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CRACK THE HARD NUT KNOWN AS WALL NUT (AKHROAT): A REVIEW

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ABSTRACT

Crack hard nut is wal nut play a important in the human body health system botanical name known as *Juglans regia* is a medicinal plant in the treatment of helminthiasis, sinusitis, diarrhea, stomachache, asthma, eczema, arthritis, and skin disorders. In endocrine diseases such as anorexia, thyroid dysfunctions, diabetes mellitus, cancer. The present study is an attempts to provide comprehensive information on the ethnobotanical use, pharmacology, nutritional value it cover about 63 000 hacter of the region, is the most commercially important species, with an annual production of approximately 60,000 tones and a farm value of about 25 million Indian rupees.

KEYWORDS: Akhroat, juglans regia, Nutritional value, Pollination, Pest control.

INTRODUCTION

Walnut trees are species of tree in the plant genus *Juglans*, the type genus belongs to family Juglandaceae, the seeds of which are referred to as walnuts. It species are deciduous trees, 10–40 metres (33–130 ft) tall, with pinnate leaves 200–900 millimetres (7.9-35.4 in), with 5–25 leaflets; the shoots have chambered pith.[1]

Scientific classification

Kingdom	Angiosperms
Order	Fagales
Family	Juglandaceae
Subfamily	Juglandoideae

Tribe	Juglandeae
Genus	*Juglans L*

Figure.no. 1 Wall nut

ORIGIN AND DISTRIBUTION

Walnut (*Juglans regia* L.) is the most wide spread tree nut in the world. The tree is commonly called as the Persian walnut, white walnut, English belongs to juglandaceae and has the scientific name *Juglans regia*.[2] The walnut tree species is native to the old world. It is native in a region stretching from the Balkans eastward to the western Himalayan chain and was cultivated in Europe as early as 1000 BC. At present, walnut is cultivated commercially throughout southern Europe, northern Africa, the USA, eastern Asia, western South America and India. In india it is found specially in kashmir.

Walnut composition and nutritional value

Walnuts are nutrient-rich food due to high contents of fats, proteins, vitamins and minerals. They are also good source of flavonoids, sterols, walnut constituent high of protein and oil contents of the kernels of *Juglans regia* L.[3] (Juglandacea) make this fruit indispensable for human nutrition. Therefore, the walnut is classified as a strategic species for human nutrition and is included in the FAO list of priority plants. The seed part of the fruit (kernel) is consumed fresh, toasted, or mixed with other confectionaries. In the Middle East walnuts are added alone or along with almonds, date, and raisin as a special pastry preparation called Ma'moul.

Table no. 1. Nutritional value of *Juglans regia* L[4]

PRINCIPLE	**VALUE PER 100 G**	**FATTY ACID**	
Vitamins (USDA, 2010)		Unsaturated fatty acids	
Folates	98 mcg	Palmitoleic acid C16:1	0.77

Niacin	1.125 mg	Oleic acid C18:1	25.26
Pantothenic acid	o.570 mg	Gadoleic acid C20:1	0.05
Pyridoxine	0.537mg	Total MUFA	22.37
Riboflavin	0.150 mg	Linoliec acid C18:2	57.10
Thiamin	0.541 mg	Lineliec acid C18:3	10.34
Vitamin A	20 IU	Total PUFA	4.29
Vitamin C	1.3 mg	**Saturated fatty acid**	
Vitamin E-y	20.83 mg	Myristic acid C14:0	0.24
Vitamin K	207 mcg	Palmitic acid C16:0	4.28
Minerals		Stearci acid C18:0	1.85
		Archidic acid C20:0	0.19
Potassium	441 mg	Total SFA	7.21
Phosphorus	346 mg	PUFA/SFA	9.91

The major components of walnut oil are triacylglycerols (980 g/kg oil), in which monounsaturated fatty acids (FAs) (mainly oleic acid) and polyunsaturated FAs (PUFAs; linoleic and α-linolenic acids) high amounts in all genotypes oil contents (78.83 to 82.4%). Walnuts have high amount of omega-6 and omega-3 PUFA, which are essential dietary fatty acids. Oil rich in oleic acid displays greater oxidative stability therefore it could be widely used as frying oil. According to an investigation it was found that it consist glutelins (70%) albumins (7%) together with lesser amounts of globulins (18%), and prolamins (5%).[5] Walnut proteins contain all essential AAs required for the needs of a human adult. Walnut cultivars analyzed have recorded rich mineral composition, especially potassium, magnesium, and calcium it also contain high levels of magnesium potassium, phosphorus and lower sodium.

POLLINATION[6]

- ✓ Walnuts are self-fertile, but sometimes require another cultivar for pollination.
- ✓ Too much cross pollination results in a condition known as flower abscission.
- ✓ Walnuts are wind pollinated and pollen will carry about 250-300ft in mature orchards.

Walnuts are similar to pecans in that the time of pollen shedding does not always overlap well with the time of female flower receptivity to pollen.[7] Hence, although most walnuts are self-fertile, they sometimes require another cultivar for pollination since the timing of the functions of male and female flowers is different. This condition is referred to as *heterogamy*. Two possible forms of heterogamy are *protandry* (meaning *first male*), where the pollen is shed before the female flower becomes receptive, and *protogyny* (*first female*) where the female flower becomes receptive to pollen before pollen is shed. Most walnuts are protandrous. Some cultivars such as 'Payne' are only slightly heterogamous and can be

planted in solid blocks since In the early 1990's, in california researchers examine that too much cross pollination resulted in a condition known as pistillate flower abscission (PFA).[8] Pollen will carry about 250-300 ft in mature orchards, so the minimum pollinizer arrangement would be about every 10th row (cross-wind).

WALL NUT CULTIVATION SOILS[9]

- ✓ The best soils for walnut are deep, well-drained silt loams having a pH 6 to 8, as found in central valleys of California.
- ✓ Walnuts and related species are generally deep-rooted (9-12 ft) and strongly tap-rooted, if no restrictive layers are present in soils.
- ✓ Irrigation is necessary in the arid climates walnuts are grown. Up to 4 acre-feet of water are applied per year in California.

SOILS AND CLIMATE[10]

The best soils are deep, well-drained silt loams with pH 6 to 8, as found in central valleys of California. Walnuts and related species are generally deep-rooted (9-12 ft). Walnuts are extremely intolerant of soil flooding, with growth reductions noted in seedlings in as little as 24 hr. This is generally thought to be a flooding stress which follows stresses of drought and high soil (and air) temperatures.[11] Walnuts are also extremely intolerant of salinity, experiencing yield reductions when salts reach about 1500 ppm.

Climate

Figure.no. 2 Climatic condition of walnut production

- ✓ In California, trees are considered cold hardy to 12-15°F.
- ✓ Rainfall in spring at bud break, or in mid-summer greatly increases the severity of walnut blight.
- ✓ High temperatures or high sunlight can cause sunburn, shriveling, darkening of kernels.

- ✓ Temperatures too cool in summer can result in inadequate kernel development or "nut fill".

In Iran, the native range of the Persian walnut, trees have been reported to survive temperatures of 5-40 Feet in mid-winter. However, cold acclimation must occur slowly in North America, since trees can be severely injured or killed by much higher temperatures in late Autumn. In California, trees are considered cold hardy to 12-15°F.[12] Carpathian cultivars are far more cold hardy and quicker to acclimate than Persian cultivars. Chilling requirement is highly variable in walnut, from 400 to 1600 hr. With the need for late leafing characteristics to avoid walnut blight, cultivars with higher chill requirements have been produced. Rainfall in spring at bud break or in mid-summer greatly increases the severity of walnut blight. Newer cultivars have been selected to leaf out after the last rains of spring occur in California.[13] High temperatures and/or high sunlight, 100-110 Feet, can cause sunburn, darkening, and shriveling of kernels, especially at the top of the tree. This is another reason that production is north of the areas where summer heat of this magnitude is common. However, temperatures too cool in summer can result in inadequate kernel development or "nut fill".

WALNUT FRUIT

Figure.no. 3 Wall nut Fruit

Wall Nuts are borne singly or in clusters of 2-3 on shoot tips.[14] A green, fleshy shuck surrounds the nut, which splits irregularly at maturity. In Persian walnut, the shuck is easily separated from the nut shell, in contrast to black walnuts where the shuck is adherent. The shell is rough, wrinkled or furrowed, and thin. Nuts are ovoid to round, ½ -2" in diameter, containing two kernels separated by a thin, papery central plate extending from the inner layer of the shell. Often a 4-6 year juvenile period must pass, and the first significant yields

occur at 8-10 years.[15] Maximal yields may not be achieved for 10 or more years. Male flowers generally appear later in life than female flowers, so fruiting may be delayed by lack of pollen in early years, not lack of female flowers. Nut size ranges from 32-45 nuts/lb in Persian walnut and 22-35 nuts/lb in black walnut.[16] Walnuts mature from 4.5-5 months after flowering, and are harvested in September-October.

PEST CONTROL FOR WALL NUT[17]

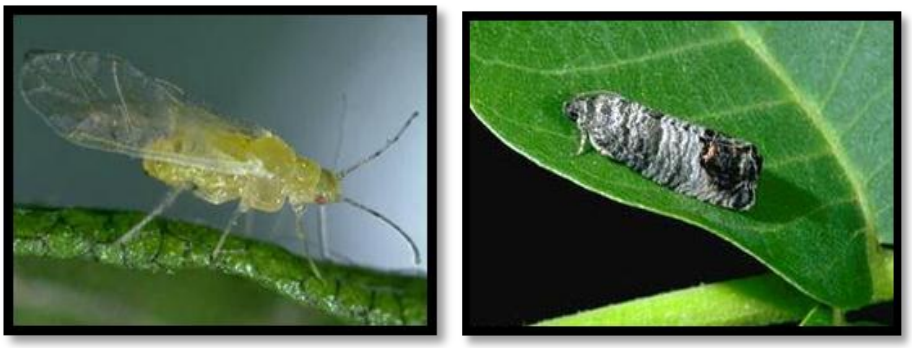

Figure.no. 4 Wall nut pest control

- ✓ Aphid feeding can reduce tree vigor and nut size, yield, and quality.
- ✓ In most orchards, walnut aphids are kept below damaging levels by an introduced parasitic wasp.
- ✓ First generation codling moth larvae reduce yield directly by causing nut lets to drop from the tree.
- ✓ Management include pheromone mating disruption, insecticide sprays, and biological control.

DAMAGE

Aphid feeding can reduce tree vigor and nut size, yield, and quality. Aphids excrete honeydew. Sooty mold growing on the honeydew turns the husk surface black, and increases the chance for sunburn on exposed nuts. High populations of aphids may lead to leaf drop, exposing more nuts to sunburn, which darkens or shrivels the kernels.[18] Walnut aphid populations of over 15 aphids per leaflet early in the season reduce nut yield and quality and cause an increase in nuts with perforated shells. An infestation in summer lowers the nut quality. A correlation has been established between infestation of dusky-veined aphids and nut quality. If 10 to 15% of the leaflets are infested for 3 to 4 weeks before shell hardening, nut size is decreased.[19] In most orchards, walnut aphids are kept below damaging levels by an introduced parasitic wasp in combination with other naturally occurring biological control

agents. However, if broad-spectrum insecticides are applied to control other pests such as codling moth, outbreaks of walnut aphid may occur.[20] Predation often effectively controls the dusky-veined aphid as well, but it may require treatment in some orchards some years.

DAMAGE

The damage caused by the codling moth is different with each generation. First generation larvae reduce yield directly by causing nut lets to drop from the tree.[21] Codling moth damaged nut lets have frass at the blossom end be careful not to confuse nuts damaged by codling moths with unpollinated nutlets or with blight-infected nut lets, which have dark lesions but no frass and drop at the same time.

MANAGEMENT[22]

Management options for codling moth in walnut orchards include pheromone mating disruption, insecticide sprays, and biological control. The options that work best for a given orchard depend on the size of the trees and the degree of codling moth infestation. In all cases, a program of monitoring with pheromone traps and checking for damage is necessary to follow codling moth generations and assess the degree of infestation and effectiveness of control actions.[23] Programs that use mating disruption alone or in combination with parasite releases or soft insecticides pose fewer water quality and environmental risks than programs that rely on organophosphate insecticides.[24]

Walnut Blight Control

- In walnut blight, one to several black lesions may appear on catkins.
- Infected nuts develop black, slightly sunken lesions at the flower end and on the sides of the nut as it matures.[25]
- In orchards with histories of walnut blight damage, protective treatments during prolonged wet springs are necessary for adequate protection.

Figure.no. 5 Wall nut seed

In walnut blight, one to several black lesions may appear on catkins. Infected nuts develop black, slightly sunken lesions at the flower end (end blight) when young more lesions will develop on the sides of the nut as it matures (side blight).[26] Shoots develop black lesions, and leaves show irregular lesions on blade.

COMMENTS ON THE DISEASE[27]

All green tissue is sensitive to walnut blight infections. Economic damage occurs when the developing nut is infected. The bacterium that causes walnut blight overwinters primarily in dormant buds. Rain is important for spreading bacteria and aiding infection. Early leafing varieties are most severely affected, and the disease tends to be more severe in northern California.

MANAGEMENT

Control of this disease depends on the application of protective sprays to newly developing nuts. In orchards with histories of walnut blight damage, protective treatments at 7- to 10-day intervals during prolonged wet springs are necessary for adequate protection. In areas or years with less intensive rainfall, spray intervals can be stretched, and weather reports can help with spray timing. Make the first application when the first pistillate flower emerges. The pistillate flowers are the small nutlets that form after a few leaves emerge.[28] Additional sprays should be applied as discussed above. Walnuts are susceptible to blight infections well beyond the pistillate bloom period whenever free moisture occurs. Additional sprays are often necessary, but they must be applied before rain for maximum benefit.[29] The total number of sprays required depends on the judgment of the grower based on disease history and climatic conditions. The success of alternate row spraying during early bloom and leafing depends upon the ability of the machinery to deliver sufficient copper material with good coverage to trees of both target rows.

PRODUCTION

Figure.no. 6 Cultivated Wall nut

- United States (2002 USDA) - 282,000 MT or 564 million lbs of in-shell nuts.
- Walnuts are produced commercially in 48 countries on 1,527,000 acres.
- There are about 200,000 acres of walnuts in California's central valley.

Exports are equivalent to 18% of total production. Principal destination countries are Japan, Germany, Spain, Italy and Israel.

World[30] (2002 FAO) - 1,300,578 MT or 2.9 billion pounds. Walnuts are produced commercially in 48 countries on 1,527,000 acres. Production has increased 48% since 1992, largely in response to a 40% increase in acreage. Yields have increased slightly in the last decade, and average about 2000 lbs/acre. Chinese production has increased over 3-fold since 1980.

United States (2002 USDA) - 282,000 MT or 564 million lbs of in-shell nuts. The industry value is $305 million, fluctuating between $275-380 million over the last decade. There are about 200,000 acres of walnuts in California's central valley, which is up about 10% since 1992.

Yield averages 2820 lbs/acre, but some orchards can produce up to 6000 lbs/acre. Prices paid to growers are 54 ¢/lb, on the low end of the 50 to 79 ¢/lb range over the last decade.

California is the only state to produce Persian walnuts. Sun Diamond, a California coop, controls 50% of production.[31]

COST OF PRODUCTS[32]

- Whole walnuts sold in bulk: $1.27/lb
- Whole walnuts sold in a 1lb. package: $1.88
- Shelled walnuts sold in a 1lb. package: $3.87

Figure.no. 7 Delicious Wall nut for spicy

Cultural Uses

- The wood is heavy and fine-grained, used mostly for furniture and gun stocks.[33]
- The husk yields valuable oil and a yellow dye when pressed; the oil is used in soaps, paints, and dyes.[34]
- Shells are ground and used as anti-skid agents for tires**.**

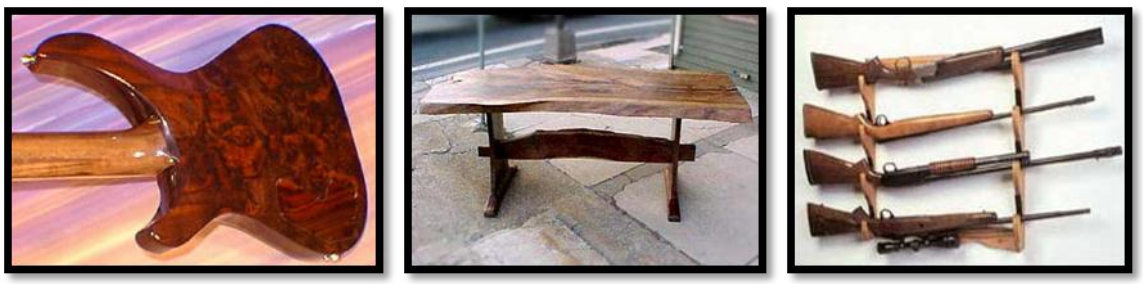

Figure.no. 8 Cultural use of wall nut

Walnuts have a number of medicinal and non-food uses, as well as some toxic properties. Juglone is excreted by the roots of black walnut and other walnuts, and is toxic to many other plants (i.e., it is allelopathic).[35] Even dead roots can release juglone for years after the tree is gone. Black walnuts should be kept away from most other plants, particularly gardens. Most susceptible plants include: asparagus, cabbage, eggplant, pepper, tomato, potato, apple, pear, blueberries, blackberries, azaleas and rhododendrons, some pines, silver maple, ornamental cherries and crabapples, crocus, some chrysanthemums, columbine, lilies and petunia.[36] Shells are ground and used as anti-skid agents for tires, blasting grit, activated carbon, and

sometimes as an adulterant of spices.[37] The husk yields a valuable oil and a yellow dye when pressed the oil is used in soaps, paints, and dyes.

MEDICINAL USES[38]

Figure.no. 9 Wall nut plant

- Walnut tincture, an extract made with grain alcohol, is an antiseptic that is high in iodine used for treating fungus conditions.
- It is derived from fresh green hulls of the black walnut tree and is said to kill adult and developmental stages of at least 100 parasites.[39]
- Ellagic acid is found in leaves and fruits; it is being studied for use as a cancer therapy drug.
- Juglone from black walnut fruit and bark acts against dermatomycosis (skin fungi), being first used for this purpose by Greeks and Romans. *Juglans insularis* is used in Cuba as an herb decoction in bath water to treat various skin diseases of children.[40] Walnut bark is used as a dentifice in Pakistan. Black walnut tincture, an extract made with grain alcohol, is derived from fresh green hulls of the black walnut tree. It is said to kill adult and developmental stages of at least 100 parasites.[41] It is touted as a great antiseptic that is high in iodine, and excellent for treatment of any kind of fungus condition. Also a good vermifuge for pin worm, ringworm, and other parasites, and even removes warts and treats psoriasis.
- The tincture is generally used in conjunction with wormwood and cloves as part of a complete parasite program. In 2000, four fluid ounces cost $39 at an internet herb shop.
- Ellagic acid is found in leaves and fruits; it is being studied for use as a cancer therapy drug, in addition to having many other biological effects see the strawberry chapter for more on ellagic acid.

BRAINS FOLD JUST LIKE PAPER THEREBY APPEARS LIKE A WALNUT

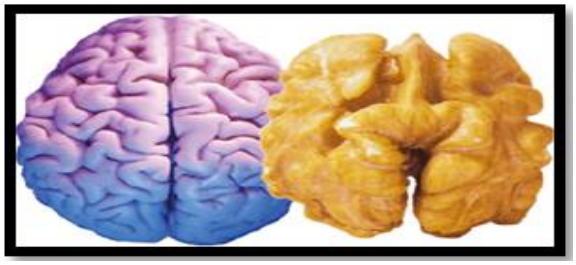

Figure.no. 10 Wall nut Brain shape

Over view of wall nut is look like a brain shape shown in figure and it is useful for our brains have that wrinkly, walnut shape may be that the rapid growth of the brain's outer brain the gray matter is constrained by the white matter. A Walnut looks like a little brain, a left and right hemisphere, upper cerebrums and lower cerebellums. Even the wrinkles or folds on the nut are similar to those of the neo-cortex. Scientists claim that walnuts help in developing over three dozen neuron-transmitters within the brain enhancing the signaling and encouraging new messaging link between the brain cells.[42] Walnuts help warding off dementia. They also extract and break down the protein based plaques associated with Alzheimer's diseases.

REASONS TO EAT WALNUTS EVERY DAY

1. Helps weight loss

Several studies have suggested that regular consumption of walnuts is unlikely to cause weight gain or obesity. In fact, an ounce of walnuts contains 2.5g of omega 3 fats, 4g of

protein and 2g of fibre that help provide satiety. Any successful weight management plan must include satiety factor; so walnut is undoubtedly the right food to consider if you are into a weight management programme.[43] Despite being 'dense in calories, walnuts can be an important tool in helping you lose weight.

2. Induces sleep

Walnuts contain a compound called melatonin, responsible for conveying messages regarding the cycle of light and dark to the body. Since melatonin is already synthesized by the body, consumption of walnuts increases the blood levels of melatonin, thereby inducing sleep. That's why eating walnuts can be a great way to improve sleep.

3. Great for your hair

Walnut is a good 'hair food' too. This is because walnuts contain biotin (vitamin B7) that helps strengthen hair, reduce hair fall and improve hair growth to certain extent. In addition to walnuts, you can try these foods to prevent hair loss.[44]

4. Prevents heart disease

Among all the dietary plants and nuts, walnuts contain the highest amount of antioxidants. Around 100 g of walnuts will give more than 20m mol antioxidants, which makes them extremely effective in combating heart disease by their ability to destroy free radicals. They are also loaded with omega-3 fatty acids that lowers bad cholesterol and increases the production of good cholesterol making it a great snack to keep your heart in great health.

5. Prevents diabetes

All types of nuts are associated with a lowered risk of diabetes and walnuts are no exception. According to a study, women who consumed 28 grams of walnuts twice a week were 24% less likely to develop type 2 diabetes. The study was published in the *Journal of Nutrition*, and even though it was conducted on women, experts believe that the benefits would be similar for men too.

6. Boosts your sperm quality

Eating 2.5 ounces of walnuts per day improves semen quality in healthy young men, According to a study by UCLA researchers, eating 75 grams of walnuts a day improves the vitality, motility, and morphology of sperm in healthy men aged 21 to 35.

7. Makes your skin glow

Walnuts are rich in B-vitamins and antioxidants that prevent your skin from free radical damage and prevents wrinkles and signs of ageing. So if you want glowing skin long into your middle-age, eat walnuts.

8. Can keep dementia at bay

Eating walnuts everyday can help ward off dementia, say scientists. In the study, Dr. Abha Chauhan and his team from the New York State Institute found that mice deprived of walnuts suffered a dramatic loss in learning, memory and physical and emotional control. According to the results, vitamin E and flavanoids in walnuts helped destroy harmful free radical chemicals that cause dementia.

9. Prevents pancreatic cancer

A new study has found that consumption of nuts, including walnuts, is inversely associated with risk of pancreatic cancer, independent of other potential risk factors for pancreatic cancer. Researchers looked at the association between nut consumption and risk of pancreatic cancer among 75,680 women in the Nurses' Health Study, with no previous history of cancer. It was observed that the women who consumed a one-ounce serving of nuts two or more times per week had a significantly reduced risk of pancreatic cancer compared to those who largely abstained from nuts.

10. Helps you live longer

Eating a handful of walnuts just thrice a week is the key to a longer life, a study has found. Scientists discovered that these edible seeds cut the risk of dying from cancer by 40 per cent and from cardiovascular disease by at least 55 per cent. In general, nut eaters in the research had a 39 per cent lesser risk of death and walnut eaters in particular a 45 per cent reduced threat.

11. Great for pregnant women

Mothers-to-be who eat a diet rich in fatty acids such as those found in walnuts can reduce the baby's chances of developing food allergies, researchers say. The research found that if a mother's diet contains a certain group of polyunsaturated fatty acids (PUFAs), the baby's gut develops differently. The PUFAs are thought to improve how gut immune cells respond to bacteria and foreign substances, making the baby less likely to suffer from allergies.

12. Reduces breast cancer risk

Daily use of walnuts equal to 2 ounces a day in humans – reduces the growth of breast cancer tumors in mice. They then compared mice given walnuts to those fed a regular diet. The research found that the group whose diet included walnut at both stages developed breast cancer at less than half the rate of the group with the typical diet. In addition, the number of tumours and their sizes were significantly smaller.

13. Can fight stress[45]

If daily stress is taking a toll on your health, it's time to eat walnuts, as they help fight stress, according to a study. The researchers found that including walnuts and walnut oil in the diet lowered both resting blood pressure and blood pressure responses to stress in the laboratory. Walnuts are a rich source of fibre, antioxidants and unsaturated fatty acids, particularly alpha linolenic acid, an omega-3 fatty acid.

Cancer-Fighting Properties: Walnuts may help reduce not only the risk of prostate cancer, but breast cancer as well. In one study, mice that ate the human equivalent of 2.4 ounces of whole walnuts for 18 weeks had significantly smaller and slower-growing prostate tumors compared to the control group that consumed the same amount of fat but from other sources. Overall the whole walnut diet reduced prostate cancer growth by 30 to 40 percent. According to another study on mice, the human equivalent of just two handfuls of walnuts a day cut breast cancer risk in half, and slowed tumor growth by 50 percent as well.

14. Brain Health

Walnuts contain a number of neuroprotective compounds, including vitamin E, folate, melatonin, omega-3 fats, and antioxidants.[40] Research shows walnut consumption may support brain health, including increasing inferential reasoning in young adults. One study also found that consuming high-antioxidant foods like walnuts "can decrease the enhanced vulnerability to oxidative stress that occurs in aging," "increase health span," and also "enhance cognitive and motor function in aging."

15. Diabetes

The beneficial dietary fat in walnuts has been shown to improve metabolic parameters in people with type 2 diabetes. Overweight adults with type 2 diabetes who ate one-quarter cup of walnuts daily had significant reductions in fasting insulin levels compared to those who did not and the benefit was achieved in the first three months.

CONCLUSION

Crack hard nut is wal nut play a important in the human body health system it is useful in many diseases anorexia, thyroid dysfunctions, diabetes mellitus, cancer. Walnuts helped to destroy harmful free radical chemicals that cause dementia also reduced risk of pancreatic cancer compared to those who largely abstained from nuts. It helps you live longer to improve how gut immune cells respond to bacteria and foreign substances, making the baby less likely to suffer from allergies and decrease the enhanced vulnerability to oxidative stress that occurs in aging, increase health system.

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