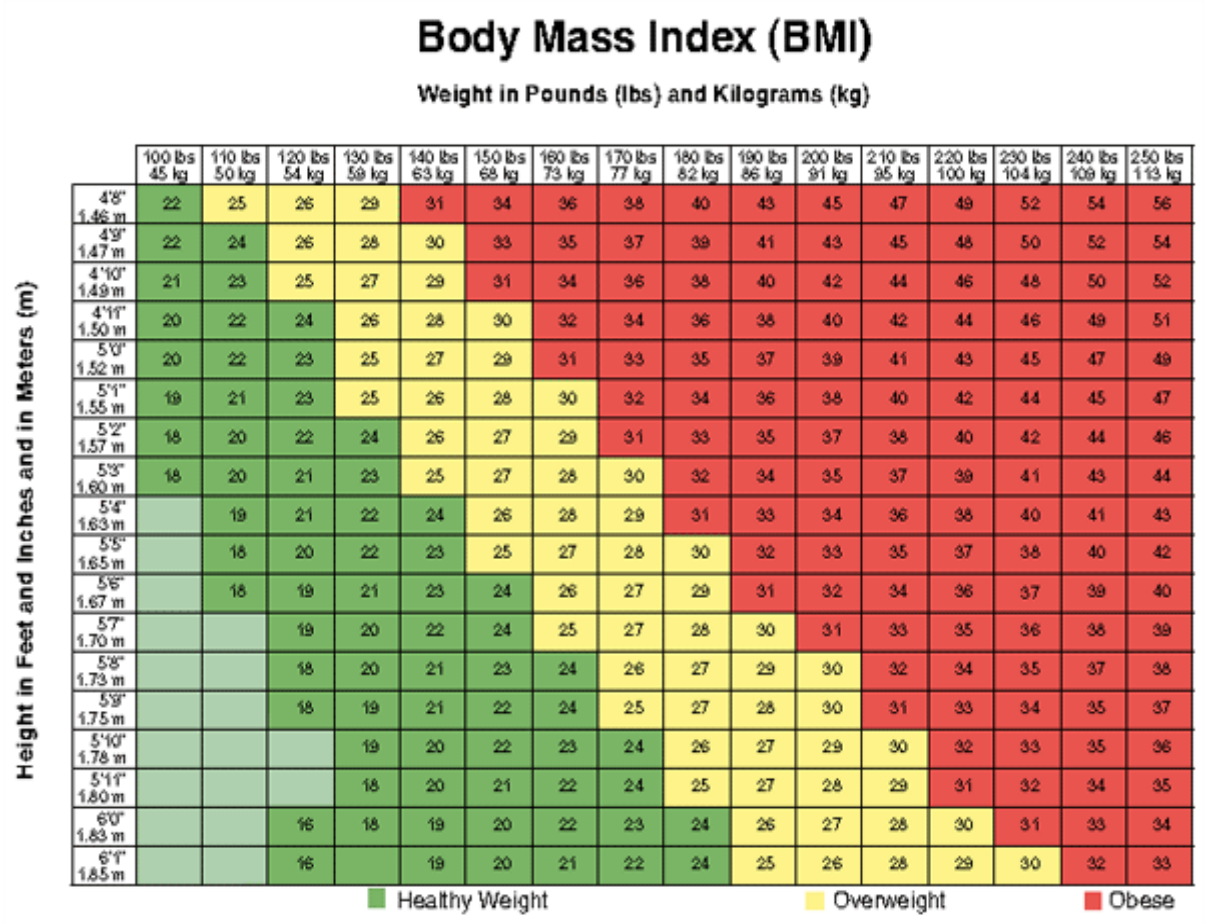

Tips To Lose Weight
1. Keep a Food Journal
2. Drink 6 Cups of Water A Day
3. Eat More Greens
4. Cook With Fat Free Broth
5. Eat Whole Grains
6. Measure Everything
7. Use Skim Milk
8. Take Your Time Eating
9. Use Smaller Plates
10. Exercise
11. Eat More Seafood
12. Use Meat as a Condiment
13. Eat More Fiber
14. Eat More Vegetarian Meals
15. Eat Healthy Snacks


**Body Mass Index**

The body mass index (BMI) or Quetelet index is a value derived from the mass (weight) and height of an individual. The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kg/m2, resulting from mass in kilograms and height in metres. The BMI may also be determined using a table [note 2] or chart which displays BMI as a function of mass and height using contour lines or colors for different BMI categories, and may use two different units of measurement.

When the term BMI is used informally, the units are usually omitted.

$$\text{Body Mass Index} = \frac{\text{Weight (in kg)}}{\text{Height}^2 \text{ (in m)}}$$


Body Mass Index (BMI)
Weight in Pounds (lbs) and Kilograms (kg)
Height in Feet and Inches and in Meters (m)
100 lbs 45 kg
110 lbs 50 kg
120 lbs 54 kg
130 lbs 59 kg
140 lbs 63 kg
150 lbs 68 kg
160 lbs 73 kg
170 lbs 77 kg
180 lbs 82 kg
190 lbs 86 kg
200 lbs 91 kg
210 lbs 95 kg
220 lbs 100 kg
230 lbs 104 kg
240 lbs 109 kg
250 lbs 113 kg
4'8" 1.46 m 22 25 26 29 31 34 36 38 40 43 45 47 49 52 54 56
4'9" 1.47 m 22 24 26 28 30 33 35 37 39 41 43 45 48 50 52 54
4'10" 1.49 m 21 23 25 27 29 31 34 36 38 40 42 44 46 48 50 52
4'11" 1.50 m 20 22 24 26 28 30 32 34 36 38 40 42 44 46 49 51
5'0" 1.52 m 20 22 23 25 27 29 31 33 35 37 39 41 43 45 47 49
5'1" 1.55 m 19 21 23 25 26 28 30 32 34 36 38 40 42 44 45 47
5'2" 1.57 m 18 20 22 24 26 27 29 31 33 35 37 38 40 42 44 46
5'3" 1.60 m 18 20 21 23 25 27 28 30 32 34 35 37 39 41 43 44
5'4" 1.63 m 19 21 22 24 26 28 29 31 33 34 36 38 40 41 43
5'5" 1.65 m 18 20 22 23 25 27 28 30 32 33 35 37 38 40 42
5'6" 1.67 m 18 19 21 23 24 26 27 29 31 32 34 36 37 39 40
5'7" 1.70 m 19 20 22 24 25 27 28 30 31 33 35 36 38 39
5'8" 1.73 m 18 20 21 23 24 26 27 29 30 32 34 35 37 38
5'9" 1.75 m 18 19 21 22 24 25 27 28 30 31 33 34 35 37
5'10" 1.78 m 19 20 22 23 24 26 27 29 30 32 33 35 36
5'11" 1.80 m 18 20 21 22 24 25 27 28 29 31 32 34 35
6'0" 1.83 m 16 18 19 20 22 23 24 26 27 28 30 31 33 34
6'1" 1.85 m 16 19 20 21 22 24 25 26 28 29 30 32 33
Healthy Weight
Overweight
Obese

**UNIT-V**

# DIET FOR OBESITY MANAGEMENT

**Diet for obesity**

**Some healthy complex carbs:**

- Whole wheat bread
- Oatmeal
- Whole wheat pasta
- Brown rice
- Potatoes

**Some healthy protein supplies:**

- Lean cuts of beef
- Fish
- Eggs (but don't eat too many yolks)
- Fat free cottage cheese
- Perhaps a little protein powder
- Skim milk
- Fat free yogurt
- Turkey
- Chicken
- Fat free peanut butter

| Week | Duration | Cardiovascular | Resistance | Sets & Exercises |
|---|---|---|---|---|
| Week 1 | At least 10 minutes | Light swimming and walking | None | None |
| Week 2 | At least 10 minutes | Light walking | Machines, 1 body part | 3 sets for 3 exercises |
| Week 3 | At least 10 minutes | Light jogging on treadmill | Machines and barbells, 2 body parts | 3 sets for 6 exercises |

| Week | Duration | Cardiovascular | Resistance | Sets & Exercises |
|---|---|---|---|---|
| Week 4 | At least 15 minutes | Light jogging on treadmill | Machines barbells and dumbbells, 2 body parts | 3 sets for 6 exercises |
| Week 6 | At least 15 minutes | Light jogging on treadmill | Machines barbells and dumbbells, 3 body parts | 3 sets for 9 exercises |

**SPLIT**

- Monday - Resistance
- Tuesday - Cardio
- Wednesday - Resistance
- Thursday - Cardio
- Friday - Resistance
- Saturday - Cardio
- Sunday - Rest

**DIET FOR MIDDLE AGE AND AGED PEOPLE**

**Diet for Middle Aged People**

Men in their thirties may need more protein, make sure the protein is high-quality, lean protein such as poultry, shellfish or seafood. Limit red meat and fatty meat as these can lead to greater risk of heart disease as men age. In addition to protein, men also need plenty of bulky food, such as rice, oats, barley and whole grain pastas. Lots of multi-colored fruits and vegetables will help avoid disease causing and age-accelerating inflammation and oxidation.

Eat oranges, for vitamin C, tomatoes for lycopene, carrots for beta-carotene, blueberries for anthocyanins, spinach for lutein and zeaxanthin, and purple grapes for resveratrol. Make sure there are no medication, medical condition or allergy conflicts with your supplement. Check for soy, shellfish, yeast or gluten, all of which frequently appear in many vitamin brands' lists of ingredients along with artificial colors, flavors and preservatives.

**Zinc**

Zinc is an essential trace element needed for proper functioning of different enzymes

**Folic acid**

Folic acid can reduce the risk of heart attack and stroke in men with high levels of the amino acid, homocysteine

**Garlic**

Garlic has been shown to lower blood pressure and cholesterol levels, thin the blood, dilate blood vessels and improve blood circulation.

1. Go back to basics on portion sizes
2. Keep active
3. Sleep well
4. Deal with stress
5. Rethink your diet
6. Don't sit down too much
7. Have breakfast lat
8. Only drink at the weekend
9. Build muscle
10. Eat protein at every meal

**Diet for Old Aged People**

For older people, as with younger adults, the diet should follow the principles of a healthy balanced diet.

**THE PRINCIPLES OF HEALTHY BALANCED DIET**

| Food group | Examples | Quantity |
|---|---|---|
| Bread, other cereals and potatoes | Bread, pasta, rice, breakfast cereals and potatoes | These should be the main part of every meal (one third of meal) |
| Fruit and vegetables (fresh, frozen and canned) | Oranges, apples, bananas, carrots, peas and tomatoes | These should be a main part of every meal and at least five servings should be consumed a day |
| Milk and dairy foods | Milk, cheese, yogurt and fromage frais | Three servings a day |
| Meat, fish and alternatives | Beef, lamb, pork, chicken, beans, lentils, eggs and fish | One or two servings a day |
| Foods containing fat and foods containing sugar | Crisps, fizzy drinks, sweets, butter, margarine, cakes and biscuits | Should be consumed only in moderation |

An increase in starchy, fibre-providing foods and a reduction in fatty and sugary foods are likely to be beneficial, particularly if individuals are overweight.

However, a low-fat, high-fibre diet is not appropriate for all elderly people, especially those with repeated infections, generally poor health or a poor appetite. As discussed above, it is important

that older people choose a nutrient rich diet, high in foods providing protein, vitamins and minerals such as milk and dairy products, meat, eggs, fish, bread, cereals, and fruit and vegetables.

A varied diet will also help to ensure adequate nutritional intake.

Snacks can be an important part of the diet in older age groups, particularly for those unable to cope with large meals at one sitting.

Dairy products such as milk provide an excellent way to provide a nutrient rich snack along with fluid in individuals who are struggling to meet their requirements.

The senses of taste and smell decline with age, which can make food seem less appetising. Using different colours and shapes in cooking can stimulate the senses and add to eating enjoyment. The addition of herbs and spices can also make food more interesting.

It is a good idea for older people to keep an emergency store of some basic foods items for times when it is difficult for them to get to the shops. Useful store cupboard items include:

- Milk e.g. long-life, evaporated, dried milk and tinned milky puddings.
- Canned meat and fish e.g. tins of corned beef, stewed meats, ham, sardines, salmon, and tuna.
- Tinned fruit and vegetables e.g. tinned peaches, baked beans, sweet corn, peas, and tomatoes.
- Dried fruit.
- Breakfast cereals or porridge oats.
- Crackers, biscuits, crisp bread and oatcakes (in an airtight tin).
- Rice and pasta.
- Soups (tinned and packet).
- Drinks e.g. cocoa, malted milk, long-life fruit juice, tea and coffee and meal replacement drinks.
- Other: stock cubes, gravy, honey, jam, peanut butter, pickles and sauces.

For older people, as with younger adults, the diet should follow the principles of a healthy balanced diet.

**The principles of a healthy balanced diet for Older Persons**

| Food group | Examples | Quantity |
|---|---|---|
| Bread, other cereals and potatoes | Bread, pasta, rice, breakfast cereals and potatoes | These should be the main part of every meal (one third of meal) |

| Food group | Examples | Quantity |
|---|---|---|
| Fruit and vegetables (fresh, frozen and canned) | Oranges, apples, bananas, carrots, peas and tomatoes | These should be a main part of every meal *and* at least five servings should be consumed a day |
| Milk and dairy foods | Milk, cheese, yogurt and fromage frais | Three servings a day |
| Meat, fish and alternatives | Beef, lamb, pork, chicken, beans, lentils, eggs and fish | One or two servings a day |
| Foods containing fat and foods containing sugar | Crisps, fizzy drinks, sweets, butter, margarine, cakes and biscuits | Should be consumed only in moderation |

An increase in starchy, fibre-providing foods and a reduction in fatty and sugary foods are likely to be beneficial, particularly if individuals are overweight.

However, a low-fat, high-fibre diet is not appropriate for all elderly people, especially those with repeated infections, generally poor health or a poor appetite. As discussed above, it is important that older people choose a nutrient rich diet, high in foods providing protein, vitamins and minerals such as milk and dairy products, meat, eggs, fish, bread, cereals, and fruit and vegetables.

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- Other: stock cubes, gravy, honey, jam, peanut butter, pickles and sauces.

**Diet for Women Athletes**

Dietary components include macronutrients (carbohydrates, protein, and fat) and micronutrients (fluids, electrolytes, vitamins, and minerals). Specific requirements are presented in the Table in the Summary of Nutritional Requirements and Sources section.

**MACRO NUTRIENTS**

**Carbohydrates**

Carbohydrates are necessary to meet energy needs, more so in endurance athletes than in strength athletes.

Carbohydrate needs are commonly based on the athlete's body size and activity level. Individuals engaged in moderate-duration, low-intensity exercise require 5-7 g of carbohydrates per kilogram of body weight.[14] By contrast, those participating in long-duration and high-intensity exercise require 7-12 g of carbohydrates per kilogram of body weight (see the Table).

Fruit, vegetables, brown rice, enriched whole-grain breads, whole grain cereals, rolled oats, beans, legumes, and sweet potatoes are good examples of healthy carbohydrate foods.

**Protein**

Active individuals have a heightened protein requirement because they have a high percentage of lean muscle mass to support, they need protein to repair muscle tissue that is damaged during exercise, and they require additional protein for energy during exercise.

The amount of protein required depends on the type of activity being performed. Researchers recommend protein intakes of 1.2-1.4 g/kg/d for individuals participating in endurance sports and 1.6-1.8 g/kg/d for those involved in anaerobic activities (see the Table).[15, 14]

**Benefits of substituting carbohydrates with protein include the following:**

- Enhanced weight loss
- Reduction in truncal adipose tissue
- Optimal maintenance of blood glucose levels
- Improved lipid profile

Protein-rich foods include lean pork and beef, poultry, fish, eggs, beans, tofu, and low-fat dairy products. Women at risk for having a low protein intake are those who restrict their energy intake to achieve weight loss or those who eat a vegetarian diet.

In the past, some investigators expressed concerns that a high-protein diet can cause renal damage. However, no conclusive evidence suggests that a high-protein diet negatively affects healthy adults with normal renal function.[16] In addition, some researchers have raised questions about whether a high-protein or low-carbohydrate diet may increase the all-cause mortality risk in women.[17] Further research is necessary to determine if this is the case.

**Fat**

Fat provides essential elements for the cell membranes and is essential for the absorption of fat-soluble vitamins. Fat should account for 25-30% of a person's energy intake.[15] Diets should be limited in saturated and trans-fats, while providing adequate amounts of essential fatty acids (linoleic and alpha-linoleic acid). In women, the following intakes are advised (see the Table):

- Linoleic acid intake 11-12 g/d
- Alpha-linoleic acid intake 1.1 g/d

Functions of essential fatty acids include regulation of blood clotting, blood pressure, heart rate, and immune responses.

Dietary fatty acids should come from naturally lean protein foods, nuts, seeds, nut butter, fatty fish (e.g., salmon, trout), fish-oil supplements, flaxseed oil, safflower oil, canola oil, sunflower oil, corn oil, avocados, and egg yolks.[16] Women should avoid consuming fats found in processed foods because of their highly saturated nature.

Low-fat diets are not recommended for active individuals.[15] Low-fat diets decrease energy and nutrient intake, reduce exercise performance, and decrease oxidation of body fat stores. Fat provides the most energy per gram of all the macronutrients and can help in achieving a positive energy balance. Dietary fat maintains concentrations of sex hormones and may prevent menstrual disturbances.[18, 19]

**MICRO NUTRIENTS**

**Fluids and electrolytes**

Dehydration impairs performance; therefore, athletes must remain well hydrated. Adequate fluid intake is approximately 2.2 L/d for women aged 19-30 years, and increased drinking is required for active individuals or those in hot environments (see the Table).[15]

Athletes should consume 400-600 mL of fluid 2 hours before exercising. During exercise, 150-350 mL (6-12 fluid ounces [fl oz.]) should be ingested every 15-20 minutes. For exercise lasting longer than 1 hour or occurring in hot environments, the fluid should be a drink containing carbohydrates and electrolytes. Post exercise meals should include fluids and foods containing sodium, because diuresis occurs with the ingestion of plain water.[20]

**Vitamins and minerals**

Female athletes are at increased risk for iron, calcium, vitamin B, and zinc deficiencies. These nutrients are vital for building bone and muscle and for energy production. Vegetarians are particularly at risk for developing deficiencies in these vitamins and minerals.[6, 21]

Iron insufficiency is one of the most prevalent nutritional deficiencies among the female athlete because of menstrual losses (see the Table). Iron deficiency may lead to fatigue.[22, 23] Ferritin values are commonly used to reflect iron stores; however, their reliability in the female athlete is questioned.

Excessive iron ingestion may also cause problems, including gastrointestinal distress, constipation, and iron toxicity

## DIET FOR AEROBICS AND ANAEROBIC EXERCISES

### Diet for Endurance Event (Aerobic)

(Canoeing, Kayaking, Rowing, Middle & Long Distance Running, Marathon, Walking, Road Cycling, Track Cycling, Swimming (Middle & Long Distance)

| Meal | Items | Quantity |
|---|---|---|
| Bed Tea | Tea | One Cup |
| Before Training | Bread | 4 Slices |
| | Jam | 20 grams |
| During Training | Fruit Juice | 200 ml |
| | Sweetened Lime Juice | 500-1000 ml |
| Break Fast | Bread | 6 Slices |
| | Butter | 25 grams |
| | Jam/Honey | 50 grams |
| | Eggs/Panner/Cutlets/Liver | 2 Nos/ 50 grams |
| | Corn Flakes/Porridge | 25 grams |
| | Banana | 2 Nos |
| | Dry Fruits(Kishmish/Apricot | 50 grams |
| | Milk | 300 ml |

| Meal | Items | Quantity |
|---|---|---|
| Lunch | Soup | 200 ml |
| | Chapattis | 150 grams |
| | Rice | 100 grams |
| | Dall | 30 grams |
| | Seasonal Vegetables | As Desired |
| | Curd | 200 grams |
| | Fruit | 200 grams |
| | Salad | As Desired |
| Evening Tea | Tea | One cup |
| During Training | Fruit Juice | 200 ml |
| | Sweetened Lime Juice | 500-1000 ml |
| After Training | Porridge/Banana | 50 gram/ 2 nos |
| Dinner | Soup | 200 ml |
| | Chapattis | 150 grams |
| | Rice | 100 gram |
| | Dall | 30 gram |
| | Seasonal Vegetables | As Desired |
| | Meet/Fish/Chicken or | |
| | Paneer | 250g/150 grams |
| | Salad | As Desired |
| | Dessert | 150 gram |
| Bed Time | Milk | 300 ml |

| Approximate Food Value | | | % Nutrients |
|---|---|---|---|
| Energy | = | 5758 K cal | - |
| Proteins | = | 210.5 gram | 13.9 |
| Fats | = | 159.0 gram | 24.8 |
| Carbohydrates | = | 882.4 gram | 61.3 |

**Diet for Anaerobic Events**

(Jumpers, Sprinting, Sprint Swimming, Sprint Cycling)

| Meal | Items | Quantity |
|---|---|---|
| Bed Tea | Tea | One Cup |
| Before Training | Bread | 2 Slices |
| | Jam | 10 grams |
| During Training | Fruit Juice | 200 ml |
| | Sweetened Lime Juice | 500-1000 ml |
| Break Fast | Bread | 6 Slices |
| | Butter | 25 grams |
| | Jam/Honey | 25 grams |
| | Eggs/Panner/Cutlets/Liver | 4 Nos/ 100 grams |
| | Corn Flakes/Porridge | 25 grams |
| | Banana | 2 Nos |
| | Dry Fruits(Kishmish/Apricot | 50 grams |
| | Milk | 300 ml |
| Lunch | Soup | 200 ml |
| | Chapattis | 100 grams |
| | Rice | 75 grams |
| | Dall | 30 grams |
| | Seasonal Vegetables | As Desired |
| | Meat/Fish/Chicken or Paneer | 150 grams/ 75 grams |
| | Curd | 200 grams |
| | Fruit | 200 grams |
| | Salad | As Desired |
| Evening Tea | Tea | One cup |
| During Training | Fruit Juice | 200 ml |
| | Sweetened Lime Juice | 500-1000 ml |
| After Training | Porridge/Banana | 25 gram/ 2 nos |
| Dinner | Soup | 200 ml |
| | Chapattis | 100 grams |
| | Rice | 75 gram |
| | Dall | 30 gram |
| | Seasonal Vegetables | As Desired |
| | Meet/Fish/Chicken or | |
| | Paneer | 150g/75 grams |

| Meal | Items | Quantity |
|---|---|---|
| | Salad | As Desired |
| | Dessert | 150 gram |
| Bed Time | Milk | 300 ml |

| Approximate Food Value | | | % Nutrients |
|---|---|---|---|
| Energy | = | 4667.0 K cal | - |
| Proteins | = | 210.0 gram | 17.9 |
| Fats | = | 144.0 gram | 27.5 |
| Carbohydrates | = | 637.0 gram | 54.6 |

**WEIGHT REDUCING DIET**

| Meal | Items | Quantity |
|---|---|---|
| Bed Tea | Tea/Lime Juice | One Cup |
| Before Training | Biscuits | 2 nos |
| During Training | Lime Juice | 1 or 2 Tumblers |
| Break Fast | Eggs/Panner/Cutlets | 1 to 2 Nos |
| | Milk | 300 ml |
| | Corn Flakes | One Katori |
| | Fruits (Papaya, Apple etc.) | One Plate |
| Lunch | Clear Soups | One Cup |
| | Chapattis | 1-2 Nos |
| | Dall | One Katori |
| | Seasonal Vegetables(Boiled) | As Desired |
| | Fresh Curd | One Katori |
| | Fruit | One No |
| | Fresh Salad | As Desired |
| Evening Tea | Tea | One cup |
| During Training | Lime Juice | 1-2 Tumblers |
| After Training | | |
| Dinner | Clear Soups | One Cup |
| | Chapattis | 1-2 Nos |
| | Dall | One Katori |
| | Seasonal Veg(Boiled) | As Desired |
| | Meet/Fish/Chicken (Boiled | 100 grams |
| | Fresh Salad | As Desired |
| | Fruit | One No |
| Bed Time | Milk | 300 ml |

**FOODS TO BE AVOIDED**

1. All fried food stuffs e.g. Puri, Pakoda, Samosa, Parantha etc.,
2. Sweets: Sugars, Gur, Honey, Glucose, Ice Creams, Cakes, Pastries, Jams, Jellies, Chocolates, Candies, etc.,
3. Cool Drinks, Spuashes, Fruit Juices, Cane Juice etc.,
4. Dried Fruits and Nuts
5. Fruits like Banana, Chiku
6. All Alcoholic Drink.

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