

5.5. VITAMINS

5.5.1. Introduction

Vitamins are natural substances found in plants and animals and known as essential nutrients for human beings. The name **vitamin** is obtained from **vital amines** as it was originally thought that these substances were all amines, although not all vitamins are amines. Human body uses these substances to stay healthy and support its many functions.

According to the ability to be absorbed in fat or water, vitamins are classified as:

- 1) **Fat-Soluble Vitamins:** Vitamin A, D, E, and K are fat-soluble vitamins. These vitamins are oily and hydrophobic compounds, and are stored in liver. These are not excreted out of the body, thus, their excessive intake can produce toxic effect and can also result in a condition known as hypervitaminosis.
- 2) **Water-Soluble Vitamins:** Vitamin B complex and vitamin C are water-soluble vitamins. These are compounds of carbon, hydrogen, oxygen, and nitrogen. These are not stored in the body, thus, required daily in small quantities.

Different vitamins perform different functions depending on their role in biological processes. Their functions can be understood well by studying the diseases related to their deficient conditions. The **vitamins** and their **deficiency diseases** are given below:

- 1) **Vitamin A:** Hardening of cornea and night blindness.
- 2) **Vitamin B₁:** Beri beri and dwarfism.
- 3) **Vitamin B₂:** Digestive system disorders, skin burning sensations, and cheilosis.
- 4) **Vitamin B₆:** Convulsions, conjunctivitis, and sometimes neurological disorders.
- 5) **Vitamin B₁₂:** Pernicious anaemia and decrease in haemoglobin.
- 6) **Vitamin C:** Bleeding in gums and scurvy.
- 7) **Vitamin D:** Improper growth of bones, soft bones in children, and rickets.
- 8) **Vitamin E:** Weakness of muscles and increase in the fragility of RBCs.
- 9) **Vitamin K:** Increase in the time taken by blood to clot; in severe cases excessive blood loss occurs (in case of a cut or an injury) which ultimately leads to death.

5.5.2. Shark Liver Oil

Shark liver oil as the name suggests is obtained from the livers of sharks (figure 5.4). It has been used as a folk medicine for promoting wound healing and curing respiratory and digestive system problems since ancient times.

Synonym

Oleum Selachoids

Biological Source

Shark liver oil is the fixed oil obtained from the fresh and carefully preserved livers of various species of shark, mainly *Hypoprion brevirostris* and *Galeorhinus zyopterus*.

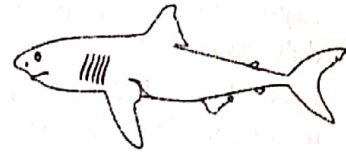


Figure 5.4: Shark Fish (*Carcharias Sp.*)

Family

Carcharhinidae

5.5.2.1. Occurrence and Distribution

In India, shark livers are processed and oil is obtained commercially in Tamil Nadu, Maharashtra, and Kerala. Shark liver oil is also being largely produced in most of the European countries.

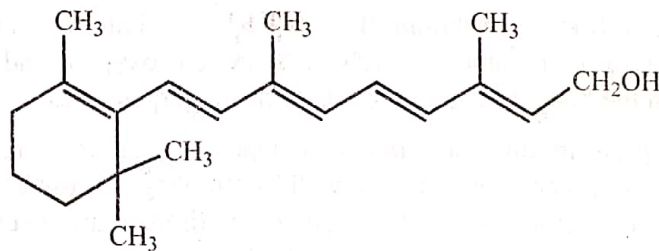
5.5.2.2. Organoleptic Evaluation

Shark liver oil has the following organoleptic properties:

- 1) **Colour:** Pale yellow to brownish-yellow.
- 2) **Odour:** Characteristic fishy, but not rancid.
- 3) **Taste:** Bland or fishy.
- 4) **Solubility:** Soluble in solvent ether, chloroform and light petroleum; slightly soluble in ethyl alcohol; insoluble in water.

5.5.2.3. Chemical Constituents

Vitamin A is present in shark liver oil at concentration ranging from 15,000-30,000 International Units per gm. The glycerides of saturated and unsaturated fatty acids are also present.



Vitamin A

5.5.2.4. Chemical Tests

Shark liver oil gives the following tests:

- 1) 1gm of shark liver oil is dissolved in 1ml of chloroform and treated with 0.5ml of sulphuric acid. A light violet colour appears which turns purple and then brown indicating the presence of vitamin A.
- 2) 1ml of shark liver oil is dissolved in 10ml of chloroform and treated with saturated solution of antimony trichloride in chloroform, followed by shaking the mixture. A blue colour appears due to the presence of vitamin A.

5.5.2.5. Therapeutic Efficacy

Shark liver oil has the following therapeutic uses:

- 1) It is used in cases of vitamin A deficiency. It is also known as **anti-xerophthalmic factor**. This oil lacks vitamin D, thus, is required to be fortified. The absence of vitamin D does not make this oil suitable as a substitute of cod liver oil.
- 2) It is nutritive oil.
- 3) It is used for preparing dilute shark liver oil, shark liver oil emulsion (Indian NF), and shark liver oil with vitamin D.
- 4) It is an ingredient in sunburn ointments.

5.5.3. Amla

Amla (or **Indian gooseberry**) is in use since ages for treating many chronic conditions including control of blood sugar. Amla is the Hindi name, while its Sanskrit name is Amalaki. This is an edible fruit with rich content of vitamin C.

Synonyms

Indian gooseberry, amalaki, dhatri, and amruta.

Biological Source

Amla is the dried and fresh fruits of *Emblica officinalis* Gaertn (*Phyllanthus emblica* Linn.).

Family

Euphorbiaceae

5.5.3.1. Occurrence and Distribution

Amla is a small- or medium-sized tree growing in all deciduous forests of India. It is also grown in Sri Lanka and Myanmar.

5.5.3.2. Organoleptic Evaluation

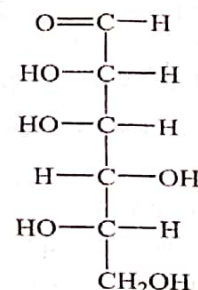
Amla has the following organoleptic properties:

- 1) **Tree:** Small- to medium-sized, 8-18m in height, greenish-grey coloured, has a smooth bark, crooked trunk, and spreading branches.
- 2) **Branchlets:** Glabrous or finely pubescent, 10-20cm long, and usually deciduous.
- 3) **Leaves:** Simple, sub-sessile, closely set along the branchlets, light green coloured, resembling pinnate leaves, and feathery.
- 4) **Flowers:** Greenish-yellow coloured.
- 5) **Fruits or Berries:** Nearly spherical, light greenish yellow coloured, smooth, hard, has 6 vertical stripes or furrows, ripen in autumn, harvested by hand after climbing the upper branches bearing fruits.

5.5.3.3. Chemical Constituents

Amla fruits contain high contents of tannins (28%). Two hydrolysable tannins, emblicanin A and B having antioxidant properties are present in amla fruits.

One of the above hydrolysable tannins hydrolyses into gallic acid, ellagic acid, and glucose; while the other into ellagic acid and glucose.



Vitamin C (Ascorbic acid)

Amla fruits are also a rich source of **vitamin C** (600-750mg/100gm of fresh pulp). Fat (0.5%) and phyllembin are also present. Amla fruits also contain high amounts of mineral matters like phosphorus, iron, and calcium. They contain considerable amount of pectin. The fresh fruits contain 75% moisture. The fruits are stored after dehydration, although the vitamin content of dried fruits remains unaffected; this is because of the presence of tannins, which prevents the oxidation of vitamin C.

5.5.3.4. Chemical Tests

Amla undergoes the following chemical tests:

- 1) Its alcoholic or aqueous extract gives blue colour with ferric chloride solution.
- 2) On adding its aqueous extract with gelatin and sodium chloride, a milky white colour is produced.
- 3) On adding its aqueous extract with lead acetate, a precipitate is formed which is removed by filtration. The filtrate is then added with a solution of 2: 6 dichlorophenol-indophenol, as a result of which the colour disappears.

5.5.3.5. Therapeutic Efficacy

Amla has the following therapeutic properties:

- 1) Its fruits are widely used in Indian medicines as an acrid, diuretic, refrigerant, and laxative.
- 2) Dried fruits are used in diarrhoea and dysentery.
- 3) They are also given in jaundice, dyspepsia, and anaemia (along with iron compound).
- 4) The fixed oil present in fruits promotes hair growth.
- 5) The seeds of fruits are used for treating asthma and bronchitis.
- 6) Alcoholic extract of the fruit possesses antiviral property.
- 7) Amla is a popular ingredient of Ayurvedic preparations, 'Triphala' and 'Chyawanprash'.
- 8) It slow down the ageing process (due to it's a rich vitamin C content). Ageing is a result of cell and tissue damage by oxygen free radicals. Vitamin C is a scavenger of free radicals and causes their breakdown.
- 9) It improves skin health.