UNIT-9

Herbs as health food

Points to be covered in this topic

- ❑ INTRODUCTION
- ❑ NUTRACEUTICALS
- ❑ ANTIOXIDANTS
- ❑ PROBIOTICS
- ❑ PREBIOTICS
- ❑ DIETARY FIBRES
- ❑ OMEGA-3 FATTY ACIDS
- ❑ SPIRULINA
- ❑ CAROTENOIDS
- ❑ SOYA
- ❑ GARLIC

9.1 INTRODUCTION

Many plants contain compounds that provide health benefits in addition to their nutritional value. These compounds are called bioactive compounds and are found in various parts of the plant, such as leaves, stems, roots, and fruits. Some examples of bioactive compounds include polyphenols, carotenoids, and phytosterols.

9.2 NUTRACEUTICALS

The term nutraceutical was coined by Dr. Stephen DeFelice in 1989 by combining the words 'nutrition' and 'pharmaceutical'. It was originally defined as a food or part of the food that provides medical or health benefits, including the prevention and/or treatment of many chronic diseases and ailments, such as cancer, diabetes, heart diseases, hypertension, arthritis, osteoporosis, etc.

9.2.1 Classification of nutraceuticals

a) On the basis of food source

(b) On the basis of therapeutic action

(c) On the basis of chemical nature

Table 9.1: On the basis of food source

FOOD SOURCE	EXAMPLE
Plants	Ascorbic acid, cellulose, leutein, pectin, B-carotene, Allicin.
Animals	Lecithin, Creatinine, Calcium, Conjugated Linoleic acid, Royal jelly.
Microbes	*Sacchromyces boulardii*, Bifidobacterium bifidum, B. infantum, etc.

Table 9.2: On the basis of therapeutic action

ANTICANCER	INFLUENCE ON BLOOD LIPID PROFILE	ANTIOXIDANT ACTIVITY	ANTI INFLAMMATORY	BONE PROTECTIVE
Capsaicin	β-glucan	Ascorbic acid	lenolenic acid	Soy protein
Genistein	γ-Tocotrienol	β-carotene	Gama linolenic acid	Calcium
Ellagic acid	Pectin	Lutein	curcumin	Inulin

Table 9.3: On the basis of chemical nature

CLASS	SOURCE	THERAPEUTIC ACTION
Carotenoids	Carrot	Neutralizes free radicals
Lycopene	Tomato and tomato products	Neutralizes free radicals
Dietary fibres	Wheat bran	May reduce colon and breast cancer

9.3 ANTIOXIDANTS

Antioxidants are important molecules that neutralize free radicals in the body. Free radicals are unstable cells that are created when we experience harmful external factors, like pollution and damaging sun rays. Free radicals cause oxidative stress, which is linked to numerous health conditions like Alzheimer's disease, heart disease, cancer, depression, multiple sclerosis, and memory loss.

9.3.1 Classification of Antioxidants

(a) True antioxidants
(b) Reducing agents
(c) Antioxidant synergists

- **True antioxidants** interact with free radicals and prevent their chain reaction.
- **Reducing agents** are effective against oxidizing agents because they easily oxidize and have a lower redox potential.
- **Antioxidant synergists** are substances that, by themselves, have little antioxidant action but can boost the activity of real antioxidants by interacting with heavy metal ions that catalyze autooxidation.

9.3.2 Sources of antioxidants

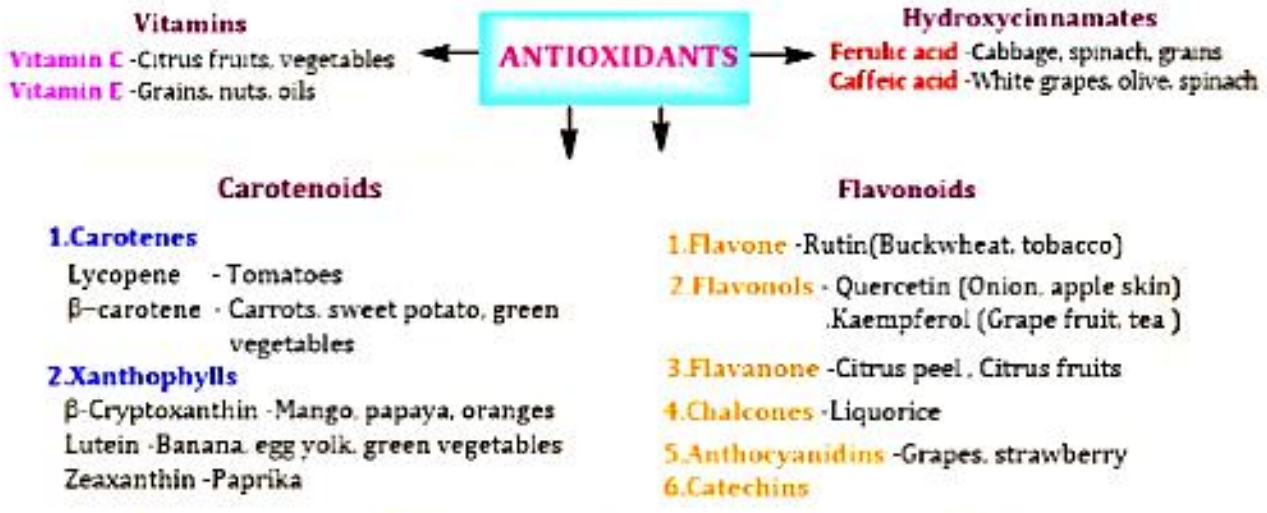

Fig. 9.1: Naturally occurring antioxidants & their sources

Therapeutic application

Treatment of cardiovascular and neurodegenerative diseases

9.4 PROBIOTICS

Probiotics are live microorganisms that can have beneficial effects on your body. It is intended to provide a fruitful result for the stomach when ingested, causing an increase in the population of gut flora. They are found in many foods, including yogurt, kefir, and kimchi.

Probiotics

e.g.- It includes *Lactobacillus species like L. acidophillus* and *Bifidobacteria*

9.5 PREBIOTICS

Prebiotics are compounds in food that **foster growth or activity of beneficial microorganisms** such as bacteria and fungi. They are used in the gut to increase the population of useful bacteria, which aid the digestion and enhance the production of valuable vitamins.

e.g.- Beneficial bacteria i.e., *Bifidobacteria* and *lactobacillus*

There are two types of dietary fibres:

Therapeutic application

- The main activity of prebiotics is to **improve gastrointestinal function.**
- Besides this improve immunological response and mineral absorption.

9.6 DIETARY FIBRES

Dietary fibres, also known as roughage, is a type of carbohydrate that is **found in plant-based foods** such as fruits, vegetables, whole grains, nuts, and seeds. Dietary fibers are mainly helpful in keeping the digestive system healthy. It has been recommended that about 30–40 g of dietary fibre should be consumed daily in order to obtain significant health benefits.

There are two types of dietary fibres:

Soluble fiber - Which dissolves in water (e.g., Pectin, Gums, Mucilage which are mainly found in plant).

Insoluble fiber - Which doesn't dissolve in water (e.g. Cellulose, Hemicelluloses, and lignin are the components of plant cell wall).

Therapeutic application

- Fibers keep the digestive tract healthy
- Reduce starch intake
- Lower blood cholesterol
- Diet for weight control in obesity
- Diabetes management

9.7 OMEGA-3 FATTY ACIDS

Omega-3 fatty acids are **polyunsaturated fats** that are essential nutrients for the human body. Omega-3 fatty acids are found in fatty fish, such as salmon, mackerel, and sardines, as well as in flaxseed, chia seeds, and walnuts.

Sources of Omega-3 fatty acid

9.7.1 PUFA are classified on the basis of position of double bonds:

1. Omega-3-fatty acids have double bond at position 3 from the methyl end.
   e.g.- Alpha-linolenic acid
2. Omega-6-fatty acids have double bond at position 6 from the methyl end.
   e.g.- Gamma-linolenic acid

There are three types of Omega-3- fatty acid

- α- Linolenic acid
- Eicosapentaenoic acid
- Docosahexaenoic acid

Therapeutic application

- Reduction of LDL and VLDL levels. Decrease in hypercholesteremia and triglyceridemic.
- Increase in HDL levels.
- Reduce blood cholesterol.

9.8 SPIRULINA

Biological source:

Spirulina is a blue green algae known as ***Spirulina platensis*** or ***Spirulina maxima.*** (Family: Oscillatoriaceae).

Spirulina

It represents a link between green plants and bacteria. It has a soft cell wall made up of complex sugars and proteins that is easily digested.

Chemical constituent of Spirulina

- It contains **65% of protein** and essential fatty acid i.e. linolenic acid which has anti-inflammatory property.
- Prominent amount of chlorophyll found in spirulina helps to remove toxins from the blood.
- Very high concentration of Iron is present and have therapeutic application in anemia.
- Spirulina is also a source of Vitamin B complex, vitamin C. vitamin D, vitamin E and minerals etc.

Therapeutic application of Spirulina

- Spirulina has been reported to have immunostimulant activities.
- Treatment and management of HIV.
- Viral infection, such as Herpes, Cytomegalovirus, Influenza, Mumps and Measles virus.

9.9 CAROTENOIDS

Carotenoids are **pigmented nutrients** that are responsible for lending color. There are two types of carotenoids, namely, **xanthophylls** (oxygenated unsaturated hydrocarbons) and **carotenes** (non-oxygenated unsaturated hydrocarbons).

Dietary carotenoids are considered to be beneficial for the **prevention of various diseases,** including certain cancers, cardiovascular disease, and eye disease.

Therapeutic application of Carotenoids

- Used commercially as a natural dye and nutrient supplement.
- It is used as nutraceutical as antioxidant.
- It is a precursor of vitamin A which makes it useful for vision and skin protection from U.V. rays.

9.10 SOYA

Biological source

These are the fully matured **dried seeds** obtained from pods of the plant ***Glycene-soja*** **and** ***Glycine max*** (Family: Leguminosae).

Soya seed

Chemical constituent of Soya

It contains fixed oil, protein, vitamin B complex, minerals, flavonoids, and insoluble fiber. Soya is made up of fiber, high protein content, and less saturated fat.

9.11 GARLIC

Biological source

Garlic is the ripe **bulb** of ***Allium sativum*** *Linn.* (Family: Liliaceae). Garlic is a nutraceutical spice that has been consumed since ancient times.

Garlic bulb

Chemical constituent of Soya

Garlic mainly contains **organo-sulfur** compounds, namely **alliin** and allicin. It has a pungent**, alliaceous taste** and odour. It also contains an enzyme called alliinase in fresh garlic that gets deactivated by drying.

Therapeutic application of Garlic

It is use in common cold, Antiseptic, Antioxidants and use as blood purifier