body is in the form of muscle and the rest is in bone, cartilage and skin. Proteins are complex molecules composed of 20 different amino acids. Nine of these 20 amino acids are termed 'essential' and have to be obtained from proteins in the diet, since they are not synthesized in the human body. The remaining non-essential amino acids can be synthesized in the body to build proteins. Proteins perform a wide range of functions and also provide energy (4 Kcal/g). Protein requirements vary with age, physiological status and stress. More proteins are required by growing infants and children, adolescents, pregnant women and individuals during infections, illness and physical stress. Animal foods like milk, meat, fish and eggs and plant foods such as pulses are rich sources of proteins. Animal proteins are of high quality as they are bioavailable and provide all the essential amino acids in right proportions, while plant or vegetable proteins are not of the same quality because of their low content of some of the essential amino acids. However, a combination of cereals, millets and pulses provides most of the amino acids, which complement each other to provide good quality proteins and essential amino acids (refer Guideline 8 on protein).

Fats (also called lipids and cooking oils)

Dietary fats are derived from two sources viz. the invisible fat present in plant and animal foods, and the visible or added fats and oils (vegetable/cooking oils). Animal foods like fatty fish and plant foods such as nuts and oil seeds and certain beans are rich sources of fats. Grains and pulses are also sources of fats but have low quantities. Fats such as vegetable oils, butter and ghee constitute dietary visible fats. Fats are a concentrated source of energy providing 9 kcal/g, and are made up of fatty acids in different proportions. Fats serve as a vehicle for fat-soluble vitamins like vitamins A, D, E & K and carotenes, and promote their absorption. They are also sources of

Table 1.4. Average values of micronutrients (vitamins) in various food groups (Per 100gm raw weight)

Foods	Vitamin B1 (Thiamine) (µg)	Vitamin B2 (Riboflavin) (µg)	Vitamin B3 (Niacin) (µg)	Vitamin B6 (pyridoxine) (µg)	Vitamin B9 (Total folates) (µg)	Vitamin C (mg)	Vitamin A (Retinol) (µg)	Vitamin D (µg)	
								(D2) Ergo calciferol	(D3) Chole calciferol
Cereals	238.46	84.6	2138.5	162.31	15.86	0	2.01	6.88	0
Millets	355.56	155.6	2177.8	113.33	24.17	0	1.02	6.10	0
Pulses	400.00	158.8	2123.5	215.53	157.06	0	8.32	8.69	0
GLVs	60.00	127.7	624.6	97.49	31.60	45.6	397.90	3.40	0
Roots & tubers	31.58	10.5	405.3	97.47	21.48	12.1	39.85	0.55	0
Vegetables	41.30	43.5	365.2	97.48	28.53	23.6	18.40	2.38	0
Nuts	390.00	140.0	3210.0	311.40	47.58	0.4	1.26	9.06	0
Fruits	34.78	21.7	369.6	65.04	11.41	36.7	35.48	3.62	0
Meat & poultry	81.82	109.1	2772.7	220.00	5.59	0	1.93	0	1.13
Fish & Sea foods	11.59	8.7	811.6	0	0	2.5	438.98	1.99	1.09*
Milk#	80.00	80.0	140.0	16.00	3.12	3.3	17.20	0.57	0
Egg	100.00	100.0	66.7	103.33	41.60	0	126.34	0	2.68
Dry spices	216.67	112.5	1066.7	213.75	28.34	4.9	38.06	19.43	0
Milk products	125.00	387.5	275.0	7.50	11.79	1.5	76.50	0.02	0
Dry fish	5.88	0	164.7	0	0	0	0.87	0.29	0
Cooking oil/ fats#	0	0	0	0	0	0	0	0	0
Table sugar	0	0	0	0	0	0	0	0	0

** Value is given only for varieties of Fish (prawns and crabs not included)*

 # Please note that the values given are for unfortified milk and oil.

Source: Indian Food Composition Tables 2017 & Nutritive Values of Indian Foods

essential poly unsaturated fatty acids (PUFA). It is necessary to have adequate and good quality fats in the diet with sufficient PUFA in proper proportions for meeting the requirements of essential fatty acids and health (refer Guideline 7). However, it is important to limit intake of cooking oils (vegetable oils), saturated fat (butter, ghee) and avoid partially hydrogenated vegetable oils (*vanaspathi)*.

Vitamins and minerals

Vitamins are nutrients required by the body in small amounts and must be present in the diet as these are not synthesized in the body. Vitamins are essential for numerous body processes and for maintenance of the structure of skin, bone, nerves, eye, brain, blood and mucous membrane. Vitamins are either water soluble or fat soluble. Vitamins A, D, E & K are fat soluble, while vitamin C and the B-complex vitamins such as thiamin (B1), riboflavin (B2), niacin, pyridoxine (B), folic acid (B9) and cyanocobalamin (B12) are water soluble. Pro-vitamin like beta-carotene is converted to vitamin A in the body. Fat soluble vitamins can be stored in the body while water soluble vitamins are not stored (except vitamin B12 & folate) and get easily excreted in urine. Vitamins B-complex and C are heat labile vitamins and are easily destroyed by heat, air or during drying, cooking and food processing.

Minerals are nutrients found in body fluids and tissues. The important 'macro' minerals are sodium, potassium, calcium, phosphorus, magnesium and sulphur, while iron, zinc, copper, selenium, molybdenum, fluorine, cobalt, chromium and iodine are micro minerals. These minerals are required for maintenance and integrity of skin, hair, nails, blood and soft tissues. They also govern nerve cell transmission, acid/base and fluid balance, enzyme and hormone activity as well as the blood-clotting processes.

Table 1.5. Average values of micronutrients (minerals) in various food groups

(Per 100g raw weight)

Foods	Calcium (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)
Cereals	18.1	69.1	2.73	1.71
Millets	60.4	73.9	3.20	2.122
Pulses	102.2	133.3	6.25	2.45
GLVs	279.3	35.7	8.07	0.31
Roots & tubers	28.5	19.4	0.61	0.20
Vegetables	38.1	21.3	0.95	0.22
Nuts	211.6	185.6	6.58	2.63
Fruits	28.2	10.3	0.59	0.10
Meat & poultry	18.7	11.7	1.49	1.82
Fish & sea foods	323.1	4.4	2.16	0.20
Milk	127.6	0.0	0.18	0.12
Egg	64.9	12.0	1.43	0.90
Dry spices	367.2	160.1	11.73	1.81
Milk products	755.0	7.3	1.86	0.28
Dry fish	1962.6	1.8	12.08	0.04
Cooking oil/fats	0	0	0	0
Table sugar	0	0	0	0

Note: Mean value of the nutrients have been derived using foods as per Annexure

Source: Indian Food Composition Tables 2017 & Nutritive Values of Indian Foods

POINTS TO REGISTER

- Choose a variety of foods in amounts appropriate for age, gender, physiological status and physical activity (refer Table 1.6).
- Use a combination of whole grains of cereals, pulses and millets.
- Prefer fresh and a variety of locally available vegetables in plenty.
- Include foods of animal origin such as milk/eggs and meat, particularly for pregnant and lactating women, children & adolescents.
- Choose nutrient-rich foods such as pulses (lentils, beans, peas), lean meat, fish and low-fat milk for elders.
- Develop healthy eating habit and exercise regularly and be physically active to avoid a sedentary lifestyle.
- Sugar should be less than 5% of the total energy per day for adults.
- No added sugar for children <2 years old.