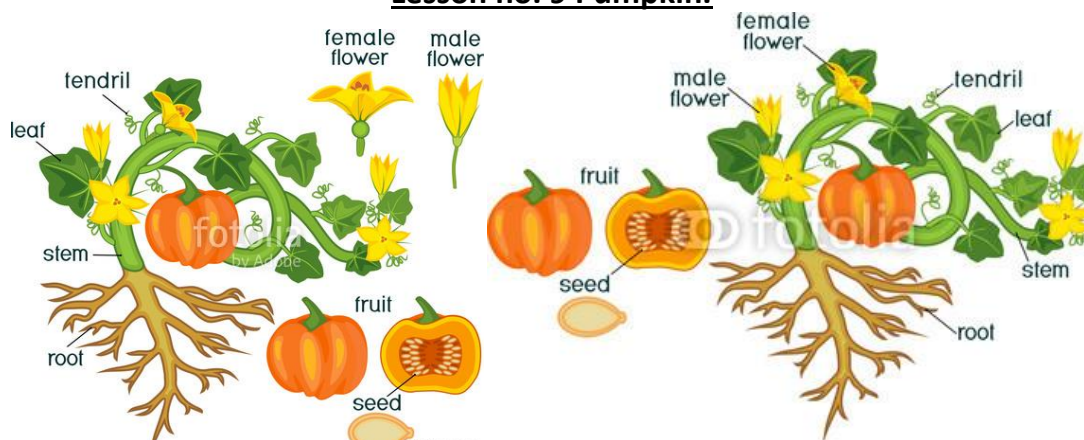


Lesson no. 9 Pumpkin.



Pumpkin vegetable is a product of squash (pumpkin) plant; it is widely eaten vegetable because it has numerous of health benefits; it is also called as squash or winter squash; it is grown & eaten all around the world; it is a warm weather crop; mostly planted in early July. It is of many types; based on the type name differs; commonly in Latin it is called as Cucurbita pepo & its botanical family is Cucurbitaceae.

• **NAMES:**

1. In Quran it is called as YAQTEEN (يَقْطِين) (means a plant without branches) means it is creeper.
2. In English it is called as Pumpkin.
3. In common language it is called as Kaddu.
4. In Hadees, Pumpkin is called as Kar'a (الفرع) and Dubba (الدباء).
5. Round Pumpkin is called Dubba & elongated Pumpkin is called as Kar'a.

QURANIC REFERENCE OF IT: -

1. In Chapter 37 (Sura) As-Saffat verse no. 139 to 146. In these verses the story of Prophet Yunus (عليه السلام) is told & Yaqteen is mentioned as climbers like tree.

وَأَنْبَتْنَا عَلَيْهِ شَجَرَةً مِّنْ يَقْطِينٍ ۝

Translations: And we caused to grow over him a tree, a gourd.

Nabi صلى الله عليه وسلم liked pumpkin, it should be added in food, it increases the brain function & intelligence, strengthens the heart, reduces inferior complex, it was eaten by previous Prophets also. We are not to prepare Nabiz in it. (Nabiz is when dates or Raisins are soaked in water overnight & the syrup in drank).

Pumpkin is mentioned in many Hadith books like Bukhari; Ibn-Majah; Tirmizi; An-Nasa'i; Shama'il Muhammadiya; Kanaz-ulmml; Shobul Imaan; Tabraani; Please refer my book part 2 lesson no. 41 Pumpkin & bottle gourd or please visit my website www.tib-e-nabi-for-you.com for detail Islamic study on Pumpkin.

• **Squash plant: -**



It is an annual plant; it requires soil temperature 8 cm deep at 15.5 degree Celsius & soil that holds water well. It is a tendril bearing plant, have hairy stem, unisexual flower, edible vegetable (pumpkin). It is a climber plant.

• **Leaves: -**



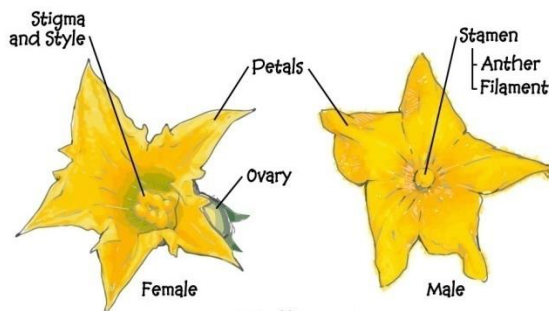
Morphology

- Stem
 - Vine
 - Cylindrical
 - Green colour
- Roots
 - tap root system
- Leaves
 - lobed with 3 or 5 lobes



Its leaves are ex-stipulate, alternative, simple, palmately lobed or palmately compound.

• Flower: -



Squash plant produces male & female flowers both but on different plant (dioecious); honey bee plays an important role in fertilization (pollination). Flowers are of yellow or white colour, the female flower have inferior ovary, the entire ovary wall ripen into a relatively soft pericarp (berry), other parts of female flower can also ripe & form a false berry. The flower has short life span.

• Pollination: -



It was historically pollinated by squash bee; however, this bee & its relatives have declined, probably due to pesticide sensitivity, at present it is pollinated by honey bees.

• Pumpkin/Squash: -



There are many varieties of it (long, round, big, large, small); it is of orange or yellow colour mostly; it matures in early autumn & can be stored for few months in a dry place. It is of mainly 2 categories (summer squash & winter squash) based on the harvesting season. It has seeds inside which are very good for health.

- **Seeds: -**



Its seeds are called as Peptia, it is edible, shape is flat, oval, light green in colour, have white outer shell (hull), some varieties have hullless seeds (no outer shell) & are only grown for seeds. The seeds are very rich in nutrition, it is roasted before eaten, it contains protein, dietary fiber, saturated, monounsaturated fatty acid, vitamin B1, B2, B3, B5, B6, B9, C, K, E, calcium, iron, magnesium, manganese, phosphorus, potassium, sodium, zinc, spinasterol etc.

A good quality seeds of pumpkin contains following amino acid mentioned in the table below: -

- **Seed oil: -**



It is also best for health; it contains myristic acid, palmitic acid, palmitoleic acid, stearic acid, oleic acid, linoleic acid, arachidic acid, behenic acid, gadoleic acid.

- **Part used: -**

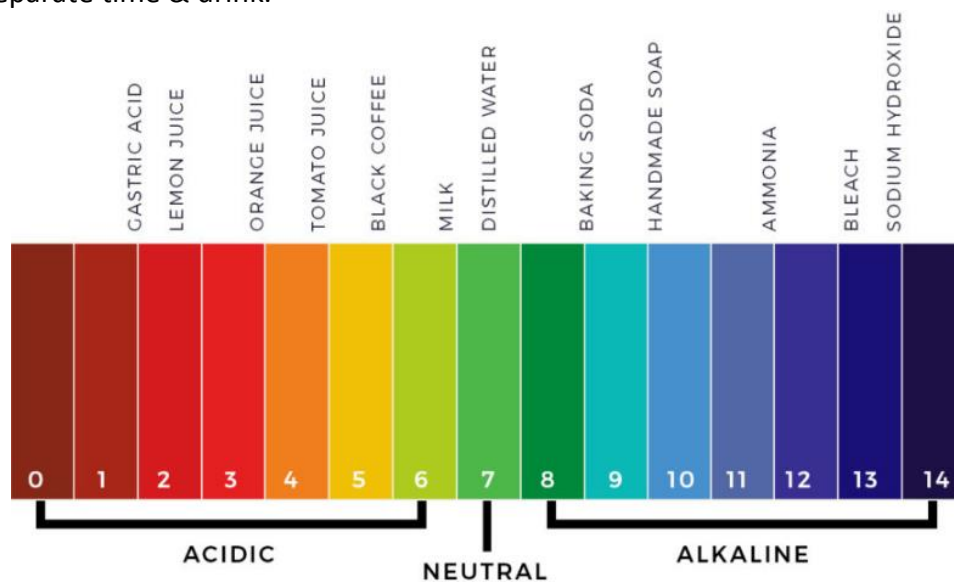
Its vegetable (pumpkin) is used in cooking, soup, juice, pickle, sauce, jam etc; its seeds & seed oil as medicine, its leaves eaten raw or cooked.

- **pH of pumpkin is:** - pH is 4.8 - 5.2 & pH of roasted pumpkin seeds is 6.3 to 6.8; it is little acidic because its pH is lesser than 7.

pH is a measure of hydrogen ion concentration, a measure of the acidity or alkalinity of a solution. The pH scale usually ranges from 0 to 14. Aqueous solutions at 25°C with a pH less than 7 are acidic, while those with a pH greater than 7 are basic or alkaline & 7 is neutral; only aqueous solutions have pH levels, vegetable oil has no pH value. Likewise, other oils such as animal and petrochemical oils also have no pH value. Fatty acids are organic molecules often found in foods, including vegetable oils.

The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and with a pH greater than 7 is considered alkaline. The normal range for pH in surface water systems is 6.5 to 8.5, and the pH range for groundwater systems is between 6 and 8.5. We can add normal water to reduce the acidity.

It is Sunnat of Prophet Muhammad (s.a.w) to mix acidic with Alkaline to make it neutral or less acidic that why He use eat dates with watermelon or cucumber or dry dates with little butter; so you can mix one acidic with alkaline; also it is Sunnat to drink honey mixed in water; also dates or raisins soaked in water over night & drink the syrup (sharbat). Remember do not soak dates & raisin together at one time; soak at separate time & drink.



- **Calories of pumpkin:** -

100 grams of pumpkin gives 26 calories.

- **Glycemic index & Glycemic load of pumpkin:** -

Pumpkin has a high Glycemic index (GI) of 75 & its glycemic load (GL) is just 3 which is low GL.

A food is considered to have a low Glycemic index (GI) if it is 55 or less; mid-range GI if 56 to 69 & high GI if 70 or more. Glycemic index is a number. It gives you an idea about how fast your body converts the carbs in a food into glucose.

A low Glycemic load (GL) is between 1 and 10; a moderate GL is 11 to 19; and a high GL is 20 or higher. For those with diabetes, you want your diet to have GL values as low as possible.

The glycemic load (GL) of food is a number that estimates how much the food will raise a person's blood glucose level after eating it. Glycemic load accounts for how much carbohydrate is in the food and how much each gram of carbohydrate in the food raises blood glucose levels.

- **Gross health benefits & indications of pumpkin:** -

It is a powerful anti oxidant, anti inflammatory, anti cancer, anti prostate cancer, good for eyesight, good for skin, nail & hair health, anti obesity, controls high blood pressure, helpful in diabetes, reduces risk of stroke, cardio vascular disease, promotes heart health, improve mood, boost immunity, prevents constipation, improves sleep, improves libido, improve women health after menopause.

- **Clinical pharmacology of pumpkin: -**

1. It is amongst the low calories vegetable. 100 g of it provides just 26 calories and contains no saturated fats or cholesterol; It is rich in dietary fiber, anti-oxidants elements, minerals, vitamins like vitamin-A, vitamin-C and vitamin-E, it Improves vision due to Vitamin A (retinol).

2. It helps in control of cholesterol & weight. It is also an excellent source of many natural poly-phenolic flavonoid compounds such as α , β carotenes, cryptoxanthin, lutein and zeaxanthin, Carotenes convert into vitamin A inside the body.

3. Zeaxanthin is a natural anti-oxidant which has UV (ultra-violet) rays filtering actions in the macula lutea in retina of the eyes. Thus, it helps protect from "age-related macular disease" (ARMD) in the elderly.

4. It is a good source of B-complex group of vitamins like folic acid, niacin, vitamin B-6 (pyridoxine), thiamin and pantothenic acid.

5. It is also rich source of minerals like copper, calcium, potassium and phosphorus. Pumpkin seeds are an excellent source of dietary fiber and mono-unsaturated fatty acids, which are good for heart health.

6. In addition, the seeds are concentrated sources of protein, minerals and health-benefiting vitamins.

7. For instance, 100 g of pumpkin seeds provide 559 calories, 30 g of protein, 110% RDA of iron, 4987 mg of niacin (31% RDA), selenium (17% of RDA), zinc (71%) etc, but no cholesterol. Further, the seeds are an excellent source of health promoting amino acid tryptophan. Tryptophan is converted to GABA in the brain.

8. Pumpkin juice is a juice extracted from raw pumpkins. Its juice has several health benefits due to which it can be used as a healthy substitute for carbonated drinks.

9. Pumpkin has a high content of vitamin D as well as minerals like copper, iron and phosphorus. Juicing is a suitable way to obtain these nutritional benefits of pumpkin.

10. This juice is highly regarded by vegetarians because of its delicious taste and versatility of use.

11. It is also used as an active ingredient in many sweets and pharmaceutical preparations.

12. It has Magnesium which is good for heart. It helps in ATP (adenosine triphosphate) formation (the energy molecules of our body) & it increases pumping action of our heart, proper bone and tooth formation, relaxes the blood vessels, and brings proper bowel function.

13. Magnesium has been shown to benefit your blood pressure and help prevent sudden cardiac arrest, heart attack and stroke.

14. Pumpkin seeds are a rich source of zinc & it is important for our body in many ways, increases immunity, cell growth and division, sleep, mood, your senses of taste and smell, eye and skin health, insulin regulation, and male sexual function. Helps in colds and flu, chronic fatigue, depression, acne, low birth weight babies, learning problems and poor school performance in children.

15. Pumpkin seeds are one of the best sources of plant-based omega-3s (alpha-linolenic acid or ALA). We all need ALA; however, ALA has to be converted in our body into essential omega-3 fats EPA and DHA.

16. Pumpkin seeds are important natural food for men's health because of high zinc content, which is important for prostate health.

17. Pumpkin seed extracts and oil is used in treating benign prostatic hyperplasia (BPH, or enlarged prostate). Research suggests that both pumpkin seed oil and pumpkin seeds are beneficial in supporting prostate health.

18. Pumpkin seeds may help improve insulin regulation and help prevent diabetic & decreases oxidative stress.

19. Pumpkin seed oil is rich in natural phytoestrogens and studies suggest it may lead to a significant increase in good "HDL" cholesterol along with decreases in blood pressure, hot flashes, headaches, joint pains and other menopausal symptoms in postmenopausal women.

20. Pumpkin seeds are rich in healthy fats, antioxidants and fibers, & provide benefits for heart and liver health, particularly when mixed with flax seeds.

21. Pumpkin seeds are a rich source of tryptophan, an amino acid (protein building block) that our body converts into serotonin, which in turn is converted into melatonin, the "sleep hormone."

22. Eating pumpkin seeds a few hours before bed, along with a carbohydrate like a small piece of fruit, may be especially beneficial for providing your body the tryptophan needed for your melatonin and serotonin production to help promote a restful night's sleep.

23. Pumpkin seed oil has been found to exhibit anti-inflammatory effects especially in arthritis, without the side effect.

- **Modern uses of Pumpkin: -**

For general health: -

Take some pumpkin, pumpkin leaves, beetroot, tomato, carrot prepare soup out of it & drink 3 times a week regularly.

For detox: -

Take some ripe pumpkin, beetroot, grapes, watermelon, 3 dates, 1 cup water (zamzam or rain water will be best) prepare juice out of it & drink once or twice a week regularly.

For eye health: -

Take some ripe pumpkin, 5 piece of watermelon, 1 spoon aloe vera gel, 3 dates, 1 cup zamzam water, prepare juice out of it & do not filter & drink twice a week lifelong.

For Hair, nail, skin health: -

Take little ripe pumpkin, 1 cucumber, 1 spoon rose water, 1 spoon aloe vera gel, 1 teaspoon extra virgin olive oil, prepare paste & apply on the face at 7.30 pm or 1 hour before sleep twice a week & keep the paste for half hour & wash with luke warm water.

Eat cooked pumpkin once a week; eat salad of tomato, cucumber, beetroot, dates, extra virgin olive oil twice a week at 6.00 pm.

For cardiac health: -

Take little ripe pumpkin, a small beetroot, 5 pieces of watermelon, 1 date, 7 seeds of black seed (kalonji), a tomato, pumpkin leaves, 1 moringa, prepare soup & filter & drink twice a week lifelong.

- **Contents/constituents of pumpkin: -**

All contents may not present in all types of it, because there are many varieties of it according to geographical regions & content may differ a lot as per cultivation, soil, seed, climate etc.

Water 91%, carbohydrate, sugar (fructose), dietary fiber, protein, vitamin A, B1, B2, B3, B5, B6, folate, C, E, K, calcium, iron, magnesium, manganese, phosphorus, potassium, little sodium, zinc, copper, beta carotene, lutein, zeaxanthin, betaine. Content of seeds & seed oil are mentioned above.

The above ingredients are based on scientific study, means these has been identified, known & learnt by modern science, it does not mean that it contains only these ingredients; there may be many more ingredients which are yet to be discovered, learnt & known by modern science.

Active ingredients of pumpkin are manganese, tryptophan, magnesium, phosphorus.

Active ingredients of pumpkin seeds oil are linoleic acid, zinc, vitamin E etc.

Active ingredient of pumpkin seeds is manganese, zinc, selenium, amino acids, copper, zinc etc.

A good quality pumpkin seeds contain following amino acids: -

Amino acids	Roasted pumpkin seeds
Weight (g)	118 grams
Tryptophan(mg) (% RDI)	671 (240%)
Threonine(mg) (% RDI)	1162 (111%)
Isoleucine(mg) (% RDI)	1493 (107%)
Leucine(mg) (% RDI)	2818 (103%)
Lysine(mg) (% RDI)	1440 (69%)
Methionine(mg) (% RDI)	702 (96%)
Cystine(mg)	386

(% RDI)	(134%)
Phenylalanine(mg) (% RDI)	2019 (231%)
Tyrosine(mg) (% RDI)	1273 (146%)
Valine(mg) (% RDI)	1840 (101%)
Histidine(mg) (% RDI)	909 (130%)
Arginine(mg)	6235
Alanine(mg)	1730
Aspartic acid(mg)	3448
Betaine(mg)	2
Glutamic acid(mg)	7207
Glycine(mg)	2146
Proline(mg)	1533
Serine(mg)	1949

- **Basic pharmacology of contents of pumpkin, seed & seed oil that are naturally present & not synthetic: -**

- **Behenic acid: -**

It has a very long-chain of saturated fatty acids; it is also called as docosanoic acid.

Main sources of behenic acid: -

It is present in pumpkin seed oil, moringa oleifera seed oil, rape seed oil, peanut oil etc.

Basic pharmacokinetics of behenic acid(based on human intake in natural food products): -

It is poorly absorbed in human body; its absorption, metabolism & excretion are yet not known & are under research.

Basic clinical pharmacology of behenic acid: -

It is smooth & moisturizing in nature thus good & helpful for skin & hair.

- **Gadoleic acid: -**

It is a monounsaturated fatty acid, it has long-chain of fatty acid; it belongs to omega 9 fatty acid.

Main sources of gadoleic acid: -

It is present in pumpkin seed oil, fish oil, cod liver oil, shark liver oil, rape seed oil etc.

Basic pharmacokinetics of gadoleic acid (based on human intake in natural food products): -

It is highly absorbed through skin; its absorption, metabolism & excretion are yet not known & are under research.

Basic clinical pharmacology of gadoleic acid: -

It is moisturizing in nature without greasy effects thus good & helpful for skin.

- **Arachidic acid: -**

It is also called as Eicosanoic acid; it is among omega 6 fatty acid; human body uses it as a starting material in synthesis of 2 kinds of essential substances (prostaglandin & leukotrienes both are unsaturated carboxylic acid).

Main sources of arachidic acid: -

It is present in meat, fish, seafood, egg, chicken, peanut oil, corn oil etc.

Basic pharmacokinetics of arachidic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are yet not known & are under research.

Basic clinical pharmacology of arachidic acid: -

It is eaten by body builders to gain muscles due to its inflammatory action in the body; it leads to increase production of eicosanoids that help raise immunity, inflammatory response in human body, it also reduces depression, increases lean muscles.

- **Spinasterol: -**

It is among phytosterol found in a variety of plants like spinach (that why called as spinasterol), cucumber, gordonia, cylanica, argan oil, pumpkin seeds, senega root, alfalfa meal. Its absorption, metabolism is not known.

Basic clinical pharmacology of spinasterol: -

It modulates mitochondrial activity & gene expression of nuclear receptor; it is anti tumour, antioxidant, anti inflammatory, good for complexion.

- **Betaine: -**

It is water soluble amino acid glycine; it is derivative of choline (choline is precursor of it) means body needs choline to synthesized betaine. It is also called as trimethylglycine (TMG) it has 3 methyl group attached to it; it was first discovered from beetroot & is called as betaine.

Main sources of betaine: -

It is present in watermelon, beetroot, wheat bran, spinach, grain, brown rice, sweet potato, beef, quinoa etc.

Basic pharmacokinetics of betaine (based on human intake in natural food products): -

It is absorbed in duodenum more than jejunum via sodium & chloride dependent transport & passive sodium independent transport system; it is rapidly absorbed in around 17 minutes & released into blood stream quite fast & its absorption is near complete; it is excreted very little in urine in form of dimethylglycine (DMG) & little in stools, eliminated mainly via metabolism not excretion. It is stored in all organs (including brain) (it crosses blood brain barrier), skeletal muscles.

Basic clinical pharmacology of betaine: -

Betaine is a methyl donor, this means helps in liver function, cellular function & detoxification, process fats; it converts blood homocysteine into methionine. Homocysteine is an amino acid, body naturally produces, high level of it can be harmful to arteries of heart & may cause cardio vascular disease, artherosclerosis by producing plaque in the arteries of heart & brain (may cause stroke), may also cause osteoporosis, visual abnormalities, blood clots, narrowing & hardening of vessels.

Methyl donors: -

It refers to nutrients involved in bio-chemical process called as Methylation; And this process reduces due to age & we depend on methyl donor foods like vitamin B12, B6, folate, choline, betaine etc so that acts properly.

- **Oleic acid: -**

Its short hand notation is C18:1, it is a non-essential (means it is produced naturally in the body) monounsaturated omega 9 fatty acids, It is insoluble in water & soluble in alcohol. It increases absorption of many drugs through skin by disrupting the lipids under the skin and penetration of the drugs, so pumpkin seed oil is best to be used with other applications on skin and used in cosmetic formulas.

Main sources of oleic acid: -

It is present in extra virgin olive oil is the best, also present in avocado oil, camellia oil, shea nut oil, apricot oil, sweet almond oil, whole egg, nuts, argan oil, pumpkin seed oil etc.

Basic pharmacokinetics of oleic acid (based on human intake in natural food products): -

It is believed that it is absorbed by different tissues mediated via passive diffusion to facilitate diffusion (this is under research) after taken up by the tissues it is stored in the form of natural triglycerides or oxidized, it is transported by lymphatic system; it is also believed to penetrate through skin (it is under research), its excretion is in stool. It is stored 98% in adipose tissues depots in form of triglycerides. Its metabolism & plasma half-life is yet not known.

Basic clinical pharmacology of oleic acid: -

It increases bioavailability of following medicines cortisol, hydrocortisone, betamethasone, 17 benzoate betamethasone, 17 valerate (betamethasone), ketarolac (anti inflammatory), metronidazole, progesterone & estradiol. So I advised to mixed powder of prednisolone mixed in extra virgin olive oil and apply on eczema & psoriasis and get good results in cheaper rates.

Oleic acid prevents cardio vascular disease, blood pressure, skin disease, breast cancer, colon cancer, prostate cancer, stomach cancer, diabetes, gall stones, gastrointestinal disease and pancreatic disease. It reduces cholesterol, triglycerides, LDL, inflammation, swelling etc.

- **Linoleic acid: -**

It is a carboxylic acid, it is polyunsaturated with omega 3 & 6 fatty acids; its short hand notation is 18:2, it is an essential fatty acid that must be consumed for health.

Main sources of linoleic acid: -

It is present in olive oil, evening primrose oil, sunflower oil, walnut oil, hemp oil, grape seed oil, safflower oil, egg yolk, butter, pumpkin seed oil etc.

Basic pharmacokinetics of linoleic acid (based on human intake in natural food products): -

It is first hydrolyzed from dietary fats & pancreatic enzymes & then with the help of bile it is absorbed in small intestine; metabolism & excretion are under research.

It gets converted into gamma linoleic acid (GLA) in the body, GLA is converted in the body into dihomogamma linoleic acid (20 carbon chain) & it is converted into Arachidonic acid which is converted into Docosahexaenoic (long-chain fatty acid with 22 carbons) acid.

Basic clinical pharmacology of linoleic acid: -

It acts on prostaglandin system of the body thus is anti-inflammatory, blood thinner, vasodilator (expand the blood vessel) it is very helpful in treatment of rheumatoid arthritis, breast lumps, fibro-adenoma (nodes in breast), cancers, reduces cholesterol, it prevents heart disease, diabetes, skin ulcers, irritable bowel syndrome etc.

- **Lutein & zeaxanthin: -**

Both are important carotenoids found in nature, they are related with beta carotene & vitamin A, they give plants, fruits & vegetables yellow or red colour, they are absorbed best in human when taken with high-fat meal because it needs bile for digestion. Both are colour pigment found in human eye (macula & retina) they get deposited in macula & retina thus prevents many diseases of eyes.

Main sources of both: -

They are present in carrot, broccoli, kale, spinach, grapes, pumpkin, yellow vegetable, egg yolk, green leafy vegetable, orange, kiwi, corn etc.

Basic pharmacokinetics of both (based on human intake in natural food products): -

They are absorbed with the help of bile by mucosa of small intestine via passive diffusion & send to the liver via lymphatic system & in liver it is incorporated into low density & high density lipoproteins & transported to target tissues (retina etc) by specific lutein binding protein mediates the selective uptake of it. The absorption depends on the amount & sources of intake; it is 70 % absorbed; it is excreted in bile & urine & stored in liver & adipose tissues of the body.

Basic clinical pharmacology of both: -

They are powerful anti oxidant, anti diabetic, anti cancer. They prevent age-related macular degeneration, cataract, retinitis pigmentosa, retinopathy, macular degeneration, they work as light filter & protect the eye tissues from sunlight damages, they block blue light from reaching the underlying

structure in the retina of eyes thus reduces the risk of light induce oxidative damage that could lead to age-related macular degeneration (AMD).

They also prevent free radicals thus prevents colon cancer, cervical cancer, lungs cancer, breast cancer, prostate cancer, vision loss, improves mental function, respirative infections, reduce high blood pressure, reduce soreness of muscles after exercise, reduce eye strain, controls diabetes, prevent heart diseases etc.

- **Palmitic acid: -**

It is a common saturated fatty acid; it is the first fatty acid produced during lipogenesis (fatty acid synthesis) & from which longer fatty acids can be produced.

Main sources of palmitic acid: -

It is present in olive oil, flaxseed oil, soyabean oil, sunflower oil, palm oil, cocoa butter, meat, milk, pumpkin seed oil etc.

Basic pharmacokinetics of palmitic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are under research.

Basic clinical pharmacology of palmitic acid: -

It softens the skin & keeps it moist thus good for psoriasis & eczema. It coats the skin, it is powerful anti-oxidant; it maintains the health of hair & skin from aging, cleans them from dirt, sweat, excessive sebum (main cause of acne and boil on face & other parts of the body).

- **Stearic acid: -**

It is saturated fatty acid.

Main sources of stearic acid: -

It is mainly present in olive oil, also present in butter, whole milk, yeast bread, egg, pumpkin seed oil etc.

Basic pharmacokinetics of stearic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are under research.

Basic clinical pharmacology of stearic acid: -

It cleans the skin & removes dirt, sweat & excessive sebum from skin & hair.

- **Myristic acid: -**

It is a common non-toxic long-chain saturated fatty acid; it is also called as tetradecanoic acid; it is water soluble; its salt & esters are commonly referred as myristates.

Main sources of myristic acid: -

It is mainly present in pumpkin seed oil, butter fat, palm kernel oil, coconut water & oil, nutmeg oil etc.

Basic pharmacokinetics of myristic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are under research.

Basic clinical pharmacology of myristic acid: -

It cleans the skin & keeps the skin hydrate, plump & youthful; it is used in beauty products, shaving, soaps, creams, lotions, hair conditioner & personal care products manufacturing.

- **Palmitoleic acid: -**

It is an omega 6 monounsaturated fatty acid; it is present in all tissues of human body & also in adipose tissues & in liver in high concentration.

Main sources of palmitoleic acid: -

It is mainly present in pumpkin seed oil, breast milk, vegetable oil, marine oil, macadamia oil, salmon oil.

Basic pharmacokinetics of palmitoleic acid (based on human intake in natural food products): -

Its absorption, metabolism & excretion are under research.

Basic clinical pharmacology of palmitoleic acid: -

It is anti thrombotic thus helpful in stroke, it is anti inflammatory, reduces cholesterol & other lipids, high blood glucose, prevents cardio vascular disease, obesity and improves insulin sensitivity.

- **Beta carotene: -**

It is an anti oxidant that converts into vitamin A & plays a very important role in human health; it is responsible for the red, yellow, orange colouration in some fruits & vegetables. It promotes eye health & prevents eye diseases.

Main sources of beta carotene: -

It is present in pumpkin, carrot, sweet potato, dark leafy vegetables, apricot, red & yellow pepper, spinach, kale etc.

Basic pharmacokinetics of beta carotene (based on human intake in natural food products):

It is absorbed in intestine by passive diffusion & get convert into provitamin A in the presence of bile acids, the intestinal mucosa plays a key role in converting it into provitamin A. it is transported in blood plasma exclusively by lipoproteins. The complete absorption, metabolism & excretion in not known fully. It is stored in fats & liver.

Basic clinical pharmacology of beta carotene: -

It is anti oxidant, reduces risk of lung cancer & promote lung health, reduces free radicals thus prevents cancer & heart disease, diabetes, promotes skin health, improves complexion, hair health, eye health, brain health; reduces pimple, acne & other skin problems.

- **Potassium: -**

It is a mineral with symbol K & atomic number 19, it is an essential mineral which body cannot prepare; it is necessary for heart, kidney & other organs to function, its low level in body is called as hypokalemia & high level is called as hyperkalemia; it is mostly present inside the cells (intracellular); normal blood range is 3.5 to 5.0 milli equivalents per/liter (mEq/L).

Main sources of potassium: -

Potassium is naturally present in banana, orange, dates, raisin, broccoli, milk, chicken, sweet potato, pumpkin, spinach, watermelon, coconut water, white & black beans, potato, dried apricot, beetroot, pomegranate, almond, quince, pumpkin etc.

Basic pharmacokinetics of potassium (bases on human intake in natural food products): -

It is absorbed in small intestines by passive diffusion; it is stored mostly inside the cell, little in liver, bones & red blood cells. 80 to 90% potassium is excreted in urine & 5 to 20% is excreted in stools, sweat.

Basic clinical pharmacology of potassium: -

It is a mineral belongs to electrolytes of the body; it conducts electrical impulses throughout the body & assists blood pressure, normal water balance, muscle contraction, nerves impulse, digestion, heart rhythm, maintain pH balance. It is not produced in our body so we need to consume it through eating; Kidneys maintain normal level of it in the body by excreting excessive amount of it in urine or reabsorb it if the amount is less in the body so that the body may reuse it. Its deficiency may cause weakness, low blood pressure, constipation, nausea, vomiting etc.

Its normal amount in body keeps blood pressure normal; water balance in body normal; prevents heart disease, stroke, osteoporosis, kidney stone etc.

- **Carbohydrate: -**

It is a macronutrient needed by the body, the body receives 4 calories per 1 gram of it; carbohydrates include sugar, glycogen, starch, dextrin, fiber & cellulose that contain only oxygen, carbon & hydrogen. It is classified in simple & complex; simple carbs are sugar & complex carbs are fiber & starch which take longer to digest. It is basic source of energy for our body.

Main sources of carbohydrates: -

It is present in watermelon (little), potato, sweet potato, bread, oats, butter, white rice, whole grain rice, pasta, lentils, banana, pineapple, quince, pumpkin etc.

Basic pharmacokinetic of carbohydrate (based on human intake in natural food products): -

Its digestion begins in mouth; salivary glands releases saliva & salivary amylase (enzyme) which begins the process of breaking down the polysaccharides (carbohydrates) while chewing the food; now the chewed food bolus is passed in stomach through food pipe (esophagus); gastric juice like HCL, rennin etc & eaten material are churned to form chyme in the stomach; the chyme now is passed little by little down into duodenum, pancreatic amylase are released which break the polysaccharides down into disaccharide (chain of only sugars linked together); now the chyme passes to small intestine, in it enzymes called lactase, sucrase, maltase etc breakdown disaccharides into monosaccharide (single sugar) & absorbed in upper & lower intestines, through villi present in small intestine & send into liver through venous blood present into portal veins, as per bodies need it is releases in the blood stream & pancreas release insulin to use it as source of energy for the body, & extra is stored is converted into glycogen by liver & stored in liver & little is stored in muscles& tissues. Liver can reconvert glycogen in to sources of energy if body lacks for other source of energy, the undigested carbohydrates reaches the large intestine (colon) where it is partly broken down & digested by intestinal bacteria, the remains is excreted in stools.

Clinical pharmacology of carbohydrates: -

Carbohydrates are main sources of body energy, it helps brain, kidney, heart, muscles, central nervous system to function, it also regulates blood glucose, it acts on uses of protein as energy, breakdown of fatty acids & prevent ketosis. If we eat less carbohydrate it may lead to hypoglycemia, ketosis, frequent urination, fatigue, dizziness, headache, constipation, bad breath, dehydration etc.

Excessive intake of carbohydrates may lead to vascular disease, atherosclerosis (leads to narrowing of arteries, stroke, diabetes, obesity, fatty liver, blood pressure etc.

- **Vitamin C: -**

It is also called as Ascorbic acid; it is an essential water soluble vitamin, very much needed by the body for many functions & absorption etc.

Main sources of vitamin C: -

It is present in watermelon, citrus fruit, broccoli, cauliflower, sprouts, capsicums, papaya, strawberries, spinach, green & red chilies, cabbage, leafy vegetables, tomato, cereals, quince, pumpkin etc.

Basic pharmacokinetic of vitamin C (based on human intake in natural food products): -

It does not need to undergo digestion, 80 to 90% of it eaten is absorbed by intestine cell border by active transport & passive diffusion & through ion channels it enters the plasma via capillaries. It is very little stored in adrenal glands, pituitary gland, brain, eyes, ovaries, testes, liver, spleen, heart, kidneys, lungs, pancreas & muscles. All together body can store 5 grams of it & we need 200mg/day in order to maintain its normal level & uses, but old, disease person, smokers & alcoholic need more daily value. It is excreted in urine in the form of dehydroascorbic acid changed by liver & kidneys both, but unused vitamin C is excreted intact.

Basic clinical pharmacology of vitamin C: -

It prevent cough & cold, repairs tissue, acts as an enzyme for curtain neurotransmitter, important for immune function, it is a powerful antioxidant (donates electron to various enzymatic & non-enzymatic reactions); body prepares collagen with the help of vitamin c; it is also helpful in Alzheimer's, dementia, acts on iron absorption, it protects the body from oxidative damages, reduces stiffness of arteries, reduces tendency of platelets to clump each other, improves nitric oxide activity (dilatation of blood vessels) thus prevents high blood pressure & heart disease, also prevent eye disease, reduces risk of cataract, prevents the lining of lungs & prevents lung disease, it is a natural antihistamine (anti allergy), eliminates toxins from the body etc. Deficiency of it causes Scurvy disease (brown spots on skin occurs, swelling of gums, bleeding from all mucous membrane, spots are more on thighs & legs, the person looks pale, feel depressed, cannot move, loss of teeth, suppurative wounds occur.

- **Vitamin A: -**

It is a fat soluble vitamin; it is group of unsaturated organic compound that includes retinol, retinal, retinoic acid & several provitamin A carotenoid. There are 2 types of vitamin A, 1) Vitamin A: - found in meat, poultry, fish & dairy products; 2) Provitamin A: - found in fruits, vegetables, plants; beta carotene is common type of provitamin A; it is an antioxidant, reduces wrinkles & repairs the skin damages; it is available in the market as tretinoin in tablets & creams to heal acne.

Main sources of vitamin A: -

It is present in watermelon, fish oil, carrot, green leafy vegetables, citrus fruit, sweet potato, spinach, kale, quince, pumpkin etc.

Basic pharmacokinetic of vitamin A (based on human intake in natural food products): -

It is absorbed in jejunum mainly, little through skin; metabolism is in liver & excreted in urine & stools, it is conjugated with glucuronic acid & then changed into retinal & retinoic acid; retinoic acid is excreted in stool, mainly. It is stored primarily as palmitate in Kupffer's cells of liver, normal adult liver stores sufficient amount of it which is enough for 2 years for the body, little is stored in kidneys, lungs, adrenal glands, fats, retina; it is excreted in urine & stools.

Clinical pharmacology of vitamin A: -

it is needed by the body for vision and maintains eye health specially retina; it prevents night blindness; it helps in normal reproduction of cells thus prevents cancer; it is required for proper growth & development of embryo throughout the pregnancy period, it is good for skin, supports immune function; helps the heart, kidneys & lungs to work properly.

- **Vitamin B1 (Thiamin): -**

It is called as Thiamin also; it is a water soluble vitamin, it belongs to B-complex family, it is an essential micro nutrient which cannot be made by our body.

Main sources of vitamin B1: -

It is present in watermelon, spinach, legumes, banana, quince, wheat germ, liver, egg, meat, dairy products, nuts, peas, fruits, vegetables, cereals, rice, breads, oats, pumpkin etc.

Basic pharmacokinetic of vitamin B1 (based on human intake in natural food products): -

Intestinal phosphatases hydrolyze thiamin to make it free & absorbed in duodenum, jejunum mainly through active transport in nutritional doses & passive diffusion in pharmacological doses, very little is known about its absorption; it is metabolized in liver; it is excreted in urine & stored little in liver, heart, kidney, brain, muscles.

Clinical pharmacology of vitamin B1: -

It is needed for metabolism of glucose, amino acids (proteins), lipids (fats) etc; every cell of the body require it to form ATP (adenosine triphosphate) as a fuel for energy, also it enables the body to use

carbohydrates as sources of energy; also nerve cells, heart cells, muscles cell require it to function normally; its deficiency causes beri-beri heart disease, weight loss, confusion, malaise, optic neuropathy, irritability, memory loss, delirium, muscles weakness, loss of appetite, tingling sensation in arms & legs, blurry vision, nausea, vomiting, reduce refluxes, shortness of breath etc; it is helpful to immune system; excessive intake of carbohydrates, protein, glucose (speacially in body builders, athletes etc) increases the need of vitamin B1.

- **Vitamin B2: -**

It is also called as Riboflavin, it is a water soluble vitamin, it is an essential micro nutrient, it helps many systems of the body; it is not synthesized in human body.

Main sources of vitamin B2: -

It is present in watermelon, liver, milk, dairy products, nuts, egg, fish, leafy vegetables, almonds, mushroom, lean meat and quince, pumpkin etc.

Basic pharmacokinetic of vitamin B2 (based on human intake in natural food products): -

It is phosphorylated in the intestinal mucosa during absorption; mainly absorbed in upper gastrointestinal tract; the body absorbs little from a single dose beyond of 27mg; when excessive amount is eaten it is not absorbed; very little is known about its absorption. The conversion of it into its coenzymes takes place mainly in cells of small intestines, heart, liver, kidneys & throughout the body in many cells; it is excreted in urine & stored little in liver, heart, kidneys & in tissues of the body.

Basic clinical pharmacology of vitamin B2: -

It is needed by the body to keep skin, eyes, nerves, red blood cells healthy, it also helps adrenal gland, nerve cells, heart, brain to function; it also acts in metabolism of food, amino acids (protein), fats, helps to convert carbohydrate into energy (Adenosine triphosphate formation- the energy body runs on). It plays an important role in functioning of mitochondria.

Its deficiency is called as Ariboflavinosis & causes weakness, throat swelling, soreness of mouth & tongue, cracks on skin, dermatitis, anemia, weak vision, itching & irritation in eyes, migraine.

- **Vitamin B3: -**

It is called as Niacin or Nicotinic acid; it is in 2 forms niacin & nicotinamide acid; it is water soluble vitamin; it is an essential micro nutrient; it plays a role in over 200 enzymatic reactions in the body; It is produced in the body in small amount from tryptophan which is found in protein containing food & sufficient amount of magnesium, vitamin B6 & B2 (are needed to produce it).

Main sources of vitamin B3: -

It is present in watermelon, green peas, peanuts, mushroom, avocados, meat, egg, fish, milk, cereal, green vegetables, liver, chicken, coffee, potato, corn, pumpkin, tomato, almonds, spinach, enriched bread, carrots, quince, pumpkin etc.

Basic pharmacokinetic of vitamin B3 (based on human intake in natural food products): -

If eaten in natural form it is absorbed in stomach & small intestines by the process of sodium-dependent carrier-mediated diffusion in 5 to 20 minutes; if taken in therapeutic doses get absorbed by passive diffusion in small intestines. Its uptake in brain requires energy, in kidneys & red blood cells requires a carrier. It is metabolized in liver in 2 ways either is conjugated with glycine or niacin is form into nicotinamide; it is stored little in liver unbounded to enzymes. It is excreted in urine.

Basic clinical pharmacology of vitamin B3: -

It regulates lipid level in the body; it acts on carbohydrate to form energy sources for the body, it ease arthritis, boost brain function, every part of body needs it to function properly, it helps convert food into energy by aiding enzymes & cellular metabolism, it acts as an antioxidant. It prevents heart disease.

Deficiency of it causes pellagra, high blood cholesterol, memory loss, fatigue, depression, diarrhea, headache, skin problems, lesion in mouth, tiredness etc.

- **Vitamin B5 (pantothenic acid): -**

It is also called as pantothenic acid, it is water soluble vitamin, it is a micro nutrient, it is necessary for making blood cells; acts to convert eaten proteins, carbohydrate, fats into energy; it is a component of coenzyme A; it is used in synthesis of coenzyme A. (coenzyme A acts on transport of carbon atoms within the cell).

Main sources of vitamin B5: -

It is present in watermelon, quince, meat, chicken, liver, kidney, fish, grains, milk, dairy products, legumes, pumpkin etc.

Basic pharmacokinetic of vitamin B5 (based on human intake in natural food products): -

It is converted into free form by intestinal enzymes & in nutritional doses it is absorbed in intestinal cells via sodium dependent active transport system in jejunum & pharmacological doses are absorbed by passive diffusion; after absorption the free form of it is now transported to erythrocytes via plasma, in cells pantothenic acid is converted into CoA, all the body tissues can convert it into CoA & ACP (acyl carrier protein), after these two complete their jobs they are degraded to form free pantothenic acid & other metabolites. It is excreted in urine & stools & little is exhaled in carbon dioxide.

Basic clinical pharmacology of vitamin B5: -

It promotes skin, hair & eyes health, proper functioning of nervous system & liver, formation of red blood cells, making of adrenal hormones, sex hormones; it is very helpful in constipation, rheumatoid arthritis, acne, allergies, asthma, baldness, colitis etc.

Its deficiency causes fatigue, nausea, vomiting, irritability, neurological weakness, numbness, abdominal cramps, sleep disturbances, hypoglycemia etc.

- **Vitamin B6: -**

It is also called as pyridoxine; it is involved in many aspects of macronutrients metabolism; it is present in many food products naturally.

Main sources of vitamin B6: -

It is present in watermelon, quince, chicken, bread, egg, vegetable, soyabean, whole grain cereals, brown rice, fish, legumes, beef, nuts, beans, liver, citrus fruits, starchy vegetables, potato, pumpkin etc.

Basic pharmacokinetic of vitamin B6 (based on human intake in natural food products): -

It is absorbed in small intestines, but before absorption a phosphate group has to be removed making vitamin B 6 in free form & absorbed by passive transport, now reaches liver via portal vein, in liver to get metabolized & flown into the blood stream it is bound with albumin & some are taken up by red blood cells, once getting in blood it can function & promote health & it is excreted mainly in urine & little is excreted in stools, it is very little stored in tissues, muscle tissues, liver, brain, kidneys, spleen.

Basic clinical pharmacology of vitamin B6: -

It is needed for proper development & function of brain in children; it is needed for neurotransmitter, histamine, haemoglobin synthesis & function. It serves as coenzyme (cofactor) for many reactions in the body, it is the master vitamin for processing amino acids & some hormones, it is needed by the body to prepare serotonin, melatonin & dopamine, it is better to intake it during treatment of tuberculosis. It supports adrenal glands to function; it acts as a coenzyme in the breakdown & utilization of fats, carbohydrates, protein, it is important for immune system, it helps in treatment of nerve compression like carpal tunnel syndrome, premenstrual syndrome, depression, arthritis, high homocysteine level, diabetes, asthma, kidney stones etc.

Its deficiency causes seborrheic dermatitis (eruption on skin), atrophic glossitis with ulceration, conjunctivitis, neuropathy, anaemia etc.

- **Folate (vitamin B9): -**

Folate is an essential micro nutrient, it is a natural form of vitamin B9, it serves many important functions of the body, it plays an important role in cell growth & formation of DNA, RNA & other genetic material & helps in treating many diseases; its name is derived from Latin Word Folium, which means leaf, leafy vegetables have it in good amount; Folic acid is a synthetic form of vitamin B9.

Main sources of folate: -

It is present in watermelon, quince, dark green leafy vegetables, fruits, nuts, beans, dates, seafood, egg, dairy products, meat, chicken, legumes, beetroot, citrus fruits, broccoli, spinach, cereals, pumpkin etc.

Basic pharmacokinetic of folate (based on human intake in natural food products): -

Its absorption is complicated because folate present in food are of many different forms, some of which cannot be absorbed until broken down by intestinal enzymes; it is not absorbed more than 50%; dietary folate contains glutamate that need to separate it from glutamate before absorption starts; It is absorbed in duodenum & jejunum, after absorption it is converted into tetrahydrofolate (the active form of folate), then a methyl group is added to it to form methyltetrahydrofolate; now the body uses it for various functions & metabolism; the body can store folate 20-70mg in liver which is enough for 3 -6 months for the body; it gets excreted in urine & little in stools & bile.

Basic clinical pharmacology of folate: -

It is needed by the body to make DNA, RNA & other genetic material; it prevents many disease & conditions like anaemia, stroke, cardiac diseases, cancers, neurological diseases, macular degeneration (eye disease), palpitation, sores in mouth & tongue, hair fall, graying of hair. It is important in fertilization in male & female, essential during pregnancy to prevent neural tube defect in embryo (it is needed more), it protect us from free radicals & oxidation thus prevent cancers, it is essential in red blood cells formation, reduces high levels of homocysteine.

Its deficiency may cause anaemia, tiredness, palpitation, breathlessness, hairfall, neural tube defect in baby during pregnancy etc.

- **Sodium: -**

Here we are learning natural sodium, its symbol is Na & atomic no. 11; it is not produced in the body we need to take it in food sources; it is an important & essential mineral on which our body functions; it regulates blood pressure, blood volume etc.

Main sources of sodium: -

Excessive intake of sodium should be avoided; pumpkin has very less amount of sodium; vegetables & fruits have less sodium in them which is good for the body. It is present in beans, meat, fish, chicken, chili, bread, rolls, milk, celery, beetroot etc.

Basic pharmacokinetic of sodium (based on human intake in natural food products): -

It is absorbed in ileum by active sodium transport because it is impermeable & in jejunum absorption takes place via mediated active transport & depends on levels of water, bicarbonate, glucose, amino acids etc; its absorption plays an important role in the absorption of chloride, amino acids, glucose & water; similar mechanism are involved in the reabsorption of it in kidneys when its level in the body falls. It is excreted mainly in urine, little in sweat & stools. It is stores in bones & dissolved in various body fluids.

Basic clinical pharmacology of sodium: -

It is amongst the essential electrolyte within the body, it remains in extracellular fluid (outside the cell) mainly, it carries electrical charges within the body, kidney maintain its normal level in the body, normal level is 135-145 milli-equivalent per liter (mEq/L), it is not produce in the body, it acts on muscles contraction, nerve cells, regulates blood pressure, blood volume; it takes part in every function of the body mostly, its low level in body is called as hyponatremia, it is found more in older aged, kidney disease, heart disease, hospitalized patient, this condition may cause brain edema, low blood pressure, fatigue, tiredness etc; its high level in the body is called as hypernatremia may cause increase in blood pressure, thirst, confusion, muscle twitching or spasm, seizures, weakness, nausea, loss of appetite, swelling in body etc.

- **Calcium: -**

It is natural essential mineral for the body, it is among the electrolytes of the body; its symbol is Ca & atomic no. 20.

Main sources of calcium: -

It is present in watermelon, quince, milk, banana, cheese, green leafy vegetables, soya beans, nuts, fish, meat, egg, bread, flour, yogurt, almonds, kale, soybean, spinach, pumpkin etc.

Basic pharmacokinetics of calcium (based on human intake in natural food products): -

Calcium is absorbed in duodenum & upper jejunum (when calcium intake is low) by transcellular active transport process, this depends on action of calcitriol & intestinal vitamin D receptors & when calcium intake is high, absorbed by paracellular passive process throughout the length of small intestine by 3 major steps, entry across the brush border, intracellular diffusion via calcium-binding protein & extrusion; Vitamin D is necessary for absorption of calcium, also vitamin C, E, k, magnesium & exercise increases the absorption of calcium. Also the level of calcium is regulated by calcitonin released by thyroid gland it reduces calcium level in blood when it is excessive & increases the excretion of calcium via kidneys; Parathyroid hormones (PTH) released by parathyroid gland increases the blood level of calcium when body need it or calcium is less in blood & promotes reabsorption of it in kidneys (calcitonin & PTH both have opposite function). Intestines can absorb 500 to 600 mg of calcium at a time; it is mostly stored in bone tissues & teeth & excreted in stool & sweat & little in urine depended upon the level of it in blood. Also estrogen act on transport of blood calcium in bones thus women mostly suffer from osteoporosis after menopause.

Basic clinical pharmacology of calcium: -

Calcium acts on bone health, communication between brain & other parts of the body, muscles contraction, blood clotting; it is a co-factor for many enzymes, it relaxes the smooth muscles & blood vessels; it maintains heart rhythm, muscles function; it is more needed in childhood & deficiency of it in childhood may cause convulsions (seizure); Excessive level of it in blood is called as hypercalcemia & may lead to kidney stone formation, heart attack, stroke, loss of appetite, excessive urination, memory loss etc; its low level in blood is called as hypocalcemia & may lead to cramps in the body, weak bones, weak teeth, numbness, tingling etc.

Contraindication: -

Sarcoidosis, excessive level of calcium in blood, very severe constipation, kidney stones, increased activity of parathyroid gland etc. Hypersensitivity of calcium, severe cardiac diseases, hypercalcemia, hypercalciuria, severe kidney stones etc.

- **Iron: -**

It is an essential mineral for our body; its symbol is Fe & atomic no. 26; it is an important component of hemoglobin (hemoglobin binds oxygen in lungs & supply it to whole body, it is oxygen carrier).

Main sources of iron: -

It is present in watermelon, quince, meat, dates, spinach, egg, nuts, dark leafy green vegetables, broccoli, pumpkin seeds, chicken, legumes, fish, banana, cabbage, kidney, almonds, pumpkin etc.

Meat is the best source of iron; it provides Fe⁺² directly which can be transported from intestine to blood stream through Fe⁺² transporter ferroportin (this binds with transferrin & delivered into tissues).

Basic pharmacokinetics of iron (based on human intake in natural food products): -

The absorption of iron is not known fully; about only 10% of iron taken in food is absorbed; it is absorbed in duodenum & upper jejunum mainly & at the end part of ileum; low pH is needed for its absorption, after absorption it get bind to transferrin (each transferrin can carry 2 atoms of iron); ceruloplasmin (protein) also helps in binding of iron; Heparin a hormone produced by liver is released when iron stores are full & inhibits iron transport & binding, thus reduces the absorption of iron; vitamin C & copper enhances iron absorption.

Storage of iron: -

Iron is stored in liver (in hepatocytes & kupffer's cells) kupffer's cells play an important role in recycling body iron, they ingest aged RBC liberate iron for it & reuse by breaking down hemoglobin. Little iron is stored in liver, heart, & kidneys in form of ferritin also little in bone marrow, spleen.

Excretion of iron: -

The body does not possess a physiological mechanism for regularly eliminating iron from the body because most of it is recycled by liver cells; iron is lost within cells, from skin & interior surface of the body (intestines, urine, breathe).

Basic clinical pharmacology of iron: -

It is an important component of Haemoglobin (hemoglobin bind oxygen in lungs & supply it to whole body); iron is beneficial for nails, hair, skin etc; it acts on blood production, its deficiency causes Anaemia (low hemoglobin level in blood) (this causes reduced in oxygen carrying capacity & supply of it); most of the iron is present in hemoglobin, it consists of one heme (iron), one protein chain (globin) this allows it to bind & load oxygen from the lungs & supply it to whole body.

Unbounded or free iron is highly destructive & dangerous it can trigger free radical activity which can cause cell death & destroy DNA.

- **Copper: -**

It is an essential micronutrient mineral; its symbol is Cu & atomic no. 29; there are lot of health benefits of it; it is needed in little amount in the body.

Main sources of copper: -

It is present in watermelon, quince, spirulina (water-plant), nuts, seeds, lobster, leafy green vegetables, guava, grapes, green olive, kiwi, mango, pineapple, pomegranate, egg etc.

Basic pharmacokinetics of copper (based on human intake in natural food products): -

It is absorbed 30 to 50%; it is absorbed easily than other minerals, its absorption depends on the copper present in the body, when the intake of it is less, absorption is increased & when intake is more absorption is less, it is mainly absorbed in small intestines & little in stomach via carrier-mediated process; its absorption is influenced by amino acids, vitamin C & other dietary factors. After absorption it is bound primarily to albumin, peptide & amino acids & transported to liver. Copper is secreted into plasma as a complex with ceruloplasmin. It is mainly stored in liver little in brain, heart & kidneys; it is excreted mainly in bile & little in urine.

Basic clinical pharmacology of copper: -

Together with iron it enables the body to form RBC; it helps to maintain health of bones, blood vessels, nerves & immune system; it also acts on iron absorption, protein metabolism, growth of body, it acts

also on development of brain, heart & other organ; it is needed by the body for making ATP, collagen. Excessive of it may cause Wilson's disease.

Deficiency of copper: -

It is very rare; but may cause cardiovascular disease, genetic defects, inflammation of optic nerve etc.

- **Magnesium: -**

It is an important essential mineral; its symbol is Mg & atomic no. 12; it is a co-factor for more than 300 enzymes that regulates functions in the body. Its normal range in blood is 0.75 to 0.95 millimoles (mmol)/L.

Main sources of magnesium: -

It is present in watermelon, quince, spinach, meat, egg, nuts, dark leafy green vegetables, broccoli, pumpkin seeds, dates, chicken, fish, legumes, pumpkin etc.

Basic pharmacokinetics of magnesium (based on human intake in natural food products): -

It is absorbed about 20 to 50% only; it is absorbed about 40% in distal intestine when the level of it is low via passive paracellular transport & about 5% in descending colon when the level of it is high via active transcellular transport. Vitamin D increases its absorption & also acts on its excretion in urine. It is excreted in urine & stool; it is stored in bones.

Basic clinical pharmacology of magnesium: -

It is a co-factor for more than 300 enzymes that regulates functions in the body. It act on protein synthesis, muscles & nerve function, blood glucose, control blood pressure, it is required for energy production, bone development, synthesis of DNA & RNA. It also plays a role in active transport of calcium & potassium ions, muscles contraction, normal heart rhythm etc.

- **Phosphorus: -**

It is an essential mineral; its symbol is P & atomic no. 15, it is needed for many parts & functions of the body.

Main sources of phosphorus: -

It is present in watermelon, quince, meat, nuts, beans, fish, chicken, dairy products, soy, grains, lentils, pumpkin etc.

Basic pharmacokinetics of phosphorus (based on human intake in natural food products): -

It is absorbed 70-85%, it is absorbed 30% in duodenum, 20% in jejunum, 35% in ileum; it is absorbed in inorganic phosphate form by 2 separate process first when the phosphorus intake is high mainly after meals by paracellular sodium independent passive diffusion pathway & second is transcellular sodium dependent carrier-mediated pathway this falls under the control of vitamin D & etc. When calcium level is too high in the body phosphorus is less absorbed, optimum calcium : phosphorus ratio is helpful in its absorption (excess of anyone decreases the absorption of both). It is stored in bones 85% & rest in tissues; it is excreted 80% in urine & rest in stools (excretion of it is a regulatory action of parathyroid hormone (PTH), vitamin D, and fibroblast).

Basic clinical pharmacology of phosphorus: -

It is present in nature combined with oxygen as phosphate. It acts on growth of teeth, bones, repairs of cells & tissues. It plays an important role in metabolism of carbohydrate, fats, protein & ATP. It works with B-complex vitamins & helps kidney function, muscles contraction, normal heart beats, nerve impulse etc.

- **Zinc: -**

It is a trace mineral; symbol is Zn & atomic no. 30; it is necessary for human body as it plays vital role in health.

Main sources of zinc: -

It is present in watermelon, quince, meat, fish, legumes, beans, egg, dairy products, seeds, nuts, whole grains, pumpkin etc.

Basic pharmacokinetics of zinc (based on human intake in natural food products): -

It is absorbed 20 to 40%, its absorption depends on its concentration & is absorbed in whole intestines (jejunum has high rate of its absorption) via carrier-mediated mechanism, it is released from food as free ions during digestion. Zinc from animal sources is easily absorbed comparing to plants sources. It is present in bile & pancreatic juices which is released in duodenum & is reused by the body this is called as endogenous zinc & zinc present in food sources is called as exogenous zinc. Its absorption depends on 2 proteins- Albumin & metallophionein. Albumin enables zinc to be transported from plasma into enterocytes. It is stored in muscles, bones mainly & little in prostate, liver, kidneys, skin, brain, lungs, heart & pancreas. It is excreted in stools 80% & rest in urine & sweat. Metallophionein binds to zinc to make it unavailable & excrete it in stools when zinc is excess in the body, & production of metallophionein is reduced when zinc is less in the body to make zinc available for the body.

Basic clinical pharmacology of zinc: -

It is necessary for immune system, prevents skin diseases, heal skin diseases, helps stimulate activity of at least 100 different enzymes in the body; it is required in little amount in the body, but children, pregnant & old aged need it more. It promotes growth in children, synthesize DNA & acts on wound healing, it is best in treating initial diarrhea & cold cough. It improves learning, memory, fertility etc. It heals acne, attention deficit hyper activity disorder (ADHD), osteoporosis, pneumonia etc.

- **Sugar (fructose): -**

Sugar present in quince mostly is fructose; meaning that blood sugar is not changing much after eating it (but diabetic patients should not eat much of it); Different varieties of quince has different ratio of fructose in it.

Main sources of fructose: -

It is present in watermelon, quince, honey, banana, apple, mango, cherry, strawberry, orange, kiwi, pears, pomegranate, apricots, carrots, yogurt, bread, lemon, lime, green beans, pumpkin etc.

Basic pharmacokinetics of fructose (based on human intake in natural fruit & food products): -

Fructose digestion begins in the small intestine (more in upper jejunum) via active transport or facilitated transport (not known properly). Our body cannot absorb intact polysaccharide molecules. Therefore, if fructose is present in the form of sucrose, sucrase, an enzyme, must first break up sucrose into separate glucose and fructose components. Single fructose molecules then enter the lining of the small intestine through a special channel and exit out the other side into the bloodstream, once in the bloodstream, fructose travels with all other absorbed nutrients to the liver for metabolism and processing.

Metabolism: -

Fructose metabolism occurs entirely in the liver. Through a complicated process called fructolysis, fructose undergoes several chemical and structural changes with the help of aldolase B (an enzyme in the liver).

Extra fructose needs to be changed into glycogen by liver & stored in liver, once the storage is full in liver then liver convert it into triglycerides & triglycerides are further converted by liver into very low-density lipoprotein (VLDL) & stored in fat cells & muscles. Excessive fructose is excreted in urine.

Basic clinical pharmacology of fructose: -

Fructose has low glycemic index & results in moderate release of insulin in the blood stream relative to glucose & sucrose; fructose gives the least dental caries among other types of sugars, fructose is more

sweeter than other types of sugar; it does not raise blood sugar much as glucose does, it is used as sources of energy in the body, excessive intake of it may cause fatty liver, metabolic disorder, blood pressure, increase lipids, increase in uric acid level, increase in free radicals etc.

- **Dietary fiber: -**

It is an eatable part of vegetables & fruit; our body cannot digest it just passes the small intestines & colon & excrete in stools; it is of two types 1) soluble fiber 2) insoluble fiber.

Soluble fiber dissolve in water & form a gel like material & helps in controlling blood cholesterol & blood glucose; it is found in apple, carrot, barley, oats, peas, beans watermelon, quince, pumpkin etc.

Insoluble fiber do not dissolve & promotes excretion & increase bulk of the stool thus relief constipation & helps in elimination of toxins also. It is found in wheat flour, beans, cauliflower, potato, green beans, watermelon, fig, quince etc.

Pumpkin has fiber & this is the reason it is helpful in constipation conditions, it can be eaten in pregnancy to relief constipation and get other benefits of it also.

Basic pharmacokinetics of dietary fiber (based on human intake in natural food products): -

Soluble fibers get dissolve in water & become a gelatinous substance; do not get digested; it helps to slow the digestion & help the body to absorb vital nutrient from eaten food.

Insoluble fibers do not dissolve in water but remain in fibrous form, and do not get digested; it helps the food pass through the digestive system and increase the bulk of stool & eliminate toxins also.

Basic clinical pharmacology of dietary fiber: -

It helps in slow down the digestive process thus gives a good control in blood glucose, improves insulin sensitivity, reduces risk of diabetes, maintains weight, helpful in obesity, reduces blood pressure, reduces cholesterol, reduces inflammation, reduces risk of heart disease, relieves constipation thus helpful in piles, fistula & other rectal disorders & disease, improves bowel movement thus improves bowel health, slowdowns the digestion thus improves quality of digestion, reduces risk of many types of cancer.

- **Vitamin K: -**

It is a fat soluble vitamin; it is essential for normal blood clotting; it occurs naturally in two forms, vitamin K1 (phylloquinone) which is widely distributed in plants; it is present in it; Leafy vegetables are good sources of K1; vitamin K2 (menaquinones) is synthesized in alimentary tract by bacteria (Escherichia coli & other bacteria).

Main sources of vitamin K1: -

It is present in olive oil & also present in green leafy vegetables (spinach, kale etc) cauliflower, cabbage, broccoli, sprout, fish, liver, meat, egg, cereals, pumpkin etc.

Basic pharmacokinetics of vitamin k (based on human intake in natural food products): -

It is absorbed in small intestine; bile is required for its absorption & stored in fatty tissues & liver; it is excreted 40% to 50% in stools & 30% to 40% in urine.

Basic clinical pharmacology of vitamin K: -

It acts on synthesis of certain proteins that are prerequisites (necessary) of blood coagulation (means act on stop bleeding) & body also needs it to control the binding of calcium in bones & other tissues. Deficiency of it makes bones weaker, calcification of arteries & other tissues thus takes care of bones, joints & heart; it reduces tumour growth & is helpful in cancers.

- **Vitamin E: -**

It is fat soluble vitamin; it is a group of eight fat soluble compounds that includes four tocopherols & four tocotrienols.

Main sources of vitamin E: -

It is present in olive oil, almonds, cereals, wheat germ, sunflower oil, corn oil, soybean oil, peanuts, green leafy vegetables, pumpkin etc.

Basic pharmacokinetics of vitamin E (based on human intake in natural food products): -

It is absorbed in small intestines & metabolized in liver & distributed through lymphatic system & stored in fat droplets of adipose tissue cells; it is mainly excreted in stool, little in urine & through skin.

Basic clinical pharmacology of vitamin E: -

It prevents coronary heart disease, supports immune system, prevent inflammation, promotes eye health, lowers the risk of cancer; It is a powerful anti-oxidant thus reduces UV damage of skin, nourishes & protects the skin when applied on face; also promotes hair growth.

- **Manganese: -**

It is an essential mineral & micro nutrient, needed by the body for proper health. Its symbol is Mn & atomic no. 25.

Main sources of manganese: -

It is present in watermelon, nuts, beans, legumes, brown rice, leafy green vegetables, pineapple, cucumber etc.

Basic pharmacokinetics of manganese (based on human intake in natural food products): -

It is absorbed 40%, it is absorbed more in women than men; if intake of it is more, than absorption is less & if intake is less, absorption is more; its absorption takes place in small intestines, after absorption it is bounded to blood protein transferring & transmanganin & transport via blood stream to tissues; it is absorbed by inhalation & dermal (skin) also; it crosses brain blood barrier. It is stored in bones, liver, kidney, pancreas; it is excreted mainly in bile & stools, little in urine & sweating; unused manganese is transported to liver for excretion & excreted via bile mainly.

Basic clinical pharmacology of manganese: -

It is needed for proper health of skin, bones, cartilage etc; it helps in glucose tolerance, regulates blood sugar, reduces inflammation, reduces premenstrual cramps, it also aids in formation of connective tissues, bones, sex hormones, blood clotting, metabolism of carbohydrates & fats; it facilitates calcium absorption.

- **Amino acids in pumpkin seeds: -**

- **Absorption & digestion of amino acid.**

When we eat high-protein foods, body breaks down protein into amino acids and peptides through digestive enzymes, such as pepsin & pancreas produces trypsin, chymotrypsin and other that aid in protein digestion.

Pepsin is the primary enzyme responsible for digesting protein; it acts on the protein molecules & breaks the bonds – called peptide bonds – that hold the protein molecules together. Next, these smaller chains of amino acids move in the stomach & then in small intestine where they're further broken down by enzymes released by the pancreas. Small intestine contains finger-like extensions called micro-villi. These structures enhance its ability to absorb dietary nutrients. Now the semi digested material pass through brush border and baso-lateral membranes of small intestine & di-tripeptides are absorbed by passive transport (facilitated or simple diffusion) or active transport (Na⁺ or H⁺ co-transporters) pathways. Di and tripeptides are more efficiently absorbed than free amino acids which in turns are better absorbed than oligopeptides. They're released into the bloodstream and used for various biochemical reactions.

Each amino acid has a different role in the human body. Upon absorption, some amino acids are incorporated into a new protein. Some fuel your muscles and support tissue repair. Others are used as a source of energy.

Tryptophan and tyrosine, for example, promote brain health. These amino acids support the production of neurotransmitters, leading to increased alertness and optimum nerve responses. Tryptophan also assists with serotonin production, lifting your mood and keeping depression at bay.

Phenylalanine serves as a precursor to melatonin, epinephrine, dopamine and other chemicals that regulate your mood and bodily functions. Methionine helps your body absorb selenium and zinc, two minerals that promote overall health. Some amino acids, such as isoleucine, play a vital role in hemoglobin production and glucose metabolism.

- **Tryptophan: -**

It is an amino acid (protein) that is useful in bio-synthesis of protein; it is essential in human because body cannot make it); it is a precursor of neuro-transmitter serotonin, melatonin, vitamin B3; it is a sedative also.

Main sources of tryptophan: -

Salmon oil, egg, spinach, milk, seeds, fenugreek seed, soy products, nuts, fish, meat, wheat, banana etc.

Basic pharmacokinetics of tryptophan (based on human intake in natural food products): -

It is absorbed in small intestine & reached the blood circulation, it passes the blood brain barrier & in brain cells it is metabolized into indolamine neuro-transmitter, niacin, a common example of indolamine is serotonin derivative from tryptophan. Tryptophan is converted into serotonin in the brain & body; it is believed that tryptophan supplements should be taken with carbidopa, which blocks the blood brain barrier. (Serotonin (5HTP) 5 hydroxytryptamine, is a monoamine neuro-transmitter. It contributes in feelings of well-being, happiness, reward, learning, memory, many physiological functions).

In the pathway of tryptophan/serotonin, melatonin hormone is produced. Melatonin regulates sleep-wake cycle. It is primarily released by pineal gland in brain. It controls circadian (daily clock) rhythms.

Pineal gland releases it at night more & very little in day light. It improves immune system function.

Natural sources of melatonin are tomato, pomegranate, olive, grapes, broccoli, cucumber, barley, seeds, nuts etc.

Fructose malabsorption causes improper absorption of tryptophan in intestine thus leading to low level of it & may cause depression.

Basic clinical pharmacology of tryptophan: -

It is necessary for normal growth of infants; nitrogen balance in adults, it aids in sleep pattern, mood. It is necessary for melatonin & serotonin formation in body, it enhances mental & emotional well-being, manages pain tolerance, weight etc. it also helps in build muscle tissue, essential for vitamin B3 production, relieves insomnia, reduces anxiety, depression, migraine, OCD, helps immune system, reduces cardiac spasms, improves sleep pattern etc.

- **Threonine: -**

It is an amino acid used in biosynthesis of proteins; it is an essential amino acid important for tooth enamel, collagen, elastin, nervous system, fats metabolism, it prevents fats buildup in liver, useful in intestinal disorders, anxiety, and depression.

Main sources of threonine: -

Cheese, chicken, fish, meat, lentil, black seed, nuts, soy etc.

Basic clinical pharmacology of threonine: -

It is useful in nervous system disorders, multiple sclerosis, spinal spasticity, makes bones, joints, tendons, ligament stronger, it helps the immune system, promotes heart health.

- **Isoleucine: -**

It is an amino acid that is used in the biosynthesis of proteins, it is an essential amino acid means the body cannot make it & we depend on food sources, it plays & helps many functions of the body.

Main sources of isoleucine: -

Meat, mutton, fish, cheese, egg, seeds, nuts, soybeans, milk, legumes, fenugreek seed etc.

Basic pharmacokinetics of isoleucine (based on human intake in natural food products): -

It is absorbed in small intestine by sodium-dependent active transport. It is metabolized in liver.

Basic clinical pharmacology of isoleucine: -

It promotes glucose consumption & uptake, it is anti-catabolic, enhances athletic performance & best for pre-workout, it acts on wound healing, detox of nitrogenous waste in the body, stimulates immune system, promotes secretion of many hormones, helps in hemoglobin formation, regulating blood glucose, energy in the body, built muscles, helpful to brain for its function.

- **Leucine: -**

It is branched chain amino acid (BCAA) it is ketogenic amino acid; it is necessary when we do exercise, it stimulates protein synthesis & assists in muscle building.

Main sources of leucine: -

Cheese, soybean, meat, nuts, chicken, seeds, fish, seafood, beans.

Basic clinical pharmacology of leucine: -

It helps regulate blood glucose, promotes growth, recovers the muscles & bone tissues, acts on production of growth hormones, repairs the tissues, essential for muscle building, it burns fats, controls obesity, promotes lean muscles growth.

- **Lysine: -**

It is an essential amino acid, which our body cannot prepare and we need to eat it from food sources. It necessary for many body functions, acts in building blocks of protein (muscles).

Main sources of lysine: -

Red meat, chicken, egg, fish, beans, lentils, wheat germ, nuts, soybeans, spirulina, fenugreek seed, shrimp, pumpkin seed, tuna, cheese, milk etc.

Basic pharmacokinetics of lysine (based on human intake in natural food products): -

It is absorbed from the lumen of the small intestine into the enterocytes by active transport, it undergoes first pass metabolism in liver & is metabolized in liver.

Basic clinical pharmacology of lysine: -

It helps the body in tissue growth, repair muscles injury, promote collagen formation, help the body to produce enzymes, antibodies, hormones, supports immune system, its deficiency causes fatigue, irritability, nausea, hair loss, anorexia, inhibited growth, anemia, problems with reproductive system, it is very helpful in treating cold sores (herpes), control blood pressure, diabetes, osteoporosis, helps athletes performance, helpful in treating cancers, reduces anxiety, increase absorption of calcium, improves digestion & prevent leaky gut, helpful in pancreatitis.

- **Methionine: -**

It is a sulfur containing amino acid; it is essential; it plays a critical role in the metabolism & health; it act on normal cell functioning, growth & repair. It is also a chelating agent for heavy metals; due to its sulfur contain it is helpful in hair, nail health & growth & good for skin health; it reduces cholesterol by increase the production of lecithin in liver & reduces fats formation in liver, also protects kidneys, liver from hepatotoxins, it is an antioxidant. It is absorbed in lumen of small intestines into enterocytes by active transport & metabolized in liver.

Main sources of methionine: -

Meat, mutton, fish, chicken, cheese, egg, beans, milk, nuts, shellfish etc.

- **Cystine: -**

It is the oxidized dimer form of amino acid, it is nonessential; the body uses it to produce taurine & other amino acids; it is a sulfur containing amino acid; our body uses vitamin B6 with the help of cystine; it heals burns, wounds, bronchitis, assist in supply of insulin, it increases level of glutathione in liver, lungs, kidneys & bone marrow. It is anti aging, anti inflammatory, anti arthritis, anti rheumatoid arthritis.

Main sources of cystine: -

Meat, egg, milk, garlic, onion, broccoli, oats, wheat germ, lentils etc.

- **Phenylalanine: -**

It is an aromatic essential amino acid in human; it plays a key role in biosynthesis of other amino acids; it is important in the structure & function of many proteins & enzymes. It is precursor of melanin, dopamine, noradrenalin hormone, thyroxin hormone. It is converted in tyrosine & used in biosynthesis of dopamine & noradrenalin. It improves memory, reduces pain of hunger; it is anti-depressant; it is also a building block protein; it is useful in vitiligo, depression, ADHA, parkinson's, multiple sclerosis, pain, osteoarthritis, rheumatoid arthritis, fat burn & helpful in alcohol withdrawal symptoms.

Main sources of phenylalanine: -

Pumpkin seed, nuts, seeds, soy, meat, fish, chicken, egg, beans, milk etc.

- **Tyrosine: -**

It is a nonessential amino acid; it is also called as 4-hydroxyphenylalanine; it is useful in cell synthesis of protein; it is a building block protein; body prepares it from phenylalanine. It is a precursor & used to produce noradrenalin, dopamine, & thyroxin & melanin hormones. It reduces stress, improves memory, it promotes growth, mental health, skin health, fat burn. It acts as a mood elevator, anti-depressant, improves memory, mental alertness, its deficiency can cause hypothyroidism leading to low blood pressure, low body temperature (hypothermia), stress, fatigue, narcolepsy; it helps thyroid gland, adrenal gland, pituitary gland to function properly. It is absorbed in small intestine by sodium-dependent active transport; after absorption it reaches the blood & crosses the blood brain barrier (BBB) & enters the brain cells & gets metabolized into catecholamine (noradrenalin). Human body regulates it amount by eating it by food sources & making inside the body (nonessential). The body does not store it much for later uses.

Main sources of tyrosine: -

Meat, fish, egg, milk, nuts, beans, oats, wheat, black seeds etc.

Dopamine: -

It regulates reward & pleasure centers in brain; it is a chemical important for memory, motor skills & etc.

Nor-adrenaline & adrenaline: -

These hormones are responsible for fight & flight response in stressful situation & also controls many functions of the body; it is secreted by adrenal glands.

Thyroxin: -

It is secreted by thyroid gland; it regulates metabolism, blood pressure, digestion, energy etc.

Melanin: -

It is pigmented hormone, gives our skin, hair, eye their colour; dark skinned people have more melanin in their skin than light skin people (depend on exposure to sunlight).

- **Valine: -**

It is an essential nutrient for vertebrates, biosynthesis of protein; it is an aliphatic & extremely hydrophobic essential amino acid; it is branched chain of amino acid (BCAA); it is important for growth, repair, blood glucose regulation, for energy; it stimulates CNS, proper mental function.

Main sources of valine: -

Cheese, soy, beans, nuts, fish, meat, chicken, mushroom, seeds, nuts, whole grains etc.

- **Histidine: -**

It is an amino acid used in biosynthesis of protein; it is semi essential amino acid, needed by human for production of histamine & also for growth & tissue repair, it is helpful in maintaining myelin sheaths that covers the nerves & protects the nerves.

Main sources of histidine: -

Meat, mutton, fish, milk, egg, seeds, nuts, chicken, cheese, soy, beans, whole grains, fenugreek seeds.

Basic pharmacokinetics of histidine (based on human intake in natural food products): -

It is absorbed in small intestine via active transport requiring the presence of sodium.

Basic clinical pharmacology of histidine: -

It plays many roles in immunity, gastric secretion & sexual functions. It is also required for blood cell formation & protects tissues against damage of radiation & heavy metals. It keeps normal pH of 7 in the body, useful in rheumatoid arthritis, allergy, ulcer & anemia caused by kidney failure or dialysis. It is an antioxidant, anti inflammatory, reduces cholesterol.

- **Arginine: -**

It is among conditional essential amino acid the body needs to function properly; it is made in liver; it plays an important role in building protein thus helpful in body building.

Main sources of arginine: -

Chicken, pumpkin seeds, spirulina, dairy products, red meat, fish, egg etc.

Basic pharmacokinetics of arginine (based on human intake in natural food products): -

It is absorbed in jejunum mainly from oral diet.

Basic clinical pharmacology of arginine: -

It releases nitric oxide in the blood & nitric oxide dilates the blood vessels thus increases the blood supply & controls high blood pressure, it improves erection, builds muscle etc. it also acts on release of growth hormone, insulin & other substances in the body. It also improves heart health, athlete performance, stimulates immune system; citrulline present in watermelon is converted into arginine in kidneys, please refer lesson on watermelon.

- **Alanine: -**

It is a non-essential amino acid that is present in blood plasma in its free state in high levels; it is involved in sugar & acid metabolism, protein synthesis, it increases immunity, provides energy for muscles tissues, brain & CNS, it acts on tryptophan, vitamin B6 metabolism; it is an important sources of energy for muscles; it helps the body to convert simple sugar (glucose) into energy; it is produced in the body. It increases exercise capacity; reduces muscle fatigue, boost immunity, it is antioxidant; anti-aging; increases muscle growth; ideal pre & post workout, reduce blood sugar, prevent liver disease, helps the liver to eliminate toxins, improves CNS functioning, helpful in benign prostate hypertrophy. It is digested in small intestine; it is converted into pyruvic acid by alanine aminotransferase-1; during fasting condition alanine derived from protein breakdown is converted into pyruvate & used to synthesis glucose by gluconeogenesis in liver, it is excreted in urine via urea cycle. It is stored little in skeletal muscles.

Main sources of alanine: -

Meat, fish, egg, milk, aloe vera, honey, black seeds, nuts etc.

- **Aspartic acid: -**

It is a non-essential amino acid; it is over all negatively charged & plays an important role in synthesis of other amino acid, citric acid & urea cycles; it is found in animals, plants, sugarcane, sugarbeet. It may be a neurotransmitter; it strengthens the muscles, improves heart function, helps in maintaining mental health, reduces tiredness, improves athletic performance, increases muscle size, reduces depression & fatigue. It is absorbed in small intestine by active transport.

Main sources of aspartic acid: -

Meat, oysters, seeds, oats, avocado, sugar beet, milk, egg, nuts, cereals etc.

- **Glutamic acid: -**

It is a nonessential amino acid. It is an excitatory neuro-transmitter; it is necessary for biosynthesis of proteins; body uses it for several key functions within the body like making other neuro-transmitters such as GABA; it promotes brain health, muscles health, intelligence, mood & mental alertness. It is called as chemical messenger. It plays an important role in body's disposal of excessive waste like nitrogen. It is absorbed in lumen of small intestine into enterocytes by active transport & excreted in urine mainly. It is almost about 2 kilo grams, storage in natural form in brain, kidneys, liver, muscles etc.

Main sources of glutamic acid: -

Meat, chicken, fish, egg, milk, wheat, mushroom, soy, broccoli, walnut, peas etc.

- **Glycine: -**

It is a nonessential amino acid that body needs for growth & maintenance of tissue & need to prepare hormones & enzymes. It is inhibitory neurotransmitter. It helps in preparing glutathione (a powerful antioxidant & reduces free radicals, delay aging). It is helpful in preparing of creatine (provides energy to muscles to perform exercise etc & acts on muscle contraction), beneficial for brain health, bone health, alzheimer's, schizophrenia, sleep disorder, stroke, burns, protects kidney & liver from harmful side effects of drugs used after organ transplant, heals wound & ulcers, it is anti inflammatory, improves skin health.

Main sources of glycine: -

Meat, fish, milk, legumes etc.

- **Proline: -**

It is a protein-genic amino acid used in biosynthesis of proteins. It heals cartilages, cushion joints, tendons, ligament, heart muscles, connective tissues & helps in formation of collagen.

Main sources of proline: -

Soy, pumpkin seed, lentils, black beans, quinoa etc.

- **Serine: -**

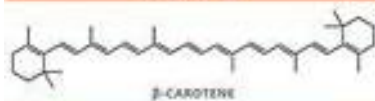
It is a nonessential amino acid, important for synthesis of protein, fats metabolism, muscle growth, immune system; it is a precursor of many amino acids, helpful in enzyme catalyze its reaction, overall health, physical & mental health.

Main sources of serine: -

Soybean, egg, lentils, meat, fish, nuts, almonds, walnut etc.

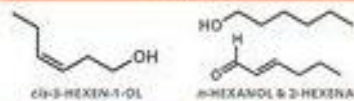
- **Main chemical structures of pumpkin: -**

COLORATION



A pumpkin's hue is due to carotenoid compounds such as β -carotene, the same compound that gives carrots their orange color. Other carotenoids include lutein, found in egg yolks, and zeaxanthin, found in corn.

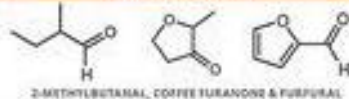
AROMA



When cut, pumpkins emit a vegetal aroma thanks to several compounds. The main aroma contributor is cis-3-hexen-1-ol, along with other six-carbon alcohols and aldehydes. Battery-smelling decetyl is also present.

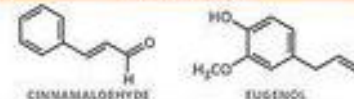


CANNED PUMPKIN

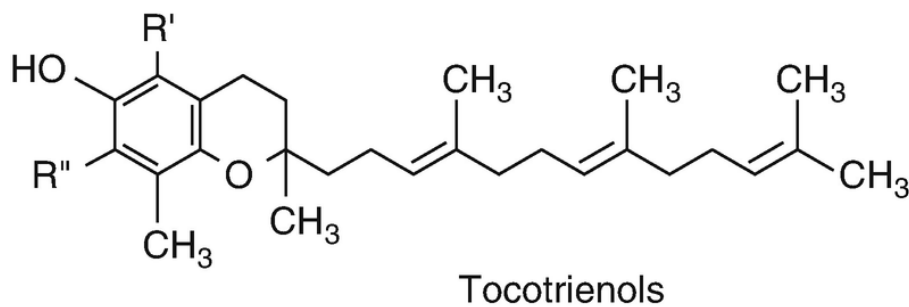
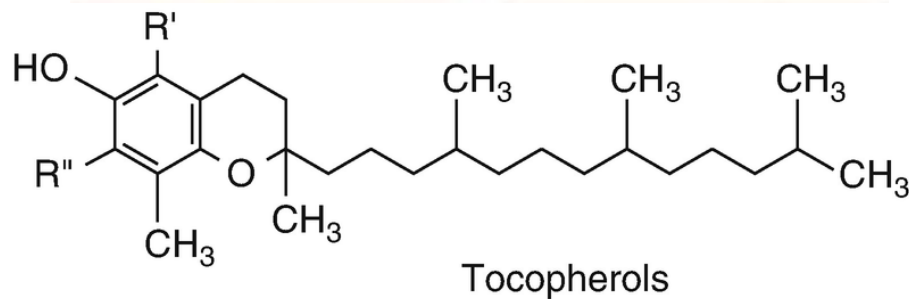


Canned pumpkin emits almost none of the six-carbon odor compounds given off by a freshly carved pumpkin. Instead, its volatiles include burnt-smelling 2-methylbutanal, coffee furanone, and furfural.

PUMPKIN SPICE



Pumpkin spice flavor has little to do with pumpkin and more to do with the spices added, including cinnamon (cinnamaldehyde), nutmeg, and clove (eugenol). Other compounds in the mix add caramelized notes.





Pumpkin - Nutritional Facts per 100 g

Nutrients mg Percentage

Folates	16 mcg	4%
Niacin	0.600 mg	4%
Pantothenic acid	0.298 mg	6%
Pyridoxine	0.061 mg	5%
Riboflavin	0.110 mg	8.5%
Thiamin	0.050 mg	4%
Vitamin A	7384 IU	246%
Vitamin C	9.0 mg	15%
Vitamin E	1.06 mg	7%
Vitamin K	1.1 mcg	1%
Sodium	1 mg	0.5%
Potassium	340 mg	7%
Calcium	21 mg	2%
Copper	0.127 mg	14%
Iron	0.80 mg	10%
Magnesium	12 mg	3%
Manganese	0.125 mg	0.5%
Phosphorus	44mg	5%
Selenium	0.3 mcg	<0.5%
Zinc	0.32 mg	3%



- Reference: -**

- www.britannica.com/plant/olive-plant
- Origin and History of the Olive | IntechOpen
- www.intechopen.com/books/origin-and-history-of-the-olive
- <https://www.healthline.com/nutrition/11-proven-benefits-of-olive-oil>
- www.tib-e-nabi-for-you.com
- Hort, Sir Arthur (1916). Theophrastus Enquiry into Plants. William Heinemann. p. 107.
- Abdelhafiz and Muhamad, 2008

A.T. Abdelhafiz, J.A. Muhamad Midcycle pericoital intravaginal bee honey and royal jelly for male factor infertility
 Int. J. Gynaecol. Obstet., 101 (2) (2008), pp. 146-149
 ArticleDownload PDFCrossRefView Record in ScopusGoogle Scholar
 Ahmad, 2016

K. Ahmad Update on pediatric cough
 Lung, 194 (2016), pp. 9-14
 CrossRefView Record in ScopusGoogle Scholar
 Akan and Garip, 2011

Z. Akan, A. Garip Protective role of quercetin: antioxidants may protect cancer cells from apoptosis and enhance cell durability
 WebmedCentral, 2 (1) (2011)
 WMC001504
 Google Scholar

"beet". def. 1 and 2. also "beet-root". Oxford English Dictionary Second Edition on CD-ROM (v. 4.0) © Oxford University Press 2009

"Cucurbita pepo L." Kew Science, Plants of the World, Royal Botanic Garden, UK. 2018. Retrieved 8 December 2018.

^ Paris, Harry S. (1989). "Historical Records, Origins, and Development of the Edible Cultivar Groups of Cucurbita pepo (Cucurbitaceae)". *Economic Botany*. New York Botanical Garden Press. 43 (4): 423–443. doi:10.1007/bf02935916. JSTOR 4255187.

^ "The Pumpkin Patch". 2007. Retrieved 19 February 2008.

^ "Horticulture Questions and Answers". Garden Help FAQ. Missouri Botanical Garden.

^ Ferriol, María; Picó, Belén (2007). "3". *Handbook of Plant Breeding: Vegetables I*. New York: Springer. p. 317. ISBN 978-0-387-72291-7. The common terms "pumpkin", "squash", "gourd", "cushaw", "ayote", "zapallo", "calabaza", etc. are often applied indiscriminately to different cultivated species of the New World genus Cucurbita L. (Cucurbitaceae): C. pepo L., C. maxima Duchesne, C. moschata Duchesne, C. argyrosperma C. Huber and C. ficifolia Bouché.

^ Schragar, Victor (2004). *The Compleat Squash: A Passionate Grower's Guide to Pumpkins, Squash, and Gourds*. New York: Artisan. p. 25. ISBN 978-1-57965-251-7.

^ "Pumpkin". Encyclopædia Britannica Online. 2007. Retrieved November 28, 2007.

^ Provesi JG, Dias CO, Amante ER (2011). "Changes in carotenoids during processing and storage of pumpkin puree". *Food Chemistry*. 128 (1): 195–202. doi:10.1016/j.foodchem.2011.03.027. PMID 25214348.

^ Jump up to:^a ^b "Pumpkins in Florida". Institute of Food and Agricultural Sciences.

^ "White Pumpkins Hit the Halloween Market". NBC News. Associated Press. October 26, 2005. Retrieved October 9, 2013.

^ Jump up to:^a ^b ^c ^d Wolford, Ron; Banks, Drusilla (2008). "Pumpkins and More". University of Illinois Extension. Retrieved 19 Feb 2008.

^ Richardson, R. W. "Squash and Pumpkin" (PDF). United States Department of Agriculture, Agricultural Research Service, National Plant Germplasm System. Archived from the original (PDF) on September 24, 2015. Retrieved November 23, 2014.

^ Stephens, James M. "Pumpkin — Cucurbita spp". University of Florida. Retrieved November 23, 2014.

^ Baggett, J. R. "Attempts to Cross Cucurbita moschata (Duch.) Poir. 'Butternut' and C. pepo L. 'Delicata'". North Carolina State University. Retrieved November 23, 2014.

^ Jump up to:^a ^b "Pumpkin production in 2017 (includes squash and gourds), Crops/Regions/World list/Production Quantity (pick lists)". UN Food and Agriculture Organization, Corporate Statistical Database (FAOSTAT). 2018. Retrieved 7 September 2019.

^ Jump up to:^a ^b ^c Astill, Gregory (2018). "Pumpkins: Background & Statistics". United States Department of Agriculture Economic Research Service. Retrieved December 2, 2018.

^ Illinois Department of Agriculture (22 Oct 2004). "Illinois Leads Nation in Pumpkin Production".

^ Hirsch, Jerry (18 November 2009). "Pumpkin pie could become scarce after Thanksgiving". Los Angeles Times. Retrieved 2 June 2015.

^ "News - Pumpkin shortage in the U.S. has Canada to the rescue - The Weather Network". www.theweathernetwork.com.

^ "Here's What Happened to the Great Pumpkin Shortage of 2015". Fortune.

^ Severson, Kim (November 17, 2009). "Libby's Warns of a Canned Pumpkin Shortage". The New York Times.

^ Williams, Roger (2009). "Effects of imidacloprid-based Insecticides on the Native Cucurbit Pollinator, Peponapis pruinosa". US Interagency IPM Projects. Archived from the original on October 28, 2018. Retrieved September 15, 2013.

^ Canto-Aguilar, M.L.; Parra-Tabla, V. (2000). "Importance of Conserving Alternative Pollinators: Assessing the Pollination Efficiency of the Squash Bee, Peponapis limitaris in Cucurbita moschata (Cucurbitaceae)". *Journal of Insect Conservation*. 4 (3): 201–208. doi:10.1023/A:1009685422587.

^ Tepedino, V. J. (April 1981). "The pollination efficiency of the squash bee (Peponapis pruinosa) and the honey bee (Apis mellifera) on summer squash (Cucurbita pepo)". *Journal of the Kansas Entomological Society*. 54 (2): 359–377. JSTOR 25084168.

^ Jump up to:^a ^b Borrell, Brenda (October 2011). "The Great Pumpkin". The Smithsonian Institution. Retrieved 31 October 2016.

^ Jump up to:^a ^b Barron, Christina (17 October 2016). "Belgian man's pumpkin sets world record at a whopping 2,624 pounds". The Washington Post. Retrieved 31 October 2016.

^ Hogan, C. Michael (2011). "Thanksgiving". Encyclopedia of Earth. National Council for Science and the Environment.

^ Roberts, Tammy. "Many uses for pumpkin". Missouri Families. University of Missouri Extension.

^ Stavelly, Keith W.F. and Fitzgerald, Kathleen. *America's Founding Food: The Story of New England Cooking*. Chapel Hill, N.C.: University of North Carolina Press, 2004. ISBN 0-8078-2894-7

^ "Cock and Bull Stories". Ngishili.com. Retrieved 2013-08-12.

^ "Pumpkin Leaves Chibwabwa". Food and Agriculture Organization. Retrieved 30 March 2017.

^ "Nutrition facts for pumpkin seeds, whole, roasted, without salt". SELF Nutritiondata. Condé Nast Publications. Retrieved 1 September 2012.

^ Kreft, S.; Kreft, M. (2007). "Physicochemical and physiological basis of dichromatic colour". *Naturwissenschaften*. 94 (11): 935–939. Bibcode:2007NW.....94..935K. doi:10.1007/s00114-007-0272-9. PMID 17534588.

^ Kaernbach, C.; Dörre, C. (2006). Gula, B.; Vitouch, O. (eds.). "On the color of transparent substances, in Current Psychological Research in Austria" (PDF). Proceedings of the 7th Scientific Conference of the Austrian Psychological Society (ÖGP). Klagenfurt. Archived from the original (PDF) on 2009-11-04.

^ Tyler Herbst, Sharon (2001). "Pumpkin-Seed Oil". *The New Food Lover's Companion* (3rd ed.). Barron. p. 550. Retrieved 14 Feb 2008.

^ Bavec F, Grobelnik Mlakar S, Rozman Č, Bavec M (2007). "Oil Pumpkins: Niche for Organic Producers" (PDF). Issues in new crops and new uses. Purdue University Agriculture, Horticulture and Landscape Architecture. Retrieved 2 September 2012.

^ "Tip 75 – Pumpkin for cats – pumpkin for dogs – Pumpkin for diarrhea or constipation". Pets.ca – Canada's Pet Information Centre. Retrieved 1 November 2011.

^ Jacob, J. P.; Wilson, H. R.; Miles, R. D.; Butcher, G. D.; Mather, F. B. "Factors Affecting Egg Production in Backyard Chicken Flocks". University of Florida IFAS Extension. Retrieved September 15, 2013.

- ^ Robert E. Henshaw, ed. (2011). Environmental History of the Hudson River. Albany, NY: State University of New York Press. ISBN 978-1-4384-4026-2.
- ^ Volker Schulz, ed. (2004). Rational Phytotherapy: A Reference Guide for Physicians and Pharmacists (5th ed.). Munich: Springer. pp. 304–305. ISBN 978-3-540-40832-1.
- ^ "Pumpkin seed (Cucurbitae peponis semen)". Heilpflanzen-Welt Bibliothek. Retrieved March 25, 2015.
- ^ Xiao, S. H.; Keiser, J.; Chen, M. G.; Tanner, M.; Utzinger, J. (2010). "Research and Development of Antischistosomal Drugs in the People's Republic of China a 60-year review". *Advances in Parasitology*. 73: 231–295. doi:10.1016/S0065-308X(10)73009-8. PMID 20627145.
- ^ Wu, Yan; Fischer, Warren (1997). *Practical Therapeutics of Traditional Chinese Medicine*. Taos, NM: Paradigm Publications. pp. 282–283. ISBN 978-0-912111-39-1.
- ^ Hson-Mou Chang, Paul P. H., eds. (2000). *Pharmacology and Applications of Chinese Materia Medica, Volume 2*. Singapore: World Scientific Publications. pp. 832–836. ISBN 978-981-02-3692-2.
- ^ Xiao, Ning; Yao, Jia-Wen; Ding, Wei; Giraudoux, Patrick; Craig, Philip S.; Ito, Akira (2013). "Priorities for Research and Control of Cstode Zoonoses in Asia". *Infectious Diseases of Poverty*. 2 (1:16): 16. doi:10.1186/2049-9957-2-16. PMC 3750256. PMID 23915395.
- ^ Ito, Akira; Li, T.; Chen, X.; Long, C.; Yanagida, T.; Nakao, M.; Sako, Y.; Okamoto, M.; Wu, Y.; Raoul, F.; Giraudoux, P.; Craig, P. S. (2013). "Mini Review on Chemotherapy of Taeniasis and Cysticercosis Due to Taenia Solium in Asia, and a Case Report With 20 Tapeworms in China" (PDF). *Tropical Biomedicine*. 30 (2): 164–73. PMID 23959481.
- ^ Fowler, Julian (28 October 2005). "Turnip battles with pumpkin for Hallowe'en". BBC. Retrieved 23 September 2007.
- ^ "Pumpkins Passions". BBC. 31 October 2005. Retrieved 19 October 2006.
- ^ Jump up to:^a^b *The Oxford companion to American food and drink*. Oxford University Press. 2007. p. 269. ISBN 978-0-19-530796-2. Retrieved February 17, 2011.
- ^ Hawthorne, Nathaniel (1837). "The Great Carbundle". *Twice-Told Tales*. Hide it [the great carbundle] under thy cloak, say'st thou? Why, it will gleam through the holes, and make thee look like a jack-o'-lantern!
- ^ Daily News (Kingston, Ontario), November 1, 1866:
The old time custom of keeping up Hallowe'en was not forgotten last night by the youngsters of the city. They had their maskings and their merry-makings, and perambulated the streets after dark in a way [that] was no doubt amusing to themselves. There was a great sacrifice of pumpkins from which to make transparent heads and face, lighted up by the unfailling two inches of tallow candle.
- ^ Jump up to:^a^b *The Day We Celebrate: Thanksgiving Treated Gastronomically and Socially*, *The New York Times*, Nov. 24, 1895, p. 27. "Odd Ornaments for Table," *The New York Times*, Oct. 21, 1900, p. 12.
- ^ Christopher Mims. "The untold history of Starbucks' Pumpkin Spice Latte". Quartz.
- ^ "Considering Pumpkin Spice and Seasonal Synesthesia". *The American Conservative*. 2013-09-28.
- ^ "Pumpkins: from decoration to delicacy". *Produce Retailer*. August 25, 2017. Archived from the original on March 22, 2018. Retrieved March 20, 2018.
- ^ "Elaine Reeves: For love of gourd". *The Mercury*. Mar 4, 2017. Retrieved March 20, 2018.
- ^ "Half Moon Bay Art & Pumpkin Festival: A Brief History". *Miramar Events*. 2016. Retrieved 31 October 2016

- **Research: -**

SCIENCE & HADEES REGARDING SQUASH (PUMPKIN): -

Squash is among the vegetables mentioned by Nabi الله عليه وسلم. Hadees from Bukhari quotes that Ibn Malik said, "A tailor invited the Prophet صلى الله عليه وسلم to a meal that he had prepared, and I went along with the Prophet صلى الله عليه وسلم. The tailor presented barley bread and soup containing gourd and cured meat. I saw the Prophet صلى الله عليه وسلم picking the pieces of gourd from around the dish, and since then I have kept on liking gourd.

Dexter L. Morris, MD, PhD, vice chairman and associate professor in the department of emergency medicine at the University Of Northern Carolina School Of Medicine says that "Squash and gourd contain such a rich array of vitamins and minerals and other compounds that scientists have just begun to map its healing power." However, they have managed to come to at least a few conclusions and one is that squash is one of the richest sources of vitamin C and beta-carotene (25% and 66% respectively). Scientists have found that people who have more vitamin C in the diets over time have fewer lung ailments as the vitamin gets transported to the lining of the lung as serves as an antioxidant. Also read scientific benefits.

In Hadees it is mentioned it increases the brain function & intelligence: -

For instance, 100 g of pumpkin seeds provide 559 calories, 30 g of protein, 110% RDA of iron, 4987 mg of niacin (31% RDA), selenium (17% of RDA), zinc (71%) etc, but no cholesterol. Further, the seeds are an excellent source of health promoting amino acid tryptophan. Tryptophan is converted to GABA in the brain; tryptophan is needed for melatonin and serotonin production to help promote a restful night's sleep. It also prevents stroke.

In Hadees it is mentioned it strengthens the heart, reduces inferior complex: -

It has Magnesium which is good for heart. It helps in ATP (adenosine triphosphate) formation (the energy molecules of our body) & it increases pumping action of our heart, proper bone and tooth formation, relaxes the blood vessels, and brings proper bowel function. Magnesium has been shown to benefit your blood pressure and help prevent sudden cardiac arrest, heart attack and stroke. Pumpkin seeds are an excellent source of dietary fiber and mono-unsaturated fatty acids, which are good for heart health.

- **CONCLUSION OF RESEARCH: -**

Nabi صلى الله عليه وسلم liked pumpkin, it should be added in food, it increases the brain function & intelligence, strengthens the heart, reduces inferior complex, it was eaten by previous Prophets also. We are not to prepare Nabiz in it. (Nabiz is when dates or Raisins are soaked in water overnight & the syrup in drank).