MS.ID-IJPBS-1876
International Journal of Pharmacy and Biological Sciences-IJPBS™ (2025) 15 (1): 18-26
Online ISSN: 2230-7605, Print ISSN: 2321-3272
Review Article | Pharmaceutical Sciences | OA Journal | MCI Approved | Index Copernicus

Nutrition Values and Therapeutic Benefits of Dragon Fruit: A Comprehensive Review

Chennupati. V. Suresh[1], M. Nithin[2], G. Lalitha[2], T. Kalyan Chakravarthi[2*] and K. Dharmarao[2]

[1]Professor & Principal of Chennupati Indo American School of Pharmacy, Jonnalagadda, Narasaraopet, Andhra Pradesh.
[2]Student of Chennupati Indo American School of Pharmacy, Jonnalagadda, Narasaraopet, Andhra Pradesh

Received: 25 Oct 2024/Accepted: 19 Nov 2024/Published online: 01 Jan 2025
***Corresponding Author Email:** kkalyanchakravarthi04801@gmail.com

Abstract

Hylocereus polyrhizus (red dragon) fruit a cactaceae plant with traditional & medicinal Uses, is found in America & South Asia these fruit have diversified bioactive Components which make them both therapeutically & nutritionally important prominent bioactive elements in this plant included phenolic compounds such as α-amyrin(15.70%) & β-amyrin (13.90%), H polyrhizus also Contain anti-oxidant, cardio protective, anti-inflammatory, anti-fungal, anti-Cancer, anti-plasmodial, anti-fungal, hepatoprotective activities. and improved understanding of H. polyrhizus, according Could have the way for the discovery of beneficial chemical with therapeutical potential.

Keywords

Hylocereus polyrhizus, red dragon fruit Ethnomedicinal uses, Phytochemistry, Nutritional values and Pharmacological activities.

*****

INTRODUCTION:

Hylocereus polyrhizus (red dragon) is a species of cactaceae family belongs to genus Hylocereus polyrhizus, It is widely cultivated in Malaysia, Thailand, Vietnam, Australia, and Hylocereus polyrhizus, commonly known as red-fleshed dragon fruit or red pitaya, is a tropical fruit-bearing cactus species native to Central America. It is highly valued for its vibrant red-pink fruit with red pulp, which contains numerous small black seeds. In many countries around the world, traditional medicines have been used for many years as herbal cures, dietary supplements, and other medicinal approaches. Traditional medicine has expanded in recent years, with people all across the nation relying on it for some of their primary therapy. According to the World Health Organization (WHO), approximately 88% of all countries are using traditional medicines in the form of herbal medicines, yoga, acupuncture, indigenous therapies, and other relevant traditional approaches. One of the most potent antidiabetic drugs, metformin, is linked to Galega officinalis (also known as goat's rue), a traditional medicine that essentially emerged in Europe. During the 1920s and 1930s, guanidine derivatives from G. officinalis were synthesized and used to mitigate diabetes

DRAGON FRUIT

Characteristics:

Scientific Name: Hylocereus polyrhizus

Common Names: Red-fleshed dragon fruit

Family: Cactaceae

Origin: Native to Central and South America, now cultivated worldwide in tropical and subtropical regions.

Botanical description:

The Cactaceae family of plants, particularly red varieties, are suitable for regions with specific rainfall demands and soil conditions. Off-season dragon fruit varieties are cultivated from May to December, with the maximum output period occurring from July to September. A night-breaking approach has been implemented for the fruit, resulting in a fully red and sweet-flavored flesh with aerial roots. The fruit is oblong in shape, with a red covering and pulp that has a deep purple color. It can reach a maximum weight. The seeds can be used for generative reproduction. These fruits are generative, with a weight of 14 cm (likely referring to size or weight). The flowers are long, 8 cm wide, and require self-pollination or cross-pollination to produce fruit.

The fruit of the plant has an oblong shape, a red covering, and a pulp that has a deep purple color. It may grow from the ground or scale trees via aerial roots and has a succulent stem. H. polyrhizus exhibits the smallest fruit size among all species of Hylocereus, with a maximum fruit weight of approximately 350 g. Seeds can be used for generative reproduction, but germination won't take place in the dark. The flesh possesses a pleasant texture and an ample quantity of delectable black seeds. Flowers need cross-pollination to produce fruit. Before morning, it is customary for huge flowers to attract a considerable number of bees, ranging from 10 to 20 each, due to their irresistible allure to these insects. The flowers have distinct borders and possess waxy white stems. The stigma lobes are quite short and have a yellowish coloration. Additionally, the outer perianth sediments are reddish in hue, particularly at the tips. The fruit is characterized by its oval shape, scales of different sizes, and reddish-purple flesh with numerous tiny black seeds

Ethno medicinal uses of Hylocereus polyrhizus:

H. polyrhizus also contains antioxidants, cardioprotective, anti-inflammatory, antifungal, antibacterial, hypolipidemic, antiviral, thrombolytic, antiplasmodial, anticancer, hepatoprotective, and antidiabetic activities. Because of its coloring pigments, carbohydrates, proteins, and fat substitution properties, the fruit is commonly used in culinary and grooming. An improved understanding of H. polyrhizus, according to this study, could pave the way for the discovery of new, beneficial chemicals with therapeutic potential. Moreover, pigments in the fruit such as betalains, betacyanins, and betaxanthin are used as natural food colorants and antioxidants thus, H. polyrhizus is recommended as an ingredient for functional foods and nutraceutical products. Consumption of Hylocereus polyrhizus plays a role in the prevention of many lifestyle-related diseases like diabetes, obesity, and cancer. Some human and experimental animal trials have reported attenuation of blood sugar, lipid levels, insulin resistance, and tumor growth with

regular consumption of Hylocereus polyrhizus however any of these benefits have not been investigated full-fledged. The functional polyphenolics of the fruit and its mechanism behind the notable properties have also been rarely elucidated. With this scope, the current study evaluated the antiglycative potential of H. polyrhizus through in vitro and in silico experiments and screened its bioactive polyphenols using UPLC-ESI-MS/MS analysis. Besides, compounds identified from the fruit were tested in silico analysis to check their interaction with the target protein, RAGE that mediates glycation associated pathology.

Phytochemistry of hylocereus polyrhizus:

Hylocereus polyrhizus Britton and Rose fruit is a tropical plant that is popular and widely cultivated due to its qualities and advantages and high nutritional content. Some substances in Hylocereus polyrhizus Britton and Rose are plant sources rich in nutrients and minerals, namely vitamin B complex and vitamin C, protein, fat, carbohydrates, fiber, flavonoids, niacin, pyridoxine, coalmine, phenolics, betacyanins, polyphenols, and carotenoids. This study aimed to assess the bacterial activity of the 96% ethanol extract of Hylocereus polyrhizus fruit peel against the growth of Staphylococcus epidermidis and Staphylococcus aureus using the well diffusion method. Maceration was used as an extraction method, and a phytochemical screening procedure was carried out according to the process from harbone. The bacterial activity was conducted by the well diffusion method. Phytochemical screening yields from 96% ethanol extract of Hylocereus polyrhizus fruit peel showed the presence of alkaloids, steroids, flavonoids, terpenoids, tannins, polyphenols, and saponins.

Extraction of Hylocereus Fruit Peel:

The Hylocereus polyrhizus Britton & Rose fruit peel powder was extracted using the maceration process with an ethanol solvent ratio of 1:10 for 3×24 hours. At a temperature of 40oC, a rotary evaporator concentrated the maceration filtration until a thick extract was produced.

Phytochemical Screening of 96% Ethanol Extract of Hylocereus polyrhizus Britton and Rose peel-

S.NO	TEST	METHOD	RESULT
1	Alkaloids	Dragendroff, Mayer, Wagner	+
2	Flavonoids	Willstatter	+
3	Steroids	Salkowski	+
4	Terpenoids	Lieberman burchard	+
5	Tannins	Gelatine test	-
6	Polyphenols	$FeCl_3$	+
7	Saponins	Foam test	+

Classes & Names of Compounds:

Class	Names of Compounds
Alkaloids	2- Benzyl ethylene, dopamine hydrochloride, choline, serotonin, amaranthine.
Amino Acids	tryptophan, L-tyramine, L-methionine, pipecolic a.
Lipids	Punicic acid, y-linolenic acid, Stearic acid, myristic acid.
Phenolic acids	Chlorogenic acid, echinacoside, glucopyranose flavonoids glycoside, rutin, gentiopicrin, glycoside, epicatechin.
fatty acids	Stearic, oleic.
Steroids	Sitosterol, Stigmast 4-en-3-one, Campester Organic acids: Sodium valproate, citraconic acid D-galacturonic acid.

Betalains are hydrophilic nitrogen-containing pigments abundantly found in red pitaya. They are classified as betaxanthins, which are yellow orange in color, and betacyanins, which are red-violet in color, and these pigments are capable of absorbing 478 and 538 nm of light, respectively. Betalains have carboxylic functional groups rather than hydroxyl functional groups, in contrast to anthocyanins. Betalains have multiple functions as antioxidants, anti-inflammatory, antiproliferative, hypoglycemic, radioprotective, cardioactive, diuretic hypolipidemic, neuroprotective, and osteoarthritis pain relievers.

Betalain Biosynthesis

In plants, arogenic acids originate from the L-tyrosineamino acid. Three key enzymes, i.e., tyrosinase, 4,5-DOPA-extradiol-dioxygenase, and betanidin-glucosyltransferase, are reported to be involved in betalain biosynthesis. Tyrosinase begins betalain biosynthesis by the hydroxylation reaction of L-tyrosine to L-DOPA, catalyzed by cytochrome

P450 enzymes. Then, L-DOPA is cleaved by a ring-opening oxidation reaction by the enzyme 4,5-DOPA-dioxygenase to produce an intermediate, 4,5-seco-DOPA, which then produces betalamic acid by spontaneous intramolecular condensation. As an alternative, a cytochrome P450 enzyme catalyzes the oxidation of L-DOPA to dopaquinone, followed by cyclization to form cyclo-DOPA. The spontaneous conjugation of betalamic acid with the amino group of cyclo-DOPA results in the production of reddish violet betacyanins. Betalamic acid can also spontaneously condense with the amino group of amino acids to produce yellow betaxanthins. Betacyanins can have additional moieties, such as glucosyl or acyl groups, added to them enzymatically. Glycosylation takes place either before condensation of cyclo-DOPA with betalamic acid catalyzed by cyclo-DOPA 5-O-glucosyltransferase or after condensation of cyclo-DOPA with betalamic acid catalyzed by betanidin glucosyltransferase. Betacyanins can go through various enzymatically catalyzed changes in addition to glycosylation, adding a variety of moieties and enhancing the structural variety of betalains.

Recent studies in pitaya have made great progress in understanding betalain biosynthesis by exploring the key roles of transcription factors such as HmoWRKY42, HuMYB132, and HubHLH159 that bind to the promoter regions of HmocDOPA5GT1, HuADH1, HuCYP76AD1–1, and HuDODA1 and influence betalain biosynthesis.

PHARMACOLOGICAL ACTIVITIES OF HYLOCEREUS POLYRHIZUS:

In the treatment of different diseases, medicinal herbal plants have demonstrated pharmacological activity, dragon fruit have much pharmacological activity as listed below:

Antimicrobial activity

White dragon fruit flesh ethanolic extract was detected as around 85% of mixed oligosaccharides occur. In contrast to insulin, these oligosaccharides had greater tolerance to human salivary α-amylase. This is not digested in the stomach, but functions as prebiotics that help the stomach. Bifidobacteria and Lactobacilli, which are healthy bacteria, are increasing. Acetone extracts (70 % concentration) of Hylocereus peel have high antimicrobial activity, particularly against Salmonella typhi.

From the disc diffusion analysis, the antibacterial activity of chloroform, hexane extract, and ethanol from the skin of white dragon fruit revealed that the inhibition region of about 7 to 9 mm was able to combat Gram-negative and Gram-positive bacteria 44. Using the microtiter process, anti-bacterial analysis was performed. It was the minimum inhibitory concentration (MIC) of the bacterial species E. coli and Staphylococcus aureus was found to be 50 µl.

Antifungal activity

The presence of polyphenol antifungal activity in the existence of flavonoid components in ethyl acetate extracts implies that they have antifungal properties. As a result, chromatography and spectroscopic methods are used to identify bioactive chemicals in extracts. All extracts had moderate to low antifungal activity, with ethyl acetate having the greatest activity, closely followed by the colored extract. However, these activities were lower than those of positive control. For example, quercetin, and kaempferol exhibited antimicrobial activity extracts and fractions of flesh and peels of red pitaya fruits are two yeasts, Candida albicans, Rhizoctonia solani four molds. Aspergillus flavus, Fusarium oxysporum, Botrytis cinerea, Cladosporium herbarum which is the research panel that include laboratory control strains obtained from the American Type Culture Collection (ATCC).

Anti-inflammatory activity

Anti-inflammatory action has been performed on dragon fruit. The research was carried out by mixing dragon fruit skin and flesh and separating it with vacuum distilled water, water, and drying. Then the results of this will be used for the purposes of bioassay testing against Cyclooxygenase-2 (COX-2), Acetylcholinesterase Enzymes (ACHE), and 5-Lipoxygenase (5-Lipox). The results of these studies have shown that extracts derived from dragon fruit flesh showed excellent results against the three enzymes in the bioassay test and showed a stronger inhibitory power on the Acetylcholinesterase enzyme compared to other enzymes. This has shown that dragon fruit has the ability to relieve inflammatory symptoms, it can be seen from the mechanism that is directly related to cholinergic anti-inflammatory. In addition, the results shown by dragon fruit flesh on COX and Lipox enzymes also have an indication of a high potency that can cause blockages in the leukotriene and prostaglandin pathways. This shows that there are anti-inflammatory properties in the properties of dragon fruit. Extract from ethanol from red dragon fruit peel contains betalain which has the ability to inhibit the transcription factor NF-KB which will result in inflammatory genes such as TNF-α and IL-1β that will not be separated.

Anti-cancer activity

Various studies have shown that the flavonoids, betanin, and polyphenols in dragon fruit have an anticancer effect. The skin of dragon fruit that has

been extracted with a mixture of water and ethanol solvent with a ratio of 50:50 has shown antiproliferative activity against human hepatocellular carcinoma cells in just one dose. Anticancer activity which is really precise is still being studied and cannot be known factually, however, previous research has resulted in the fact that the effect of polyphenol anticancer in dragon fruit may be mediated through factor suppression on nucleic-kappa B and by a mediated pathway. growth factor receptors, antioxidant mechanisms, anti-inflammatory, angiogenesis inhibition, cell cycle arrest and apoptosis induction, and protein kinase activation.

The red-fleshed contains lycopene, that is a natural antioxidant recognized to combat cancer. Antioxidants will protect cells from reactive oxygen species that can cause damaging effects and prevent any cancer-causing free radical formation. Red pitaya flesh and peel rich in polyphenols and good source of antioxidants. Research also shows that white dragon fruit is rich in flavonoids.

Antiulcer activity

The topical quercetin content in the skin of red dragon fruit (Hylocereus polyrhizus) shows antiulcer activity. It can be proven from the results of total distress in 35% of cases within 2 to 4 days and in 90% of cases within 4 to 7 days. Quercetin is useful for reducing the frequency of relapses and relieving mild symptoms. Gastric Ulcer Healing: Preclinical studies on animals have shown that red dragon fruit may speed up the healing of ulcers by promoting tissue regeneration and reducing ulcer size. The presence of vitamin C, a known agent for collagen formation and tissue repair, might further support this process. In conclusion, red dragon fruit shows promising potential as a natural remedy for the prevention and treatment of gastric ulcers. However, while the initial findings are encouraging, more clinical research on humans is needed to fully understand its effectiveness and therapeutic potential in ulcer management.

Antioxidant activity

Red dragon is considered as a fruit that is low in calories but high in nutrition, water content, sugars, minerals, and antioxidants. H. polyrhizus or known as the red fleshed pitaya, is rich in betalains which meets the trade interest for antioxidant products and also natural food colorant. Fruit seed oil holds high potential as a source of natural antioxidants. Pitaya contains an abundance of phytoalbumins known for its antioxidant properties, not just phytoalbumins, the pulp and peel is also rich in polyphenols. Through the study from the ethanolic extract of both the peel and the flesh of H. undatus, it is shown that the peel contains more flavonoids than the flesh. The pulp of pitaya can be added to yogurt to improve antioxidant activity. The abundance of phenolic compounds is closely connected to the antioxidant properties of polyphenol-rich plant extracts. The base hydrolysis produced a considerable number of phenolic compounds after being extracted with 80% methanol. Nonetheless, the hydrolysis of acid and composite enzymes showed low effectiveness in liberating bound phenolics in RP (Red dragon fruit), which may contribute to limited antioxidant properties. In recent research, using the DPPH method, higher free radical-scavenging activity was shown by fruit peel pigment extract having IC50 of 159.6 µg/mL

Antidiabetic activity:

There are several leaves and fruits that have the potential to be anti-diabetic, such as dragon fruit. Several studies have shown that dragon fruit has an antidiabetic activity effect. For patients with Type II Diabetes, the use of red dragon fruit can reduce blood glucose levels. The substance that lowers blood sugar levels in red dragon fruit is glucose. In addition to glucose, dietary fiber in dragon fruit has a function to reduce the intensity of decreasing food in the intestines, thereby reducing the formation of blood glucose. The use of dried dragon fruit also has specific results as an herb for antidiabetic activity. This is also because dragon fruit dry has a blood sugar-lowering effect that can lead to diabetes. For antidiabetic activity, the use of dragon fruit is not only fixed on dragon fruit flesh. Dragon fruit seeds and skin also have an antidiabetic effect. Dragon fruit seeds contain saponins that are soluble in water extracts and are useful as an antidiabetic substance, especially for people with type II diabetes. Meanwhile, dragon fruit skin contains soluble fibers that are believed to be able to regulate blood sugar levels in the body. Diabetics will generally have wound that are difficult to heal. However, in one study, it was found that the use of Hylocereus undatus or white dragon fruit had the effect of accelerating the recovery process. The most effective white dragon fruit preparations used for wound healing in diabetics are topical preparations derived from flower or leaf water extracts. The use of white dragon fruit in the wound healing process in diabetics occurs due to the presence of DNA collagen content, increased epithelialization and hydroxyproline, tensile strength and total protein.

Anti-infertility activity

An experiment showed that dragon fruit extract can maintain sperm motility and improve testicular histology. white dragon which contains gallic acid as an antioxidant which tends to increase spermatozoa

quality in the form of increased motility, number, and morphology of spermatozoa in the epididymis.

Hormonal Balance: The fruit contains essential vitamins and minerals, including vitamin C, magnesium, and iron, which play important roles in regulating hormones. Balanced hormone levels are crucial for reproductive health, and consuming dragon fruit may support hormonal equilibrium, potentially benefiting menstrual cycles in women and spermatogenesis in men.

Improved Sperm Quality: Some studies have suggested that the antioxidants in dragon fruit can improve sperm quality by protecting sperm cells from oxidative damage. This could lead to better sperm count, motility, and morphology, which are important factors for male fertility.

Antiplatelet activity

Dragon fruit has antiplatelet activity because it contains ethanol and ethyl acetate extracts which have inhibitory effects in concentration-dependent mannerson Platelets inhibited the aggregation of platelets to show an antithrombotic effect. Besides this inhibition, it can also attenuate the other pathways of 2, 3, 5-mediated platelet activation. H. polyrhizus (RF) dragon fruits demonstrated better free radical-neutralizing qualities than dragon fruits. It lowered plasma lipids while improving total and LDL cholesterol, glucose levels, and serum antioxidant capacity in hyperlipidemic rats. Consuming red pitaya juice for a duration of 8 weeks could enhance the diastolic stiffness of the heart in rats that were fed with maize starch

Anti-Tumor Action:

Numerous research have demonstrated the anticancer properties of dragon fruit's flavonoids, polyphenols, and betanin. In just one dosage, the dragon fruit skin that was extracted using a 50:50 blend of water and ethanol solvent demonstrated antiproliferative action against human hepatocellular carcinoma cells. The specific nature of the anticancer action of dragon fruit is still being investigated and cannot be determined with certainty. Nevertheless, prior studies have shown that the anticancer impact of polyphenols in dragon fruit may be mediated by a mediated route and factor inhibition on nucleic-kappa B. growth factor receptors, anti-inflammatory, antioxidant processes, prevention of angiogenesis, induction of cell cycle arrest and apoptosis, and activation of protein kinase. The natural antioxidant lycopene, which is found in red meat, is known to prevent cancer. Antioxidants shield cells from potentially harmful reactive oxygen species and stop the production of free radicals that can lead to cancer. Rich in polyphenol and strong sources of antioxidants, the flesh and peel of red pitayas Studies also reveal that white dragon fruit has high flavonoid content

Hepatoprotective activity

The extracts of dragon fruit do have a beneficial effect on poisoned rats. Due to its high antioxidant components coming from the above-mentioned intake of CCl4. In specific, triterpenes and flavonoids are phytochemical components that defend the liver against fat peroxidation, but with a subsequent improvement in Serum Glutamic-Pyruvic Transaminase (SGPT) and Serum Glutamic-Oxaloacetic Transaminase (SGOT), the silymarin capsule has little preventive function against liver injury. The extract of dragon fruit is effective in protecting the liver from it has been shown to test animals against persistent damage when induced with CCl4.

Cardioprotective activity

The effectiveness of polyphenols in flesh owned by H. polyrhizus is Anti-thrombotic effect, inhibiting numerous platelet-activation mechanisms, resulting in decreased platelet aggregation or hyperactivation. Polyphenols can contribute to inhibiting platelet degranulation. It can also downregulate thromboxane A2 receptors, inhibit collagen and adenosine diphosphate (ADP) receptors, and affect other platelet-activation pathways. As a result, it may operate as a replacement for presently employed anti-platelet medications by targeting new platelet activation pathways. In the 1st pathway, the attachment of fibrinogen to (GPIIb/IIIa) receptors of platelets to inhibit further platelet recruitment which increases its cardioprotective properties further. In one study, rats were given two thermal processing methods for this dragon fruit were selected. The results of the analysis were that the cardioprotective substances of red dragon fruit will be polyphenols and antioxidant material.

Neuroprotective activity

As mentioned previously, dragon fruit has a myriad of benefits and one of them is related to the neuroprotective activity of nerve work. The phytochemical content in dragon fruit plays an active role in neuroprotective activity, especially when preventing neurodegenerative diseases. The phytochemical content in dragon fruit which has the potential to prevent neurodegenerative diseases while also playing an active role in neuroprotector activity is essential fatty acids.

Cytoprotective activity

Red dragon fruit is a great source of various for natural antioxidants, including ascorbic acid, betalains, and polyphenols. As a fiber-rich Dragon fruit, it helps in food digestion. Soluble fibers found in pitaya peel may help neutralize dangerous

substances such as heavy metals in the digestive process and may be associated with blood sugar control in people with type II diabetes. Pitaya peel also has mucilage that can have a beneficial effect on the metabolism of cholesterol.

Hypolipidemic activity

Dragon fruit flesh extract was used to determine hypolipidemic activity in rats. The extract of dragon fruit flesh could minimize TG, total cholesterol, LDL, and total cholesterol ratio over HDL cholesterol, body weight, Lee index obesity, and could also substantially raise serum HDL cholesterol, total fecal cholesterol, and fat. A dosage of 200 mg/kg BW (body weight) of red dragon fruit peel powder lowered total triglycerides, cholesterol, LDL-c, VLDL, body weight, Lee index, obesity, and total cholesterol ratio over HDL cholesterol. Furthermore, it could increase the quantity of blood serum HDL-c levels while also improving blood lipid levels. Experiments in male hyperlipidemia BALB/C mice (Mus musculus) and obese female Wistar rats on a high-fat diet yielded these results. The red dragon fruit peel contains approximately 69.3% dietary fiber, which facilitates the production of fatty acid fermentation products. These products inhibit the synthesis of liver fatty acids and cholesterol and decrease the release of triglycerol. In particular, soluble kinds can keep bile acids and cholesterol in check in the small intestine. Another in vivo investigation found that a methanol extract of red dragon fruit had a hypocholesterolemia impact on hypercholesterolemia-induced rats. From this study, it was shown that dragon fruit flesh extract had biological activities of anti-obesity and hypolipidemic which could prevent atherosclerosis. Dragon fruit flesh extract consumption may not only bind cholesterol and fat from the feed but also increases the amount of cholesterol and fat in the feces.

Analgesic activity

Red dragon fruit, like many other plants, contains gallic acid (3,4,5-trihydroxybenzoic acid), an organic substance that exists in plant materials that acts as antioxidant, antibacterial, antiviral, and analgesic activities.

NUTRITIONAL VALUES OF HYLOCEREUS POLYRHIZUS:

Dragon fruit has heavy nutritional value energy 264 Kcal, water 87 g, protein1.1g, fat 0.4 g, carbohydrate 11.0 g, fiber 3g, calcium 8.5 mg, iron 1.9 mg, phosphorus 22.5 mg, vitamin B1 (Thiamine) 0.04 mg, vitamin B2 (Riboflavin) 0.05 mg and vitamin B3 (Niacin) 0.16 mg per 100 g fruit pulp. It is very useful for lowering blood sugars in type 2 diabetes. Dragon fruit is beneficial for carbohydrate metabolism, heart tissues, and teeth, healthy blood and tissue formation strengthening bones due to high calcium content, strengthening immune system, faster healing of bruises and wounds, respiratory tract infections and even as a mild laxative due to substantial fiber content. Dragon fruit has low cholesterol concentration, to balance blood sugar concentration, to prevent colon cancer, to strengthen kidney function and bone, to strengthen the brain workings, increasing the sharpness of the eyes as well as cosmetic properties. The seeds of dragon fruits are high in polyunsaturated fats that reduce triglycerides and lower the risk of cardiovascular disorders. In order to yield dietary fiber with a high amount of soluble fiber, red pitaya pulp was dried at a low temperature, which showed its promise as a fat substitute in dieting as well as antioxidant properties. The fiber was added to strawberry ice cream, which eventually led to a product with a maximum acceptance rate and a 73.5% improvement in the over run and rheological behavior of the sample's fat content. This suggests that the food sector has a choice in how to minimize fat while boosting the nutritional value of goods. When compared to Malaysian red pitaya, which was lyophilized, the crude fiber content of the syrup was around 3.8 times lower. In the study, the fiber and protein levels in Malaysian and Australian red pitaya juice were measured to be 1.45 g/100 g and 2.65 g/100 g, respectively. It was found that the protein level was higher than the fiber level.

Types of Dragons Fruit

Dragon fruit, also known as pitaya, comes in various types, each with its own unique characteristics. Here are the main types of dragon fruit:

Yellow Dragon Fruit	It's sweet and tropical, loaded with vitamin C that helps your immune system and skin. Plus, it has fiber to help your tummy feel full and work well. This one looks cool and tastes great. It's full of vitamins and fiber too. And it's got antioxidants that fight off bad stuff in your body and help keep you healthy.
Pink Dragon Fruit	It's sweet and a bit tangy, and it's good for your skin and digestion because it's full of vitamin C and fiber. And like the others, it's got antioxidants to keep you feeling good.
Red Dragon Fruit	This one has bright red flesh and is packed with something called lycopene, which is super good for your heart and might even help prevent cancer. It's also got lots of vitamin C and fiber to keep you healthy.

Nutritional Value - 170 gm of dragon fruit cubes contain:

Calories	102
Carbohydrates	22g
Protein	2g
Fat	0g
Fiber	5g
Sugar	13g
Vitamin A[IU]	100 IU
Vitamin C.	4mg
Calcium	31mg
Iron, Magnesium	68mg

CONCLUSION:

Hylocereus polyrhizus, commonly referred to as red dragon, is a botanical specimen with a diverse range of bioactive compounds, which give rise to various therapeutic properties. This review article presented ethnobotanical descriptions and highlighted the various health benefits of red dragon fruit and its primary component through its antioxidant, anti-inflammatory, antibacterial, and anticancer properties, among other pharmacological actions.

REFERENCE:

1. Zhuang, Y., Zhang, Y. & Sun, L. (2012). Characteristics of fibre-rich powder and antioxidant activity of pitaya (Hylocereus undatus) peels. International Journal of Food Science & Technology, 47, 1279–1285.
2. Hylocereus undatus). Foods. 2021;10(6):1183. doi: 10.3390/foods10061183. 2 Linh Thuy Le; Nguyen Ngoc Thanh Tien; Han Truong Duy Vo; Linh Tran Khanh Vu; Ngoc Lieu Le [27 April 2021) Functional compounds in dragon fruit peels and their potential health benefits. International Journal of Food Science and Technology 2022, 57, 2571–2580.

3. Yongliang Zhuang, * Yufeng Zhang & Liping Sun[15 January 2012) Characteristics of fibre-rich powder and antioxidant activity of pitaya (Hylocereus undatus) peels. International Journal of Food Science and Technology 2012, 47, 1279–1285.
4. Kunnika, S. & Pranee, A. (2011). Influence of enzyme treatment on bioactive compounds and colour stability of betacyanin in flesh and peel of red dragon fruit Hylocereus polyrhizus (Weber) Britton and Rose. International Food Research Journal, 18, 1437–1448.
5. Herbach, K.M., Rohe, M., Stintzing, F.C. & Carle, R. (2006). Structural and chromatic stability of purple pitaya (Hylocereus polyrhizus [Weber] Britton & Rose) betacyanins as affected by the juice matrix and selected additives. Food Research International, 39, 667–677.
6. Nurliyana R, Syed Zahir I, Mustapha Suleiman K, Aisyah MR, Kamarul Rahim K. Antioxidant study of pulps and peels of dragon fruits: a comparative study. Int Food Res J. 2010;17(2):367-75.
7. Hapsari A, Pujiastutik YE. The potential effect of red dragon fruit (Hylocereus polyrhizus) peel ethanol extract on endometriosis progressivity in endometriosis mice. J Kedokt Hewan. 2018;12(2):53-6. doi: 10.21157/ j.ked. hewan. v12i2.10497.
8. Singh S, Kumar S. A review on nutritional, medicinal and bio-active compound of dragon fruit Hylocereus polyrhizus (FAC Weber) Britton & Rose. Int J Biochem Res Rev. 2023;32(5):57-67.
9. Tang W, Li W, Yang Y, Lin X, Wang L, Li C, et al. Phenolic compounds profile and antioxidant capacity of pitahaya fruit peel from two red-skinned species (Hylocereus polyrhizus and World Health Organization (WHO). Global Centre for Traditional Medicine.
Available from:
https://www.who.int/initiatives/who-global-centre-for-traditional-medicine. Accessed April 22, 2023.
10. Le NL. Functional compounds in dragon fruit peels and their potential health benefits: a review. Int J Food Sci Technol. 2022;57(5):2571-80. Doi: 10.1111/ijfs.15111.
11. Panjaitan RG, Amelia S. Antihypercholesterolemia power of red dragon fruit (Hylocereus polyrhizus) peel extract. Pharmacogn J. 2022;14(3):518-23. Doi: 10.5530/pj.2022.14.65.
12. Sendker J, Sheridan H. History and current status of herbal medicines. In: Pelkonen O, Duez P, Vuorela PM, Vuorela H, eds. Toxicology of Herbal Products. Cham: Springer International Publishing; 2017. p. 11-27. Doi: 10.1007/978-3-319-43806-1_2.
13. Dubois-Deruy E, Peugnet V, Turkieh A, Pinet F. Oxidative stress in cardiovascular diseases. Antioxidants (Basel). 2020;9(9):864. Doi: 10.3390/antiox9090864.
14. Vijayakumar R, Abd Gani SS, Zaidan UH, Halmi MIE, Karunakaran T, Hamdan MR. Exploring the potential use of Hylocereus polyrhizus peels as a source of cosmeceutical sunscreen agent for its antioxidant and photoprotective properties. Evid Based Complement Alternat Med. 2020; 2020:7520736.
Doi: 10.1155/2020/7520736.
15. Ravichandran G, Lakshmanan DK, Murugesan S, Elangovan Hylocereus polyrhizus, red dragon fruit Ethnomedicinal uses, Phytochemistry, Nutritional values and Pharmacological activities.A, Rajasekaran NS, Thilagar S. Attenuation of protein glycation by functional polyphenolics of dragon fruit (Hylocereus polyrhizus); an in vitro and in silico evaluation. Food Res Int. 2021; 140:110081. Doi: 10.1016/j.
16. Zitha EZ, Magalhães DS, do Lago RC, Carvalho EE, Pasqual M, de Barros Vilas Boas EV. Changes in the bioactive compounds and antioxidant activity in red-fleshed dragon fruit during its development. Sci Hortic. 2022; 291:110611.
Doi: 10.1016/j.scienta.2021.110611.
17. Fruit (Hylocereus polyrhizus). Borneo Sci. 2012; 18. Foong JH, Hon WM, Ho CW. Bioactive compounds determination in fermented liquid dragon 31:37-56.