

NUTRACEUTICAL VALUE AND HEALTH BENEFITS OF DRAGON FRUIT(*HYLOCEREUS SPP*)

¹Bhadre T.M, ²Doshi S.S, ³Lolage A.T, ⁴Bahir A.S, ⁵Bankar A.S

^{1,2,3,4}Student, ⁵Guide

Department of Pharmacognosy

A.C.S College of Pharmaceutical Science & Research, Ashti.

Abstract: This review is planned to discuss the nutraceutical value and health benefits of dragon fruit. Dragon fruit is taken into account as heavenly fruit on the planet. It is consumed as fresh or dried fruit as a vegetable, as a fodder as a natural colouring agent in various drinks and beverages, as a cellulose supply. Dragon fruit is an exotic tropical plant that brings multiple advantages to human health because of its high nutritional value and bioactive compounds, together with powerful natural antioxidants. Extracts types stems, flowers, peels, pulps of dragon fruit own range of helpful biological activities against pathogenic microbes including bacteria, fungi and viruses and diseases like diabetes, obesity, hyperlipidaemia and cancer. High low *cereussundatus* is characteristically largely cultivated vine cactus belonging to family *Cactaceae*, originated in Mexico and America. It is well acknowledged in the name of dragon fruit or pitaya or pitahaya, additionally illustrious *Buahnaga* in Malaysia means dragon fruit. This review emphasised on attractive colour of dragon fruit, mouth-watering pulp with black seeds embedded, makes it acceptable globally.

Keywords: Tropical fruit, Antioxidant, Nutraceutical value, Pitaya, Pectin

Introduction:

Dragon fruit considered as an important economic fruit species worldwide due to its nutritional value.^[21] Dragon fruit are gaining more popularity for their nutritional medicinal properties. The colour of red-fleshed dragon fruits become pigmented during the ripening process.^[24] The fruit is reach in sugar, antioxidant also having good test and crispy properties.^[12] Dragon fruit is emerging in health promotion in addition to its known application in food consisting nutritional values. The fruit pulp existing in variety of colour such as white, red and purple including peel in red and yellow colour. The red having a higher demand in market due to its health benefit elegant colour. The dragon fruits are achieving much more attention recently because of its micronutrient enrichment regulated by phenolics which possess antioxidant activities. Dragon fruit is edible fruit which contain water soluble fibre and also contain high level of vitamin c, flavonoids, hydroxycinnamates.^[25] This fruit is named as “pitaya” because of the bracts on the skin of the fruit which means scaly fruit.^[17] The biggest advantage of this crop is that once planted it will grow for about 20 years, and 1 hectare could bear about 1000 dragon fruit plant. Commercially it is grown in countries like Australia, Taiwan, Vietnam.^[6] It gives fruit in second year of planting and full production within 5 years. It has several health benefits including its ability to aid in weight loss, improve digestion, reduce LDL (Low Density Lipoprotein) cholesterol in the blood and strengthen the immune system.

Phyto albumins Hydroxycinnamates helps to prevent cancer and flavonoids acts on brain cell and blood vessel to reduce the risk of severe heart diseases. It also protects against bacteria, fungi and helps in overall functioning of the body. The red skin fruit weighed up to 1 kg has translucent dark red flesh considered to be rich source of nutrient, mineral, vitamin such as vit B1, vitB2, vitB3, vit C, protein, fats, carbohydrates, crude fibre, flavonoids, irons, glucose. It is also considered to be rich in which are valued for their antioxidant activity. The dragon fruit helps in the digestive process, prevents cancer, diabetes, reduce effect of toxic substances such as heavy metal, decreases cholesterol level and high blood [pressure. Regular consumption of dragon fruit helps against asthma and cough. It is also rich in potassium, sodium, calcium which are good for health other than fruits. Cultivation of dragon has been started in different district of Bangladesh due to suitable climate seasonal rainfall, light intensity and soil type. The dragon fruit is marketed as fantastic fable.as legend has it, a dragon fruit is the last thing is to come out from the fire breathing mouth of dragon. They say the flame come from the tail base called “*Jayna*” means the *sweetest tasting*.

Once the dragon was slayed the warrior would gather the fruit to present in front of the emperor. The dragon fruit was introduced to home gardens in India in 1990s. It gains wider popularity among the farmer because of its profit ability and it needed lower input once planted. The plant sustains for more than 20 years and is high in nutraceutical properties. The low maintenance and higher profit have attracted farmers worldwide. This has also led to increase its cultivation in the state of India such as Maharashtra, Karnataka, Andhra Pradesh, west Bengal, Telangana as and the Andaman and Nico bar islands and many north eastern states. A recent estimate by Indian Council of Agricultural Research National Institute of Abiotic Stress Management, Baramati in Maharashtra found that dragon fruit are cultivated nearly about 4000 hectors in states of India. India produces approx. 12000 tonnes every year. The fruit can be exported to Persian Gulf countries, the European Union, United States. In June 2021 India exported its first consignment of dragon fruit to Dubai in UAE. The dragon fruit plant is the member of *cacti* family and it is hardy and grows in diverse climatic condition in variety of soil. Dragon fruit is healthy, sweet, deliciously exotic and real fruit.

Morphology of dragon fruit:

Dragon fruit plant reaches up to 1.5 to 2.5 meters height.it is a fast growing and ever green cactus. It is a terrestrial cactus with succulent three-winged and green steam it contains leafless thin vine like branches.^[29] The steam is fleshy with many branched

segments. Each segments have three wavy wings and 1-3 spines or sometime spineless.^[30] Steam is on vertical surface and aerial root of the plant absorb water. Dragon fruit are 25-30cm long and 15-17cm wide with bell shaped. Dragon flower are usually white in colour.^[11] The fruit is beautiful contain bright red skin studded with green scales and red or white flesh with numerous tiny black seed.^[16] Generally, three types of dragon fruits are available in different countries. All are leathery and slightly leafy skin.^[15] Suitable plant variety for every given country and proper cultivation process is the most important topic for investigation on dragon fruit plant.

Fig. 1. Dragon fruits in different colour.



Fig. 2. Dragon fruit plant with fruits.

Fig. 3. Dragon fruit plant with flowers.**Nutritional value:**

Dragon fruit is classified into two types one with white pulp and other with red /pink pulp. It is low in calories rich in phenolics, flavonoids and antioxidants. The biochemical analytical study of 100gm fresh fruit analyse that the fruit have 83-88% moisture content. The fruit is slightly acidic and titratable acidity varies from 0.20-0.30 mg lactic acid equivalent. Organic acid present are measure constituents which are responsible for acidity and thus the acidity is the indirect measure of total organic acid in the dragon fruit. Organic acid involves various function in human system including growth and the maturation factor. They also highly influence the organoleptic properties.^[14] Dragon fruit is one the rich sources of vitamin c content ranges between 4-10mg/100gm vitamin c is one of the most important water-soluble vitamins which is naturally present in fruits and vegetables.^[28] Consumption of 100gm fresh dragon fruit produces 8-14 %RDA of vitamin c. Total sugar content is 3.5 – 7.0 gm /100gm fresh fruit. Fruits with pink flesh have higher phenolic 40-60mg and flavonoids 20-40mg comparing to white fleshed fruit 15-20mg and 10-20 mg. The antioxidant activity measured by DPPH method also reveal that pink fleshed fruit contains 250-400mM TE/100gm which is higher than white fleshed fruit 100-125Mm TE/100gm. Phenolic compound are associated with colour, sensory quality, nutritional and antioxidant property.^[22] Considering the climate condition in Indian states Karnataka, Kerala, Tamil Nādu, Maharashtra, Gujarat, Orissa, west Bengal, Andhra Pradesh, Andaman and Nico bar island are ideal for dragon fruit production. The rainfall requirement is 1145-2540mm/year. In relevant to evaluation studies adaptably and production was undertaken COORG, Karnataka.^[13] Preferable temperature in a dry tropical climate is 20–29-degree C. above 40-degree Celsius plants will get damage. Heavy rainfall is not suitable for crop as it can cause flower drop and fruit drop.^[9]

Soil requirement Dragon fruit could be grown in wide range of soil types. The most ideal soil type should be rich in organic matter and slightly acidic. The area to be used is sub-marginal, organic fertilizer will be applied to coverup the lacking number of organic matters in soil. Dragon fruit usually prefer sandy loam with high organic matter and grows well in soil having good drainage ability. The nutritional values of dragon fruit changes depending on the species, origin and harvesting time. It contains significant amount of minerals higher than pineapples.^[4] Mature dragon fruits have higher TSS, which is mainly in higher in autumn time fruits than in summer.^[18] It is also a source of glucose, fructose, dietary fibres.^[12] The fresh fruit contains 83% moisture, 0.24 % protein ,0.65% fat, 0.9 % fibre. 100gm of fresh fruit pulp contains 8mg calcium, 36.1 mg phosphorous, 0.61 mg iron, 9mg vitamin c. ^[26] 0.16 mg vit b3, 0.05mg vitb2. 0.04mg vit b1, 11g carbohydrate 3g fibre, 0.4 g fat, 1.1g protein, 87g water.^[27]

Health Benefits of Dragon Fruit:

Dragon fruit is healthy and nutritious for human health because of its essential nutrients such as vitamins, minerals, complex carbohydrates, fibres antioxidants. The study show that the dragon fruit promoted the growth of healthy gut bacteria and beta cyanine which act as a red or purple pigment with antioxidative activities it is low in calories 0 cholesterol and full of antioxidant properties cardiovascular heart problems are decreased and blood pressures are maintained delicately. Dragon fruits flesh is rich in polysaccharides and mix oligosaccharides these are acting as promoting factors for the growth of bacteria such as lactobacilli and bifidobacterial the gastrointestinal microflora is called probiotics which decreases the growth of GI pathogens. Dragon fruit is also used as a natural probiotic in which the pulp is juicy and which contains large amount of small black seeds embedded. It is also said to have this as a potential source of antioxidants and micronutrients.

Bone & teeth:

Rich source of calcium and phosphorous works together to improve bone mass and prevent osteoporosis.

Nervous system:

High in B vitamins which aid in the formation nerve cell and health fat for proper conductive signalling.

Eye Support:

Contain vitamin A in the form of carotene needed for proper colour vision and prevention of night blindness.

Glowing skin:

Antioxidants and essential fatty acids for blemish free softer tighter younger looking skin.

Anti-inflammatory:

Provide alkalinity due to high vitamin and vitamin content, helping to reduce inflammation and irritation in joints, and nourish healing wounds, cuts.

Digestion & Metabolism:

It contains high fibre for optimal digestive health aids in weight loss via also increased of metabolic rate.

Cardio vascular:

Prevent cardio vascular disease, lower's cholesterol level and decreases high blood pressure.

Anti-aging:

Anti-oxidants work against free radicals and make your skin tighter and younger looking.

Immunity:

High vitamins and minerals content boost our immunity and treat disease and illness.

Cancer prevention:

Loaded with Phyto albumins, and antioxidant that prevents cancer causing free radicals and blocks tumour cell growth. Also removes toxic heavy metals from body.

Regulate Diabetes:

High amount of fibres dragon fruit can ultimately help regulate diabetes as it can stabilize blood sugar levels by suppressing sugar spikes. However, with any dietary changes or modifications, always consult your doctor to make sure this is a good fruit for you. Flavonoids are act on the brain cells and the blood vessels which decreases the risk of heart disease^[8] such as heart attack it minimizes heart diseases and stable the blood pressure.^[5] Beta lanes can combat oxidative stress and which may have the ability to decrease the cancer cells it has the ability to aid in weight loss improves the digestion reduce the low-density lipoprotein (LDL – Bad cholesterol) cholesterol in the blood and strengthen the immune system.^[8] Carotenoids decreases the risk of cancer and cardiovascular disease or disorders.^[7] Lycopene's inhibit the sale growth of various human cancer cell lines.^[10] The seeds of dragon fruit are high in polyunsaturated fats that reduce triglycerides and lower the risk of cardiovascular disorders.^[3] Regular consumption of dragon fruit that contain a high amount of vitamin C would help in fighting against cough and asthma increases the wound healing properties and quickly heals the court area more ever enhance the immune system and also stimulate the activity of other antioxidants in the body.^[2] Dragon fruits contain high amount of phosphorus and calcium which help to reinforce bone and play an important role in tissue formation and forms healthy teeth.^[1] Red dragon fruit having so much iron which increases haemoglobin and erythrocyte level in pregnant woman.^[23]

Dragon fruit improve appetite, eyesight and memory of human being.^[12] It also produce a positive effect on metabolism, digestion, immune system, clear vision, oxidative stress, diabetes and cardiovascular diseases.^[19] It strengthen the immune system and use in treatment of diabetes. Medicine made from the flower and stem improves the blood circulation. The fruit offers numerous nutrients including vitamin C, phosphorus, calcium, antioxidants. The nutrients of dragon fruits which help to control diabetes and low cholesterol level and prevent asthma and arthritis. Red Dragon fruit having much iron to elevates haemoglobin and erythrocyte level in pregnant women.^[23] It also reduced stiffness.^[20] Dragon fruit peels are high in potential to be used as a natural dye.^[5] Fresh as well as dried dragon fruit skin both are rich in pectin's and beta lain making it natural food thickener and natural colouring agent. One of the natural food additives derived from the disposable part peel of fruit named "Dragon Fruit Colouring Powder" is using namely as 'albedo'. So, it does not affect natural benefit of dragon fruit. The 'albedo' of dragon fruit is used as a conventional method to colour rice milk, yogurt juice and pastry.^[25] It has medicinal value like reducing hypertension.^[20]

Conclusion:

Due to the nutritional and medicinal properties of the dragon fruit provides lots of benefits to human health mostly for the control and management of oxidative stress. Different parts of dragon fruit contain bioactive compounds involved in large number of beneficial biological activities which includes antioxidant, antimicrobial and anticancer properties. This includes beta Laine flavonoid, polyphenol, terpenoids and steroids, alkaloid, tannins and carotenoids which have been proven as effective healthier, safer and sustainable alternatives to synthetic drug for the treatment and prevention of many diseases such as diabetes, cancer, obesity, hyperlipidaemia and pathogenic agents such as viruses, bacteria and fungi besides the pharmaceutical value of its compound. The dragon fruit is also on natural source of colour on with potential uses in food and cosmetic industries. The dragon fruit due to its economical characteristics benefits to human health and the commercial value has become cost effective product. photo Vita name means economy and or driving force in the sustainable development of the country particularly in the promotion of sustainable use of ecosystems and biodiversity of South Western region more sensitive to the effects of climate change the high adaptability and tolerance of dragon fruit to a white range of severe environmental condition explain the success of experimental planting model of the climbing characters in the mangrove areas off Mekong delta region further studies are it needed to understand

the adaptive mechanism underlying sale in tolerance of the dragon fruit and to select genotypes capable for growing under the increasingly see where condition caused by global climate change. The research of dragon fruit should be intensified an extended by emphasizing its value chain and production aspects for long term perspective.

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