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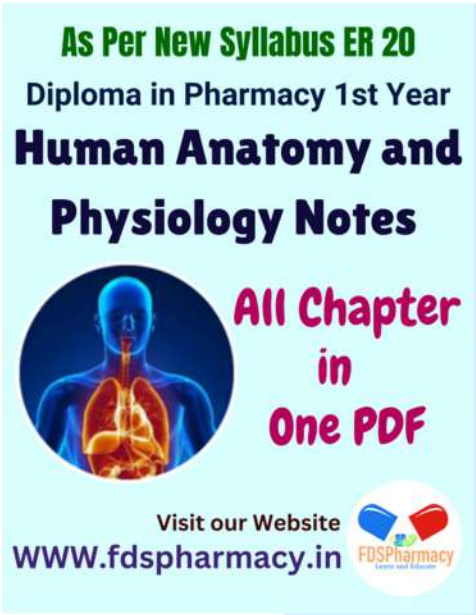
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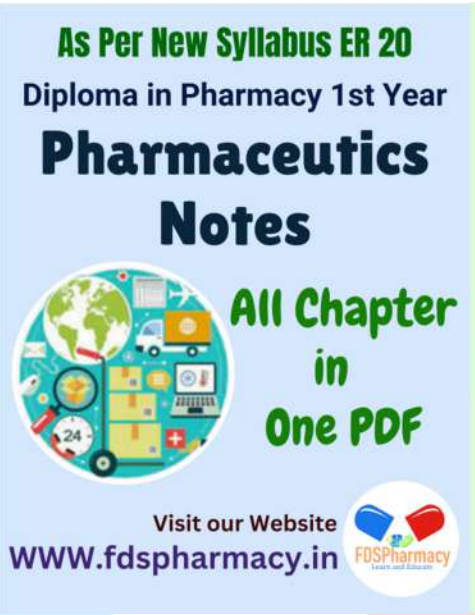
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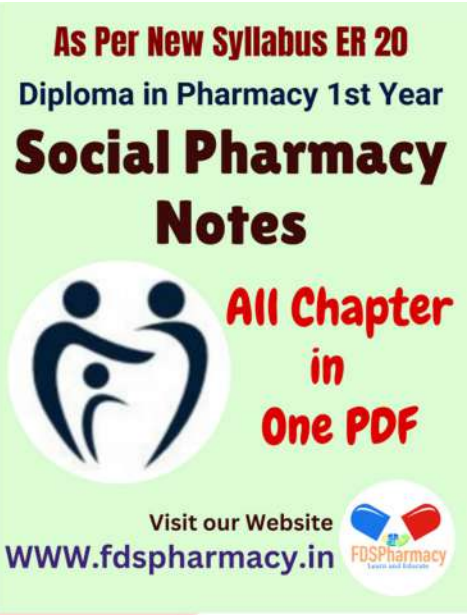
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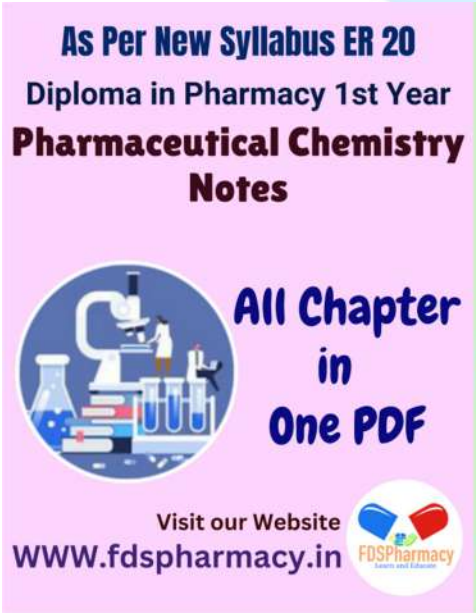
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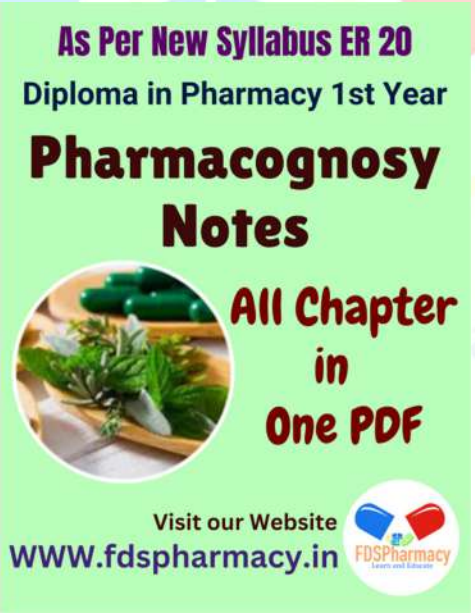
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# Link in Description

# Diploma in Pharmacy 1st Year
# Pharmacognosy
# Chapter 9 : Herbs as Health Food


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# Chapter 9

## Herbs as Health Food

# Neutraceuticals

→ In 1989, Stephen Defelice discovered the term nutraceuticals from nutrition and pharmaceutical.

→ He defined nutraceutical as a substance that is considered as a food or its part, which provides nutritional value and other health benefits, including disease prevention or health promotion.

→ Thus, nutraceuticals are foods or food ingredients that provide medical or health benefits.

→ They range from isolated nutrients, dietary supplements, and specific diets to genetically engineered designer foods and herbal products.

## Classification

➢ Depending upon various characteristics, nutraceuticals are classified into the following major classes:

1. Nutraceuticals according to their food source.
2. Nutraceuticals according to their mechanism of action.
3. Nutraceuticals according to their chemical nature.
4. Nutraceuticals according to their higher contents in specific foods items.

## Nutraceuticals according to their food source.

- Nutraceuticals can be obtained from plants, animals, and microbes

| Source | Examples of Nutraceuticals |
|---|---|
| Plants | Ascorbic Acid, Ellegic Acid, Cellulose, Pectin |
| Animals | Choline, Conjugated Lenoleic Acid |
| Microbes | Yeast, Lactobacilus acidophilus, |

## Nutraceuticals According to mechanism of Action

→ In this system, the nutraceuticals factors can be grouped together without considering the food sonrce, based upon their confiemed physiological properties.

→ The classes includes are antioxidant, antibacterial, antihypertensive, antihypercholesterolemic, anti aggregate, anti inflammatory, etc

# Nutraceuticals According to their Chemical nature

- In this Class, Nutraceuticals are categorised under molecular or elemental groups. This model includes several large groups, which provide a basis for sub-classification, subgroups, etc
    1. Isoprenoid derivatives
    2. Phenolic substance
    3. Fatly acids and structural lipids
    4. Carbohydrates and derivatives
    5. Amino acid based substance
    6. Microbes
    7. Minerals

# Nutraceuticals According to their Higher content in Specific Food Items

## Categories :

- Nutraceuticals can also be categorised based on the food available in the market:

- **Traditional Nutraceuticals :**
- **Non-traditional Nutraccuticals:)**

## Traditional Nutraceuticals

- Traditional nutraceuticals are natural and bring no changes in the food.
- Numerous natural components are present in the food that provides benefits (apart from basic nutrition), like lycopene in tomatoes, omega-3 fatty acids in salmon, or saponins in soy.

## Non-Traditional Nutraceuticals

- Non-traditional nutraceuticals are artificial foods formed through biotechnology. Food samples contain bioactive components formulated to produce products for human well-being.

## Therapeutic Applications

- Nutritional therapy is a healing system that uses dietary therapeutics or nutraceuticals as a complementary therapy.
- This therapy relies on the belief that foods can not only be sources of nutrients and energy, but can also provide the following benefits :
    1. Provide medicinal benefits,
    2. Avoid side effects,
    3. Increase the health beneficial effects,

4. Due to their natural dietary supplement, they do not have unpleasant side effects,
5. Increase the health value, diet and improve medical condition of humans, and
6. Easily available and economically affordable

- Most of the nutraceuticals possess numerous therapeutic benefits and are claimed to exhibit physiological benefits or provide protection against various diseases.
  1. Cardiovascular agents,
  2. Anti-obese agents,
  3. Anti-diabetic agents,
  4. Anti-cancer agents,
  5. Immune boosters,
  6. Substances that manage chronic inflammatory disorders, and
  7. Formulations to cure degenerative diseases.

# Antioxidants

→ Antioxidants are natural or synthetic substances that either prevent or delay some types of cell damage.

→ Vegetables and fruits are good sources of antioxidants; however, research has shown that some antioxidant supplements are not beneficial in preventing diseases.

→ Vitamins C and E, selenium, and carotenoids (betacarotene, lycopene, lutein, and zeaxanthin) are some common examples of antioxidants

## Classification

- **Enzymatic Antioxidants :** Catalase, Glucose 6 phosphate dehydrogenase, etc
- **Non-Enzymatic Antioxidants :** vitamin C, vitamin E, plant polyphenol, carotenoids, and glutathione.

## Sources of Antioxidants

- Antioxidants are abundantly found in plant foods, including fruits, vegetables, nuts, whole grains, and also in some meats, poultry, and fish

1. Allium sulphur compounds are obtained from leeks, onions, and garlic
2. Beta-carotenes are obtained from pumpkin, mangoes, apncots, carrots, spinach, and parsley.
3. Flavonoids are obtained from tea, green tea, citrus fruits, red wine, onion, and apples.
4. lndoles are obtained from broccoli, cabbage, and cauliflower
5. Lutein is obtained from green leafy vegetables (spinach) and corn
6. Zinc is obtained from seafood, lean meat, milk, and nuts.
7. Vitamin A is obtained from liver, sweet potatoes, -carrots, milk, and egg yolks.
8. Vitamin C is obtained from oranges, blackcurrants, kiwifruit, mangoes, broccoli, spinach, capsicum, and strawberries
9. Vitamin E is obtained from vegetable oils (wheatgerm oil), avocados, nuts, seeds, and whole grains
10. Zoochemicals are obtained from red meat, offal, fish, and plants that animals eat.

## Therapeutic Applications

- Cardiovascular Diseases
- Cancer
- Brain Injury
- Neurodegenerative Diseases
- Liver Damage

# PROBIOTICS

→ Probiotics are friendly bacteria that promote healthy digestion and absorption of some nutrients.

→ They crowd out pathogens, such as yeasts, bacteria, and viruses that may cause disease and develop a mutually advantageous symbiosis with human GIT.

→ Bacteria belonging to Lactobacillus and Bifidobacterium groups are most commonly used in probiotics.

→ Saccharomyces boulardii (yeast) may also be used.

## Selection Criteria

➢ Living organisms can be termed as probiotics if they fulfil the given criteria:

- They should get separated from the same species from the expected host.
- They should have a clear favourable impact on the host.
- They should not produce any symptoms of disease.
- They should have the capacity to survive the GIT conditions and should easily pass through it.
- They should have the capacity to endure extended lengths of time during storage.

## Mechanism of Action

1) Adhering and colonising in the gut.
2) Suppressing the development or epithelial intrusion by pathogenic organisms and or generation of antimicrobial substances.
3) Improving intestinal hindrance work.
4) Controlling the exchange of dietary antigens.
5) Stimulating the host mucosal and systematic immunity.

## Therapeutic Applications

✓ Probiotics help balance the friendly bacteria in the digestive system.

✓ They include good bacteria, which are live microorganisms that provide health benefits on consumption.

✓ Due to their ability to restore the natural balance of gut bacteria, they provide health benefits.

✓ They are known for their ability to prevent diarrhoea or reduce its severity.

✓ Their supplements have the ability to improve some mental health conditions.

# PREBIOTICS

→ Prebiotics are indigestible carbohydrates that promote the growth of good bacteria of large intestine, e.g., Bifidobacteria and Lactobacilli.
→ Bacterial breakdown (fermentation) of prebiotics form Gases and Short-Chain Fatty Acids (SCFAs), which feed bacteria themselves and colonic lining cells.
→ Some SCFAs are absorbed and provide some energy (1-2 kcal/gram prebiotics).
→ Wheat, onions, leeks (the bulb), potatoes (cooked and cooled), and jicama are the examples of foods rich in prebiotics.

## Mode of Action

- Since prebiotics are non-digestible carbohydrates, they are not digested by the upper GIT and travel in the ileum and colon where they are broken down by the resident microbes.
- They stop intestinal bleeding in intestine.
- They coat the host surface receptors.
- They produce bacteriocins, which inhibit the growth of related toxins.
- They control metabolism and boost immunity

## Therapeutic Applications

✓ Prebiotics improve immune function in the gut and body.
✓ They promote regular bowel movement
✓ They reduce the intestinal infection
✓ They initiate and regulate Immune function

# Dietary Fibres

→ Dietary fibres are edinle but non- digestible plant carbohydrates, containing at least 3 monosaccharides.
→ Lignin (not a carbohydrate) is also a dietry fibre.
→ Undigested fibre (cannot be absorbed in the small intestine) reaches the large intestine, where it is or may be not broken down into absorbable substance by the normal intestinal bacteria.

## Classification

➢ **Soluble Fibre :** It includes pectins, gums, and mucilage (found mainly in plant cells). It mainly lowers the LDL (bad cholesterol) levels, and can also help with constipation. Fruits, vegetables, oat bran, barley, seed husks, flaxseed, psyllium, dried beans, lentils, peas, sweet potatoes, soy milk, and soy products are good sources of soluble fibre.
➢ **Insoluble Fibre :** It includes cellulose, hemicelluloses, and lignin (make up the structural parts of plant cell walls). It mainly increases the bulk of faeces and prevents constipation and related problems (haemorrhoids).

## Daily Intake of Fibres

- According to the government guidelines 2015, the recommended intake of fibre is as given below

| Age (year) | Recommended Intake of Fibre |
|---|---|
| 2-5 | 15g per day |
| 5-10 | 20g per day |
| 11-16 | 25g per day |
| 17-Above | 30g per day |

### In case of deficiency of fibre , one should

- Take rich fibre breakfast cereals (wholewheat biscuit, muesli without sugar, bran flakes, and porridge) and fresh fruits, seeds and nuts.
- Take wholemeal or seeded wholegrain breads.
- Take whole wheat pasta, bulgur wheat, or brown rice.
- Take potatoes with skins (baked potato, wedges) or boiled potatoes (hot or as salad).
- Try fruit, vegetable sticks, rye crackers, oatcakes, unsalted nuts, or seeds in snacks.

## Therapeutic Applications

- ✓ Dietary fibre taken in adequate amount promotes good health and provides various health benefits, like improved bowel function, controlled blood sugar level, improved gut health, and improved immunity.
- ✓ Reduced Risk of Type 2 Diabetes
- ✓ Reduced Risk of Cardiovascular Diseases
- ✓ Reduced Risk of Cancer
- ✓ Reduced Risk of Breast Cancer

# OMEGA-3-FATTY ACIDS

- → Omega-3 fatty acids are found in fish, flaxseed, and dietary supplements (fish oil).
- → ALA (Alpha-Linolenic Acid), EPA (Eicosapentaenoic Acid), and DHA (Docosahexaenoic Acid) are the three major omega-3 fatty acids.
- → ALA being an essential fatty acid, cannot be produced by the body, thus, one should get it from foods and beverages. Body can convert some ALA into very small amounts of EPA and then into DHA.
- → Consequently, the levels of these omega-3 fatty acids in the body can be increased only by getting EPA and DHA from foods and dietary supplements.
- → Omega-3 fatty acids are important components of cell membranes.

→ Retina, brain, and sperm cells have high DHA levels.
→ Omega-3s also provide calories to provide energy to the body.
→ They also have many functions in the heart, blood vessels, lungs, immune system, and endocrine system.

## Types of Food Providing Omega 3 Fatty Acids

- Omega-3 fatty acids either occur naturally in some foods or are added to some fortified foods)
- Following are the food items that provide adequate amounts of omega-3s:
    - Fish and other seafood (cold-water fatty fish, such as salmon, mackerel, tuna, herring, and sardines)
    - Nuts and seeds (flaxseed, chia seeds, and walnuts)
    - Plant oils (flaxseed oil, soybean oil, and canola oil)
    - Fortified foods (certain brands of eggs, yogurt, juices, milk, soy beverages, and infant formulas)

## Therapeutic Applications

✓ Omega-3 fatty acids reduce the risk of cardiovascular diseases.
✓ They reduce the risk of death in a person with a cardiovascular disease.
✓ They reduce the risk of sudden cardiac death due to an abnormal heart rhythm.
✓ They reduce the risk of blood clots by preventing blood platelets to clump together.
✓ They keep the lining of arteries smooth and damage free, which might otherwise make the arteries thick and hard. This prevents formation of plaque in the arteries.
✓ They slow down the production of substances involved in the body's inflammatory response
✓ They increase the levels of High-Density Lipoprotein (HDL/good cholesterol).
✓ They lower down the blood pressure.

# Spirulina

→ Spirulina is a blue green algae, Spirulina platensis or Spirulina. maxima (and belongs to family Oscillatonaceae).
→ Spirulina can be consumed by humans and other animals.
→ In spirulina, carbohydrates are mainly found in the form of glycogen and rhamnose which are easily digestible and require less insulin.
→ Vitamin content of spirulina mainly includes natural β-carotene with 9-ciscarotenoid isomer having more anti-oxidant capacity.
→ Other vitamins present in the spirulina are $B_1$, $B_2$, $B_3$, $B_6$, $B_{12}$ and $E_3$.

## Therapeutic Applications

- ✓ Spirulina shows immunostimulant activities as it stimulates the production and activity of bone marrow stem cells, macrophages, and T-cells. It also enhances the functioning of spleen and thymus gland.
- ✓ In vitro studies on spirulina have shown that it increases cell nucleus enzyme activity and DNA repair, and therefore shows anti-cancer properties.
- ✓ Its water extract inhibits HIV-1 replication in human derived T-cell lines and in human peripheral blood mononuclear cells

# CAROTENOIDS

→ Carotenoids are the pigments that occur naturally in animal and plant kingdoms.
→ This group of fat-soluble pigments contains more than 700 compounds imparting red, orange, and yellow colours.
→ Carotenoids are mostly hydrocarbons, containing 40 carbon atoms and 2 terminal rings.

## Classification

- ➢ Photosynthetic organisms (plant algae and cyanobacteria), some non-photosynthetic bacteria, and fungi produce carotenoids.
- ➢ Two classes of naturally occurring carotenoids are:
    1. **Carotenes** (β-carotene) consisting of linear hydrocarbons that can be cyclised at end or both the ends of the molecule.
    2. **Oxygenated derivatives of carotenes** (lutein, violaxanthin, , and zeaxanthin)

## Therapeutic Applications

- ✓ Vision Benefits
- ✓ Cardiovascular Benefits:
- ✓ Skin Aging Protection
- ✓ Skin Cancer Protection
- ✓ Bone Health
- ✓ Slowing Rate of Mental Decline
- ✓ Boosting lmmunity
- ✓ Reduced Risk of Breast Cancer and Prostate Cancer

# SOYABEAN

→ Soyabean (or golden bean or miracle crop) is a complete source of protein and oil.
→ Its generic name is soy (glycine soya).
→ It belongs to the legume family and was originated in China.
→ It was introduced to India across the Himalayan Mountains many years ago.
→ Soyabean is grown for their seeds and is the second largest oil seed after groundnut in India.
→ Soyabean is full of nutritional value.
→ It contains about 40-50% high quality protein and 20-22% oil.
→ Soyabeans also have some essential amino acids (5%), carbohydrates, vitamins (thiamine and riboflavin), and minerals.
→ Soyabean is cultivated in states of India, like Madhya Pradesh, Maharashtra, Uttar Pradesh, and Rajasthan.

## Therapeutic Applications

- Soyabean oil (extracted from its seed) is widely used in India as vegetable cooking oil.
- Soyabean milk is a nutritious drink as it contains the essential proteins, fibres, fatty acids, vitamins, and minerals. Thus, it maintains an optimum level of health.
- Soyabean flour is good for health and can be used as a supplement of wheat flour.
- Soyabean foods (tofu and soya yogurt) are rich source of proteins and vitamins.
- Soyabean contains low fat and almost no cholesterol.
- It contains omega-3 fatty acids, which keeps the heart healthy.
- It is an excellent source of calcium and vitamin B12

# GARLIC

→ Garlic is the fresh compound bulb of Allium sativum Linn. (and belongs to family Liliaceae).
→ It is cultivated in India, Russia, USA, Italy, and Southern Europe.
→ Garlic is being used medicinally in Egypt since ancient times.
→ Earlier, it was used in the treatment of leprosy, but later it was started to be used in the treatment of scurvy, ear aches, flatulence, etc.
→ Plentiful of minerals, vitamins, carbohydrates, amino acids, volatile oils, and other trace elements arebulbs in garlic bulbs

## Therapeutic Applications

✓ Garlic exhibits various therapeutic properties like analgesic, carminative, gastric stimulant, anticonvulsant, antibacterial, aphrodisiac, and diuretic.
✓ It aids in digestion and absorption of food.
✓ It is used in the treatment of malignant tumors, hypertension, atherosclerosis, tuberculosis, whooping cough, piles, duodenal ulcer, epilepsy, diabetes, chronic bronchitis, and bronchial asthma.
✓ It also prevents blood clotting, lowers cholesterol and blood sugar levels, and boosts immunity.
✓ Oil of garlic is used as an insecticide.