

SHREE H. N. SHUKLA INSTITUTE OF PHARMACEUTICAL EDUCATION
AND RESEARCH



B.PHRAM
(SEMESTER –VI)

SUBJECT NAME: HERBAL DRUG TECHNOLOGY

Chapter 2:NEUTRACEUTICALS

SUBJECT CODE: BP603TP

UNIT-II 7 Hours

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.

Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

Topic include:

NUTRACEUTICALS

- + Definition
- + Scope of nutraceuticals
- + Global market overview and growth of nutraceutical segment
- + Nutraceuticals also known as
- + Objects
- + Introduction
- + Classification
- + Use in disease
- + Study of the following herbs as health food
- + Alfalfa
- + Chicory
- + Ginger
- + Fenugreek
- + Garlic
- + Honey
- + Amla
- + Ginseng
- + Ashwagandha
- + Spirulina
- + Role of nutraceuticals in diabetes
- + Role of nutraceuticals in cardio vascular system
- + Role of nutraceuticals in cancer
- + Role of nutraceutical in irritable bowel diseases
- + Role of nutraceuticals in GIT

INTRODUCTION:

- The term was coined in 1989 by Dr. Stephen De Felice (Chairman of the Foundation for Innovation in Medicine)
- The term is intended for a nutritional supplement that is sold with the intent to treat or prevent disease and does not have any regulatory definition. Hence a “Nutraceutical” is any substance that may be considered a food or part of a food which provides medical or health benefits, encompassing, prevention and treatment of diseases.

DEFINITION:

- A nutraceuticals is a substance that is food or a part of food treatment of diseases
- Nutraceutical can be defined as a food or a part of food or a nutrient, which in addition to its nutrient values provides health benefits including promotion of health and prevention of disease

Nutrition + Pharma →NUTRACEUTICALS

“Food as Medicine”

Most of the diseases such as Diabetes, cardiovascular, obesity, etc. occur due to incorrect diet and life style. Hence nutraceuticals play an important role in disease prevention as well as promoting health.

Objects

- Increase Nutritional factor of food
- Activate immunity
- Increase feed consumption
- Induce maturation
- Antimicrobial capability
- No negative environment impact or Hazardous problems

Nutraceuticals also known as:

- Phytoceuticals
- Phytochemicals
- Phytonutrients
- Phytofoods
- Functional foods

GLOBAL MARKET OVERVIEW AND GROWTH OF NUTRACEUTICAL SEGMENT

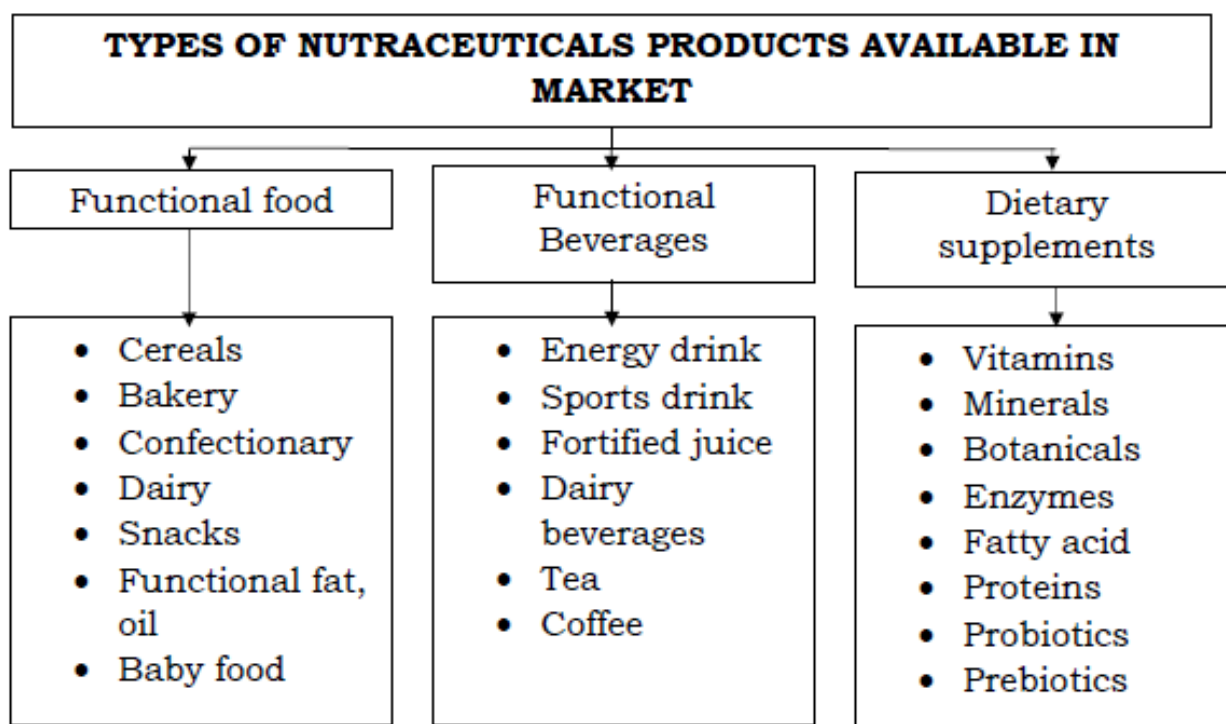
- The nutraceutical market is predicted to record a revenue of USD 671.30 billion by 2024
- Developing countries have a high prevalence of non communicable diseases like cancer, diabetes, cardiovascular ailments, etc. Therefore the demand for nutraceuticals is expected to rise in these nation
- Nutraceuticals are also gaining global importance and have become a part of daily diet due to increased risk of diseases due to improper life style and people continuously adapting preventive healthcare measures \
- The gradually increasing healthcare expenses are also stimulating the demand for nutraceuticals
- Developed countries like united states and Europe have seen a fast emerging segment of customized products especially functional foods and beverages.
- Nutraceuticals have become an opportunity for economic growth of many developing countries which have a rich source of medicinal herbs and traditional knowledge of such plants, especially India, china and south American countries
- Nutraceuticals strengthens the body defence mechanism and improves the body's immunity towards the disease.

TOP GLOBAL COMPANIES DOMINATING THE NUTRACEUTICAL MARKET:

- Top global companies dominating the global market include, pepsico, Kelloggs, Herblife, Suntory, Nestle, Amway, Coca cola, Quest nutrition, Natures bountry inc, Post holdings inc and clif bar are the major manufacturers in functional beverages and protein industry.

SCOPE OF NUTRACEUTICALS:

- Nutraceuticals are expected to deliver promising outcomes in the prevention and occurrence of various diseases resulting due to improper lifestyle and food habits.
- Various constituent of plant like catechins, carotenoids, lycopene, polyphenols, PUFA, etc., have been very effective in the prevention and occurrence of various diseases like cardiovascular, arthritis, cancer, Gastrointestinal disorder etc.



CLASSIFICATION:

It may classified based on:

1. Natural source
2. Pharmacological condition
3. Chemical constituents

Classification:**Based on their source**

1. PLANT: Tomato, garlic, Momordica
2. ANIMAL: Shark liver oil, cod liver oil
3. MINERALS: calcium, Magnesium, Phosphorous
4. MICROORGANISM: Bifidobacterium, Lactobacilli

Classification based on their chemical groupings

1. INORGANIC MINERAL SUPPLEMENTS: Minerals
2. DIGESTIVE ENZYMES: Enzymes
3. PROBIOTICS: Helpful bacteria
4. PREBIOTICS: Digestive enzymes
5. DIETARY FIBRES: Fibres
6. ANTIOXIDANTS: Natural antioxidants
7. PHYTOCHEMICALS:

a)	Fatty acids	omega 3 fatty acid
b)	Isoprenoids	carotenoids
c)	Lipids	Spingolipids

Inorganic Mineral Supplements:

Calcium, Magnesium, manganese, boron, Copper, Zinc

Probiotics:

Live active microorganisms which when administered in adequate amount acquires health on the host
e.g. E.Coli, Bacillus species, species of Lactobacillus

Probiotics:

Non digestible substance provide beneficial physiological effect for host by stimulating the favorable growth of limited number of indigenous bacteria **e.g.** Inulin, Oligofructose

Dietary Fibers:

Structural carbohydrate of plants

Neither digested nor absorbed

Insoluble fibers:

- Absorption of water in GIT
- Speeds up digestion and elimination time
- Increased stool weight
- Promotes regular eliminates
- **e.g.** cereals, wheat product, Brown rice, Fruits & veg with peels

Soluble fibers:

- Lowers serum cholesterol
- Regulates blood sugar level
- **e.g.** Oats, Dried beans, Legumes, Fruits, Vegetables

Antioxidants:

Anti-oxidants are in 3 categories:

- True antioxidant
- Reducing agents
- Antioxidant synergists

Antioxidants deficiency cause disease like cancer, Rheumatoid arthritis, cardiovascular system, Alzheimer disease

True antioxidants:

React with free radical and block chain reaction

Reducing:

It have low redox potential, readily get oxidized and effective against oxidizing agents

Synergistics:

It enhance the effect of other antioxidants

Use in disease:

CONDITION	NUTRACEUTICALS
Allergy relief	Ginkgo biloba
Arthritis support	Glucosamine
Cancer preservation	Flax seed, Green tea
Cholesterol lowering	Garlic
Digestive support	Digestive enzyme
Diabetic	Garlic, Momordica
Female hormone support	Black cohosh, flash unicorn
Immunomodulator	Ginseng
Prostate	Tomato lycopenes

ALFALFA**FAMILY:**

Fabaceae / Leguminosae

SPECIES: *medicago sativa*

ACTIVE CONSTITUENTS:

carotenoids, Triterpenoid saponin, Isoflavonoid

PART USED:

Herb

HERBAL USES:

Arthritis, high cholesterol, diabetic, Peptic ulcer and it has diuretic and emetic

CHICORY

SYNONYM:

kaasani

BIOLOGICAL SOURCE:

Dried leaves and roots of *Cichorium intybus*

FAMILY:

Compositae

ACTIVE CONSTITUENTS:

Flavonoids, tannin, triterpenoids, umbeliferon, scopoletin

HERBAL USES: Jaundice, liver problem, Diabetes, intestinal worms

GINGER**BIOLOGICAL SOURCE:**

Zingibar officinalis

FAMILY:

Zingiberaceae

ACTIVE CONSTITUENTS:

Gingerol, shagol, Zingiberin, Starch, Zingeberol

HERBAL USES:

Boost digestion, control Nausea, Reduce arthritis, Increase blood flow, prevent cancer, Decrease cholesterol

FENUGREEK

SYNONYM: Medhika, Methi

BIOLOGICAL SOURCE: Dried ripe seeds of *Trigonella Foenum*

FAMILY: Leguminoseae

ACTIVE CONSTITUENTS: Fenugreekine, trigonellin, Diosgenin

HERBAL USES: Diabetes, Hyperlipidemia, Hypercholesterol, ulcer, upper respiratory tract infection, Arthritis

GARLIC**SYNONYM:** Lasun**BIOLOGICAL SOURCE:** Dried bulbs of *Allium sativum***FAMILY:** Liliaceae**ACTIVE CONSTITUENTS:** Allicin, Allyl propyl disulphide, selenium, scordinins**HERBAL USES:** Hypertension, Diabetes, Hypercholesterol, Hyperlipidaemia, Flatulence, spasm**HONEY****SYNONYM:** Madhu**BIOLOGICAL SOURCE:** Sugar secretion deposited in honey comb by bees *Apis mellifera*, *Apis dorsata***FAMILY:** Apidae**ACTIVE CONSTITUENTS:** Glucose, Fructose, Dextrin, Maltose, Formic acid, Acetic acid**HERBAL USES:** Nutritive and in cough**AMLA****SYNONYM:**

Amalaki, Indian Gooseberry

BIOLOGICAL SOURCE: Dried ripe fruits of *Phyllanthus emblica***FAMILY:** Euphorbiaceae**ACTIVE CONSTITUENTS:** Gallic acid, Ellagic acid, vit C, Amino acid, Phyllembin**HERBAL USES:** Powerful antioxidant, accelerates the cell regeneration, Building the body's immune system**GINSENG****SYNONYM:** Ninjin**BIOLOGICAL SOURCE:** Dried roots of *Panax ginseng* (Korea) *Panax quinquefolium***FAMILY:** Araliaceae

ACTIVE CONSTITUENTS:

Oleanic acid, Panaxodiol, Panaxotriol, Dammarol

HERBAL USES:

Stress, Fatigue, Erectile dysfunction, Hyperglycemia, Aging, cvs, Menopausal symptoms

ASHWAGANDHA

SYNONYM: Withania

BIOLOGICAL SOURCE: Dried roots of *Withania somnifera*

FAMILY: solanaceae

ACTIVE CONSTITUENTS:

Triacontane, Dihydroxystigmasterol, Withamine, Somnine, Amino acid, Withanolides, withaferine A

HERBAL USES:

Sedative, Diuretics, Emetic, Dyspepsia, Flatulence, Asthma, Nervic tonic,

Liver complains

SPIRULINA

BIOLOGICAL SOURCE: Blue green algae, *Spirulina platensis* & *Spirulina maxima*

FAMILY: Oscillatoriaceae

ACTIVE CONSTITUENTS:

Beta carotene, protenous nitrogen, lipid, vitamin F , Fatty acid, Phycobiliprotein, glycogen, rhamnose

HERBAL USES:

Immunostimulatory, Hypolipidemic antiviral, Anti-inflammatory and anticancer effects

NUTRACEUTICALS IN DIABETES:

➤ Diabetes mellitus is characterized by abnormal high level of blood glucose or either due to insufficient insulin production

Common form

1. Type I (5%) autoimmune disorder
2. Type II (95%) obesity

Role of Nutraceuticals:**✓Lipolic acid**

– Universal antioxidant for treatment of Neuropathy. It is a possible at more effective as a long term dietary supplement

✓Dietary fibres

-used for both pharmacological and food supplements, possess reduction in weight by glucose and lipid control

They are two types in fruits, viz. water soluble fiber and water insoluble fiber. They are present in fruits, vegetable, grains, legumes etc. They are used to correct constipation, bowel irregularities, Haemorrhoids.

NUTRACEUTICALS IN CARDIO VASCULAR SYSTEM:

➤CVS disorder is a disorder of heart and blood vessels and Hypertension, Congestive Heart Failure, Stroke, Peripheral vascular disease and etc.

➤Majority CVS disorder are preventable

Role of Nutraceuticals:

✓Nutraceuticals in form of antioxidant, dietary fibers, vitamin, minerals are used with physical exercise for prevention and treatment of CVS disorder

✓Polyphenol present in grape wine reduce arterial disease

✓Flavonoids are widely distributed in onion, black grapes, red wine, apple, cherries

✓Flavonoids are available as flavones (Chamomile) flavonones (Citrus fruit) for curing cvs disorder

✓Flavonoids protect vascular and capillaries that supply oxygen and nutrients

NUTRACEUTICALS IN CANCER

- ✓ A disease caused by uncontrolled division of abnormal cells in the part of body
- ✓ They may be malignant or Benign

Role of Nutraceuticals:

Nutraceuticals have ability to control and regulate the DNA damaging factor in cancer cells

✓It posses therapeutic benefits like Anti-obesity, immunity enhancement, cardiovascular, Anti-diabetic effects

✓It has proven to be potential to interfere even at late stage cancer and alter the metastatic spread of cancer by increasing the phytochemicals

✓By utilizing daily diet of nutraceuticals specific sides to entire gene combination found in particular form of cancer

NUTRACEUTICAL IN IRRITABLE BOWEL DISEASES:

➤Irritable Bowel syndrome is a chronic gastrointestinal that are characterized by abdominal pain or discomfort at least 3 days and change is frequency and form of stool.

Role of Nutraceuticals:

- ✓ Nutraceuticals such as bioactive peptides, phytochemicals, omega-3-poly unsaturated fatty acids.
- ✓ Dietary supplements such as fish oil, curcumin, aloe vera treat bowel syndrome
- ✓ Curcumin and green tea supplementation cause reduction in IBD
- ✓ Bifidobacterium infantis over Lactobacillus and placebo treat abdominal pain or discomfort and bowel movement difficulty.

NEUTRACEUTICALS IN GIT;

- ✓ The GIT disorder is refer to any condition or disease within the GI tract (from mouth to Anus). This also includes liver, Pancreas, Gall bladder

HERBAL DRUG AND HERB FOOD INTERACTION**Definition:**

It is defined as an *“alteration in the duration or magnitude of pharmacological effect of one drug produced by another Herb food or other substance”*.

Drug interaction is a reaction between two or more drugs or between a drug and a food, beverage or supplement inside the body.

A drug interaction can make the drug less effective, Increased activity or cause unwanted side effects.

Types of Drug Interaction:

- Drug- Drug interaction
- Drug- food interaction
- Drug-Disease interaction

DRUG-DRUG INTERACTION:

Most common type of drug interaction. More the medications administered, greater is the chance of drugs interacting with each other. One drug may potentiate the activity of another or inhibit its activity or serious unexpected side effects may occur.

E.g. Vicodin a pain killer when taken along with sedating antihistamine drug that produce additive effect of drowsiness

DRUG-FOOD INTERACTION:

This is another type of drug interaction where drugs interact with food/ Beverage and can produce various side effects.

E.g. Grape juice reduces the enzyme activity in liver which are responsible for metabolizing drug thus resulting in increased blood levels of certain drugs such as cholesterol lowering drugs (Statins), this leads to toxic effects of the drug such as muscle pain and muscle injury.

DRUG-DISEASE INTERACTION:

Sometimes drugs also interact with certain diseases where the disease alter the way a drug works.

E.g. Oral decongestants like pseudoephedrine, Phenylephrine may increase the Blood Pressure and can be dangerous in patients having hypertension.

MECHANISM OF DRUG INTERACTIONS:

PHARMACODYNAMIC	PHARMACOKINETIC
	Absorption Distribution Metabolism Excretion

PHARMACODYNAMIC INTERACTION:

This occurs when two or more drugs administered together act at the similar receptor sites leading to enhancement (additive or synergistic) effects or decreased (antagonistic) effects.

E.g. Chlorpromazine given to prevent nausea and vomiting interacts with antipsychotic medications like haloperidol and produce serious and possible fatal irregular cardiac rhythm.

PHARMACOKINETIC INTERACTION:

This occurs when drugs interact during the process of Absorption, Distribution, Metabolism and/or Excretion.

ABSORPTION INTERACTIONS:

Some drugs can alter the absorption of another drug E.g. calcium can bind with some drugs like tetracycline and HIV drug dolutegravir and block its absorption, Hence such drug should not be taken along with milk and antacids.

**** Pharmacodynamic interactions occur due to the Pharmacological effects of drugs ****

DISTRIBUTION INTERACTIONS:

One or more drugs can compete with each other for plasma protein binding sites resulting in displacement of one drug thereby increasing its blood levels and toxicity.

E.g. Fenofibric acid (cholesterol lowering agent) and warfarin (blood thinner) when administered together, compete for the protein binding sites leading to displacement and increased blood levels of warfarin thus resulting in bleeding.

METABOLISM INTERACTIONS:

Enzymes in the liver such as cytochromes are responsible for metabolizing drugs and eliminating them from the body. Some drugs may alter the enzyme levels or its activity resulting in fast or slow metabolism of drugs.

E.g. DILTIAZEM (Anti-hypertensive) inhibit the cytochrome enzyme responsible for metabolizing SAMVASTATIN (Hypo-cholestremic) and elevates its blood levels resulting in serious liver and muscle side effects.

EXCRETION INTERACTIONS:

Some Non-steroidal Anti-Inflammatory Drugs (NSAID's) like indomethacin may lower the kidney function and reduce the excretion of lithium, a drug used for bipolar disorders. In such cases dose adjustment is required.

HERB-DRUG / FOOD INTERACTIONS:

- Even though herbal medicines are obtained from natural sources, their active ingredients are potent chemicals which can give rise to herb-drug or herb-food interactions. Herbal supplements and nutraceuticals are been purchased over the counter (OTC) and may be labelled as “All Natural” but that does not mean they are always safe.
- Herbal supplements are not subject to review by the FDA and their use can often be risky when taken along with other drugs or foods.

MINIMIZING HERB-DRUG / HERB-FOOD INTERACTIONS:

- Avoid taking mucilage containing herbs like ISPHAGULA, flax with other drugs, as mucilage can inhibit the absorption of many drugs. Even mucilage containing drugs can alter the blood sugar levels which have to be considered in case of diabetic patients. Spicy substances such as ginger, capsicum, etc can enhance the absorption rate of some drugs, Hence they need to be taken one hour after drug administration.
- Heart tonic herbs such as hawthorn/ digitalis/ cactus, should be avoided when taking

heart medications.

- Caffeine containing herbs like green tea, kola nut, coffee and herbal stimulants likeephedra should be avoided when taking heart medications or mood altering drugs or antidepressants.
- Avoid herbs or formulations containing liquorice when using diuretics like furosemide because liquorice can cause potassium depletion from the body.
- While taking anti-depressants like mono amino oxidase (MAO) inhibitors, avoid African aphrodisiac herbs containing YOHIMBINE.Green vegetables like broccoli, spinach, cabbage, etc which have high vitamin-k content are reported to interact with anticoagulant drugs as vitamin-K has coagulation promoting effects.
- Grape fruit juice interacts with calcium channel blockers (antihypertensive), lipid lowering drugs, psychiatric medications, oral contraceptives and antiallergic medication. Grape juice modified the metabolism pattern of these drugs in the liver.

a) HYPERCIUM

Hypercium is a flowering plant in hypericaceae family. It is most commonly used for depression, Anxiety, Menopause

INTERACTION:

- Hypercium + Anti-biotic, Anti- depressant, oral contraceptives, immune suppressants, sedatives
- Hypercium + Anti-depressants: Increase 5HT may cause some problems such as Hallucination, confusion, fever, sweating.

SIDE EFFECTS:

- Dizziness
- Anxiety
- Restlessness
- Diarrhea
- Tiredness

USES:

- Depression

- Menopause
- Somatization disorder
- Wound healing
- Irritant bowel disease

HYPERICUM PERFORATION (St. John, s Wort)

- It is a popular herb used to treat mild depression.
- The active constituent of this herb is known as “hypericin” which has similar effects on the brain as that of mono amino oxidase (MAO) inhibitors(antidepressant)
- If taken together, it may produce dangerous drug interactions resulting in rapid rise in blood pressure, severe head ache, collapse and death.
- Foods such as cheese, chicken liver, fish, legumes, soya sauce should be avoided with this drug.
- Hypericin has also reported to produce interactions with immune suppressant drug cyclosporine, anti viral drug indinavir, oral contraceptives, digoxin.
- Benzodiazepines are resulting in increased sensitivity to light, anxiety, dizziness, dry mouth, fatigue and sexual dysfunctions.

b) KAVA-KAVA (Piper methysticum)

- It is a root found on south-pacific Island. It has calming effect, producing in brain similar to the drug Diazepam
- It can also prevent convulsion and relax muscle
- But it is not on additive
- It is available as dietary supplement in powder and Tincture form

INTERACTION:

- It should not be taken with drugs which act on nervous system such as barbiturates, antidepressants, antipsychotics and alcohol.

Because psychotropic medicines are used to treat psychiatric disorder, Antidepressant and alcohol has sedating effect

- It is reported that concomitant use of kava with central nervous system depressant can increase the risk of drowsiness and motor reflex depression.
- Kava has also reported to produce hepatotoxic effects when taken with some drugs.

SIDE EFFECT:

- May cause Liver failure and should not use longer 3months
- Rashes
- Shortness of breath
- Swelling

USES:

- Anxiety, restlessness
- Insomnia, relieve pain
- Anti-depressant
- Anticonvulsant effect
- Muscle relaxing
- Anxiety, restlessness
- Insomnia, relieve pain
- Anti-depressant
- Anticonvulsant effect
- Muscle relaxing

c) GINKGO BILOBA (Maiden hair tree)

- It is a fan shaped leaves tree. It is taken by mouth for memory disorder including Alzheimer's disease

- It is also used for condition due to reduce blood flow in brain. This leads to memory loss, Headache, Dizziness.

INTERACTION:

- Ginkgo + Ibuprofen: Both drugs can slow blood clotting. On combination, there is too much of slow blood clotting, It may chance of bleeding and bruising
- Ginkgo+ Anti-coagulant: It may also have chance of bleeding and bruising
- Ginkgo + warfarin: Both drugs can slow blood clotting. It may also chance of bleeding and bruising.

SIDE EFFECTS:

Their seeds may contain toxin and cause effects like

- Seizure
- Loss of consciousness

USES:

- Glaucoma
- Heart disease
- High cholesterol
- Schizophrenia
- Control blood pressure
- It has been used to treat symptoms of Alzheimer, Dementia, Parkinson's disease and to enhance the memory capabilities.

d) GINSENG (Panax ginseng)

- American Ginseng (*Panax quinquefolis*) is on herb used for fight infection such as cold and flu and makes symptoms milder when infection occurs
- Ginseng is used to improve the body's resistance to stress, boost the immune system and improve the sense of wellbeing and stamina

INTERACTION:

- Ginseng + Anti-depressant: Stimulate the body
- Ginseng + Anti-diabetes: Both drugs lower blood sugars. On combination, it may cause too low level of blood glucose

SIDE EFFECTS:

- Headache
- Restlessness
- Insomnia

USES:

- Improves digestion
- Treat infection of intestine
- Treat vomiting, inflammation of colon
- Anemia treatment

e) GARLIC (Allium sativum)

- Garlic is a plant in the Allium (onion) family. It can relieve sickness including common cold. Improve the function of immune system. Also reduces cholesterol.

INTERACTION:

- Garlic + Warfarin: Garlic increases warfarin effect. It may chance of bruising and bleeding
- Garlic + Isoniazid, saquinavir, cyclosporine: Do not take in combination because Garlic, may quickly breakdown the Isoniazid, saquinavir and decreases their effect

SIDE EFFECTS:

- Bleeding disorder
- Digestion problem
- Low Blood Pressure
- Burn sensation in mouth and stomach

USES:

- Atherosclerosis
- Diabetes
- Hyperlipidemia
- High Blood Pressure
- Ring warm
- Some cancer

**** Grape juice decreases the activity of cytochrome P450 3A4 enzyme that are responsible for breaking down many drugs and toxins. ****

**** Grape juice contain compounds known as Furanocoumarins, that Block the CYP 3A4 enzymes ****

f) PEPPER (Piper Nigrum)

- Most commonly used species of dried unripe fruit.
- It is taken by mouth for arthritis, Asthma, Stomach upset, Headache, Sinus Infection

INTERACTION:

- Pepper + cyclosporine: Increase their effect and increase in interaction
- Pepper + Lithium: Diuretic effect decreases the level of lithium
- Pepper + Anti diabetic: Leads to decreases the blood sugar level
- Pepper + Anti-coagulant: Shows the blood clotting and increase the chances of bruising and bleeding

SIDE EFFECTS:

- Allergic reactions in some patient
- Burning
- Nausea
- Sneezing

USES:

- Diarrhoea

- Cancer
- Pain
- Stomach upset

g) EPHEDRA (*Ephedra gerardiana*)

- It is an herbal for asthma, bronchitis, allergies, cold, flu symptoms.
- Also for weight loss

INTERACTION:

- Ephedra + Theophyllin: Asthma, Chronic bronchitis
- Ephedra+ MAO, Nardil: Risk of increase blood pressure
- Ephedra should not combine with stimulant drugs (Caffeine).It may cause additive

Effect

SIDE EFFECTS:

- Nausea
- Headache
- Dry mouth
- Dizziness
- Anxiety

USES:

- Heart disease
- High blood pressure
- Thyroid disorder
- Glaucoma