

# 2



## SPORTS AND NUTRITION

*“If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have the safest way to health.”*

– Hippocrates

### BALANCED DIET AND NUTRITION – MACRO AND MICRO NUTRIENTS

#### Meaning of Balanced Diet

A balanced diet is one that consists of different food types and sufficient amounts of nutrients for the development of the human body. Nutrients are substances that provide nourishment. Essential nutrients include carbohydrates, proteins, fats, vitamins, minerals, fibres and water. Components like saturated fat, refined sugar, salt, alcohol, etc. should be taken in moderation. Even what is considered nutritious, such as carbohydrates, should be consumed in appropriate amounts. A balanced diet therefore does not have a standard structure. It should be planned according to the

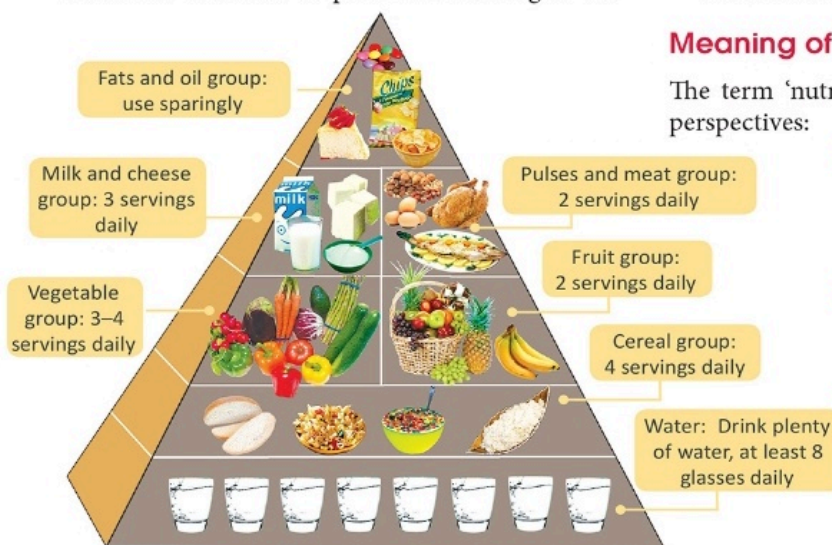
individual’s body type. The following points must be taken into consideration:

- ❖ The age, gender and body weight of the individual.
- ❖ The activity level and eating habits of the individual.
- ❖ Situational factors like income level, social customs and availability of food types.
- ❖ Proportion of proteins, fats and carbohydrates should be in the ratio 1 : 1 : 4.
- ❖ The type of foods included should be varied.
- ❖ Meals should be planned in such a manner that the individual takes three to four meals a day, rather than two heavy ones. Breakfast should be the heaviest and dinner the lightest.

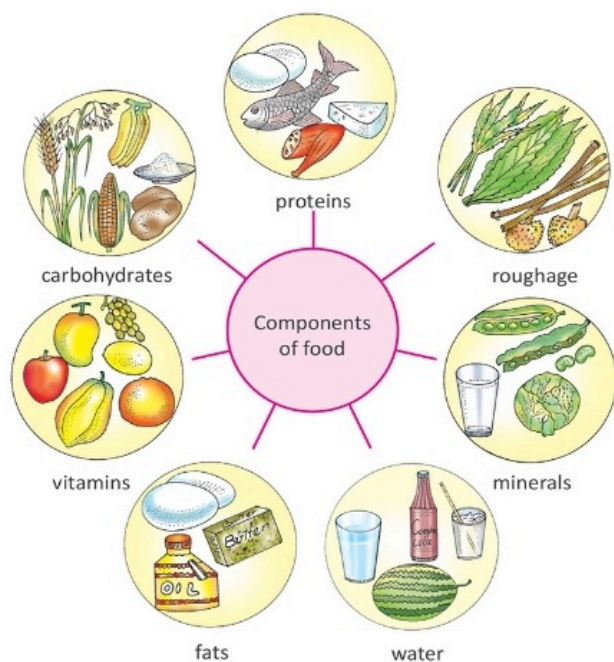
#### Meaning of Nutrition

The term ‘nutrition’ can be viewed from several perspectives:

- ❖ It is the science which deals with the interaction of food in relation to the well-being of a person.
- ❖ It studies how food affects the body and provides energy through nutrients.
- ❖ It is the overall process in which food is ingested and digested, its nutrients absorbed and distributed into the various systems of the body for smooth functioning.



**Figure 2.1** A balanced diet contains all types of required nutrients from all the food groups.



**Figure 2.2** Components of food

Many people think that food and nutrition are synonymous but this is a common misconception. In fact, foods are those substances which we eat for the sustenance of our life; while nutrition concerns substances present in the food we eat which affects our body. Thus, nutrition means getting the right amount of nutrients from food by a living organism for her/his bodily functions like maintenance, growth, metabolism, repair and replacement of tissues.

### Macronutrients

Nutrients that are required in large amounts in the diet are known as macronutrients, i.e. carbohydrates, proteins, fats and water. The functions of macronutrients are to provide energy, promote growth and development and regulate body functions.

#### Carbohydrates

Carbohydrates are organic compounds which are the primary sources of energy. They are known as 'energy giving foods' and are made of small and simple sugars that enter the body as glucose. They provide 17 kJ/g of energy. 45–65% of our total energy needs should come from carbohydrates.

A carbohydrate molecule consists of carbon (carbo-), hydrogen (hydro-) and oxygen (-ate) atoms, with a hydrogen and oxygen atom ratio of 2 : 1 just like in water that is  $H_2O$ .



**Figure 2.3** Foods rich in carbohydrates

Carbohydrates come in two main forms, i.e. simple carbohydrates and complex carbohydrates. Simple carbohydrates are formed by smaller chains; they are crystalline, water soluble and give food a sweet taste. Examples include glucose, fructose, galactose, sucrose, maltose and lactose. Complex carbohydrates, also known as polysaccharides, are formed by longer chains, such as starch, dextrin, glycogen and cellulose.

Though carbohydrates are one of our body's dependable sources of energy, excessive intake can lead to health conditions such as coronary heart diseases, hypertension, diabetes, obesity and stroke. Lack of carbohydrates, on the other hand, results in loose skin, weight loss, weakening of the body and fatigue.

Food rich in carbohydrate includes cereals, pulses, dried peas, dates, potato, banana, colocasia, sweet potatoes, gur, bajra, jowar, etc.

#### Proteins

Proteins are substances that have carbon compounds, hydrogen, nitrogen, oxygen and sometimes sulphur, phosphorus and iron. Our body converts them to amino acids as the large size of protein molecules makes it difficult for them to be used without being broken down. There are 20 amino acids out of which nine amino acids must be obtained from the food we eat.

Proteins are known as the 'building blocks of life.' In fact, the etymology of the word 'protein' is protos, meaning 'first'. This is a testament to how essential protein is to living organisms. It forms protoplasm, and is found in many physiological

parts – the blood, the endocrine glands, bones, teeth, tissues, etc. Unlike carbohydrates and fats, proteins also contain nitrogen in addition to phosphorus and sulphur, and are sometimes referred to as nitrogenous substance. They can either be obtained from meat and meat products like eggs and dairy products or vegetables and pulses, soybean, mustard, dry fruits, whole grain and nuts. Animal protein is considered more powerful than vegetable protein.



**Figure 2.4** Foods rich in proteins

Proteins are involved in the production of hormones, enzymes, tissues and antibodies; regulation of water and acid balance in the body; and transportation of oxygen and nutrients. Deficiency of protein may lead to diseases like marasmus and kwashiorkor, and health conditions such as low immunity, muscle pain, joint pain, poor concentration and fatigue. Meanwhile, regularly consuming more protein than your body requires triggers heart problems, weight gain and liver damage.

### **Fats**

Fats, also called lipids, are composed of the elements carbon, oxygen and hydrogen in the ratio 76 : 12 : 12. Fats are a backup energy source. They regulate the body's core temperature, boost hormone production, protect organs and are a good solvent for fat-soluble vitamins (A, D, E and K) and carotenoids. It is recommended that 20–35% of our daily energy requirement should come from fats.

Fats are classified into saturated fats, polyunsaturated fats and monounsaturated fats. The fats present in processed foods, packaged foods, sea foods and dairy products are saturated fats. These fats have the tendency to raise the level of cholesterol in the blood stream and heighten

the risk of getting cardiovascular diseases. Polyunsaturated fats and monounsaturated fats help in lowering the blood cholesterol. Inclusion of fat in the diet must naturally take into account which type should be struck from the list.



**Figure 2.5** Foods rich in fats

Fats can be obtained from animal sources such as dairy products like milk, butter, curd, ghee, fish oil, meat and eggs. Vegetarian sources of fats include coconut, soybean, mustard oil, cotton seed, dried fruits, etc.

### **Water**

Water is made-up of hydrogen and oxygen elements in the ratio 2 : 1. It serves as a transporter of nutrients to cells and remover of waste through urine. It is also crucial for control of body temperature, ionic balance of the blood, as well as the body's metabolism. It has zero calorie content.

Water may not always be considered as macronutrient, but it is needed by our body in large amount. Therefore, USDA (United States Dietary Association) includes water as a part of macronutrients but UNICEF does not. 50% of the water we need comes from the food we eat.

### **Micronutrients**

Unlike macronutrients, micronutrients are needed in small quantities, though they are indispensable for our health. Commonly known micronutrients are minerals and vitamins. Their primary function is to enable chemical reactions. Unlike macronutrients, they are not responsible for the production of energy.

### **Minerals**

Approximately 4% of our body mass is made-up of minerals, which are found in an ionised state. The minerals present in, and needed by, our body are

broadly classified into two types: macrominerals, such as calcium, potassium, phosphorus, sodium, chlorine, magnesium and sulphur, and microminerals (trace minerals), for example, copper, iron, iodine, fluoride, cobalt, chromium, selenium and zinc. We need 0.1 g of macrominerals and 0.01 g of trace minerals on a daily basis.



**Figure 2.6** Foods rich in vitamins and minerals

Let us take a closer look at some of the important minerals.

#### Macrominerals

- ❖ **Calcium:** Calcium is found in milk and milk products, dark leafy green vegetables, green beans, almonds and canned fish with bones. It strengthens our bones and teeth and helps in the clotting of blood. The daily value (DV) for calcium is 1 g (approx.). Calcium deficiency causes rickets, osteoporosis, hypocalcaemia and osteopenia.
- ❖ **Potassium:** Found in whole grains, beans, potatoes, dark green leafy vegetables, bananas, fish, mushroom, yogurt, avocados and squash. It is needed for proper fluid balance, nerve transmission and muscle contraction. The DV for potassium is 3.5 g (approx.). Low potassium causes hypokalemia, which weakens our body.
- ❖ **Sodium:** Found in large amounts in canned foods, fast foods, table salts, cured meat, salad dressing, pickles, instant foods, etc. sodium aids muscular activities and transmission of nerve impulses. The DV for sodium is 2.3 g. Sodium deficiency causes hyponatremia, the symptoms of which include vomiting, nausea, muscle spasms and seizures.
- ❖ **Magnesium:** Found in dark leafy green vegetables, nuts, fish, beans, whole grains, avocados, yogurt, bananas, dried fruits and

dark chocolate, magnesium enables the proper functioning of nerves and muscles, boosts the immune system, normalises heart beat and strengthens bones. The DV for magnesium is 0.4 g. Magnesium deficiency causes hypomagnesemia, which has many symptoms, including impaired memory, appetite loss, insomnia, irritability and fatigue.

- ❖ **Phosphorus:** The main sources of phosphorus are meat and meat products, milk and milk products, lentils, nuts and whole grains. It maintains the bones and teeth, and also makes our gums healthy. The DV for phosphorus is 1 g. Phosphorus deficiency causes hypophosphatemia (symptoms include muscular dysfunction and weakness), rickets in children and osteomalacia.

#### Microminerals

- ❖ **Iodine:** It is an important ingredient of hormones produced by the thyroid gland which are required for growth, production of blood cells, metabolism, reproduction, nerve and muscle function and maintenance of body temperature. Lack of iodine intake causes enlargement of thyroid gland, a condition referred to as goitre. Its main sources are sea food, fish and iodized salt. The DV for iodine is 150 mcg (micrograms) for adults and children aged four years and above.
- ❖ **Iron:** Iron is required for production of haemoglobin, the oxygen carrying protein molecule. Deficiency of iron causes anaemia. Red meats, fish, poultry, whole grains and dark green leafy vegetables are rich in iron. The DV for iron is 18 mg for adults and children aged four years and above.
- ❖ **Chromium:** It regulates blood sugar levels. It is mainly found in whole grains, nuts, cheese, orange juice, potatoes, raw tomatoes, etc. In addition to causing anxiety and fatigue, chromium deficiency increases the risk of diabetes. The DV for chromium is 120 mcg per 2000 calories.
- ❖ **Copper:** It is needed for iron metabolism. Liver, sesame seeds, and dark chocolates are examples of good sources of copper. Insufficient intake of copper leads to anaemia and reduction in WBC count. The DV for copper is 2 mg.

- ❖ **Zinc:** Health benefits of zinc are stronger immune and digestive systems, diabetes control, reduction of stress, metabolism of energy and quicker recovery from wounds. Zinc is found in red meat, sesame seeds, pumpkin seeds and cooked oysters. Hair loss, diarrhoea, appetite loss and skin conditions (like acne, pimples), etc. are major symptoms of zinc deficiency. The DV for zinc is 15 mg per day for adults and children aged four years and above.

### Vitamins

Vitamins contribute to our energy level and boost our immune system. They are classified into fat soluble vitamins and water soluble vitamins.

1. **Fat-soluble Vitamins:** So called because they dissolve in fat, these vitamins are stored in the liver and fatty tissues. They also stay longer in our body, and are likely to cause toxicity since the body cannot excrete them quickly enough. Vitamins A, D, E and K are fat soluble.
  - ❖ **Vitamin A:** It was discovered by Elmer MacCollum, Hopkins and Funk in 1913. It is available in different forms like retinol, retinal, retinoic acid and a number of provitamin A carotenoids. Vitamin A is composed of hydrogen, carbon and oxygen. It is needed for new cell growth, good vision, healthy skin, hair and maintenance of immune system. Vitamin A deficiency (VAD) or hypovitaminosis causes night blindness, xerophthalmia and keratomalacia. Such conditions can be treated by including foods rich in vitamin A in our diet, like cod liver oil, egg yolk, milk and milk products, spinach, broccoli, papaya, yellow vegetables and carrots. The DV for vitamin A is 2 mg.
  - ❖ **Vitamin D:** Like vitamin A, it is made-up of carbon, hydrogen and oxygen elements. Vitamin D, along with calcium, helps in building bones and keeping them strong and healthy. It also blocks the release of parathyroid hormone, which can reabsorb bone tissue, making bones thin and brittle. The vitamin D deficiency or hypovitaminosis D causes rickets in children, osteomalacia and osteoporosis in adults, periodontitis, dental cavities and higher risk of cancer. The good sources of vitamin D are morning sunlight, salmon, sardines, mackerel, tuna, raw milk, eggs and mushrooms.
2. **Water-soluble Vitamins:** Vitamins B complex and vitamin C are water-soluble vitamins. These vitamins are ejected from the body during urination. Thus, daily intake of these vitamins is recommended.
  - ❖ **Vitamin E:** Vitamin E acts as an antioxidant and protects cells against the effects of free radicals. It also helps in formation of red blood cells, keeps skin healthy, maintains a normal reproductive function, reduces risk of heart attacks and is also used in the treatment of alzheimer's disease. Hypovitaminosis E may cause haemolytic anaemia, infertility, muscles degeneration, paralysis and increased risk of developing malignancies. The main sources of vitamin E are dark green leafy vegetables, fruits, whole cereals, liver, pulses, human colostrum and sea foods. The DV for vitamin E is 20 mg of natural alpha-tocopherols.
  - ❖ **Vitamin K:** Vitamin K is necessary for normal blood clotting. It plays a vital role in cell growth, metabolism of bone and other tissues, prevention of haemorrhage and excessive bleeding in wounds. The deficiency of vitamin K causes haemorrhagic disease in newborns, heavy menstrual cycle, gum bleeding, nose bleeding and easy bruising, defective blood coagulation and anaemia. Its main sources are green leafy vegetables, eggs, meat and soybean. The DV for vitamin K is 80 mcg.



Figure 2.7 Different types of vitamins

❖ **Vitamin B Complex:** It is a group of eight water soluble B vitamins. These groups of vitamins work alongside each other; each has its own specific benefits. Together, they play a vital role in keeping and running our body like a well-

oiled machine. The following table provides all information related to Vitamin B complex, i.e. vitamins, their scientific names, daily value, functions, deficiency diseases and important food sources.

**Table 2.1** Vitamin B complex

| Vitamins       | Scientific Name  | Approx. Daily Value | Function  | Deficiency Diseases  | Food Sources   |
|----------------|------------------|---------------------|---|--|--|
| B <sub>1</sub> | Thiamine         | 1.5 mg              | <ul style="list-style-type: none"> <li>❖ Helps in metabolising the body fat and protein</li> <li>❖ Regulates important functions of cardiovascular, nervous, endocrine, and digestive systems</li> </ul>  | Skin diseases, headache, nausea, fatigue, depression, loss of mental alertness, difficulty in breathing, constipation and heart damage | Nuts, oranges, eggs, seeds, liver, peas, cereals, flour and oats                 |
| B <sub>2</sub> | Riboflavin       | 1.7 mg              | <ul style="list-style-type: none"> <li>❖ This yellow coloured vitamin has antioxidant properties</li> <li>❖ Keeps the skin healthy</li> <li>❖ It also participates in the production of RBCs. Overcooking and exposure to sunlight tend to destroy it.</li> </ul> | Unhealthy skin, cataracts and weakening of the immune system   | Almonds, oily fish, red meat, eggs, mushrooms, sesame seed, sea food and spinach |
| B <sub>3</sub> | Niacin           | 20 mg               | <ul style="list-style-type: none"> <li>❖ Vital for the digestive system, skin and for producing energy</li> </ul>   | Pellagra   | Peanuts, mushrooms, tuna, liver, and chicken breasts                             |
| B <sub>5</sub> | Pantothenic Acid | 10 mg               | <ul style="list-style-type: none"> <li>❖ Helps in the production of hormones and cholesterol</li> </ul>   | Fatigue, insomnia and burning feet   | Chicken liver, avocados, salmon, sunflower seeds, mushrooms, broccoli and corn   |
| B <sub>6</sub> | Pyridoxine       | 2 mg                | <ul style="list-style-type: none"> <li>❖ Helps in the synthesis of haemoglobin</li> <li>❖ Keeps our immune system and nervous system healthy</li> </ul>   | Dermatitis, depression and weakened immune system  | Pistachio nuts, cooked tuna, banana, spinach, sunflower seeds and bran           |

*contd...*

|                 |            |  |   |   |   |
|-----------------|------------|--|---|---|---|
| B <sub>7</sub>  | Biotin     | 30 mg  | <ul style="list-style-type: none"> <li>❖ Strengthens hair and nails</li> <li>❖ Helps in the production of energy</li> <li>❖ Produces fatty acids and amino acids</li> </ul> | Skin changes, hair loss, confusion and nausea             | Eggs, almonds, legumes, whole grains, milk and meat                         |
| B <sub>9</sub>  | Folic acid | 400 mcg  | <ul style="list-style-type: none"> <li>❖ Required for numerous body functions, including DNA synthesis and repair, cell division and cell growth</li> </ul>                 | Anaemia in adults, birth defects and heart diseases       | Citrus fruits and juice, avocados, lentils, nuts, and dark green vegetables |
| B <sub>12</sub> | Cobalamin  | <ul style="list-style-type: none"> <li>❖ 2.4 mcg for ages 14 years and above;</li> <li>2.6 mcg for pregnant women;</li> <li>2.8 mcg for breastfeeding women</li> </ul> | <ul style="list-style-type: none"> <li>❖ Helps in protein metabolism</li> <li>❖ Formation of red blood cells and maintenance of central nervous system</li> </ul>           | Anaemia, weakness and tingling, numbness in arms and legs | Low fat dairy, cheese, red meat, liver, fortified soy products and cereals  |

❖ **Vitamin C (Ascorbic Acid):** Vitamin C is considered one of the healthiest and safest nutrients. It comes with a broad spectrum of benefits, ranging from growth and repair of tissues, healing of wounds, production of collagen, bone and tooth formation, increasing the absorption and utilisation of iron, to lowering hypertension, curing cataracts, reducing the risk of cardiovascular diseases, and controlling asthma as well as diabetes. Severe vitamin C deficiency may result in the disease known as scurvy. It may also lead to gingivitis, anaemia, fatigue and weakness. Vitamin C is found in plenty in oranges, red peppers, sprouts, guava, strawberries, broccoli, dark green leafy vegetables, tomatoes, and papayas. The DV for vitamin C is 60 mg for adults and children aged four years and older. One large orange contains 82 mg of ascorbic acid, which is over the recommended DV.

## NUTRITIVE AND NON-NUTRITIVE COMPONENTS OF DIET

### Nutritive Components of Diet

Nutritive components of diet consist of:

- ❖ **Macronutrients:** proteins, carbohydrates and fats
- ❖ **Micronutrients:** vitamins and minerals

### Non-nutritive Components of Diet

Non-nutritive components are compounds absorbed from the food but which do not provide energy in the form of calories. They can be either valuable or harmful to our body. Non-nutritive components are important to our body. They are as follows:

1. **Fibre or Roughage:** Dietary fibre or roughage is the indigestible component of food found in fruits, vegetables and grains. Though it does not provide calories, it is still a vital part of a healthy diet; dietary fibre bulks up our body, making it appear fuller. It plays a role in digestion and prevents constipation. There are two forms of fibre – *soluble fibre*, which dissolves in water and reduces cholesterol and alterations in blood sugar level, and *insoluble fibre*, which does not dissolve in water and softens the stool, thereby bringing relief from chronic constipation. Insoluble fibre also lowers the risk of heart diseases and certain forms of cancer. The DV of dietary fibre is 30 g (approx.) per day for adults. Fibre is found



**Figure 2.8** Green vegetables are rich sources of roughage.

in fruits, dark green leafy vegetables, cereals, grains, nuts and legumes.

2. **Water:** Water is a predominant part of our body. It makes up for two-thirds of human body weight and 90% of blood. It is needed by cells and organs for their smooth functioning. Water is involved in digestion, absorption and transportation of food; dissolution of nutrients, elimination of waste products and regulation of body temperature. Our body gets 20% of total water from the solid food we eat and remaining 80% from the water we drink.
3. **Colour Compounds:** We like our food to have certain appetising colours. Some foods are naturally enriched with attractive colours, such as fruits, while others like animal products have dull, monochromatic shades. Sometimes pigments are added to lend characteristic hues. For plants, the major colours are carotenoids (orange–yellow), green, and flavonoid (blue, red and cream). Milk is white due to reflection of light from the colloidal scattering of milk protein.
4. **Flavour Compounds:** Flavours are derived from both nutritive and non-nutritive components of food. Acidic content gives a sour taste, for example, citric acid in lemons. Alkalinity meanwhile lends a bitter taste and soapy feeling to the mouth in foods. An example of alkaline flavour is found in baking soda.
5. **Plant Compounds:** There are non-nutritive compounds which, when ingested, might have harmful or

healthy impacts, depending on several factors like usage and suitability. Caffeine, for instance, stimulates the brain if taken in small quantities, but excessive amounts of caffeine in the body increases heart rate.

## EATING FOR WEIGHT CONTROL – A HEALTHY WEIGHT, THE PITFALLS OF DIETING, FOOD INTOLERANCE AND FOOD MYTHS

### Meaning of Healthy Weight

In a 1998 study published by the American National Institute of Health, a healthy weight was defined as:

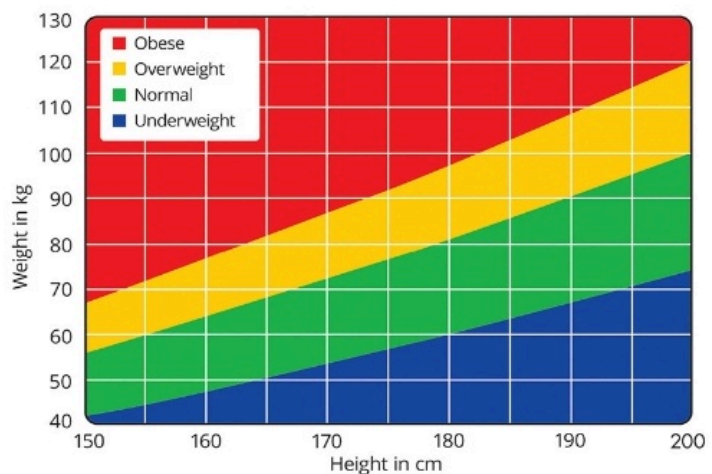
*“A healthy weight is considered to be one that is between 19 and 25 (BMI). If the BMI is between 25 and 29 an adult is considered overweight. If the BMI is 30 or greater, the person is considered to be obese.”*

While BMI is one indicator of healthiness, it is not the sole determinant. Someone with the appropriate healthy weight might have their mass distributed in the wrong areas.

A healthy weight is the weight which suits our body’s height without compromising any health factor. A person with a healthy weight has the right BMI and is free from major health problems, such as heart diseases, kidney failure, diabetes, infections and so on.

By using height and weight chart and BMI chart healthy weight for a person can be calculated.

**Figure 2.9** Body Mass Index





**Table 2.2** Height and weight charts for male and female

**Male**

| Height (in cm) | Low Weight (kg) | Medium Weight (kg) | Maximum Weight (kg) |
|----------------|-----------------|--------------------|---------------------|
| 157.5          | 50.7–54.4       | 53.7–57.1          | 57.1–63.9           |
| 160            | 52.1–55.8       | 54.8–60.3          | 58.5–65.1           |
| 162.5          | 53.5–57.1       | 56.2–61.6          | 59.8–67.3           |
| 165            | 54.8–58.5       | 57.8–63.0          | 61.2–68.9           |
| 167.5          | 56.2–60.3       | 59.0–64.8          | 62.6–70.0           |
| 170            | 58.0–62.1       | 60.7–66.9          | 64.4–73.0           |
| 172.5          | 59.8–63.9       | 62.6–68.9          | 66.6–75.2           |
| 175            | 61.6–63.7       | 64.4–70.7          | 68.4–77.1           |
| 178            | 63.4–68.0       | 66.6–72.5          | 70.3–78.9           |
| 180            | 65.3–69.8       | 68.0–74.8          | 72.1–81.8           |
| 183            | 67.1–71.6       | 69.8–77.1          | 75.3–83.4           |
| 185.5          | 68.9–73.4       | 71.6–79.3          | 76.1–85.7           |
| 188            | 70.7–75.7       | 73.4–81.5          | 78.4–87.9           |
| 190.5          | 72.5–77.5       | 75.7–83.9          | 80.7–90.2           |
| 193            | 74.3–79.3       | 78.0–86.1          | 82.5–92.5           |

**Female**

| Height (in cm) | Low Weight (kg) | Medium Weight (kg) | Maximum Weight (kg) |
|----------------|-----------------|--------------------|---------------------|
| 147.5          | 41.7–44.4       | 43.5–48.5          | 47.1–53.9           |
| 150            | 42.6–45.8       | 44.4–49.4          | 48.0–55.3           |
| 152.5          | 43.5–47.1       | 45.8–51.2          | 49.4–56.7           |
| 155            | 44.9–48.5       | 47.1–52.6          | 50.8–58.0           |
| 157.5          | 46.2–49.9       | 48.5–53.9          | 52.1–59.4           |
| 160            | 47.6–51.2       | 49.9–55.3          | 53.5–60.7           |
| 162.5          | 49.0–52.6       | 51.2–57.1          | 54.9–62.6           |
| 165            | 50.3–53.9       | 52.6–58.9          | 56.7–64.4           |
| 167.5          | 51.6–55.8       | 54.4–61.2          | 58.5–66.2           |
| 170            | 53.5–57.6       | 56.2–63.0          | 60.3–68.0           |
| 172.5          | 54.8–59.4       | 58.0–64.8          | 62.1–69.8           |
| 175            | 57.1–61.2       | 59.8–66.8          | 63.9–71.6           |
| 178            | 58.9–63.5       | 61.6–68.4          | 65.7–73.9           |
| 180            | 60.7–65.3       | 63.5–70.3          | 67.5–76.2           |
| 183            | 62.6–67.1       | 65.3–72.1          | 69.4–78.4           |

**Calculating BMI**

BMI, or Body Mass Index, is the ratio of body weight to the square of the height. Mathematically, it can be shown as:

$$BMI = \frac{\text{weight in kg}}{(\text{height in m})^2}$$

The WHO criteria for underweight, normal or healthy, overweight and obesity is given below:

**Table 2.3** BMI chart

| Category        | BMI (Body Mass Index) |
|-----------------|-----------------------|
| Underweight     | < 18.5                |
| Normal weight   | = 18.3 – 24.9         |
| Overweight      | = 25 – 29.9           |
| Obesity Class 1 | = 30 – 34.9           |
| Obesity Class 2 | = 35 – 39.9           |
| Obesity Class 3 | > 40                  |

As already stated, we should look beyond BMI to understand what it means to have a healthy weight. It is achieved through lifestyle modifications and the principle of ‘eating what we need to live, not living to eat’. The ideal weight is always accompanied by a normal and wise attitude towards food selection and portion.

**How to Maintain Healthy Body Weight**

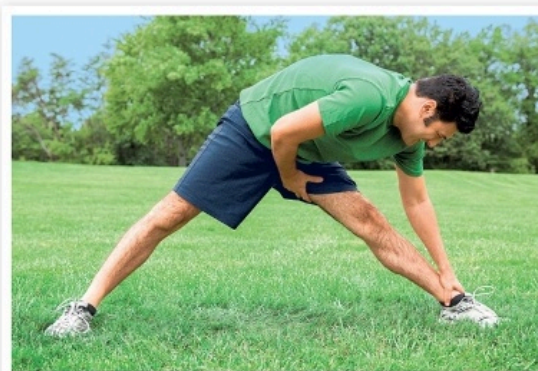
- ❖ **Goal Setting:** Finding out your weight in relation to height, lets you know if you need to gain or lose weight further. Once this becomes clearer, set a target for how much change you want to see within a month with the right diet and exercise. It is recommended that you start with smaller targets and raise your levels with each successful phase.
- ❖ **Health, Not Wealth, is the Key:** Though it is tempting to lose weight to look good, it is best to lose weight to be healthy. Try to achieve or

maintain a BMI between 18.5 and 24.9. If you are male, your waist should measure less than 40 inches and if you are female your waist should be less than 35 inches. If your BMI or waist goes beyond these limits you may face variety of health risks.

- ❖ **Control Calories Count:** Cut 100 calories a day if you have exceeded your ideal weight.
- ❖ **Change Lifestyle for the Better:** Minor changes in lifestyle and behaviour towards exercise can help maintain body weight. Taking the stairs instead of lifts and escalators, walking reasonable distances instead of commuting by automobiles, taking part in physical activities, reducing the amount of time spent on electronic gadgets, etc. are some positive lifestyle changes that can be undertaken without investing extra time, resources and energy.
- ❖ **Get the Support of Those Who Matter:** Involve those around you in your plan to lose weight so that you have an unending source of motivation. If there's anybody you know undergoing a similar change, it is even better. Human beings are known to work better as teams and in competitive environments.
- ❖ **Yoga:** Yogic exercises like meditative asanas bring relief from stress and tension. They can be used to maintain proper weight.
- ❖ **Saying No to Fatty Foods:** Fats have maximum number of calories, but if not utilised, they get stored as body fat. Fatty foods, especially junk foods, should be cut down from one's diet.
- ❖ **Avoid Overeating:** Eating more than our body needs leads to weight gain. Eat nutritious food as per the demands of your age, height, gender, and physical activity levels.
- ❖ **Avoid Carbohydrate Rich Food:** While carbohydrates give us energy, consuming high carbohydrate foods like sugar, rice, potatoes, etc. without using them up with the appropriate amount of physical exertion is not advisable.
- ❖ **Eat the Right Number of Meals:** It is inadvisable to skip meals just so we can lose weight. The better idea is to eat smaller meals at frequent intervals, with the portions matching the energy requirements. This means a heavy breakfast, a properly adequate lunch and a light dinner.

- ❖ **Say No to Alcohol:** Alcohol is directly absorbed from the blood stream and deposited as fat; it can thus increase weight and bloat your cheeks and abdomen. Even if it has to be consumed for social purposes, it must be drunk at minimal levels. The best approach, however, is abstinence.

- ❖ **Exercise Regularly:** Though some of our calorie intake is used up during respiration, digestion, sleeping and other bodily activities, leftover calories get stored as body fat, leading to weight gain. Regular exercise can help in this situation by burning the excess calories. When our calories intake and expenditure cancel each other out, our body weight remains the same.



**Figure 2.10** Be active, be fit, be healthy.

Maintaining a healthy weight is not an easy work; it requires a lot of effort and discipline from the individual's side. However, it is not an impossible task to achieve. From what we have learned above, implementing strategic eating and exercise can enable us to remain physically fit with the right body weight.



#### **DID YOU KNOW?**

Daily stretching reduces muscle fatigue and risk of injury. Stretching increases blood supply and nutrients to joint structures, increases soft tissue temperature, enhances elasticity of soft tissues and acts as a lubricant for our bones and cartilages. Stretching also increases a joint's ability to move through a greater range of motion with less energy required to do so, decreasing resistance in tendons and muscles.

## The Pitfalls of Dieting

Nowadays, we are realising the advantages of having a healthy physique and body in general. Those who are overweight have plenty of diet charts and exercise methods to choose from in order to lose weight. Most, however, do not want to face the physical challenge of exerting their body on a regular basis. This may be due to several reasons: lack of time, lack of willpower, laziness, etc. They compensate instead with dieting.

The catch with dieting is that without exercise, it remains a temporary solution. Research has found that 90% of dieters gain all their weight back, sometimes even more than that. In fact, there are various pitfalls of dieting that keep us away from reducing weight at a steady pace:

- ❖ **Extreme Reduction of Calories:** Our body needs a specific amount of calories for proper functioning. Cutting that intake severely, say 1800 calories a day, cannot supply sufficient energy. Any dieting method that reduces your calories intake drastically lowers body metabolism. Though weight will be lost ultimately, it will be too excessive and dangerous for health. We now know that being underweight is just as destructive as being overweight.
- ❖ **Restriction of Selected Nutrients:** Dieting restricts components of food like carbohydrates and fats since they can get converted to body fat. If this continues, then the body will weaken, lose its immunity and become vulnerable to several deficiency diseases and conditions.
- ❖ **Skipping Meals:** There is a direct relationship between metabolic rate and body weight. A good metabolic rate allows you to maintain or lose weight. Skipping meals therefore ends up lowering metabolism to conserve energy. This also means you are more likely to eat more than your body can process in the next meal.
- ❖ **Intake of Calories through Drinking:** The idea that calorie-laden fluids are a better dieting option is incorrect. Drinks such as sodas, processed juices with added sugar, coffee with cream and sugar, etc. all contribute to weight gain.

- ❖ **Intake of Pre-packaged and Labelled Foods:**

Dieters are tempted to use products that have unrealistic labels on them like 'sugar-free', 'diet soda', 'fat-free', etc. Depending on these items for sustenance will leave lasting damages on the body, as they cannot provide you with the nutrients or energy your body needs.

- ❖ **Avoiding Exercise:** Exercising and dieting are two sides of the same coin. If the diet provides energy, the exercise part expends it so that very little is left in the body as deposited fat.

## Food Intolerance

Food intolerance occurs when a person has difficulty digesting a particular food. It is sometimes referred to as food sensitivity and varies from person to person. Food intolerance is neither frequent nor fatal; it can be avoided by dietary control.

**Causes of Food Intolerance:** Food intolerance is caused by part or complete ineffectiveness of the body enzymes responsible for breaking down or absorbing the food. This defect may be innate, diet-related or induced by some illness.

**Symptoms of Food Intolerance:** The onset of symptoms is usually slower and maybe delayed by many hours after the food is taken. Signs include nausea, stomach pain, vomiting, diarrhoea, flatulence, gas, cramps, heartburn, headache and nervousness.

**Management of Food Intolerance:** There are no valid tests for intolerance. The only way to identify the causes is by accurately recording the times and duration of all symptoms as well as everything you eat. Guidance can also be provided by a doctor who can diagnose and manage dietary consumption.

## Food Myths

Food myths are unfounded and unscientific myths surrounding the consumption of particular foods, such as:

1. **Potatoes Make You Fat:** As we all know, carbohydrates are the energy source of our body. One does not gain weight by simply eating carbohydrates as long as intake of starchy food is not excessive.

2. **Fat-free Products will Help You Lose Weight:** So, frequent intake of fat-free products may still lead to weight gain, as their calorie content is similar. Without full utilisation of the calorie intake, weight gain will always be a problem.
3. **Eggs Cause Heart Problems:** Eggs are in fact beneficial for health as they provide protein, vitamins A, B, D, zinc, iron, calcium and phosphorus, etc.
4. **Weight Gain is Caused by Unprocessed Food:** If your body has not processed the food, it means it hasn't absorbed the calorie content. Therefore, failure to process certain foods actually leads to weight loss.
5. **Food Cravings are Driven by Deficiency:** Food cravings are caused mostly by emotional needs. We are inclined to wanting more of what we shouldn't have.
6. **Raw Carrots are Healthier than Cooked Ones:** Cooking breaks down the tough cellular walls in which the beta-carotene is encased. The best option is to have carrots steamed. Although raw carrots have plenty of nutrients.
7. **Spicy Food Causes Ulcer:** In reality, what happens is that spicy food worsens an already irritable bowel. Ulcer is caused mostly by the bacteria *Helicobacter pylori*.
8. **Eat Less if You have Fever:** Though fever is linked with loss of appetite, it does not mean that our body does not need nutrition. In fact, our metabolic rate shoots up during illness, which means we still need to eat to supply energy.



## SUMMARY

1. A balanced diet comprises different types of foods which in total provides the body with sufficient nutrition for growth and development.
2. Nutrition means getting the right amount of nutrients for bodily functions like maintenance, growth, metabolism, repair and replacement of tissue.
3. Carbohydrates and fats provide energy to the body. Proteins build protoplasm, and help production of enzymes and antibodies and transportation of oxygen and nutrients throughout the body.
4. Minerals are divided into macrominerals (calcium, potassium, sodium, magnesium, etc.) which are required in large quantities and microminerals (iodine, iron, chromium, copper, etc.) which we need in smaller doses.
5. Vitamins are classified as fat-soluble vitamins (A, D, E and K), and water-soluble vitamins (B-Complex and C). Vitamin B Complex is further divided into eight types.
6. Diet also contains non-nutritive components like water, roughage or fibre, colour compounds, flavour compounds and plant compounds.
7. Diet affects performance of an athlete to a certain extent. Though excessive vitamin intake does not improve performance, deficiency tends to have a negative impact on the body. Minerals should only be consumed in prescribed quantities.
8. A healthy weight is the weight which suits our body's height without compromising any health factor.
9. An individual's healthy weight can be maintained with the right diet, right exercise, and right attitude towards life and oneself.
10. Dieting, if implemented wrongly, can have multiple pitfalls, such as weakening of the immune system, acute loss of weight and susceptibility to diseases.
11. Food intolerance means having difficulty digesting a particular food. It manifests itself slowly through several symptoms, like diarrhoea, headache, gas, flatulence, etc.
12. Food myths are common albeit false beliefs surrounding consumption of particular foods.

**A. Objective Type/Multiple-Choice Questions**
**1 mark**
**I. Give one word answers.**

1. Which macromineral is present in beans and potatoes?
2. Which vitamin is considered as one of the healthiest and safest nutrients?
3. Which disease is caused by the deficiency of vitamin D?
4. What is the ratio of the elements carbon, oxygen and hydrogen in fats?
5. Name a disease which is caused by the deficiency of vitamin K.

**II. Fill in the blanks.**

1. Deficiency of ..... can lead to diseases like marasmus and kwashiorkor.
2. Starch and cellulose are the complex carbohydrates which are known as .....
3. Vitamin B complex is a group of ..... water soluble B vitamins.
4. .... is a yellow coloured vitamin which has antioxidant properties.

**III. State True or False.**

1. The daily value for vitamin C is 60 mg in adults. ....
2. Iodine is required for the formation of haemoglobin. ....
3. In carbohydrates, the ratio of hydrogen atoms to oxygen atoms is 1 : 2. ....

**IV. Multiple-Choice Questions**

1. What is another name of riboflavin?  
 (a) Vitamin B                      (b) Vitamin B<sub>5</sub>                      (c) Vitamin B<sub>2</sub>                      (d) Vitamin C
2. Who discovered vitamin A?  
 (a) Theo Haimann                      (b) Elmer MacCollum *et al.*                      (c) O'Donnell                      (d) None of these
3. Which of the following vitamin is insoluble in fats?  
 (a) A                      (b) E                      (c) K                      (d) C
4. Deficiency of which of the following leads to rickets?  
 (a) Iron                      (b) Iodine                      (c) Calcium                      (d) Chromium
5. What is the calorific value of water?  
 (a) 10 joules/calorie                      (b) 0 joule/calorie                      (c) 25 joules/calorie                      (d) 100 joules/calorie
6. If the weight is in kg and height in m, which of these is the correct formula for calculating Body Mass Index?  
 (a) weight x (height)<sup>2</sup>                      (b)  $\frac{\text{weight}}{(\text{height})^2}$                       (c)  $\frac{\text{height}}{\text{weight}}$                       (d)  $\frac{\text{weight}}{\text{height}}$

## B. Very Short Answer Type Questions

1. Define a balanced diet. (CBSE 2014)
2. What do you mean by nutrition?
3. Write briefly about macronutrients. (CBSE 2019)
4. What are proteins? (CBSE 2012)
5. Make a list of macronutrients and micronutrients.
6. What are the nutritive components of diet?
7. Name any two non-nutritive components of diet. (CBSE SP 2017)
8. What are vitamins? (CBSE 2013)
9. What are the different types of vitamins?
10. Define healthy weight.
11. What is food intolerance? (CBSE 2016)
12. Explain the meaning of food myths.
13. What do you mean by dieting? (CBSE 2019)
14. What are carbohydrates? (CBSE 2011)
15. What are fats? (CBSE 2011)
16. Why does the weightlifter's diet include lots of proteins? (CBSE 2018)
17. Define sports nutrition.
18. Explain the importance of calcium for children. (CBSE 2012)
19. Enlist two sources of calcium. (CBSE 2019)
20. What are some symptoms of food intolerance?
21. What is the danger of restricting components of diet like carbohydrates and fats?
22. What are fats and carbohydrates composed of?
23. What is roughage or fibre in diet? (CBSE 2016)

## C. Short Answer Type-I Questions

**3 marks**

1. Define balance diet and mention the elements of diet. (CBSE 2011)
2. How is nutrition different from food?
3. Write briefly about minerals as an important nutritive component. (CBSE 2016)
4. Write a short note on vitamins and their types.
5. What are the different forms of Vitamin B Complex? Explain any one of them.
6. Explain the role of fibre in diet.
7. What do you understand by micronutrients? Explain the sources and role of any two macronutrients. (CBSE 2019)
8. Discuss any three macrominerals and their importance.
9. Discuss any three microminerals and their importance.
10. Why is water important even though it is non-nutritive?
11. How would you differentiate between flavour compounds and colour compounds?

12. How does protein act as a nutritive component of diet?
13. Discuss water-soluble vitamins briefly.
14. Discuss fat-soluble vitamins briefly.
15. Explain the causes and management of food intolerance.
16. What do you understand by food myths? Discuss briefly about various food myths. (CBSE 2016)
17. Explain any three myths about dieting. (CBSE SP 2017)

#### D. Short Answer Type-II Questions

5 marks

1. What is balanced diet? Elucidate its any four constituents. (CBSE 2013)
2. Explain macronutrients and their role in our diet. (CBSE 2019)
3. Discuss micronutrients in detail.
4. 'Vitamins are essential for our metabolic process.' What happens if our diet is devoid of vitamins? (CBSE 2012)
5. How do minerals contribute to our health? Explain citing at least four examples of each type of minerals.
6. What are fats? Write a detailed note on its types. Also mention its importance in the proper functioning of the body. (CBSE 2012)
7. Write a note on the nutritive components of diet.
8. Write a note on the non-nutritive components of diet.
9. Explain any five essential elements of diet. (CBSE 2014)
10. How can healthy weight be maintained? Explain.
11. What are the various pitfalls of dieting?

#### E. Value-Based Question

Naman was a Class 6 student. He used to bring junk food in his lunch box daily. His teacher observed that he was neither concentrating on his studies nor actively participating in physical activities. In this matter, he had a talk with his parents and came to know that he refuses to eat roti, dal, fruits and vegetables. Due to this, he is facing these problems. (CBSE 2018)

**Answer the following questions based on the above passage:**

1. What type of problems was Naman facing?
2. Why should junk food not to be recommended?
3. What values has his teacher shown in this matter?