Semester- 6th
Subject: Herbal Drug Technology
Subject code: BP603
Module -2

NUTRACEUTICALS

Objectives: upon compilation of this module the student should be able to:

1. Understand the basic concept of nutraceuticals
2. Know the market growth of nutraceuticals
3. Understand about herbs used as a nutraceuticals
4. Know about the drugs used in various ailments
5. Know about the herbal-drug interactions

Learning outcomes: the student will be able to:

1. Learn the difference between pharmaceuticals and nutraceuticals
2. Learn about global market growth and scope of nutraceuticals
3. Learn about the market preparations of nutraceuticals
4. Learn about herbs used in Cancer, CVS, Diabetes and GIT as a nutraceuticals
5. Learn about various herbal drug interactions as well as Herbal Food interactions.

Introduction: Nutraceuticals are a group of products that are more than a food but less than a pharmaceuticals. It is a substance which may be regarded as a food or part of a food which provides medical or health benefits, helps in prevention and treatment of a disease. These are foods which provides health benefits to reduce the risk of chronic diseases and basic nutrition. A nutraceutical may be a naturally nutrient- rich food such as spirulina, garlic, soy or a specific component of a food like omega-3 oil from salmon. They are also known as medical foods, nutritional supplements and dietary supplements. It ranges from isolated nutrients, dietary supplements, genetically engineered „designer” foods, herbal products, and processed products such as cereals and soups. They have received considerable interest because of their presumed safety and potential nutritional and therapeutic effects. Foods and nutrients play a vital role in the normal functioning of the body. They help to maintain the health of the individual and to reduce the risk of various diseases. Worldwide acceptance of this fact formed a recognition link between "nutrition" and "health", and thus the concept of "nutraceuticals"
Classification of Nutraceuticals: The food sources used as nutraceuticals are all natural and can be categorized as

1. Dietary Fiber
2. Probiotics
3. Prebiotics
4. Polyunsaturated fatty acids
5. Antioxidant
6. Polyphenols
7. Spice
Global demand of nutraceuticals: The nutraceutical industry lies under three main segments which include functional foods, dietary supplements, and herbal/natural products. Global nutraceutical market is estimated as USD 117 billion (INR 5148 billion). In 2007, nutraceuticals sale is projected to reach $74.7 billion at an AAGR of 9.9%. This assumes a world economic recovery in 2003 and an end to price competition.
According to a recent report, the total market for nutraceuticals in India is growing at 21 percent per annum. It is currently valued at INR 44bn (€621 m), but could be worth more than INR 95bn in four years. As a concept, “Nutraceuticals” is still in its stage of infancy in India. But it has been growing much faster than global rates at CAGR of 18% for the last 3 years driven by functional food and beverages categories. The most rapidly growing segments of the industry were dietary supplements (19.5 percent per year) and natural/herbal products (11.6 percent per year).

With the ever-changing lifestyle of humans, the antioxidant defense systems are often overloaded resulting in oxidative stress. Moreover, the levels of antioxidant defense mechanism decrease appreciably with age. These may result in the development of a great many diseases. Hence research over the past several decades have primarily focussed on different nutraceuticals. Antioxidant products may either function intrinsically to scavenge free radicals (e.g. vitamins, PUFA) or specifically stimulate the body’s defense system. This review reflects the potential merits and demerits of nutraceuticals among healthy individuals. However, an individual’s susceptibility to any particular disease predominantly depends upon genetic predisposition and lifestyle disorders like smoking, high alcohol consumption. So the response of nutraceuticals can vary from person to person. Nutraceuticals have proven health benefits and their consumption (within their acceptable Recommended Dietary Intakes) will keep diseases at bay and allow humans to maintain an overall good health.
NUTRACEUTICALS AND DISEASES:

**Cardiovascular diseases:** Worldwide, the burdens of chronic diseases like cardiovascular diseases, cancers, diabetes and obesity is rapidly increasing. In 2001, chronic diseases contributed approximately 59% of the 56.5 million total reported deaths in the world and 46% of the global burden of disease. Cardiovascular diseases (CVD) is the name for the group of disorders of the heart and blood vessels and include hypertension (high blood pressure), coronary heart disease (heart attack), cerebrovascular disease (stroke), heart failure, peripheral vascular disease, etc. In 1999 CVD alone contributed to a third of global deaths and by 2010 it would be the leading cause of death in developing countries. Majority of the CVD are preventable and controllable. It was reported that low intake of fruits and vegetables is associated with a high mortality in cardiovascular disease. Many research studies have identified a protective role for a diet rich in fruits and vegetables against CVD. This apart, nutraceuticals in the form of antioxidants, dietary fibers, omega-3 polyunsaturated fatty acids (n-3 PUFAs), vitamins, and minerals are recommended together with physical exercise for prevention and treatment of CVD. It has been demonstrated that the molecules like polyphenols present in grapes and in wine alter cellular metabolism and signalling, which is consistent with reducing arterial disease. Flavonoids are widely distributed in onion, endives, cruciferous vegetables, black grapes, red wine, grapefruits, apples, cherries and berries. Flavanoids in plants available as flavones (containing the flavonoid apigenin found in chamomile); flavanones (hesperidins - citrus fruits; silybin- milk thistle flavonols (tea:quercetin, kaempferol and rutin grapefruit; rutin buckwheat; ginkgo flavonglycosides -ginkgo) play a major role in curing the cardiovascular diseases. Flavonoids block the angiotensin-converting enzyme (ACE) that raises blood pressure; by blocking the "suicide" enzyme cyclo-oxygenase that breaks down prostaglandins, they prevent platelet stickiness and hence platelet aggregation. Flavonoids also protect the vascular system and strengthen the tiny capillaries that carry oxygen and essential nutrients to all cells.

**Diabetes:** Diabetes mellitus is characterized by abnormally high levels of blood glucose, either due to insufficient insulin production, or due to its ineffectiveness. The most common forms of diabetes are type 1 diabetes (5%), an autoimmune disorder, and type 2 diabetes (95%), which is associated with obesity. Gestational diabetes occurs in pregnancy. Globally the total number of people with diabetes is projected to raise from 171 million in 2000 to 366 million in 2003. Docosahexaenoic acid modulates insulin resistance and is also vital for neurovisual development. This is especially important in women with gestational diabetes mellitus which foster the recommendation for essential fatty acids during pregnancy. Lipoic acid is a universal antioxidant, now used in Germany for the treatment of diabetic neuropathy. It is possible that lipoic acid may be more effective as a long-term dietary supplement aimed at the prophylactic protection of diabetics from complications. Dietary fibers from psyllium have been used extensively both as pharmacological supplements, food ingredients, in processed food to aid weight reduction, for glucose control in diabetic patients and to reduce lipid levels in hyperlipidemia. Good magnesium status reduces diabetes risk and improves insulin sensitivity;
chromium picolinate, calcium and vitamin D appear to promote insulin sensitivity and improve glycemic control in some diabetics; extracts of bitter melon and of cinnamon have the potential to treat and possibly prevent diabetes. However it has been suggested that Nutraceuticals with meaningful doses of combinations may substantially prevent and presumably could be marketed legally.

**Cancer:** Flavonoids which block the enzymes that produce estrogen reduce of estrogen induced cancers. Phytoestrogens is recommended to prevent prostate/breast cancer. Soy foods are source of Iso-flavones, curcumin from curry and soya isoflavones possess cancer chemo preventive properties. Lycopene concentrates in the skin, testes, adrenal and prostate protects against cancer. Saponins contains antitumor and antimutagenic activities. Curcumin (diferuloylmethane) which is a polyphenol of turmeric possesses anti-carcinogenic, antioxidative and anti-inflammatory properties. Beet roots, cucumber fruits, spinach leaves, and turmeric rhizomes were reported to possess anti-tumor activity.

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<thead>
<tr>
<th>Sr.no.</th>
<th>Disease</th>
<th>Examples</th>
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<tbody>
<tr>
<td>1</td>
<td>Alzheimer</td>
<td>Vitamin E and C, alpha-lipoic acid</td>
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<tr>
<td>2</td>
<td>Cardiovascular</td>
<td>Flavonoids (onion, black grapes)</td>
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<td>3</td>
<td>Parkinson</td>
<td>Vitamin E</td>
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<td>4</td>
<td>Obesity</td>
<td>Chitosan, fenugreek, vitamin C</td>
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<td>5</td>
<td>Diabetes</td>
<td>Calcium, vitamin D, Emblica officinalis</td>
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<tr>
<td>6</td>
<td>Osteoarthritis</td>
<td>Glucosamine, chondroitin sulfate</td>
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<td>7</td>
<td>Constipation</td>
<td>Buck wheat</td>
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<tr>
<td>8</td>
<td>Vision improving</td>
<td>Carrot, mangoes, spinach, kiwi, egg yolk</td>
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<td>9</td>
<td>Antioxidant</td>
<td>Oats, fruits, carrots</td>
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<td>10</td>
<td>Anti-inflammatory</td>
<td>Turmeric</td>
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<td>11</td>
<td>Hypertension</td>
<td>Curry leaf, green tea</td>
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<td>12</td>
<td>Hyperlipidemia</td>
<td>Emblica officinalis</td>
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Herbs as health food

1. Alfalfa: Alfalfa is an herb. People use the leaves, sprouts, and seeds to make medicine. Alfalfa is used for kidney conditions, bladder and prostate conditions, and to increase urine flow. It is also used for high cholesterol, asthma, osteoarthritis, rheumatoid arthritis, diabetes, upset stomach, and a bleeding disorder called thrombocytopenic purpura. People also take alfalfa as a source of vitamins A, C, E, and K4; and minerals calcium, potassium, phosphorous, and iron. It is used in High cholesterol. Taking alfalfa seeds seems to lower total cholesterol and “bad” low-density lipoprotein (LDL) cholesterol in people with high cholesterol levels. Kidney problems, Bladder problems, Prostate problems, Asthma, Arthritis and Diabetes

2. Chicory: Chicory (Cichorium intybus) is a perennial herbal plant of the dandelion family Asteraceae. In addition, chicory herb plays a key role as antioxidant, anti-inflammatory, sedative, immunological, productive and reproductive enhancer, cardiovascular, hypolipidemic, anticancer, anti/protozoal, gastro-protective, antidiabetic, analgesic, anthelmintic, antimicrobial, wound healing and bitter tonic without inducing therapeutic adverse effect. Also, chicory plant is a good and very important protective source for hepatocytes and other liver cells as well as it is used as prebiotic against some species of pathogenic bacteria for both in vitro and in vivo.
3. **Ginger:** It is the dried rhizomes of Zingiber officinale, belonging to family Zingiberaceae. It contains volatile oils, minerals, resins. Ginger oil contains zingiberine, bisabolone, curcumene. Resins contain phenolic keteones such as gingerols, shogoals, zingerone and other compounds. Ginger is commonly used for various types of "stomach problems," including motion sickness, morning sickness, colic, upset stomach, gas, diarrhea, irritable bowel syndrome (IBS), nausea, nausea caused by cancer treatment, nausea caused by HIV/AIDS treatment, nausea and vomiting after surgery, as well as loss of appetite. Other uses include pain relief from rheumatoid arthritis (RA), osteoarthritis, menstrual pain, and other conditions. However, there is not strong evidence to support the use of ginger for these conditions. Some people pour the fresh juice on their skin to treat burns. The oil made from ginger is sometimes applied to the skin to relieve pain. Ginger extract is also applied to the skin to prevent insect bites. In foods and beverages, ginger is used as a flavoring agent. In manufacturing, ginger is used as for fragrance in soaps and cosmetics. One of the chemicals in ginger is also used as an ingredient in laxative, anti-gas, and antacid medications.

4. **Fenugreek:** Fenugreek (Trigonella foenum-graecum) is a legume and it has been used as a spice throughout the world to enhance the sensory quality of foods. It is known for its medicinal qualities like antidiabetic, anticarcinogenic, hypocholesterolemic, antioxidant, immunological Activity etc. It contains alkaloids, flavonoids, coumarins, proteins, amino acids and steroidal saponins.

5. **Garlic:** It consists of dried bulbs of Allium sativum, belonging to the family Liliaceae. Allium sativum pulp contains vitamins especially B-1, vitamin C, vitamin A, flavonoids, ascorbic acid, phosphorous, potassium, sulphur, selenium, calcium, magnesium, germanium, sodium, iron, manganese and trace iodine. Garlic is being used from thousand of years for its medicinal properties. Numerous researches have proved its beneficial role in cardiovascular condition. Indeed, garlic does indeed have cardioprotective properties. Researches also proved its active role as anticancer, natural immunity booster, antioxidant, antibiotic & antidiabetic product. On other hand studies also report some side effects of garlic if it is used with blood-thinners, anti-HIV, or hypoglycemic drugs.

6. **Honey:** It is a sugar like secretion deposited in honey comb by the bees Apis mellifera, Apis dorsata and other species of Apis belonging to family: Apidae. Honey is an aqueous solution containing 35% glucose, 45% fructose and 2% sucrose. It is used as demulcent, sweetening agent, nutrient, antiseptic and expectorant.
7. **Amla**: Emblica officinalis (i.e., Phyllanthus emblica/ Indian gooseberry/ Amla) has been used extensively as a nutraceutical in several diseases since it is known to boost immunity and offers numerous health benefits such as antioxidant, anti-inflammatory, and anti-aging effects. Phytochemically, it is composed of several bioactive compounds such as flavonoids (i.e., Quercetin, Kaempferol), phenolic compounds (i.e., gallic acid, methyl gallate, ellagic acid, trigallayl glucose), tannins (i.e., Emblicanin A and B, phyllaemblicin B, punigluconin, pedunclagin, Chebulinic acid, Corilagin, Geraniin, Ellagotannin), amino acids (i.e., glutamic acid, aspartic acid, alanine, lysine, proline, cystine), fatty acids (i.e., stearic acid, oleic acid, palmitic acid, myristic acid, linolenic acid, linoleic acid), alkaloids (i.e., Phyllantine, Phyllembein, Phyllantidine), pectin, citric acid, ascorbic acid (Vitamin C), cellulose, gum, and albumin. It is used in the treatment of Anaemia, Diarrhoea, and Jaundice etc.

8. **Gingeng**: It consists of roots of the plant Panax gingeng and other species of pabax belonging to the family Araliaceae. It contains saponins, glycosides, volatile oil, sterols, polysaccharides, minerals vitamin-B, biotin etc. Ginseng has beneficial antioxidant and anti-inflammatory properties. Ginseng could help improve brain functions like memory, behavior and mood. Ginseng has been shown to benefit mental functions, feelings of calmness and mood in both healthy people and those with Alzheimer's disease.

9. **Ashwangandha**: It consist of dried roots and stem bases of the plant Withania somnifera belonging to the family Solanaceae. The name “ashwagandha” is derived from two Sanskrit words: “ashwa” meaning “horse” and “gandha” meaning “smell,” which roughly translates to “horse-like smell,” or “horse essence,” which could be a reference to the traditional belief that the root provides the strength, character, essence, or stamina of a stallion. Ashwagandha, has health benefits which are as follows such as it controls cholesterol levels, increases fertility in men, reduces anxiety, relieves stress, fights diabetes, controls hair fall, hindres, treat osteoporosis, rheumatic arthritis, treats cancer, increases blood production, prevents seizures, aids in muscle growth, stimulates the thyroid gland, reduces ocular diseases, anti-tumor, anti-inflammatory and antibacterial properties etc.

10. **Spirulina**: Spirulina is a biomass of cyanobacteria (blue-green algae) that can be consumed by humans and animals. The two species are Arthrospira platensis and A. maxima. As an ecologically sound, nutrient-rich dietary supplement, spirulina is being investigated to address food security and malnutrition, and as dietary support in long-term space flight or Mars missions. Its advantage for food security is that it needs less land and water than livestock to produce protein and energy. Dried spirulina contains 5% water, 24% carbohydrates, 8% fat, and about 60% (51–71%) protein (table). Provided in its typical supplement form as a dried powder, a 100-g amount of spirulina supplies 290
kilocalories (1,200 kJ) and is a rich source (20% or more of the Daily Value, DV) of numerous essential nutrients, particularly protein, B vitamins (thiamin, riboflavin, and niacin, providing 207%, 306%, and 85% DV, respectively), and dietary minerals, such as iron (219% DV) and manganese (90% DV) (table). The lipid content of spirulina is 8% by weight (table) providing the fatty acids, gamma-linolenic acid, alpha-linolenic acid, linoleic acid, stearidonic acid, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and arachidonic acid.

Herbal- drug and Herb Food Interactions

Introduction: According to the World Health Organisation, herbal medicines are defined as ‘finished, labelled medicinal products that contain as active ingredients aerial or underground parts of plants, or other plant material, or combinations thereof, whether in the crude state or as plant preparations. Plant material includes juices, gums, fatty oils, essential oils, and any other substances of this nature. Herbal medicines may contain excipients in addition to the active ingredients. Medicines containing plant material combined with chemically defined active substances, including chemically defined, isolated constituents of plants, are not considered to be herbal medicines. Thus, herbal medicines contain a combination of pharmacologically active plant constituents that are claimed to work synergistically to produce an effect greater than the sum of the effects of the single constituents. There is a general belief by the public that herbal medicines are safe because they are natural. However, this is a hazardous oversimplification. Many different side effects to herbs have been reported and recently reviewed, including adverse events caused by herb-to-drug interactions. Since all herbal medicines are mixtures of more than one active ingredient, such combinations of many substances obviously increase the likelihood of interactions taking place. Hence, theoretically, the likelihood of herb-to-drug interactions is higher than drug-to-drug interactions, if only because synthetic drugs usually contain single chemical.

Mechanisms of Herb-to-Drug Interactions:

Herb-to-drug interactions are based on the same pharmacokinetic (changes of plasma drug concentration) and pharmacodynamic (drugs interacting at receptors on target organs) principles as drug-to-drug interactions.

The pharmacokinetic interactions that have been identified so far all point towards the fact that a number of herbs, most notably St. John’s wort, can affect the blood concentration of different conventional medicines that are metabolized by cytochrome P450 (CYP, the most important phase I drug-metabolizing enzyme system) and/or are transported by P-glycoprotein (a glycoprotein which influences drug absorption and elimination by limiting the
cellular transport from the intestinal lumen into epithelial cells and by enhancing the excretion of drugs from hepatocytes and renal tubules into the adjacent luminal space). Polymorphisms in the genes for CYP enzymes and P-glycoprotein may influence the interactions mediated through these pathways [12]. Probe drugs used in pharmacokinetic trials include midazolam, alprazolam, nifedipine (CYP3A4), chlorzoxazone (CYP2E1), debrisoquine, dextromethorphan (CYP2D6), tolbutamide, diclofenac and flurbiprofen (CYP2C9), caffeine, tizanidine (CYP1A2) and omeprazole (CYP2C19). Fexofenadine, digoxin and talinolol have been extensively used in pharmacokinetic trials as P-glycoprotein substrates.

**Pharmacodynamic interactions** have been less studied but may be additive (or synergetic), i.e. the herbal medicines potentiate the pharmacological/toxicological action of synthetic drugs, or antagonistic, i.e. the herbal medicines reduce the efficacy of synthetic drugs. Warfarin interactions are a classical example of pharmacodynamic interactions. Theoretically, increased anticoagulant effects could be expected when warfarin is combined with coumarin-containing herbs (some plant coumarins exert anticoagulant effects) or with antiplatelet herbs. Conversely, vitamin K-containing herbs can antagonize the effect of warfarin (the action of warfarin is due to its ability to antagonize the cofactor function of vitamin K).

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**Source:** Laurence L. Brunton, Randa Hilal-Dandan, Björn C. Knollmann: Goodman & Gilman's: The Pharmacological Basis of Therapeutics, Thirteenth Edition: Copyright © McGraw-Hill Education. All rights reserved.
Study of drugs and their side effects and interactions:

1. **Hypericum**: St. John’s Wort (Hypericum perforatum) extracts are widely used as a safe alternative to conventional antidepressant drugs for mild to moderate forms of depressive disorders. The herb contains numerous compounds with documented biological activity, including the naphthodianthrone hypericin, a broad range of flavonoids, and the phloroglucinol hyperforin, which inhibits the re-uptake of several brain neurotransmitters, including 5-hydroxytryptamine (5-HT, serotonin). Pharmacodynamic interactions may occur when St. John’s wort is given together with drugs that enhance 5-HT signaling in the brain (e.g. 5-HT re-uptake inhibitors, 5-HT ligands). St. John’s wort has been shown to clinically interact with a number of conventional drugs mostly via these pharmacokinetic and/or pharmacodynamic mechanisms; such interactions take place with immunosuppressants (cyclosporine, tacrolimus, prednisone), hormones (oral pill, tibolone), cardiovascular drugs (the anticoagulants warfarin and phenprocoumon, the cardiac inotropic drug digoxin, the antilipidaemic drugs simvastatin, rosuvastatin and atorvastatin, the calcium blockers nifedipine and verapamil.

2. **Kava- kava**: Preparation from the rhizome and roots of Piper methysticum (Fam. Piperaceae) are used for the treatment of anxiety, and the available evidence suggests that kava extracts are superior to placebo for treating patients with anxiety disorders. Unfortunately, in the UK and various other European countries, the sale of kava is currently prohibited due to reports of potential hepatotoxicity. In vitro, kavalactones, the active ingredients of kava, have been shown to be potent inhibitors of several enzymes of the CYP450 system. However, clinical trials have shown that, at therapeutic doses, kava inhibits CYP2E1 but not other CYP isoforms, such as CYP3A4, CYP2D6 or CYP1A2. Some possible pharmacodynamic interactions, highlighted by single case reports have been postulated to occur when combining kava with benzodiazepines, anti-Parkinson or antidepressant drugs.

3. **Ginkobiloba**: Extracts from the leaves of the ginkgo tree (Ginkgo biloba, Fam. Ginkgoaceae) are used for the treatment of cognitive impairments, dementia, intermittent claudication and tinnitus. The effect of ginkgo on various CYP isoforms as well as on P-glycoprotein has been investigated in a number of clinical trials by using different probe drugs, such as alprazolam, midazolam, diazepam, nifedipine (CYP3A4), caffeine (CYP1A2), chlorzoxazone (CYP2E1), debrisoquine (CYP2D6), tolbutamide, diclofenac, flurbiprofen (CYP2C), omeprazole, voriconazole (CYP2C19), fexofenadine, digoxin and talinolol (P-glycoprotein substrates). It is often mentioned that ginkgo can interact with anticoagulant drugs. Clinical trials have also shown that ginkgo has no additive effect with aspirin on platelet aggregation, does not change the antiplatelet activity of clopidogrel and cilostazol.
4. **Ginseng**: Panax quinquefolius (Fam. Araliaceae), commonly known as ‘American ginseng’, is a herbaceous perennial herb native to North America. A clinical study showed that American ginseng reduced the anticoagulant effect of warfarin in healthy volunteers. On the other hand, two clinical trials have recently shown that American ginseng did not affect the pharmacokinetics of the antiretroviral drugs indinavir and zidovudine.

5. **Garlic**: (Allium sativum L., Fam. Alliaceae) is used in modern phytotherapy to treat hypercholesterolaemia and prevent arteriosclerosis although the clinical evidence is far from compelling. Garlic preparations include garlic powder standardized to contain 1.3% alliin and 0.6% allicin, garlic aged extract, which does not contain allicin but is high in water soluble phytochemicals, such as diallyl sulphides and garlic oil (i.e. essential oil obtained from the distillation of the cloves). Two garlic preparations, namely garlic oil and garlic powder, have been evaluated for their potential to affect CYP enzymes in clinical trials. The results suggest that garlic oil may selectively inhibit CYP2E1, but not other CYP isoforms (such as CYP1A2, CYP3A4 or CYP2D6) and that garlic powder has no effect on CYP3A4 [54,55,56,57,58]. Recently, it has been shown that a 21-day garlic treatment (aged garlic extract) induces intestinal expression of P-glycoprotein without affecting intestinal or hepatic CYP3A4 in humans.

6. **Pepper**: The black pepper (Piper nigrum L) vine and its extracts have been used as a folk medicine in a variety of cultures and are the source of the most commonly used spice worldwide. The chemical piperine is a major bioactive component present in black pepper (and white pepper as well) that has numerous reported physiological and drug-like actions. The various evidences shows that black pepper may have health benefits, particularly in enhancing digestive tract function. There is suggestive evidence that black pepper piperine may have nervous system benefits and may influence body energy usage in rats. Preliminary evidence in cell culture studies suggests that black pepper contains antioxidant constituents and possesses anti-inflammatory and antimicrobial properties.

7. **Ephedra**: Ephedra is an herb. Usually, the branches and tops are used to make medicine, but the root or whole plant can also be used. Ephedra is banned in the U.S. due to safety concerns. Ephedra is used for weight loss and obesity and to enhance athletic performance. It is also used for allergies and hay fever; nasal congestion; and respiratory tract conditions such as bronchospasm, asthma, and bronchitis. It is also used for colds, flu, swine flu, fever, chills, headache, inability to sweat, joint and bone pain, and as a “water pill” to increase urine flow in people who retain fluids. Ephedra contains a chemical called ephedrine. Ephedrine stimulates the heart, the lungs, and the nervous system.