

Lesson no. 15 Dates.



- **Basic encyclopedia of dates & date palm tree:-**

- **NAMES: -**

1. Latin name is Phoenix dactylifera Linn.
2. Urdu and Hindi name is khajur.
3. English name is dates palm tree & its fruit is called as dates.

- **QURANIC NAMES:-**

1. It is called with various names in Quran.
2. It is called as Nakhil or Nakhil (plural) or Nakhlat (singular) 20 times in Quran.
3. It is called Leenat in chapter 59 Hashr, (Sura) verse no. 5.
4. It is mentioned as Naqir in chapter 4 (Sura) Nisa, verse no. 53 and 124.
5. Qitmir in chapter 35 (Sura) Fatir, verse no. 13.
6. Rutab in Chapter 19 (Sura) Maryam verse no 25.

In Hadees it is mentioned under 8 names.

The names mentioned in hadees are different stages & different varieties of dates.

Among 8 names, 5 are stages of dates & 3 are types of dates.

1. Balah - it is the first stage of dates; the dates are unripen (raw).
2. Bushra- it is the 2nd stage; dates are unripen fresh dates of yellow or red colour & are eatable.
3. Basr- it is the 3rd stage of dates; now the Bushra start getting ripen. They are eatable. (Half ripen).
4. Rutab - freshly ripen dates; mainly ripen on its tree. These are what we eat mostly, it is of brownish colour & soft & wet. (Fully ripen).
5. Tamar- it the 5th stage of dates; now Rutab gets dried up (mainly on tree). (Also Dates are generally called as Tamar please note).

The 3 names mentioned in Hadees are types of dates: -

1. Barni.
2. Ajwah.
3. Sukhara.

- **QURANIC REFERENCES OF IT:**

There are 20 references of it in Quran, by the names of Nakhil or Nakhil (plural) & Nakhlat (singular).

They are 8 times are mentioned alone. And 12 times mentioned with other fruits like pomegranate, grapes, and olives.

1. Chapter 2 Baqarah verse no. 266. (Nakhil)
2. Chapter 6 An'am verse no. 99. (Nakhil)
3. Chapter 6 An'am verse no. 141. (Nakhil)
4. Chapter 13 Ra'ad verse no. 4. (Nakhil)
5. Chapter 16 Nahl verse no. 11. (Nakhil)
6. Chapter 16 Nahl verse no. 67. (Nakhil)
7. Chapter 17 Bani-Israel verse no. 91. (Nakhil)
8. Chapter 18 Khaf verse no. 32. (Nakhil)
9. Chapter 19 Mariam verse no. 23. (Nakhlat)
10. Chapter 19 Mariam verse no. 25. (Nakhlat & Rutab)

11. Chapter 20 Ta'ah verse no. 71. (Nakhl)
12. Chapter 23 Mu-minoon verse no. 19. (Nakhil)
13. Chapter 26 Shu-araa verse no. 148. (Nakhl)
14. Chapter 36 Yaaseen verse no. 34. (Nakhil)
15. Chapter 50 Qaat verse no.10. (Nakhl)
16. Chapter 54 Qamar verse no. 20. (Nakhl)
17. Chapter 55 Rahmaan verse no. 11. (Nakhl)
18. Chapter 55 Rahmaan verse no. 68. (Nakhl)
19. Chapter 69 Haqqa verse no. 7. (Nakhl)
20. Chapter 80 Abasa verse no. 29. (Nakhl)

• **OTHER REFERENCES OF DATES IN QURAN:**

1. It is referred as LEENAT in chapter 59 (Sura) HASHR verse no. 5.
 2. In chapter 4 (Sura) NISA verse no. 53 & 124 it is called as NAQIR. (Naqir means a groove or dent on date seed).
 3. In chapter 35 (Sura) FATIR, verse no. 13, it is called as QITMIR. (Qitmir means a groove or dent on dates seed or thin membrane on date seed).
 4. In chapter 6 (Sura) AN'AAM verse no. 95, it is called as NAVA. (Nava means date seed).
 5. In chapter 36 (Sura) YASEEN verse no. 39 it is called AL-URJOON. (Al-Urjoon means the lower base of dates which becomes dry & get sickled shaped & it compared with new moon in verse no. 39 of chapter 36 (Sura) YASEEN.
 6. In chapter 111 (Sura) LAHAB & Chapter 54 (Sura) QAMAR it is called as HABL & DUSUR (Both means Palm Fibers).
- It is important to know about the stages of date's maturation, because by it only, you will understand the uses of it, and why it is called by different names in Quran and Hadees.

Please visit my website www.tib-e.nabi-for-you.com for detail Islamic study on dates.

There are many Hadith on dates; it is mentioned in following books of Hadith (reference are also given as Hadith number)

Ibn Majah, Tirmizi, Abu Dawud, Bukhari, An-Nasai, Muslim, Abu Nuaim, At-tibb Al Nabawi Harful Haa, Baihaqi, Mustadrak Al Hakim, Musnad.

1. Eat fresh ripen dates & watermelon or Mashmelon together because one cools the other. Eat the following together: butter & dried dates together, cucumber & dates, Balah (fresh unripen dates) & Tamar (dried dates).
2. Avoid making Nabiz (syrup) from two types of dates or dates & raisins, semi ripen dates & ripen dates together are Khamr (intoxicant). 7 Ajwah dates eaten early morning on empty stomach prevents black magic, evil eye, cardiac problems, skin disease & Ajwah dates are from Jannah.
3. Dates if eaten early morning on empty stomach are helpful in worm infection, inferior complex. Keep dates always at home & it has Barkat in it as Muslims have. Do not pick more than 1 dates at a time to eat, do not eat excessively during or after illness, 7 dates at one time are best. They are best nutrition, do Tahneek to new born with dates. This lesson has 53 Hadees.

• **Dates tree/date palm tree: -**

It is a flowering plant, its family is Arecaceae; It is cultivated for its edible sweet fruit called as Date; it is naturally wind-pollinated; it is grown from its seed; it is dioecious tree (having separate male & female plant); it is easily grown, its genus is phoenix & in Latin it is called as Phoenix dactylifera; there are many species (types) of it.

It grows about 21-23 meters in height; it grows singly or form clump with several stems from a single root system; it takes 4 to 8 years to bear its fruit; a mature date tree can produce 70 to 140 kgs of dates per season; it requires well drained deep soil with pH of 8 to 11 (means alkali soil). The soil should also be free from calcium carbonate. Male and female flowers are borne on separate plants but under cultivation the female flowers are artificially pollinated; usually oblong but varying much in shape, size and colour. Palms are known to live as long as 150 years, but their fruit production declines, and in commercial culture they are replaced at an earlier age.

All parts of the date palm yield products of economic value. Its trunk furnishes timber; the midribs of the leaves supply material for crates and furniture; the leaflets, for basketry; the leaf bases, for fuel; the fruit stalks, for rope and fuel; the fiber, for cordage and packing material; and the seeds are sometimes ground and used as stock feed. Syrup, vinegar and strong liquor are derived from the fruit. The plant

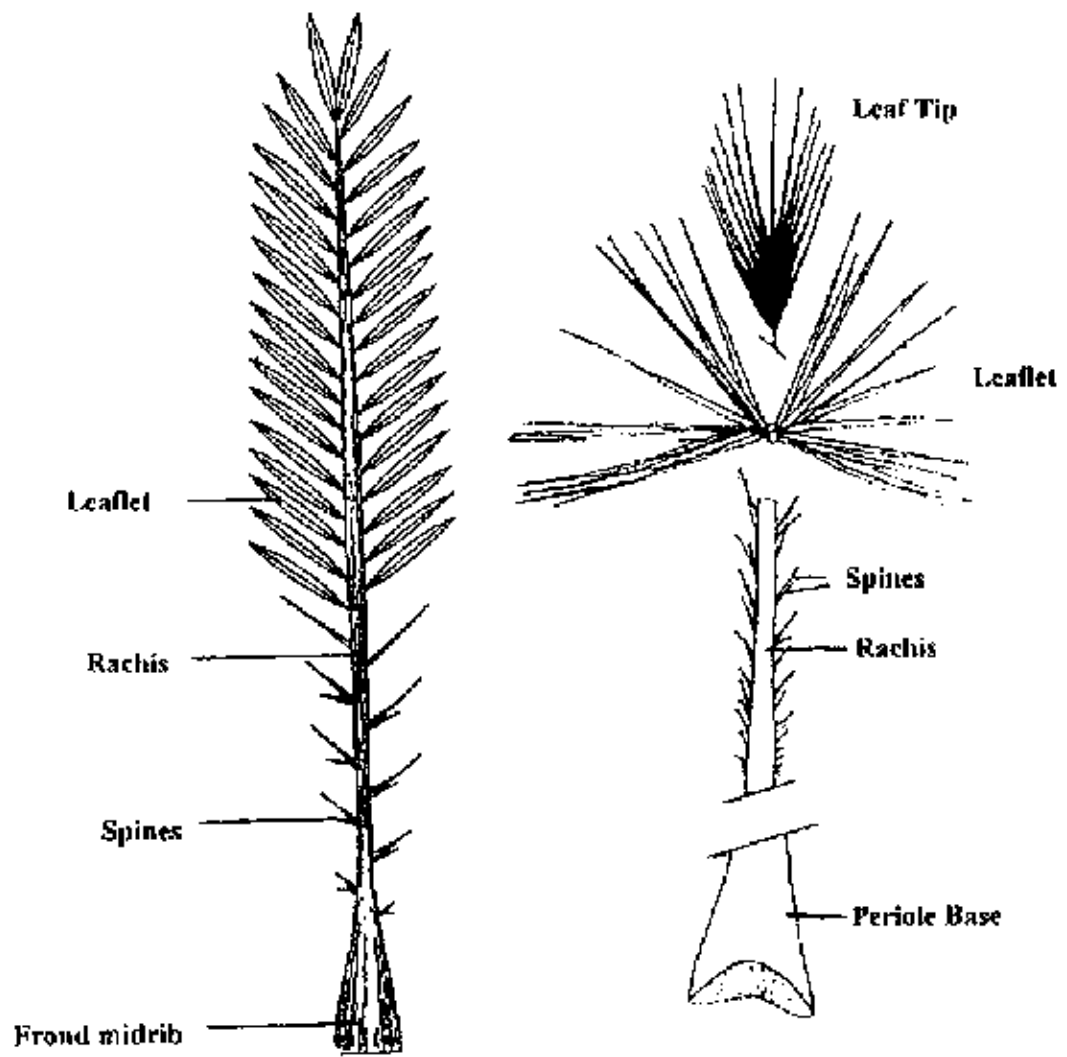
physiology is also used as a beverage, either fresh or fermented, but, because the method of extraction seriously injures the palm, only those trees that produce little fruit are used for sap. When a palm is cut down, the tender terminal bud is eaten as a salad.

Egypt, Iran, Saudi Arabia, and Iraq are the leading date-producing and date-exporting countries, although fruit from Algeria and Tunisia also is well known in Europe. California is the major American producer. The date palm is grown as an ornamental tree along the Mediterranean shores of Europe.



- **Leaves: -**

Its leaves are 4 to 6 meters long, with spines on the petiole & pinnate, about 100 leaflets; the leaflets are 30 cm long & 2 cm wide. Leaves have a normal life of 3 to 7 years.



- **Date fruit: -**



Dates are of many types of different places; it is oval-cylindrical shaped; 3 to 7 cm long & 2.5 cm in diameter; colour is bright red to bright yellow in fresh raw condition & dark reddish-brown or blackish in colour when fully ripen & yellow & brown when half ripen; it is sweet, has a single seed (drupe) inside. Dates needs to be harvested to get ripen; now a day the bunches of dates are bagged or covered on the tree while growing & before ripening so that the fruit remains healthy & grow larger & are protected from weather, animals, birds etc. More than 1,000 dates may appear on a single bunch weighing 8 kg (18 pounds) or more.



- **Dates spices: -**

species	Common Name	Distribution
<i>Phoenix dactylifera</i> L.	Date Palm	Mediterranean countries, Africa and part of Asia; introduced in North America and

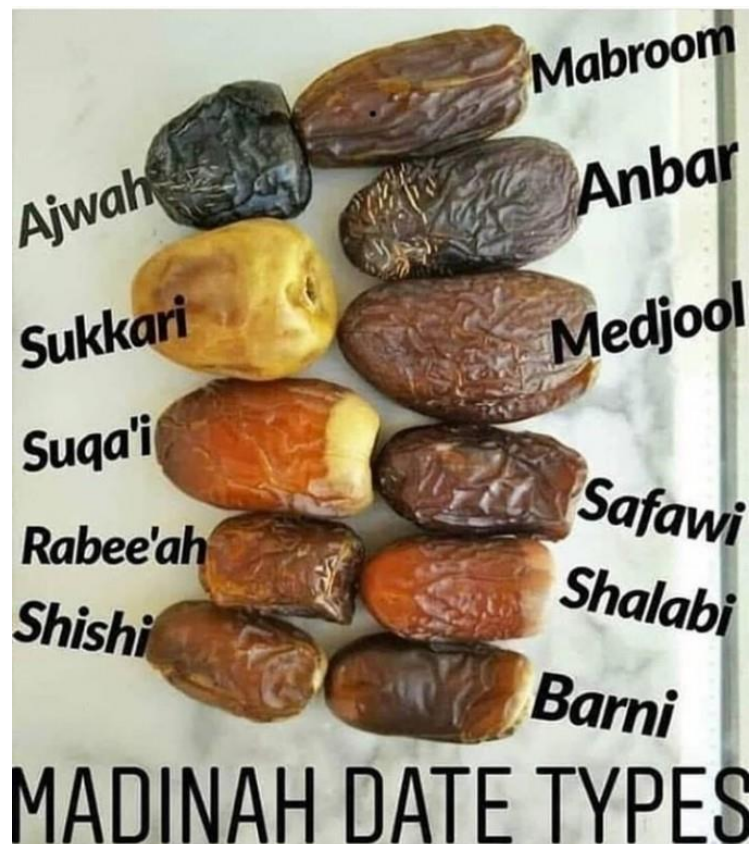
<i>P. atlantica</i> A. Chev.		Australia
<i>P. canariensis</i> Chabeaud.	Canary Palm	Occidental Africa and Canary Islands Canary Islands and Cape Verde
<i>P. reclinata</i> Jacq.	Dwarf Palm	Tropical Africa (Senegal and Uganda) and Yemen (Asia)
<i>P. sylvestris</i> Roxb.	Wild Date Palm or Sugar Palm	India and Pakistan
<i>P. humilis</i> Royle.		India, Burma, and China
<i>P. hanceana</i> Naudin.		Meridional China and Thailand
<i>P. robelinic</i> O'Brein.		Sri Lanka, Toukin, Annam, Laos and Thailand
<i>P. farinifera</i> Roxb.	Pigmy Palm	India, Ceylon and Annam
<i>P. rupicola</i> T. Anders.	Rocky Date Palm	India
<i>P. acaulis</i> Roxb.	Dwarf Palm	Bangladeshi and India
<i>P. paludosa</i> Roxb.	Hental or Juliana Palm	Bangladeshi, Tenasherim, Andaman, Nikobaren and Thailand

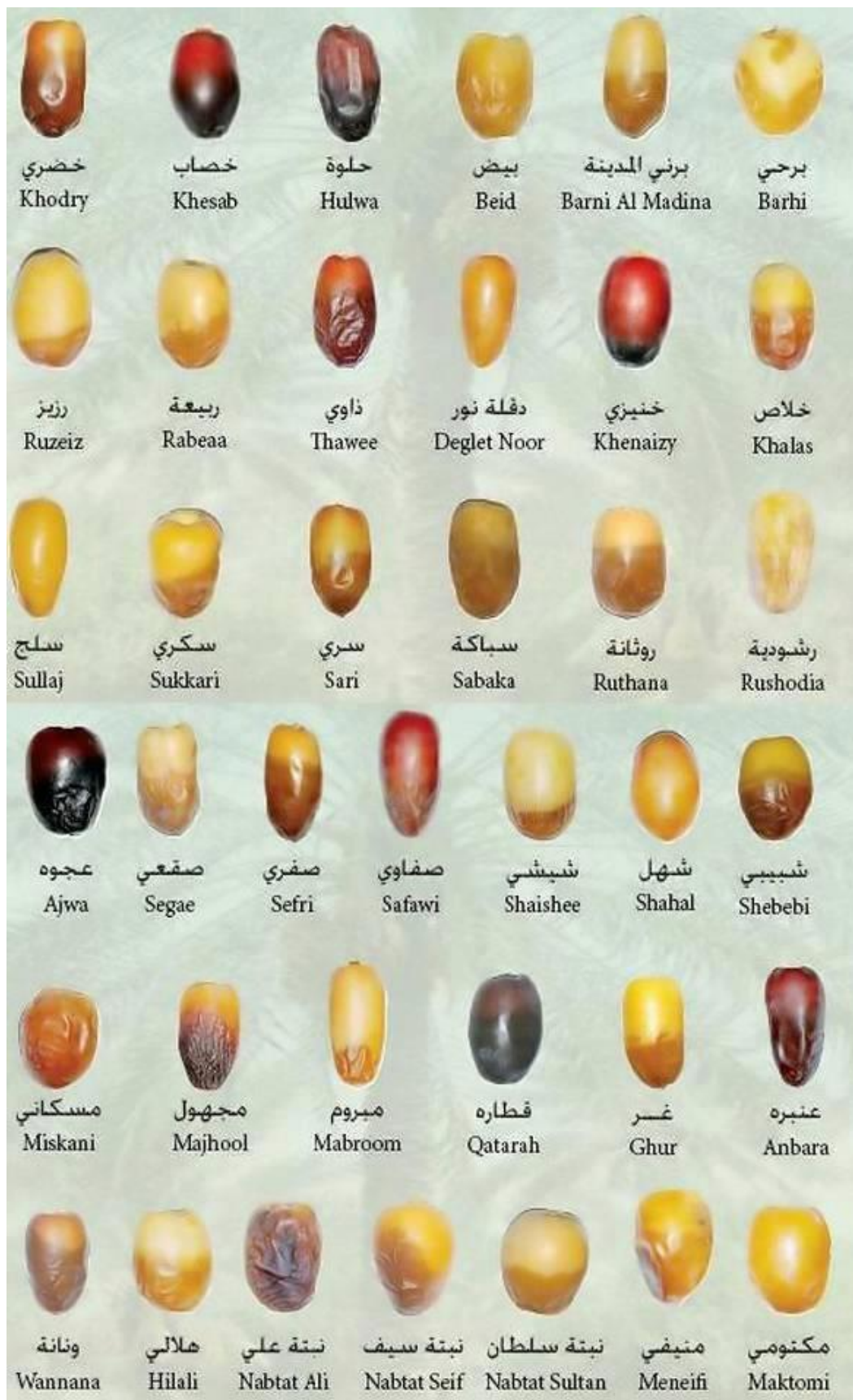
Besides date palm, five of the above species bear edible fruit

(*P. atlantica* chev, *P. reclinata* Jacq., *P. farinifera* Roxb., *P. humilis* Royle., and *P. acaulis* Roxb.).

Most of the 12 *Phoenix* species are well known as ornamentals, the most highly valued is *P. canariensis* Chabeaud, commonly called the Canary Island Palm. *P. sylvestris* Roxb is widely used in India as a source of sugar.

- **Different types of dates: -**







Ammari



Angou



Arichti



Bejjou



Bisr Helou



Deglet



Gounda



Gousbi



Branch of Hamraya dates



Hissa



Kenta



Kentichi



Lagou



Medjool



Touzerzayet



Trounja



Ammari



Angou



Arichti



Bejjou



Bisr Helou



Deglet



Gounda



Gousbi



Branch of Hamraya dates



Hissa



Kenta



Kentichi



Lagou



Medjool



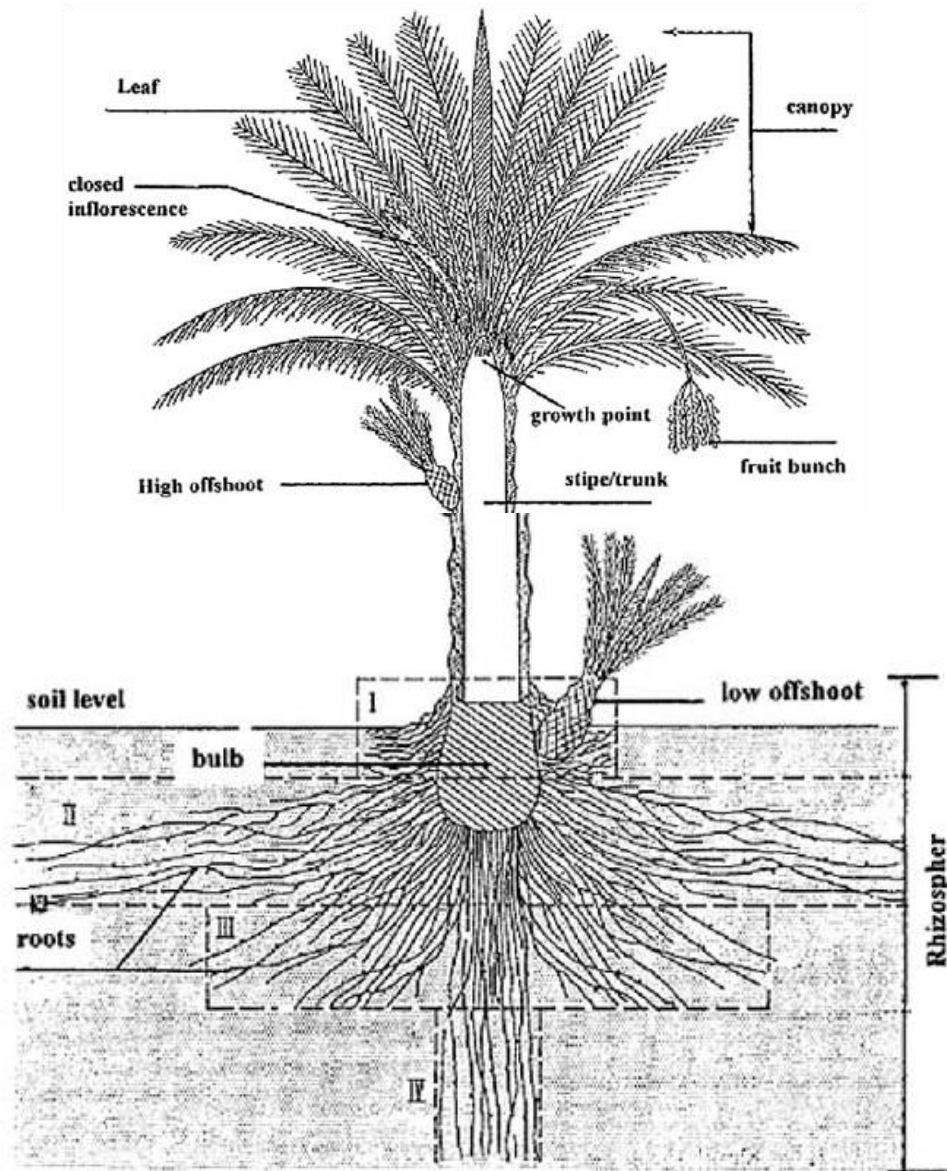
Touzerzayet



Trounja

• **Root System:-**

Being a monocotyledon, date palm has no tap root. Its root system is fasciculated and roots are fibrous, similar to a maize plant. Secondary roots appear on the primary root which develop directly from the seed. These secondary roots produce lateral roots (tertiary roots and so on) of the same type with approximately the same diameter throughout their length. All date palm roots present pneumatics, which are respiratory organs. Roots are found as far as 25 m from the palm and deeper than 6 m, but 85 percent of the roots are distributed in the zone of 2 m deep and 2 m on both lateral sides in a deep loamy soil. Date roots can withstand wet soil for many months, but if such conditions spread over longer periods, they become harmful to the health of the roots and to fruit production. Date palm root development and distribution depends on soil characteristics, type of culture, depth of the underground water and variety.



- **Date palm trunk: -**



The date palm trunk, also called stem or stipe is vertical, cylindrical and columnar of the same girth all the way up. The girth does not increase once the canopy of fronds has fully developed. It is brown in colour, lignified and without any ramification. Its average circumference is about 1 to 1.10 m.

The trunk is composed of tough, fibrous vascular bundles cemented together in a matrix of cellular tissue which is much lignified near the outer part of the trunk. Being a monocotyledon, date palm does not have a cambium layer.

The trunk is covered for several years with the bases of the old dry fronds, making it rough, but with age these bases weather and the trunk becomes smoother with visible cicatrices of these bases. Vertical growth of date palm is ensured by its terminal bud, called phyllophor, and its height could reach 20 meters.

Horizontal or lateral growth is ensured by an extra fascicular cambium which soon disappears, and which results in a constant and uniform trunk width during the palm's entire life. However, the terminal bud could experience an abnormal growth caused by a nutritional deficiency, which leads to shrinkage of the trunk. This stage is mainly caused by drought conditions.

- **Reproductive organs & flowers: -**



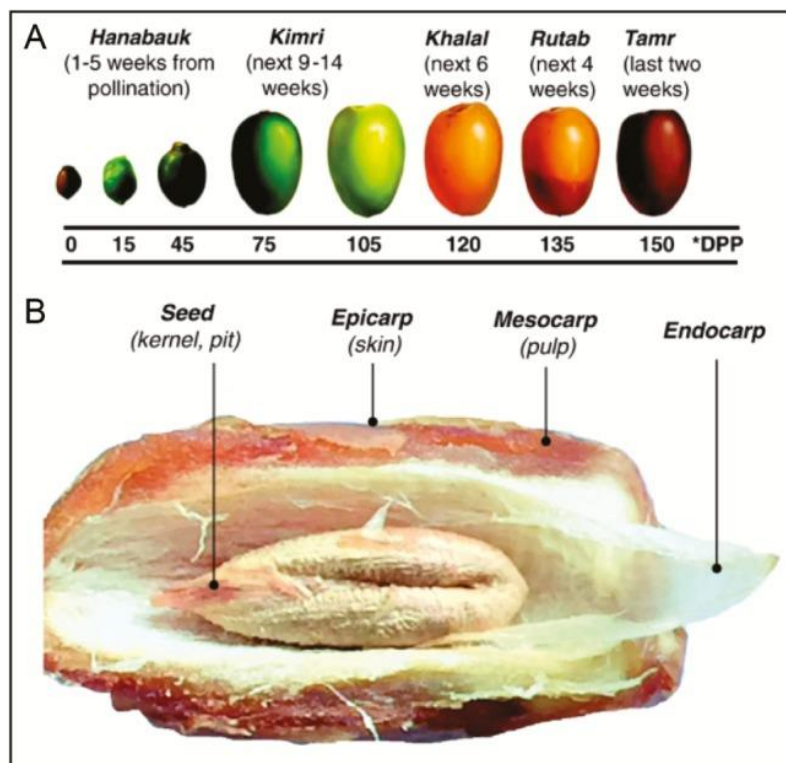


A is male flower

B is female flower

Date palm is a dioecious species with male and female flowers being produced in clusters on separate palms. These flowering clusters are produced with axils of leaves of the previous year's growth. In rare cases both pistillate and staminate flowers are produced on the same spike while the presence of hermaphrodite flowers in the inflorescence; the inflorescence, also called flower cluster, in its early stages is enclosed in a hard covering/envelope known as spathe, which splits open as the flowers mature exposing the entire inflorescence for pollination purposes; The male inflorescence is crowded at the end of the rachis, while branches of the inflorescence of the female cluster are less densely crowded at the end of the rachis. These characteristics allow the recognition of the inflorescence's sex before its opening. The male flower is sweet-scented and normally has six stamens, surrounded by waxy scale-like petals and sepals (3 each). Each stamen is composed of two little yellowish pollen sacs. The female flower has a diameter of about 3 to 4 mm and has rudimentary stamens and three carpels closely pressed together and the ovary is superior (hypogynous). The three sepals and three petals are united together so that only tips diverge. On opening the female flowers show more yellow colour while the male ones show white colour dust, produced on shaking. The pollen sacs usually open within an hour or two after the bursting of the spathe.



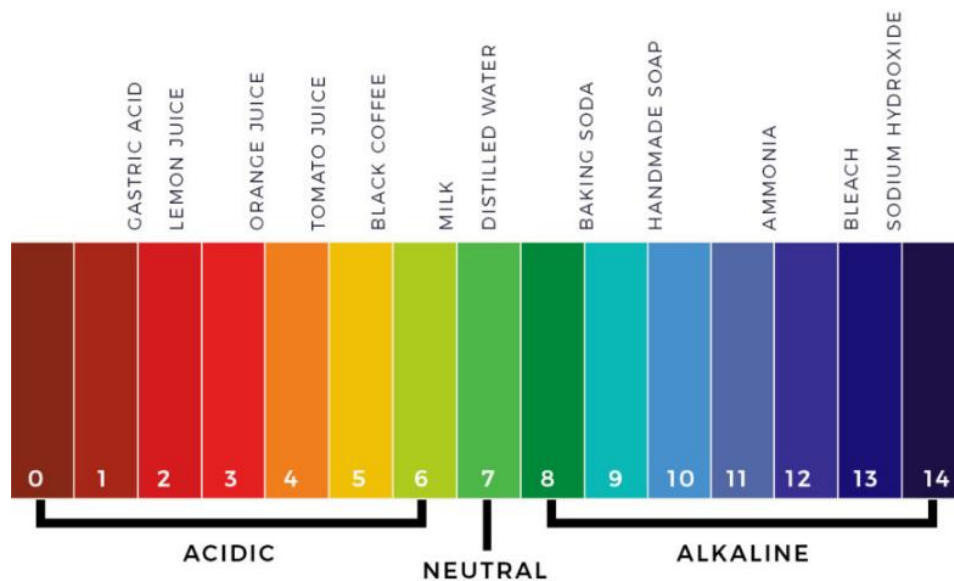


- **pH of dates is:** -pH is 6.5 - 8.5; it is mild acidic or alkaline because its pH is around 7.

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 date fruit:** -1 fresh raw dates of 7 gram give only 20 calories; 100 gram of ripen dates give 282 calories.
- **Glycemic index & Glycemic load of dates:** -

Dried ripen & fresh dates on average has glycemic index (GI) of 42 & glycemic load (GL) 18 per 60 grams serving & both come under low GI & low GL. This varies as per different types of dates from different places.

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 of dates:** -

Good in constipation, helpful during delivery (fresh dates), nourishes brain, heart; improves peristalsis movement of gastrointestinal tract, helpful in anemia, RBC formation, maintains pH of blood, reduces weight, fats, protects from cancer, it is antioxidant, anti inflammatory; increase urine output, strengthens the bone, teeth, eye sight, nerves; reduces thyroid activity so helpful in hyperthyroidism, help liver function, kills worm of GIT, improves bladder function, kidney function, reduces piles, blood pressure, best in summer season (it's sharbat), can be daily or often 3 dates per day, helpful in heavy menstrual bleeding, strengthens the whole body, best for recovery period, best eat with cucumber or watermelon, best of hairs, skin, nails, increases libido etc.

- **Clinical pharmacology of dates:** -

Dates are rich in dietary fiber, which prevents LDL cholesterol absorption in the gut. Additionally, the fiber diet works as a bulk laxative. It, thus, helps protect the colon mucous membrane from cancer-causing chemicals binding to it in the colon.

Dates contain health benefiting flavonoid polyphenolic antioxidants known as tannins. Tannins are known to possess anti-infective, anti-inflammatory, and anti-hemorrhagic (prevent easy bleeding tendencies) properties.

Dates are sources of vitamin-A (contains 149 IU or 5% of RDA per 100 g), which is known to have antioxidant properties and essential for vision.

Dates compose antioxidant flavonoids such as β -carotene, lutein, and zeaxanthin. These antioxidants found to have the ability to protect cells and other structures in the body from harmful effects of oxygen-free radicals. Thus, eating dates found to offer some protection from colon, prostate, breast, endometrial, lung, and pancreatic cancers.

Zeaxanthin is an important dietary carotenoid that selectively absorbed into the retinal macula lutea, where it thought to provide antioxidant and protective light-filtering functions. It thus offers protection against age-related macular degeneration, especially in the older adults.

Dates are excellent source of iron, carry 0.90 mg/100 g of fruits (about 11% of RDI). Iron, being a component of hemoglobin inside the red blood cells, determines the oxygen-carrying capacity of the blood.

Further, they are excellent sources of potassium. 100 g contains 696 mg or 16% of daily recommended levels of this electrolyte. Potassium is an important component of cell and body fluids that help regulate heart rate and blood pressure. They, thus, offer protection against stroke and coronary heart diseases.

Date fruits are also rich in minerals like calcium, manganese, copper, and magnesium. Calcium is an important mineral that is an essential constituent of bone and teeth and required by the body for muscle contraction, blood clotting, and nerve impulse conduction. There are more benefits mentioned below in separate content section.

- **Modern uses of it: -**

For severe anaemia: -

Eat 7 ripen dates early morning of empty stomach daily for 40 days & followed by 3 dates daily for more 40 dates.

For constipation: -

Eat 7 ripen dates at bed time with half cucumber or little watermelon before sleep daily for 40 dates but eat dinner sooner & drink lot of water in day time.

For general health: -

Eat 3 or 5 or 7 ripen dates twice a week empty stomach or with breakfast lifelong

For recovery after illness: -

Eat 3 ripen dates with cucumber or watermelon or any fruit two to three times a day till full recovery.

To increase libido: -

Soak 3 ripen dates in glass cow milk overnight & boil it little at early morning & drink for 40 days.

In summer season: -

Take 3 dates soak in 1 glass water for some time & add little watermelon run in mixer grinder to make a fresh juice & drink it for instant energy, this can be done in weakness, giddiness condition also.

For instant sex boosting: -

Eat 7 dates & 2 slice of watermelon 1 hour before intercourse; watermelon contains citrulline which is a natural viagra.

For preventing diseases: -

Soak 3 dates in glass of clean water overnight & add 1 spoon of honey init & drink it on empty stomach early morning 2 times a week lifelong.

Any disease condition: -

Eat 3 to 5 dates in breakfast 2 times a week or drink it syrup Nabiz (dates soak in water overnight).

For lung disease, TB, throat infection etc: -

Drink Gaba of dates twice a day in luke warm condition 50 ml each time for 1 month. (gaba is gum obtained from palm date tree).

For children health:-

Make the children to eat 7 dates daily till growth age; this will help proper of child & health.

For detox & remove toxins: -

Take 3 spoon of date vinegar mix in 100 ml water, add little lemon juice, 1 spoon honey & drink once a week early morning lifelong.

• **Contents/constituents of dates: -**

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.

The details given below are based on natural ingredients found in dates and not synthetically preparation of dates like jam, sweetmeats etc.

Sugar, dietary fiber, protein, vitamin A, B1, B2, B3, B5, B6, B9, C, E, K, calcium, iron, magnesium, manganese, phosphorus, potassium, sodium, zinc,

	Compounds
Benzoic acid and derivatives	Gallic acid, protocatechuic acid, <i>p</i> -hydroxybenzoic acid, vanillic acid, syringic acid, sinapic acid
Cinnamic acid and derivatives	Caffeic acid, hydrocaffeic acid, ferulic acid, <i>p</i> -coumaric acid, syringic acid, dactyliferic acid, 2-caffeoylshikimic acid hexoside, 3-caffeoylshikimic acid, 4-caffeoylshikimic acid, 5-caffeoylshikimic acid, caffeoylsinapoyl hexoside, and dicaffeoylsinapoyl hexoside
Flavonoid glycosides and esters	Luteolin, quercetin, and apigenin, quercetin rhamnosyl-hexoside sulfate, quercetin 3- <i>O</i> -rutinoside (rutin), quercetin hexoside sulfate, quercetin acetyl-hexoside, isorhamnetin-3- <i>O</i> -rutinoside, isorhamnetin hexoside, chrysoeriol rhamnosyl-hexoside, isorhamnetin acetyl-hexoside, quercetin 3- <i>O</i> -glucoside (isoquercitrin), chrysoeriol hexoside sulfate, and chrysoeriol hexoside
Flavan-3-ols	(+)-catechin, and (-)-epicatechin
Proanthocyanidins	Procyanidin oligomers based on (-)-epicatechin including procyanidin B1, procyanidin B2, procyanidin trimer, procyanidin tetramer, procyanidin pentamer, and procyanidin polymers based on (-)-epicatechin (decamers to heptadecamers)
Anthocyanins	Cyanidin (in some dark varieties)

A good quality of date contains little amount of amino acids mentioned in table below: -

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.

Date of 24 gram has following amino acids in it.	ripen
Weight (g)	24
Tryptophan(mg) (% RDI)	2 (1%)
Threonine(mg) (% RDI)	10 (1%)
Isoleucine(mg) (% RDI)	11 (1%)
Leucine(mg) (% RDI)	20 (1%)

Lysine(mg) (% RDI)	13 (1%)
Methionine(mg) (% RDI)	4 (1%)
Cystine(mg) (% RDI)	11 (4%)
Phenylalanine(mg) (% RDI)	12 (1%)
Tyrosine(mg) (% RDI)	4 (0%)
Valine(mg) (% RDI)	16 (1%)
Histidine(mg) (% RDI)	7 (1%)
Arginine(mg)	14
Alanine(mg)	19
Aspartic acid(mg)	53
Glutamic acid(mg)	64
Glycine(mg)	22
Proline(mg)	27
Serine(mg)	15

- **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 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.

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 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 eases 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 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 in 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 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 B6 in free form & absorbed by passive transport, now reaches liver via portal vein, in liver to get metabolized & flow 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 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.

- **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 olive oil; 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 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 & 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.

- **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 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 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, grapes 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.

- **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 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.

- **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; it 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 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 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; Hepcidin 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 haemoglobin. 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 (haemoglobin 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 haemoglobin level in blood) (this causes reduced in oxygen carrying capacity & supply of it); most of the iron is present in haemoglobin, 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.

- **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 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 & metallophilonein. 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. Metallophilonein binds to zinc to make it unavailable & excrete it in stools when zinc is excess in the body, & production of metallophilonein 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.

- **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, grapes 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, grapes 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 dependant 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.

- **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, grapes 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.

- **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.

- **Gallic acid: -**

It is also known as Trihydroxybenzoic acid; it is a type of phenolic acid; it is a group of hydrolysable tannins. It is used in pharmaceutical industries for various purposes.

Main sources of gallic acid: -

Tea, oak bark, strawberries, grapes, banana, clove, vinegar, gallnuts etc.

Basic pharmacokinetics of gallic acid: -

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

Basic clinical pharmacology of gallic acid: -

It is anti viral, anti fungal, anti oxidant, prevents cancers of colon, prostate, leukemia without harming healthy cells, prevents neural disorders, anti inflammatory, asthma, allergy, rhinitis, sinusitis etc.

Protocatechuic acid: -

It is a dihydroxybenzoic acid (a type of phenolic acid); it is structurally similar to gallic acid, caffeic acid, vanillic acid & syringic acid; it well known antioxidant, anti-inflammatory, anti bacterial, anticancer, anti ulcer, anti-ageing, antiviral, analgesic, protects liver, heart, brain & nerves; it is mainly present in green tea, bran & grains, almond, olive oil, star anise, plums, rosemary, Japanese ginkgo biloba.

Syringic acid: -

It is a naturally occurring Trihydroxybenzoic acid or dimethoxybenzoic acid; it has a role as a plant metabolite, it is a member of benzoic acid & phenols; it can be derive from gallic acid; it is anti-diabetic, it is present in wheat, maize, oats, rice, dates, apple, grapes, olive oil, rape, seed oil, thyme, marjoram, vinegar, walnut etc.

- **Vanillic acid: -**

It is a dihydroxybenzoic acid used as a flavouring agent; it is mainly present in root of angelica sinensis (herb from china), acai oil, argan oil, vinegar etc. It is antioxidant, anti inflammatory, anti-pain, neuro-protective.

- **Sinapic acid: -**

Sinapic acid (3,5-dimethoxy-4-hydroxycinnamic acid) is an orally bioavailable phytochemical, extensively found in spices, citrus and berry fruits, vegetables, cereals, and oilseed crops and is known to exhibit antioxidant, anti-inflammatory, anticancer, antimutagenic, antiglycemic, neuroprotective, and antibacterial activities. The literature reveals that sinapic acid is a bioactive phenolic acid and has the potential to attenuate various chemically induced toxicities.

- **p-hydrobenzoic acid: -**

4-Hydroxybenzoic acid, also known as *p*-hydroxybenzoic acid (PHBA), is a monohydroxybenzoic acid, a phenolic derivative of benzoic acid. It is a white crystalline solid that is slightly soluble in water and chloroform but more soluble in polar organic solvents such as alcohols and acetone. It is primarily known as the basis for the preparation of its esters, known as parabens, which are used as preservatives in cosmetics and some ophthalmic solutions. It is isomeric with 2-hydroxybenzoic acid, known as salicylic acid, a precursor to aspirin and with 3-hydroxybenzoic acid. It is found in plants of the genus *Vitex* such as *V. agnus-castus* or *V. negundo*, and in *Hypericum perforatum* (St John's wort). It is also found in *Spongiochloris spongiosa*, a freshwater green alga, cloudy olive oil, acai oil, acai palm.

p-hydroxy benzoic acid (PHBA) is an organic chemical which can be obtained naturally as well as synthetically. The literature survey reveals its various biological properties as an antimicrobial, antialgal, antimutagenic, anti-estrogenic, hypoglycemic, anti-inflammatory, anti-platelet aggregating, nematocidal, antiviral, antioxidant etc. It is also reported to be used as preservative in many drugs, cosmetic products, pharmaceuticals, food and beverages. Some derivatives of 4-hydroxybenzoic acid are found to possess direct action on Hbs molecules, inhibit acetic acid induced oedema and used in management of sickle cell disease.

- **Caffeic acid:** -

It is 3-4 dihydroxycinnamic acid; it is a type of polyphenol; It is an organic compound that is classified as hydroxycinnamic acid; it is present in all plants; it is a strong antioxidant, anticancer, beneficial in dementia & anti inflammatory, antiviral, boosts athlete performance, reduces blood glucose in diabetes, and reduces aging. It is present coffee, turmeric, thyme, cabbage, apple, mushroom, olive oil etc. Every less is known about it yet.

- **Hydrocaffeic acid:** -

3, 4-Dihydroxyhydrocinnamic acid (or Dihydrocaffeic acid, DHCA) is a metabolite product of the hydrogenation of caffeoylquinic acids, occurring in normal human biofluids, with potent antioxidant properties. DHCA has been detected in human plasma following coffee ingestion and is increased with some dietary sources, such as after ingestion of phenolic constituents. Polyphenol-rich foods such as vegetables and fruits have been shown to significantly improve platelet, antioxidant activity.

- ***p*-coumaric acid:**-

***p*-Coumaric acid** is a hydroxycinnamic acid, an organic compound that is a hydroxy derivative of cinnamic acid. There are three isomers of coumaric acid—*o*-coumaric acid, *m*-coumaric acid, and *p*-coumaric acid—that differ by the position of the hydroxy substitution of the phenyl group. *p*-Coumaric acid is the most abundant isomer of the three in nature. *p*-Coumaric acid exists in two forms *trans-p*-coumaric acid and *cis-p*-coumaric acid. It is present in dates, peanut, garlic, tomato, basil, beans, honey, vinegars, barley grains, bread, flex seeds. It is a strong anti inflammatory, best for arthritis, antioxidant, liver & kidney protective.

- **Ferulic acid:** -

It is a hydroxycinnamic acid, an organic phenolic compound; it is antioxidant & used in skin care products, it reduces spots, wrinkles, it is anti-ageing, anti hypertensive, anti diabetic, helpful in cardiovascular diseases, Alzheimer's etc. It is mainly present in bran, oats, rice, eggplant, citrus, apple seeds etc.

- **Dactylifric acid:** -

3-O-Caffeoylshikimic acid (dactylifric acid) and its isomers, a new class of enzymic browning substrates in dates, it acts on brownish colour of ripen dates

- **Caffeoylshikimic acid:** -

Caffeoylshikimic Acid (CFA) CFA is one of the phenolics compound identified in the extraction of palm oil vegetation liquor in a form of a three different isomers. The isomers namely 3-O-caffeoylshikimic acid (3-O-CFA), 4-O-caffeoylshikimic acid (4-O-CFA) and 5-O-caffeoylshikimic acid (5-O-CFA) are identified as a signature phenolic acids group in the OPP. Throughout the literature, 3-O-CFA, 4-O-CFA and 5-O-CFA are also known as dactylifric, isodactylifric and neodactylifric, respectively are the main enzymic browning substrates present in dates

3-O-Caffeoylshikimic acid, also known as 3-O-caffeoylshikimate or neodactylifric acid; it belongs to the class of organic compounds known as coumaric acids and derivatives. These are aromatic compounds.

The ability of CFA to be hydrolyzed into shikimic acid (SA) has received a great attention from many researches in identifying CFA from plants. CFA can be hydrolyzed into caffeic acid (CA) and SA under

appropriate conditions. SA is a base material for the manufacturing of Oseltamivir phosphate (Tamiflu), a drug used for prevention and treatment for the human influenza virus H1N1 from swine origin, seasonal influenza virus types A and B, and avian influenza virus H5N1. This makes dates amongst best fruits on earth to be eaten regularly.

- **Luteolin:** -

It is a tetra-hydroxy flavone (flavonoids are polyphenolic compounds); a naturally occurring flavonoid

Main sources of luteolin: -

Celery seeds, thyme, green pepper, fenugreek seeds, broccoli, carrot, orange, basil etc.

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

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

Basic clinical pharmacology of luteolin: -

It is famous for activities like anti oxidant, anti inflammatory, apoptosis (inducing & chemo-preventive activities), reduces free radicals, oxidative stress, reduces tumour cell growth & suppresses metastasis & cancer growth.

- **Quercetin:** -

It is a plant flavonol from the flavonoid group of polyphenols; it is bitter in taste.

Main sources of quercetin: -

Red onion, green tea, apples, ginkgo biloba, grapes etc.

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

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

Basic clinical pharmacology of quercetin: -

It is good for heart diseases, coronary heart disease, prevents cancer, arthritis, bladder infection, diabetes; it is anti oxidant, anti inflammatory, reduces benign prostatic hyperplasia, cholesterol, blood pressure, asthma, symptoms of rheumatoid arthritis.

- **Apigenin:** -

It is a natural flavonoid compound found in many fruits & vegetables serves multiple physiological functions.

Main sources of apigenin: -

It is present in onion, oranges, wheat, tea, grapes, parsley and thyme.

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

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

Basic clinical pharmacology of apigenin: -

It calms the nerves, provides antioxidant effects, prevents & helps the body to fight cancer; it is anti-obesity; neuro-protective, help mood & brain function; reduces cortisol, blood sugar; improves bone, heart & skin health; promotes sleep. It is also anti bacterial, anti viral; reduces blood pressure.

- **Quercetin-3-glucoside:** -

Quercetin is a flavonoid that can be consumed in the diet. It has antioxidant, anti-inflammatory, anti-proliferative and anti-carcinogenic properties. Quercetin 3-glucoside (Q3G) is a glucoside derivative of quercetin.

- **Isorhamnetin-3-O-rutinoside**

It is a disaccharide derivative, a glycosyloxyflavone, a monomethoxyflavone and a trihydroxyflavone. It is a member of the class of compounds known as flavonoid-3-o-glycosides. Flavonoid-3-o-glycosides are phenolic compounds containing a flavonoid moiety which is O-glycosidically linked to carbohydrate moiety at the C3-position. Isorhamnetin 3-rutinoside is slightly soluble (in water) and a very weakly acidic compound (based on its pKa). Isorhamnetin 3-rutinoside can be found in common bean, ginkgo nuts, sea-buckthornberry, and swede, which makes isorhamnetin 3-rutinoside a potential biomarker for the consumption of these food products.

- **Anthocyanin:** -

It is a type of flavonoid & is the pigments that give red, purple & blue plants their rich colouring.

Main sources of anthocyanin: -

Black soybean, pomegranate, black berries, cherries, grape, plums etc.

Basic pharmacokinetics of anthocyanin: -

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

Basic clinical pharmacology of anthocyanin: -

It is a strong anti oxidant, anti cancer, anti inflammatory, removes free radicals from the body, prevents heart diseases, blood pressure, infections, urinary infections, cough & cold.

- **Cyanidin: -**

It is a natural organic compound & type of anthocyanin; it is a pigment found in grapes, black berry, cherry, raspberry etc. it is anti inflammatory, anti oxidant, anti toxic, anti cancer, reduces free radical etc. Every less is known about it yet.

- **Procyanidin & proanthocyanidin: -**

It is a member of proanthocyanidin (condensed tannin) class of flavonoids; it is oligomeric compound, including catechins, epicatechin, gallo catechin & epigallocatechin. It reduces cholesterol, cardiac diseases, risk of stroke, prevents cancer, inflammation, tumours etc; it is also anti proliferative.

Main sources of both: -

Beans, black grapes, grape seeds, apples, chocolates, strawberries, blue berries, cranberries, ginko biloba, red cabbage etc.

- **Epicatechin: -**

It is a type of flavanol (a natural type of phenol) (please note flavanol & flavonols are different), flavonols is class flavonoids (phenol) that contains a ketone group & flavanol is a natural phenol.

Main sources of epicatechin: -

It is present in apple, quince, dark chocolate, cherries, guava, pear, black berry, green tea, cocoa etc.

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

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

Basic clinical pharmacology of epicatechin: -

It is anti oxidant, reduces myostatin (myostatin is inhibitor of muscles growth).

Many compounds present in dates like caffeoyl-sinapoyl-hexoside, isorhamnetin-acetyl-hexoside, quercetin-rhamnosul-hexoside etc as under research & currently no details are available.

- **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 patten 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 kgs, 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.

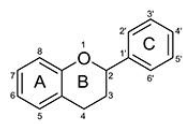
- **Serine: -**

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.

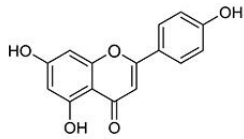
- **Main sources of serine: -**

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

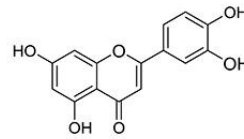
- **Main chemical structures of dates: -**



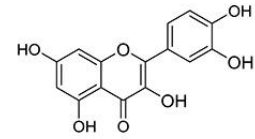
Flavonoid



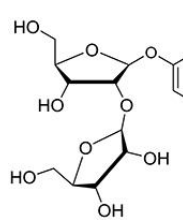
Apigenin



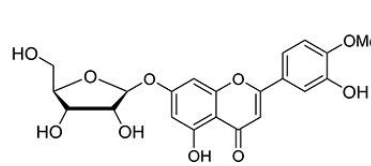
Luteolin



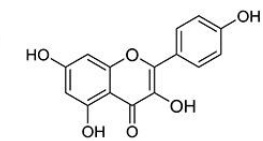
Quercetin



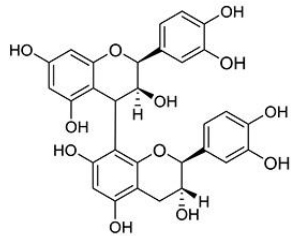
Diosmetin 1



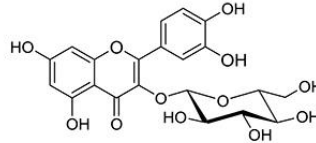
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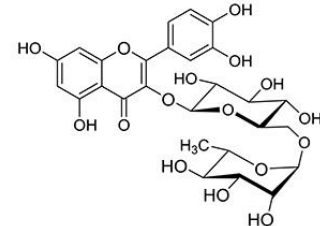
Kaempferol



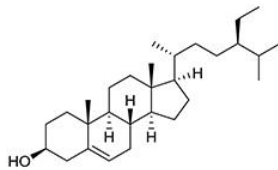
Procyanidin β (4 \rightarrow 8)Dimers



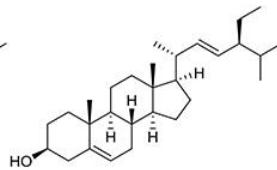
Isoquercetin



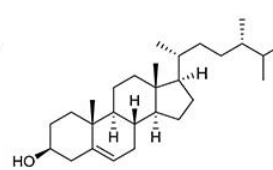
Rutin



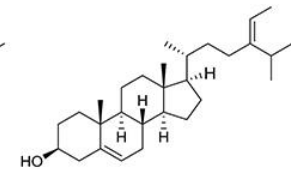
β -Sitosterol



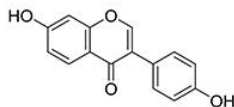
Stigmasterol



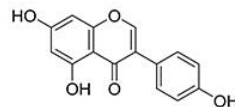
Campesterol



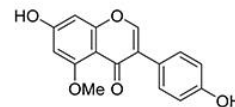
Isofucosterol



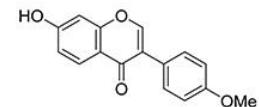
Diadzein



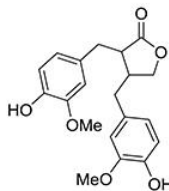
Genistein



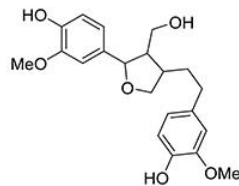
Glycitein



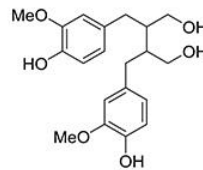
Formononetin



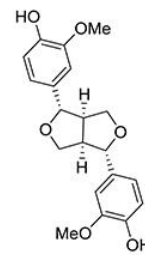
Matairesinol



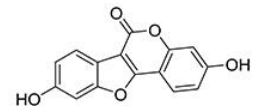
Lariciresinol



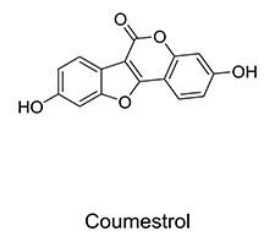
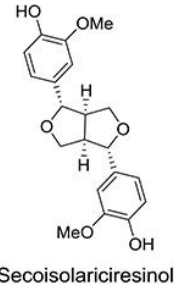
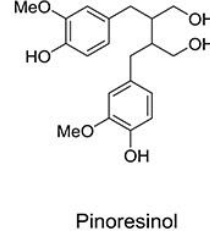
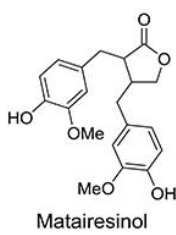
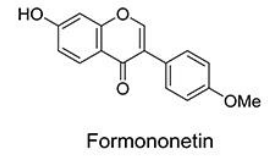
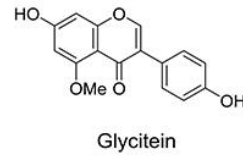
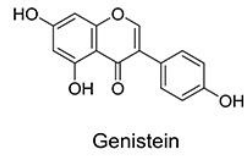
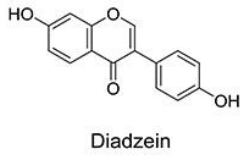
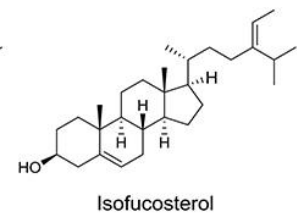
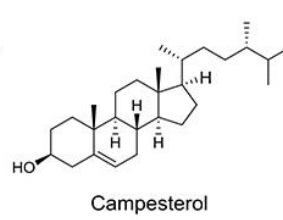
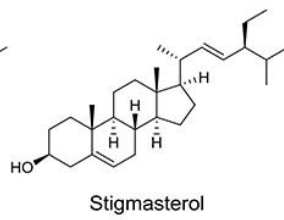
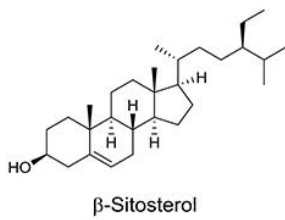
Pinoresinol



Secoisolariciresinol



Coumestrol



Dates, Deglet Noor



Deglet Noor dates

Nutritional value per 100 g (3.5 oz)

Energy	1,178 kJ (282 kcal)
Carbohydrates	75.03 g (2.647 oz)
Sugars	63.35 g (2.235 oz)
Dietary fiber	8 g (0.28 oz)
Fat	0.39 g (0.014 oz)
Protein	2.45 g (0.086 oz)
Vitamins	Quantity%DV [†]
Vitamin A equiv.	0%
beta-Carotene	6 µg
lutein zeaxanthin	75 µg
Vitamin A	10 IU
Thiamine (B1)	5%
	0.052 mg
Riboflavin (B2)	6%

	0.066 mg
Niacin (B3)	8% 1.274 mg
Pantothenic acid (B5)	12% 0.589 mg
Vitamin B6	13% 0.165 mg
Folate (B9)	5% 19 µg
Vitamin C	0% 0.4 mg
Vitamin E	0% 0.05 mg
Vitamin K	3% 2.7 µg
Minerals	Quantity%DV [†]
Calcium	4% 39 mg
Iron	8% 1.02 mg
Magnesium	12% 43 mg
Manganese	12% 0.262 mg
Phosphorus	9% 62 mg
Potassium	14% 656 mg
Sodium	0% 2 mg
Zinc	3% 0.29 mg
Other constituents	Quantity
Water	20.53 g (0.724 oz)

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- ^ The Quran, Chapter 19 - verses 22-25, retrieved on Feb. 28 2015, So she [Virgin Mary] conceived him, and she retired with him to a remote place. And the pains of childbirth drove her to the trunk of a palm tree. she cried (in her anguish): 'Ah! would that I had died before this! would that I had been a thing forgotten and out of sight!' But (a voice) cried to her from beneath the (palm-tree): 'Grieve not! for thy Lord hath provided a rivulet beneath thee; And shake towards thyself the trunk of the palm-tree; it will let fall fresh ripe dates upon thee.'
- ^ Islam Q & A, question # 214222: Does Islam recommend any particular foods to maintain a woman's good health during pregnancy?, retrieved on Feb. 28 2015
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● **Research:** -

SCIENCE & HADEES REGARDING DATES: -

Prophet صلى الله عليه وسلم said, "Whoever takes seven 'Ajwah dates in the morning will not be effected by magic or poison on that day." Nabى صلى الله عليه وسلم has also said, "There is a tree among the trees which is similar to a Muslim (in goodness), and that is the date palm tree." As Muslims we are wise to include these foods in our diet. Allah has blessed us with many good foods and in Quran (Surah A'araaf verse no. 160) it is said "Eat of the good foods We have provided for you."

Prophet صلى الله عليه وسلم used to break the fast by eating some dates before offering Magrib (sunset) prayer, and if ripe dates were not available, he used to substitute them with some dried dates. When they too were not available, he used to have a few sips of water, according to some reports. Modern science has proved that dates are part of a healthy diet. They contain sugar, fat and proteins, as well as important vitamins. Hence the great importance attached to them by the Prophet صلى الله عليه وسلم.

Dates are also rich in natural fibers & natural vitamin & other necessary elements, thus prevent cholesterol & triglycerides from increasing & prevent cardiac diseases. Modern medicine has shown that they are effective in preventing abdominal cancer. They also surpass other fruits in the sheer variety of their constituents. They contain oil, calcium, sulphur, iron, potassium, phosphorous, manganese, copper and magnesium. In other words, one date is the equivalent of a balanced and healthy diet. Arabs usually combine dates with milk and yogurt or bread, butter (A sweet dish called as Hais is Sunnah & beloved to Prophet صلى الله عليه وسلم). This combination indeed makes a balanced and nutritious diet for both mind and body. Dates and date palms have been mentioned in the Holy Quran nearly 20 times, thus showing their importance. Prophet صلى الله عليه وسلم compared good Muslims with the date palm tree, saying: "Among trees, there is a tree like a Muslim. Its leaves do not fall."

Maryam (Mary) (a.s), the mother of Isaa (a.s) (Jesus) was advised to eat dates as her food when she felt labor pains, during her confinement. Dates are definitely the "crown of sweets," and an ideal food which is easy to digest, and within half an hour of taking it, the tired body regains vigor. The reason for this is that lack of sugar in the blood is the main factor that makes people feel hungry. When the body absorbs the nutritional essence of a few dates, the feeling of hunger becomes appeased. Breaking the fast with dates helps one avoid over-eating later.

Experiments have also shown that dates contain some stimulants that strengthen the muscles of the uterus in the last months of pregnancy. This helps the dilation of the lower part of uterus (lower segment) at the time of delivery and reduces the bleeding after delivery (PPH). Dieticians consider dates as the best food for women in confinement and those who are breast-feeding. This is because dates contain elements that assist in alleviating depression in mothers and enriching the breast-milk with all the elements needed to make the child healthy and resistant to disease. Prophet صلى الله عليه وسلم has emphasized the importance of dates and their effectiveness. He صلى الله عليه وسلم has also recommended dates for excessive menstruation. Modern dietitians now recommend dates to be given to children suffering from nervous disorders or hyperactivity. The Prophet صلى الله عليه وسلم has also recommended dates as a medicine for heart troubles, according to some reports. Modern science has also proved the effectiveness of date, in preventing diseases of the respiratory system.

Science & Tahneek:-

It is to take a date or something sweet in your mouth and chew it a little, then put the date or the sweet thing into new born mouth & rub the date at upper palate of new born mouth for a while. Nabi صلى الله عليه وسلم used to do it, this is Sunnah, which we should do it. Nowadays, new born suffer from juvenile diabetes & lack of glucose, which causes brain damage of new born, by this Sunnah we can solve many problems of new born.

Cucumber & dates together: -

Cucumber & dates: Cucumber has a cold effect and dates have a hot one. By combining the two it becomes neutralized. From this Hadees we gather that it is recommended that the effect (hot or cold) of things eaten should be taken into consideration. Cucumber is insipid and tasteless, and dates are sweet which results in the cucumber also tasting sweet. Both are opposite to each other & cucumber are rich in water contains.

Please match the nutritional facts of both cucumber & dates & see what a combination both are both makes a perfect nutrition & are opposite to each other. This is the miracle of Sunnah of Prophet صلى الله عليه وسلم eating both together.

Nutritional value of dates. 100 grams of dates has 282 calories.		Nutritional value of Cucumber. 100 grams of Cucumber has 16 calories only.	
Water content in dry dates	10% to 20%.	Water content in cucumber	96%.
Total Fat 0.4 g	0%	Total Fat 0.1 g	0%
Saturated fat 0 g	0%	Saturated fat 0 g	0%
Polyunsaturated fat 0 g		Polyunsaturated fat 0 g	
Monounsaturated fat 0 g		Monounsaturated fat 0 g	
Cholesterol 0 mg	0%	Cholesterol 0 mg	0%
Sodium 2 mg	0%	Sodium 2 mg	0%
Potassium 656 mg	18%	Potassium 147 mg	4%
Total Carbohydrate 75 g	25%	Total Carbohydrate 3.6 g	1%
Dietary fiber 8 g	32%	Dietary fiber 0.5 g	2%
Sugar 63 g		Sugar 1.7 g	
Protein 2.4 g	4%	Protein 0.6 g	1%
Vitamin A	0%	Vitamin A	2%
Vitamin C	%	Vitamin C	4%

Calcium	3%	Calcium	1%
Iron	5%	Iron	1%
Vitamin D	0%	Vitamin D	0%
Vitamin B6	10%	Vitamin B6	10%
Magnesium	10%	Magnesium	3%

Watermelon & Dates together: -

Match the nutrition of both & judge, both are opposite to each other & the combination make a perfect nutrition. This is miracle of Sunnah of Prophet ﷺ eating both together.

Nutritional value of dates. 100 grams of dates has 282 calories.		Nutritional value of watermelon. 100 grams of Watermelon has 30 calories only.	
Water content in dry dates	10% to 20%.	Water content in watermelon	92%.
Total Fat 0.4 g	0%	Total Fat 0.1 g	0%
Saturated fat 0 g	0%	Saturated fat 0 g	0%
Polyunsaturated fat 0 g		Polyunsaturated fat 0 g	
Monounsaturated fat 0 g		Monounsaturated fat 0 g	
Cholesterol 0 mg	0%	Cholesterol 0 mg	0%
Sodium 2 mg	0%	Sodium 1 mg	0%
Potassium 656 mg	18%	Potassium 112 mg	18%
Total Carbohydrate 75 g	25%	Total Carbohydrate 8 g	25%
Dietary fiber 8 g	32%	Dietary fiber 0.4 g	32%
Sugar 63 g		Sugar 6 g	
Protein 2.4 g	4%	Protein 0.6 g	4%
Vitamin A	0%	Vitamin A	11%
Vitamin C	%	Vitamin C	13%
Calcium	3%	Calcium	0%
Iron	5%	Iron	1%
Vitamin D	0%	Vitamin D	0%
Vitamin B6	10%	Vitamin B6	0%
Magnesium	10%	Magnesium	2%

CONCLUSION OF RESEARCH: -

1. Eat fresh ripen dates & watermelon or Mashmelon together because one cools the other. Eat the following together: butter & dried dates together, cucumber & dates, Balah (fresh unripen dates) & Tamar (dried dates).
2. Avoid making Nabiz (syrup) from two types of dates or dates & raisins, semi ripen dates & ripen dates together are Khamr (intoxicant). 7 Ajwah dates eaten early morning on empty stomach prevents black magic, evil eye, cardiac problems, skin disease & Ajwah dates are from Jannah.
3. Dates if eaten early morning on empty stomach are helpful in worm infection, inferior complex. Keep dates always at home & it has Barkat in it as Muslims have. Do not pick more than 1 dates at a time to eat, do not eat excessively during or after illness, 7 dates at one time are best. They are best nutrition, do Tahneek to new born with dates.
4. Dates are instant energy sources it syrup can be drunk in summer, to breakfast with it gives instant energy in small quantity; it is good for hyperthyroidism; it has many curative, healing, anticancer, antioxidant, preventive properties; it is cheap, easy available in all season, easy to store, shelf life is longer & can be used in all age, all season, all disease.

