

# Food, Nutrition and Nutrients

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Food is the basic necessity of life. Everybody eats food and most people enjoy it. From the beginning, scientists were curious about the food they consumed, its passage in the body and its effects. Food is the substance taken into the body that will help meet the body's needs for energy, maintenance of **good health**, growth and reproduction.

## Guidelines for Good Health

The general guidelines to good health that may be followed are :

1. Maintain regularity in our routine.
2. Eat as much natural foods as you can.
3. Consume seasonal foods as far as possible.
4. Eat well but do not 'overeat'
5. Avoid excessive salt and spices.
6. Avoid too much sweets, especially sugar
7. Eat foods which contain carbohydrates, especially starch and fiber.
8. Avoid foods that contain large amounts of cholesterol and saturated fats.
9. Watch your weight and maintain ideal weight.
10. Avoid eating the same kind of foods all the time. Eat a variety of foods.

## Developing Good Eating Habits

Developing good eating habits benefits a person in the long run. Our selection of food is a reflection of our habits which we have acquired over a long period of time. Our food habits are influenced by our cultural background, religious beliefs, social norms, our geographical location, and the availability of particular food items. Normal food servings are as follows :

1. Six to eleven servings of bread, cereal and pasta.
2. Three to five servings of vegetables.
3. Two to four servings of fruits.
4. Two to three servings of milk, yogurt and cheese
5. Two to three servings of meat, poultry, fish, bean, eggs and nuts.
6. Fats, oils and sweets are to be used sparingly.

Customs within individual communities also influence our likes and dislikes, certain accepted and contra-indicated foods and certain eating habits. Many dietary habits of an individual can be traced to the association of such foods with pleasant or unpleasant experiences in childhood. The emotional and psychological needs of a person greatly influences his choice of food. Unfortunately, our physiological needs influence the least. Our dietary patterns do not always match our physiological requirements.

In India we find both vegetarians and non-vegetarians. A vegetarian diet includes the use of dairy products, fruits, vegetables, cereals and cereal products. All animal food sources are rejected. The egg too is not eaten by many strict vegetarians. However, egg in the concealed forms as in cakes may be eaten. Jains besides, not consuming eggs, do not allow the use of all root vegetables, onion and garlic. They restrict the use of anything that grows below the level of soil. However, their diet can also be very fulfilling if items permitted in their religion are included in the right proportions everyday.

The non-vegetarian's diet includes animal foods, fruits and vegetables and cereals and cereal products, and also dairy products. However, many people do not consume sufficient fruits and vegetables along with animal foods.

## **Food Misinformation**

Certain foods and fallacies prevail in our country, for example, milk should not be eaten with fish and meat. The concept of hot and cold foods is engraved in our minds. All flesh foods, eggs are termed as hot while milk and curds are termed cold.

Certain foods are not given, to the young child. Pregnancy is accompanied by several restrictions and taboos about eating foods, Pickles, eggs, puddings prepared with the colostrums of animals (kharvas) etc. are generally not eaten by an expectant mother. These and many fallacies about foods restrict their use as well as unnecessarily cause avoidance of nutritious ones. However, the effect of these on any individual should be evaluated and the fad or fallacy borne out by individual experience.

Most of the social customs and religious functions in our country are associated with food. It is a custom to distribute mithai or sweetmeats on any auspicious occasion. Meals for guests in marriages and other such functions are generally heavily-spiced, oily and may contain one or more sweets. This attitude towards food greatly influences our eating habits and hence many people are sweet-toothed. The attitude of one's parents, towards foods influences the eating habits of one's children. The parents unknowingly transfer their likes and dislikes to their children by exhibiting these very strongly in front of them.

## **Snacks**

In today's world the pace of life is fast and it has become virtually impossible to follow the three or four meal pattern that was traditionally accepted. Now the emphasis has shifted to include more snacks in the meal pattern. It has been found to be more convenient to prepare a snack which can at least partially meet the nutritional needs of the family.

It does not matter when one eats. It is important to consider what one eats and how much. It is beneficial to have a snack time. Some people find it better than the three-meal pattern because that is the best way to receive adequate calories and nutrients by eating more often. Children and adolescents who seem to be always hungry can satisfy their appetite by eating nutritious snacks. Children who have small appetites may eat more often by way of snacks thereby meeting their physical needs.

However, as a general rule, snacks should not replace breakfast, which is the first and the most important meal of the day.

## **Selection of a Snack**

No snack can be a perfect one. However, some snacks are more nutritious than others. A snack should be selected and planned according to the needs of the family.

It should be nutritious, supplying as many nutrients as it can. The timing of the snack should be such that it should be eaten when needed most. e.g. children returning home from school may be so hungry that potato wafers, chocolates or chewda may be nibbled in order to satisfy their hunger. If a plate full of snacks is at hand, they would willingly eat them. Hence, planned intake of snacks can be an effective means of meeting the energy and nutrient needs of a growing and active child.

Most snack foods are high in energy value but contain little protein, vitamins or minerals. Most fruits make an excellent snack, such as a banana or an apple. A fruit yoghurt is cooling and refreshing like the fruit milk shakes.

## **Fast Foods**

Now a days several small wholesome meals are eaten by teenagers. Pizzas, hamburgers, noodles are some of the western fast foods which have become popular in the metropolitan cities of our country.

However, we are not new to the concept of fast foods, Idlis, dosas, meduwadas, chaats were always served in our restaurants. Wadapav is the latest and cheapest fast food available on our restaurants. Wadapav is the latest and cheapest fast food available on our streets. Fast food can be considered to be nutritious food. It should be cautioned here that fast food should be eaten only once in a while. If not supplemented with a balanced diet, they could prove to be recipes for disaster. A fast food can never replace a good, wholesome meal.

Typical Meal Pattern for on Urban family.

<b>Non-vegetarian</b>	<b>Vegetarian</b>
<b>Breakfast</b> Milk, tea or coffee Bread with butter Egg fried or boiled Banana/seasonal fruit	<b>Breakfast</b> Milk, tea, coffee Vada / idli with chutney or sambar Banana / seasonal fruit
<b>Lunch</b> Chapatis, parathas or paris Dry vegetable (generally from the other vegetable group) or usal (legume preparation) Banana / some seasonal fruit OR Rice and dal or pulao Carrot / ccumber salad or usal / vegetable curry Banana or some seasonal fruit OR Sliced bred with butter Tea or coffee Biscuits, chiwda or farsan (savoury mixture) Boiled or fried egg or omelette	<b>Lunch</b> Chapatis, parathas or paris Dry vegetable (generally from the other vegetable group) or usal (legume preparation) Banana / some seasonal fruit OR Rice and dal or pulao Carrot / ccumber salad or usal / vegetable curry Banana or some seasonal fruit OR Sliced bred with butter Tea or coffee Biscuits, chiwda or farsan (savoury mixture)
<b>Dinner</b> Banana or some seasonal fruit Snacks with tea Chapatis / Parathas / Puris Dal or curry (vegetable / fish/ meat) Rice	<b>Dinner</b> Banana or some seasonal fruit Snacks with tea Chapatis / Parathas / Puris Dal or curry (vegetable Rice

# Vegetable or Usal Salad

## **Curd or Buttermilk**

In general, planning meals in advance helps to balance the required nutrition. It is not only more economical with regard to time and money but also ensures balanced and attractive meals.

This curiosity of how food helps the body led to the development of the science of nutrition. **Nutrition** is defined as the scientific study of food and its relation to health. It can also be defined as the science which deals with those processes by which the body utilizes food for energy, growth and maintenance of health.

## **What is Nutrition ?**

As defined earlier, nutrition is the science of food and its interaction with an organism to promote and maintain health. Thus, nutrition is a combination of processes by which all parts of the body receive and utilize the materials necessary for the performance of their functions and for the growth and renewal of all the components (rejuvenation).

Optimum nutrition means that a person is receiving and utilizing essential nutrients in proper proportions as required by the body while also providing a 'reserve'.

Good nutritional status refers to the intake of a well-balanced diet, which supplies all the essential nutrients to meet the body's requirements. Such a person may be said to be receiving optimum nutrition.

Poor nutritional status refers to an inadequate or even excessive intake or poor utilization of the nutrients to meet the body's requirements. Overeating can also result in poor nutritional status of a person.

Malnutrition refers to the physical effects on the human body of a dietary intake inadequate in quantity and/or quality.

Under nutrition refers to low food intake. The critical unit of food energy intake may be defined as 1.2. BMR. The BMR (Basal Metabolic Rate) is the minimum energy expenditure necessary for body maintenance at rest with no physical activity.

## **Signs of Good Nutritional Status**

Shiny hair, smooth skin, clear eyes and alert expression and firm flesh on well-developed structure reflect good nutritional states of a person. A person ought to be of correct weight in relation to his height. His physical and mental responses should be normal. Good nutritional status of a person is also reflected by his stamina and resistance to diseases. Good nutrition also helps a person have regular sleep and elimination habits. It may increase a person's life span. In short, a person with a good nutritional status can enjoy life fully.

## **Signs of Poor Nutritional Status**

These are seen in a person who has an apathetic attitude in general towards life. He has a poor physique, very little stamina, dull lifeless hair, dull eyes, slumped posture, fatigue and depression. He may be grossly overweight or underweight. The three important aspects namely those of diet, sleep and elimination habits are irregular. Clinical symptoms of nutritional deficiency may be evident in some. In most cases sub-clinical nutritional deficiencies may be present, but may not exhibit any symptoms.

## **What is Malnutrition ?**

Malnutrition is a state in which a prolonged lack of one or more nutrients retards physical development or causes specific clinical disorders. e.g. iron deficiency anaemia, goiter, etc. Malnutrition can also be defined as an impairment of health resulting from a deficiency, excess or imbalance of nutrients. It includes under-nutrition and over-nutrition.

Persons prone to malnutrition are infants, pre-school children, adolescents, pregnant women and elderly people. Pregnant women are especially prone to malnutrition if they are adolescents and not mature enough to bear children.

Life cannot be sustained without adequate nourishment. Man needs adequate food for growth, development and to lead an active and healthy life. Since all foods are not of the same quality from a nutritional point of view, man's ability to meet his nutritional needs and maintain good health depends upon the type and quantity of foodstuffs he is able to include in his diet to satisfy his hunger. the primary criteria for adequate food intake. But, satisfaction of hunger itself is not a safe guide for the selection of proper foods. For sustaining healthy and active life, diets should be planned on sound nutritional principles – Nutrients.

Man needs a wide range of nutrients to perform various functions in the body and to lead a healthy life. The nutrients include proteins, fats, carbohydrates, vitamins and minerals. These nutrients are chemical substances which are present in the food we eat daily. Proteins, fats and carbohydrates are some times referred to as proximate principles or macro-nutrients They are oxidized in the body to yield energy which the body needs. The present knowledge regarding various nutrients and the role they play in the living organism will be briefly described.

### **Proteins**

Proteins are vital to any living organism. Proteins are the important constituent of tissues and cells of the body. They form the important component of muscle and other tissues and vital body fluids like blood. The proteins in the form of enzymes and hormones are concerned with a wide range of vital metabolic processes in the body. Proteins supply the body building material and make good the loss that occur due to wear and tear. Proteins, as antibodies, help the body to defend against infections. Thus, proteins are vital to the living process and carry out a wide range of functions essential for the sustenance of life. Thus, proteins are one of the most important nutrients required by the body and should be supplied in adequate amounts in the diet. The protein needed by the body has to be supplied through the diet we consume. The dietary proteins are broken down into amino acids and absorbed and are used by the body for various functions like tissue building, replacement of protein depleted, etc. The amino acids not used for the above is used are broken down to provide energy. Proteins are required for maintenance (replacing the wear and tear in tissue) in adults, for growth in infants and children, for fetal development in pregnancy and milk output during lactation.

All foods except refined sugar, oil and fats contain proteins to varying degree. Some foods contain a high amount of protein and can be classified as protein rich foods. Examples of such foods are animal foods like meat, fish and egg and plant foods like pulses, oil seeds and nuts. Milk also can be classified under this category if due allowance is made for large amount of water in it. These foods contain over 20% protein and soyabean is the richest source containing over 40% of protein. Cereals and millets are moderate source of protein as they contain about 10% protein. Rice contains less protein (7%) than wheat and other cereals, but its' quality is better. However, the cereals, as they are consumed in large amounts daily, they contribute a considerable amount of protein to the daily intake.

The best quality protein is the one which provides essential amino acid pattern very close to the pattern of the tissue proteins. Egg proteins, human milk protein satisfy these criteria and are classified as high quality proteins. The proteins of animal foods like milk, meat, fish etc. generally compare well with egg in their essential amino acid composition and are categorized as good quality proteins. They are also highly digestible.

As discussed earlier, a judicious mixture of plant foods like cereals and pulses and vegetables can be relatively inexpensive and at the same time can provide a mixture of proteins with nearly as good as an amino acid pattern as that of expensive animal foods.

## **Fats**

Fat is an important component of our diet and serves a number of functions in the body. Fat is a concentrated source of energy and it supplies, per unit weight more than twice the energy furnished by either proteins or carbohydrates. It also imparts palatability to a diet and retards stomach emptying time. Presence of fat in the diet is important for the absorption of fat soluble vitamins like vitamin A and carotene present in the diet. Apart from these functions, some fats, particularly those derived from vegetable sources provide what is known as “essential fatty acids” (EFA) which has vitamin-like functions in the body. These essential fatty acids are also important for the structure and functions of cells.

Fats in the diet can be of two kinds, the visible and invisible fat. The visible fats are those derived from animal fats like butter, ghee which are solid fats and those derived from vegetable fats like groundnut, mustard, coconut, safflower, til, which are liquid fats. Hydrogenated vegetable oil known as. “vanaspati” is a solid fat and is popular in India. These fats are triglycerides of fatty acids, both saturated and unsaturated. Animal fats like ghee and butter contain vitamin A and D. These; vitamins are not present in vegetable oils.

Apart from the added or visible fat, some amount of fat is present in other food items like cereals, pulses, oilseeds, milk, egg, meat etc. This invisible fat is believed to contribute significantly to the total fat and essential fatty acid content of diet depending upon foodstuffs present in the diet. Diets: containing nuts, oilseeds, soybean, avocado, pear and animal foods have a higher amount of invisible fat.

A cereal-pulse based diet not containing any added (visible) fat, can meet more than 50% of the individual's EFA need On the basis of these considerations, it is now” believed, that the visible fat to meet: EFA requirements is in the range of 15/25 gms/day for different physiological groups.

In recent years, there has been a revival of interest in the nutritional aspect of fats on two counts. One is the role of excessive intake of fat in diet in increasing the level of cholesterol in blood. Excess cholesterol in blood gradually leads to its being deposited under the lining of blood vessels, resulting in a condition known as ‘atherosclerosis’ in which: the blood vessels are narrowed and hardened. The coronary arteries supplying blood to the heart are, affected and coronary heart disease results. i.e., amount greater than 80 *g/day*, may lead to an increase in blood cholesterol. While this be so with persons leading a sedentary life, physical activity and vigorous exercise appear to help persons tolerate higher levels of fat in the diet without much increase in the blood cholesterol. Another important, aspect of dietary fat is the nutritional significance of polyunsaturated fatty acids present particularly in vegetable oils which not only act as a source of essential fatty acids, but helps in the control of blood. cholesterol. Like vitamins, essential fatty acids also play a role in several metabolic reactions. A deficiency of these fatty acids was believed to lead to a skin condition known as toad skin in which recent studies have, however, shown that this condition responds to vitamin E and B complex more effectively than to EFA treatment. Certain fats like butter, ghee, coconut oil and hydrogenated vegetable oils, all containing a high proportion of saturated fats have been shown to

cause considerable elevation of blood cholesterol when consumed in large amounts. The polyunsaturated fatty acids present in oils like groundnut oil, safflower or sunflower oil have also been shown to prevent an increase in serum cholesterol on a high fat diet.

The quantity *of* fat that should be included in a well balanced diet unlike proteins is not known with any degree *of* certainty. In deciding the desirable level *of* fat in the diet, the following facts must be kept in view: (a) the minimum amount of fat to meet the essential fatty acid requirement, (b) the amount needed to promote absorption of fat soluble vitamins (c) providing palatability to food (d) the undesirable effect of excessive intake of fat. The essential fatty acid requirement has been placed at 3-6% of total energy intake depending on age and physiological state. During growth, pregnancy and lactation EFA requirement are relatively higher.

## **Carbohydrates**

Carbohydrates are a class of energy yielding substances. Energy is required for rest, activity and growth. It is well known that when a body is at rest, it expends certain amount of energy for body functions such as respiration, digestion, blood circulation, absorption and excretion, maintenance of body temperature, etc. The energy yielding substances include starch, glucose, cane sugar, milk, sugar, etc. Grain food, roots and tubers are largely composed of starch, a complex carbohydrate. Food ingredients like simple sugars, namely, cane sugar and glucose are pure carbohydrates. Starch is a complex carbohydrate made up of glucose units. Glucose derived from starch and other sugars present in the diet is the main source of energy in the body. Carbohydrates derived from cereals form a chief source of energy in "Indian diets. Starches when eaten in a cooked form are completely digested in the gastrointestinal tract and the released glucose is absorbed and metabolized in the body to yield energy. Starches are almost completely utilized and there being no difference between starches derived from different sources.

## **Vitamins**

Present in small amounts in many foods. They are required for carrying out many vital functions of the body and many of them are involved in the utilization of the major nutrients like proteins, fat and carbohydrates. Although they are needed in small amounts, they are essential for health and well-being of the body.

Vitamins can be broadly classified as water soluble and fat soluble vitamins. B-complex vitamins and ascorbic acid belong to the former group while vitamin A, D, E, K are the fat soluble vitamins. Water soluble vitamins are not accumulated in the body, but are readily excreted, while fat soluble vitamins are stored in the body. For this reason, excessive intake of fat soluble vitamins, vitamin A and D can prove toxic.

Vitamin A is necessary for clear vision in dim light, Lack of vitamin A thus leads to night blindness. Vitamin A or retinol is present in some animal foods like butter and ghee, whole milk, curds, egg yolk, liver etc. Intake of large amount of vitamin A for prolonged periods can lead to toxic which include irritability headache, nausea and characteristic forceful vomiting. The symptoms subside on stoppage of the intake. Vitamin A deficiency which is common among children of the poor in the country is a public health problem leading to blindness. As an effective approach to prevent vitamin A deficiency among the child in rural areas, daily consumption of locally available inexpensive source of carotene is recommended.

Green leafy vegetables like apathy, carrots, drumstick, spinach, amaranth etc and fruits like papaya, seasonal fruits like mangoes and tomatoes, yellow pumpkin are some of the alternatives that can be suggested.

Vitamin D is required for bone growth and calcium metabolism. Lack of vitamin D leads to rickets and osteomalacia. Vitamin D plays an important role in the absorption of dietary calcium from the intestine and its deposition in bone. Gross deformities of bone may therefore result if enough vitamin D is not available to the body. Vitamin D is also formed in the skin by the ultraviolet rays present in sunlight which convert a cholesterol derivative present in the skin to vitamin D. The most inexpensive way of getting vitamin D is exposure to sunlight which is freely available in plenty, particularly, in tropical countries. As in the case of vitamin A, intake of excessive amounts of vitamin D can also lead to toxic symptoms, which include irritability, nausea, vomiting and constipation.

The other fat soluble vitamins are vitamin E and vitamin K which are widely distributed both in the plant and animal kingdom. Vitamin E possesses an antioxidant property. It is believed to have a role in preventing the oxidation of carotene and vitamin A in the intestine and also in preventing lipid peroxidation of cells and maintain integrity of cell membrane which are largely composed of unsaturated fats. Vitamin E is widely distributed in foods. It is present in high concentration in vegetable oils and in cereal grains. Human requirements of vitamin E is not known with certainty.

There are several B vitamins, but only some of them have importance in human nutrition. The common property of B vitamins is that they are essential for the metabolism and proper utilization of energy, carbohydrates, proteins and fats. An important vitamin of this group is thiamine. The richest source of thiamine is yeast and the outer layers of cereals like rice, wheat and millets. The commonly consumed foods which contain a high level of thiamine are un-milled cereals, pulses and nuts, particularly groundnut.

Folic acid is one of the two vitamins associated with certain type of anemia. Folic acid is required for the multiplication and maturation of red cells and leads to megaloblastic anaemia, which is often seen in children and pregnant women.

Like folic acid, vitamin B-12 is also involved in the maturation of cells and deficiency of this vitamin will also result in megaloblastic anaemia. This vitamin is also required for proper functioning of the central nervous system and also required for metabolism of folic acid. This vitamin is required for DNA synthesis and methyl group transfer.

Ascorbic acid, that is vitamin C, is an essential nutrient. It is involved in collagen synthesis, bone and teeth calcification and many other reactions in the body as a reducing agent. Vitamin C deficiency causes scurvy characterized by weakness, bleeding gums and defective bone growth. Ascorbic acid occurs widely in plant foods, particularly in fresh fruits and vegetables, especially in green varieties. When vegetables become dry and stale, or cut and exposed to air most of the vitamin C originally present is destroyed. Whenever possible fresh raw vegetables should be used for obtaining enough vitamin C. Fresh fruits like orange, grapes, lime etc., contain good amount of vitamin C. But very cheap fruits like amla and guava are very rich sources of vitamin C. Indeed, amla is one of the richest natural sources of the vitamin.

### **Minerals and Trace Metals**

A large number of minerals and trace metals are present in the body. Some of these form part of body structural component and some others act as catalytic agents in many body reactions. Bones and skeleton are made up mainly of calcium, magnesium and phosphorus, and iron is a component of blood. Minerals like zinc, molybdenum, copper, manganese and magnesium are either a structural part or activate a large number of enzyme systems. Iodine is a part of hormone, thyroxine. Sodium, potassium are important elements present in fluids within and outside the cells and along with ions like chloride, bicarbonate and carbonate keep water and acid base balance. In the case of growing infants and children, intake of additional amounts of several minerals are essential to ensure adequate growth of tissues.

Calcium is an essential element required for several life processes. As a structural component, calcium is required for the formation and maintenance of skeleton bones and teeth. It is also required for a number of other essential processes. It is required for normal contraction of muscle to make limbs move, contraction of heart for its normal function, nervous activity and blood clotting. Calcium is present in both animal and plant foods. The richest source of Ca among animal foods is milk, butter milk, skim milk and cheese and among the vegetable sources is green leafy vegetables. Among the leafy vegetables, amaranth, fenugreek and drumstick leaves are particularly rich in calcium and among root vegetables, tapioca is a good source. Most cereals and millets contain some amount of this element and the millet ragi is a particularly rich source of calcium. Rice is a poor source and therefore insufficiency of calcium is one of the main defects of diets largely based on rice.

Children need relatively more calcium than adults to meet the requirements of growing bones. Calcium requirements are also increased during pregnancy to meet the needs of the growing foetus and during lactation to compensate for Ca secreted in breast milk. A healthy breast fed baby of 3 months receives a large amount of Ca all of which has been drawn from mother's milk. A generous intake of milk and green leafy vegetables is therefore recommended during these periods.

Another major element in the body, next in importance to calcium is phosphorus. Utilization of calcium is closely linked with that of phosphorus, since most of the calcium in the body is deposited as calcium phosphate in the bone and the teeth. The rich sources of phosphorus in our diets are cereals, pulses, nuts and oilseeds.

Iron is an essential element for the formation of haemoglobin of red cells of blood and plays an important role in the transport of oxygen. Tissues also require iron for various oxidation reduction reactions. Most of the iron in the body is re-utilised and some of the body iron is also stored in the liver and spleen. The amount of iron to be absorbed from the daily diet is quite small. It is in the neighborhood of 1-3 mg dependent upon the sex and the physiological status. Since there is limited capacity to reabsorb dietary iron, diet should contain 10-25 fold iron required daily. Diets differ very widely in the bioavailability of their iron.

Rich sources of iron are cereals, millets, pulses, green leafy vegetables. Of the cereal grains and millets, bajra and ragi are a very good source of iron. Milk, a good source of several nutrients, is a poor source of iron. Medicinal iron in the form of iron salts have to be provided to correct anemia.

Sodium (Na) and Potassium (K) are important constituents of fluids present outside and within the cell. Proper concentration of these electrolytes inside and outside the cell is essential to maintain osmotic balance and keep cells in proper shape. Sodium and potassium are present in all foods particularly so in fruits and vegetables. In plant foods, potassium is present in higher concentrations than sodium by a factor of 10 to 50 fold. Plant foods are indeed the rich source of potassium. The exact requirement of K is not known, but potassium present in a vegetarian food is probably adequate to meet the daily requirement. Sodium is lost in urine and particularly in sweat as sodium chloride. Sodium present in foods is not adequate to meet the requirement. Hence sodium chloride, i.e., salt has to be included in the diet. Daily intake of salt in our country may be as high as 20 g, the average being around 15 g per adult. In view of the association of hypertension with high salt intake, a lower intake of 8-10 g/day may be advisable. Under conditions of excessive sweating as in summer and for those who work in hot environment a still higher intake may be necessary.

Magnesium is present in a small concentration in all cells and is required for cellular metabolism. It is also present in bone along with calcium. Magnesium shares many of the properties of calcium so far as absorption and metabolism and tissue distribution are concerned. Magnesium is also implicated to have a role in cardiovascular disease.

Green leafy vegetables are a good source of magnesium. Diets based on cereals, pulses and vegetables can provide adequate magnesium to meet the requirement.

It is known now that a large number of elements are required in trace amounts for a wide range of functions in the body. Some of the important trace elements of relevance in human nutrition are zinc, copper, selenium, cobalt, fluoride, manganese, chromium, iodine and molybdenum. Other trace elements are arsenic, nickel, vanadium and silicon. Some of the essential trace elements for humans are well established, viz., iodine, In, Cu, F, Mn, Cr.

Iodine deficiency diseases including goitre are widespread in many parts of the world and it forms a major public health problem in our country. Over 120-150 million people in the world are estimated to suffer from iodine deficiency. Iodine deficiency is characterized by swelling of thyroid gland in the neck. Iodine deficiency during fetal stage may lead to mental retardation and in later life retardation of body growth. The daily requirement of iodine is reported to be 100-150 ug. One of the well tested approaches to control iodine deficiency disease in the population is the distribution of iodized salt to affected population.

Copper is an essential element for man. It plays an important role in iron absorption. Central nervous system disorders may also result from copper deficiency with impaired mediation and catecholamine metabolism.

Chromium is essential for animal and probably for man. Chromium deficiency has been shown to lead to impaired glucose tolerance. Chromium content of cereal based Indian diets ranges between 70-150 ug/day.

Manganese is established as an essential element as it participates in a number of reactions as a component of metallo enzyme. Its deficiency leads to abnormality in skeletal bone mineralisation. It also participates in lipid and carbohydrate metabolism. A large number of foods consumed in India have been analysed for manganese. Manganese content of diets consumed in India varies from 4-10 mg/day. Absorption of manganese from these diets vary from 15-20%. Surprisingly, diets of poor income groups have a better absorption of manganese than diets of high income groups. The basis for these differences in absorption is not known. The estimated manganese requirement on these diets based on human balance studies is 5 mg/day. Most of our diets can provide this amount. Hence, manganese deficiency is not likely to occur in our population. Excess of manganese is toxic, a situation that may be encountered in manganese mines and other industries.

Fluoride is also an important element in human health. It is an essential element, a minimum amount being required for prevention of dental caries. However, its presence in high concentration in the environment, particularly in water (>2-3 ppm) leads to fluorosis resulting in hardening of bone.

Dental caries may be caused by excess intake of sticky sweets among children. This situation is more prevalent in the West than in our country. However, the practice of brushing the teeth and washing the mouth after food should be inculcated among children to reduce the risk of caries. It is estimated that by food alone, 0.3-0.8 mg F may be supplied.

Selenium is an essential element and along with vitamin E, it is required for maintaining liver integrity. Selenium deficiency leads to liver necrosis. Selenium deficiency is also implicated as a risk factor in cancer.

## **Fiber**

Though fiber does not contribute to the nutritive value of foods, the presence of fiber, i.e., roughage in the diet is necessary for the mechanism of "digestion and elimination of waste". The contraction of muscular walls of the digestive tract is stimulated by the fiber, thus counteracting the tendency to constipation. -lack of adequate dietary fiber in diets containing refined foods, leads to constipation

and colon cancer. Also some of the dietary fibers like gums, mucilages in our diets have been shown to lower blood cholesterol and also blood glucose in diabetics. Vegetables, particularly the leafy ones, fruits, condiments, spices and unrefined cereals are comparatively rich in fiber and a generous inclusion of these provides a diet rich in fiber.

### **What part does Indian Noni play in our lives ?**

After reading and knowing some important properties and facts of food, nutrition and the role nutrients play in our lives, we can spell out the great and wonderful effects Indian NONI has on our lives and the unbeatable results that our so outstanding in today's world..

Indian NONI supplies us with all the vitamins required by our body for the various functions explained in the earlier paragraphs. Indian NONI provides our body with all the minerals necessary for our structure and stability and that too in a balanced form.

Indian NONI also infuses into our body all the trace elements that are very important for the functioning of our cells, tissues and also takes care of our metabolism. Indian NONI is an adaptogen. It takes care of the balance in the body. Brings down what is excess and puts up what is more, especially when it comes to vitamins, minerals and trace elements by getting rid of toxins.

**We must all work together and take Indian Noni to Every household in Every Village and Every City, in Every State in India and to Every Country in this Universe.**