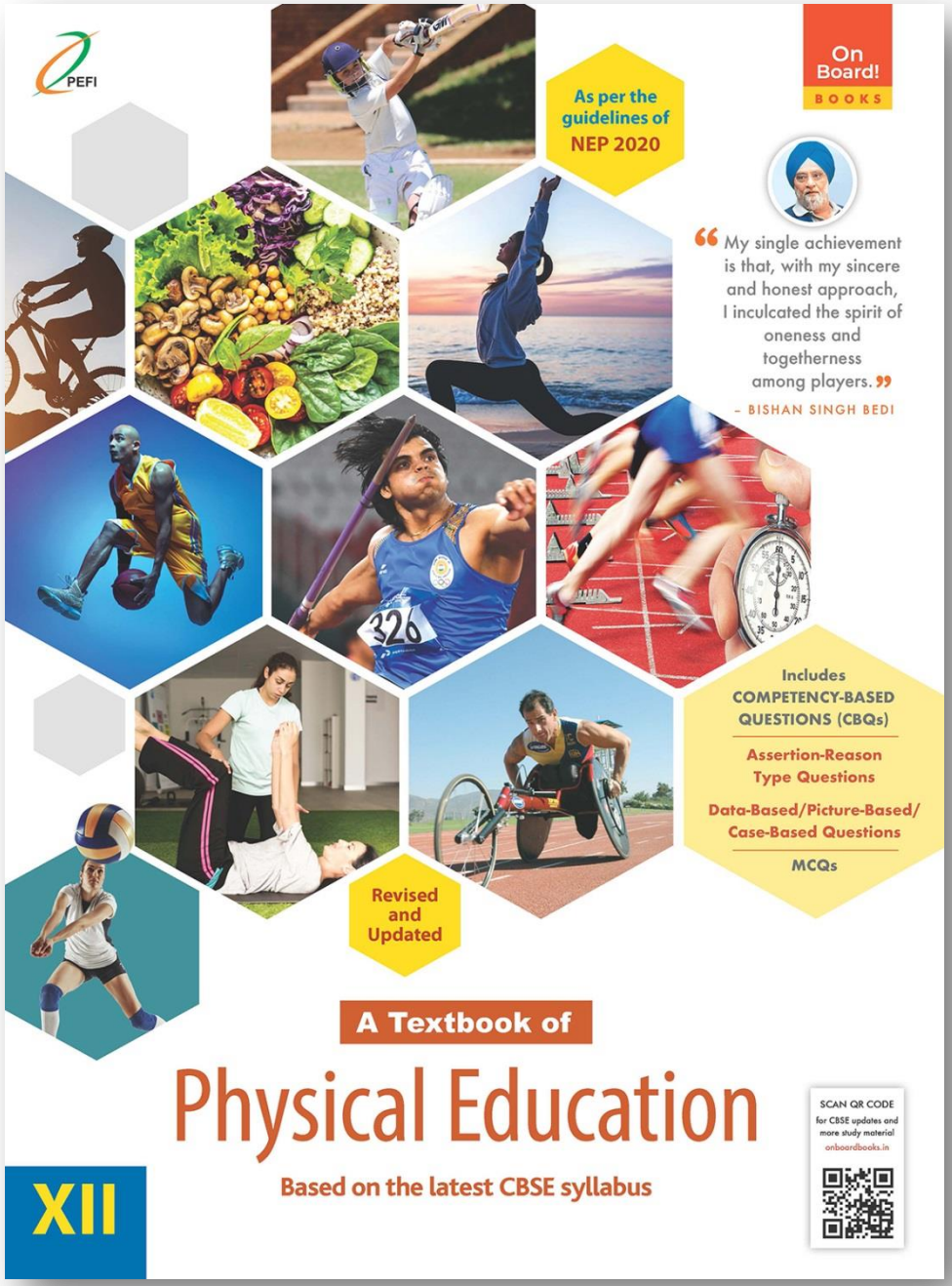
A TEXTBOOK OF PHYSICAL EDUCATION CLASS 12

Chapter 5

SPORTS AND NUTRITION



CONCEPT OF BALANCED DIET AND NUTRITION

Concept 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. Essential nutrients include carbohydrates, proteins, fats, vitamins, minerals, fibres and water.

Concept of Nutrition

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.

Figure 5.1 A balanced diet contains all types of required nutrients from all the food groups.

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.

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. Proteins are known as the ‘building blocks of life.’

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.

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 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..

Micronutrients

Unlike macronutrients, micronutrients are needed in small quantities. 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

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.

Macrominerals

Calcium: Source - milk and milk products, dark leafy green vegetables, green beans, almonds and canned fish with bones.
Function - 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: Source: whole grains, beans, dark green leafy vegetables, potatoes, bananas, fish, mushroom, etc. 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: Source: 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. It 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. Its deficiency causes hypomagnesemia, which has many symptoms, including impaired memory, appetite loss, insomnia, irritability and fatigue.

Phosphorus: Source: 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:** Vitamins A, D, E and K are fat soluble.

Vitamin A: It was discovered by Elmer MacCollum, Hopkins and Funk in 1913. It is needed for new cell growth, good vision, healthy skin, hair and maintenance of immune system. Its deficiency causes night blindness, xerophthalmia and keratomalacia. Sources are 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: It 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 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. The DV for vitamin D is 10 mcg.

Figure 5.7 Different types of vitamins

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.

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 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.

Refer to Table 2.1 of the textbook for all information related to Vitamin B complex, i.e. vitamins, their scientific names, daily value, functions, deficiency diseases and important food sources.

Vitamin C (Ascorbic Acid): Vitamin C helps in growth and repair of tissues, heals the wounds, produces collagen, bone and tooth formation, increases the absorption and utilisation of iron, to lowering hypertension, cures cataracts, reduces the risk of cardiovascular diseases, and controls asthma as well as diabetes. Its deficiency causes scurvy. It may also lead to gingivitis, anaemia, fatigue and weakness. Sources are 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

It Non-nutritive components are compounds absorbed from the food but which do not provide energy in the form of calories.

1. **Fibre or Roughage:** 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 dissolves in water and softens the stool, thereby bringing relief from chronic constipation. The DV of dietary fibre is 30 g (approx.) per day for adults. Fibre is found in fruits, dark green leafy vegetables, cereals, grains, nuts and legumes.

2. Phytochemicals: Phytochemicals are found in fruits, vegetables, grains, beans and other plants. They act as antioxidants and protect cells from damage that could lead to cancer. By eating more colourful vegetables, fruits and other plant foods, the risk of cancer can be reduced because these foods have certain phytochemicals like Beta-carotene and other carotenoids.

3. Water: 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.

4. 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.

5. 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 in foods meanwhile lends a bitter taste and soapy feeling to the mouth. An example of alkaline flavour is found in baking soda.

6. Plant Compounds: There are non-nutritive compounds which, when ingested, might have harmful or healthy impacts, depending on several factors like usage and suitability. Coffee or caffeine, for instance, stimulates the brain if taken in small quantities, but excessive amounts of caffeine in the body increases heart rate.

7. Anthocyanins: Anthocyanin pigments are in glycosylated forms. They are responsible for the colours – red, purple and blue in fruits and vegetables. They give grapes, blueberries, cranberries and raspberries their dark colour. They have anti-inflammatory and anti-tumour properties.

8. Flavonoids or isoflavones: These are found in vegetables, fruits and grains. Examples are soybeans and chickpeas. These may act a little bit like oestrogen. The oestrogen-like compounds in these plants are called phytoestrogens. These help in lowering the risk of heart disease, osteoporosis, breast cancer and symptoms of menopause.

9. Artificial Sweeteners: These are synthetic compounds that duplicate the taste of sugar, but have less energy. So, these are often added to diet foods and beverages.

10. Preservatives: These are compounds that have the ability to minimise microbial growth and these often added to food and beverage products to prolong shelf life. Preservatives are considered additives and are typically regulated

11. Spices: All of us have seen spices like turmeric, red chilli, pepper, cumin and garlic. Turmeric roots are also consumed as a vegetable and garlic as an antibiotic. So, a spice is a dried seed, fruit, root, bark or vegetable substances. The main use of a spice is to flavour, colour or preserve food. Spices are used as medicines or cosmetics, in religious rituals or in perfume production.

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 in the 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, plant compounds, anthocyanins, flavnoids, etc.
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.