



DRAGON FRUIT HERBAL GUTIKA: A POTENTIAL AYURVEDIC DOSAGE FORM FOR MULTIPLE HEALTH BENEFITS

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ABSTRACT

Hylocereus polyrhizus, also known as the red-fleshed pitaya, and *Hylocereus undatus*, also known as the white-fleshed pitaya, are two common species of dragon fruit that are members of the Cactaceae family. Both of these species are gaining popularity in a lot of countries all over the world. Antioxidants, a high fiber content, anti-diabetic, anticancer, nutraceutical activity, immune booster, and iron supplement are just a few of the many health benefits of dragon fruit. Ayurveda prescribes herbal Gutika as a dosage form. Because it has so many health benefits, dragon fruit herbal Gutika can be used for many different purposes.

KEYWORDS: Red Dragon Fruit, Herbal Gutika, Dosage form,

Health benefits.

INTRODUCTION

Many synthetic compounds have been found that can be used for medicinal purposes as a consequence of extensive research and development. However, a significant issue is brought about by these chemicals' negative impacts. Natural products are increasingly being used.^[1] There are multiple Allopathic compounds available but to concur with their negative effect of its, we used Dragon fruit as a supplement.

Pitaya, also known as dragon fruit, is a member of the Cactaceae family and is mostly found in the genera *Hylocereus* and *Selenicereus*. The *Hylocereus* variety has around 16 unique species and has the most broadly developed variations. It is also known as kamalam in

Gujarat, strawberry pear in French, thangloy in Vietnamese, pitayaroja in Spanish, and la pitahaya rouge in French. *Hylocereus undatus* (white-fleshed dragon fruit), *Hylocereus polyrhizus* (red-fleshed dragon fruit), and *Selenicereus megalanthus* (yellow-fleshed dragon fruit) are the three varieties of dragon fruit that are commercially grown.^[2] *Hylocereus polyrhizus* has a high nutritional value (vitamin C, vitamin A, ascorbic acid, carbohydrate, fat, raw protein, raw fibre, and several minerals) as compared to *Hylocereus undatus*, due to this consideration we select *Hylocereus polyrhizus*.

The most important component of every medical system is its medications; in fact, the effectiveness of any therapy is strongly influenced by the quality of medications and the formulation in which they are taken. Gutika is highly esteemed and favoured in ayurvedic pharmaceuticals because of its easy administration, pleasant taste, prolonged shelf-life, and convenient dispensing and transportation.^[4] It is a solid preparation that can either be made by heating a drug's powder with jaggery, sugar, or guggul or without heating anything upon rolling the powder into pill shapes after macerating it with a liquid such as honey or guggul. For the patient, this kind of medicine is seen as the most efficient. Also, it has a long lifespan and may be used both inside and externally. such as Triphala Guggul and Bilvadi Gutika.^[5]



Figure 1: Red Flesh Dragon Fruit.

Table 1: Nomenclature of *Hylocereus polyrhizus*.

Kingdom	Plantae (Plants)
Sub kingdom	Trachebionta (Vascular Plants)
Super divison	Spermatophyta (Seed Plants)
Divison	Magnoliophyta (Flowering Plants)
Class	Magnoliopsida (Dicotyledons)
Order	Caryophyllales
Family	Cactaceae (Cactus Family)
Subfamily	Cactodideae
Tribe	Hylocereae
Genus	Hylocereus and Stenocereus

Species	<i>Hylocereus polyrhizus</i>
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Table 2: Nutritional Contents of Dragon fruit.^[6]

Nutrients	Values per 100gm
Water	87gm
Protein	1.1gm
Fat	0.4gm
Dietary Fiber	3gm
Carbohydrates	11gm
Calcium (Ca)	8.5mg
Phosphorus (P)	22.5mg
Iron (Fe)	1.9mg
Vitamin B1(Thiamine)	0.04mg
Vitamin B2 (Riboflavin)	0.05mg
Vitamin B3 (Niacin)	0.16mg
Vitamin C (Ascorbic acid)	20.5mg

MATERIAL AND METHODS

Material

Dragon fruit powder, Sugar, Jaggery, Guggul, Honey.

Formulation Procedure

- A Khalva was used to combine the dragon fruit powder and the specified liquids to make a soft paste. At the point when more than one fluid is proposed for latrine use, they are utilized successively.
- When sita or guda are added, they should be cooked in paka over low heat. The remaining fine powdered additives are added to the paka, where they are combined with the other components.
- This mass has been grounded appropriately. Rolling this mass between two fingers demonstrates that this is the final stage in the production of pills; it shouldn't adhere to it.
- By using a hot air oven or shade pills can be dried.
- Sugar ought to be taken multiple times to how much churna when it is added. Guggulu or honey should be added in equal quantities to churna.
- If we needed liquids like Swarasa, Kwatha, or gomutra, for example. then take twice as much of it.
- When adding jaggery, double the amount of churna should be taken.
- Kajjali is prepared first when Parada and Gandhaka are given, and the other drugs are added one at a time, following the procedure.

- Minerals, metals, and jewels make sindura and bhasma, unless otherwise specified; Animal products must be purified.
- If guggulu is one of the components, there is no need for a binding agent.
- The Khalva yantra should be thoroughly combined with the other components before any tikshna dravyas, such as Vatsanabha, Raskarpura, or Rasapushpa, are utilized.

Ingredients for preparation of Gutika

There are three components that are required for the preparation of Gutika:

1. Drug fine powder.
2. Restricting substance/Sweet substance.
3. Dravya bhavana

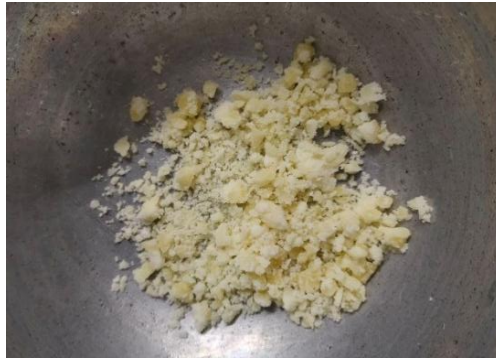
Table 3: Quantity of Ayurvedic binding agents relative to Churna, or powder, used in Gutika preparation.^[4]

Substance	Quantity of the substances included in the Churna Dravya reference
Sita (Sugar)	Four Times
Guda (Jaggery)	Two Times
Guggulu (Commiphora wightii)	Same Quantity
Madhu (Honey)	Same Quantity
Drava Padarth (Liquid Substance)	Two Times

Jaggary, sarkara, and honey are utilized as "binding substances" for making pills. These ingredients make Gutika more palatable by taking away the medications' unpleasant scent and bitterness.

Drugs for Bhavana

The quantity of liquid that is provided ought to be just right in order to keep the material moist while it is being ground and to produce a mushy or soggy mass. The quantity of liquid should be sufficient to satisfy the following conditions. Immersion, samplavana (consistency similar to clay), ardrata, and ekibhoot (homogeneity) are required. Up until subhavit lakshan, the procedure continues. In the event that Kwath is used in the planning of the vati, Bhavana ought to be added to the primary medicine churna. Kwatha should be prepared using eight times as much water, reduced to one eighth of its original volume, and filtered through a cloth.



Step 1: Heating Jaggery on Low Flame.



Step 2: Occurrence of Jaggery Paka.



Step 3: Addition of dragon Fruit Powder to make dough Mass.



Step 4: Formation of Gutika by rolling between fingers.

Some Micromeritic Properties of Dragon Fruit Powder^{[7][8]}

Calculation of Angle of repose

A powder blend's angle of repose was determined using the funnel method. First, the powder mixture was poured into the funnel in a precise amount. The height of the funnel was then adjusted so that its tip touched the powder blend's highest point. After that, the powder mixture was allowed to freely flow through the funnel and onto the ground below. The powder cone's diameter was then measured, and the angle of repose was calculated using the following equation:

$$\tan\theta = h/r,$$

Where h denotes the powder cone's height and r denotes its radius

Calculation of Bulk Density

A measured quantity of a blend is poured into a graduated cylinder, and its weight and volume are measured to determine its apparent bulk density. The bulk density is then calculated by dividing the powder's weight by its bulk volume:

Powder weight divided by powder volume determines bulk density.

Calculation of Tap Density

A powder's tapped density is determined by repeatedly tapping the powder's measuring cylinder on a flat surface cushioned with a material that can absorb the impact of tapping. This procedure is repeated until the powder volume inside the cylinder during tapping remains constant. the tapped density is then calculated as the mass-to-volume ratio of the powder:

The powder's weight divided by the powder's tapped volume is the tap density.

Calculation of Carr's Index

Carr's Index can be used to determine a powder's compressibility based on its bulk density and true density. The following formula can be used to calculate this index, which is used to determine the extent of a solid's compression:

$$\text{Carr's index} = [(\text{Tapped density} - \text{Bulk density}) / \text{Tapped density}] \times 100.$$

Calculation of Hausner Ratio

The Hausner Ratio, which is a numerical value, can be used to approximate a powder or granular material's flowability. This proportion is acquired by partitioning the tapped thickness of the material by its mass thickness, utilizing the recipe:

Hausner Ratio = Tapped Thickness/Mass Thickness.

Evaluation Parameters for Gutika^[4]

In order to assess the quality of the final product that is obtained through a thorough pharmacy method, various pharmacopeias establish certain standard criteria that a tablet or pill must meet. Weight uniformity, pill/tablet hardness, disintegration time, Total ash value, Water-soluble ash value, Acid-insoluble ash value, loss upon drying, and other factors are some of these criteria.

Determining the pills' or tablets' uniform weight

Twenty pills are selected at random and weighed separately on a precision weighing balance to ensure uniformity in weight. After that, the total weight of the twenty pills is divided by the number of pills in each group to determine the average weight of each pill. The most noteworthy and least loads, as well as the normal weight, are recorded for each gathering of tablets.

Determining the pills' hardness

To decide the hardness of a pill, it is put in a tablet/pill hardness analyzer (Monsanto Hardness tester) and the handle is turned to get the pill set up. The knob is further twisted to increase the pressure after the scale is set to zero. When the pill's hardness is measured on the scale, it is thought to have broken down. With ten tablets from each group, this procedure is repeated, and the average hardness of each tablet is calculated.

Time of disintegration calculation

Three pills are placed in a tube of the disintegrator apparatus to determine their disintegration time. After that, the equipment is adjusted so that the tube moves up and down in a beaker of distilled water at a rate of 30 times per minute until the particles remain above the screen and can easily pass through it.

Calculation of the Total ash value

A porcelain crucible must first be weighed before the ash value can be determined. The crucible with the sample is then placed in an electric furnace with two grams of the sample inside. From 550 to 700 °C, the temperature is gradually increased until the sample is carbon-free. The crucible and sample are then allowed to cool before being weighed once more. The percentage of the ash values of the two experimental drugs is then calculated.

Calculation of the water-soluble ash value

The insoluble material on ash-less filter paper was collected, washed with hot water, ignited, cooled in a desiccator, and weighed after the ash was heated with 25 ml of water for 5 minutes. The weight of the insoluble material was deducted from the mass of the total ash. The difference stands in for the ash that is water soluble. Based on the air-dried medication, the percentage of water-insoluble ash was determined.

Calculation of the acid-insoluble ash value

The ash was heated for 5 minutes in 25 ml of 2 M hydrochloric acid, and the insoluble material was then collected on ash-free filter paper, washed in hot water to reach pH neutral, ignited, cooled in a desiccator, and weighed. In order to quantify the proportion of acid-insoluble ash, the air-dried medication was used as a reference. When a drug component is administered orally, the amount of the drug component absorbed in the gastrointestinal canal is affected by its low acid-insoluble ash value.

Calculation of loss on drying

A watch glass is carefully weighed to determine the drying loss. After that, one gram of the sample is added to the watch glass, and dried for six hours in an electric hot air oven at 100°C. Before the sample is weighed once more and the result is calculated, it is allowed to cool down after being dried. The difference between the two weights determines the sample's percentage loss upon drying.

Calculation of Friability

After being weighed, a group of tablets is put into a machine that shakes them repeatedly and rolls them, causing them to fall six inches with each rotation. The tablets are weighed once more and the resulting weight is compared to their initial weight after receiving this treatment for either four minutes or one hundred rotations. The amount of material lost due to abrasion, expressed as a percentage of the initial weight, determines the degree of tablet friability.

Purpose of Dragon fruit Gutika^[1]

There are a number of reasons why Gutika are an excellent treatment option.

Antioxidant activity

Polyphenols, vitamin C, vitamin E, carotenes, and betanin, all of which have been found to lower oxidative stress in the body, can be found in abundance in dragon fruit. It's possible

that the body's antioxidants won't always be enough to fight the reactive oxygen species (ROS) that are made. ROS raises the risk of a lot of degenerative diseases that can kill you, like cancer, heart disease, and Alzheimer's. Natural antioxidants are preferred because synthetic antioxidants like butylated hydroxyanisole and butylated hydroxytoluene pose risks of toxicity and cancer. Dragon fruit's antioxidant properties can be preserved or even enhanced through proper storage and processing, making it a useful dietary supplement for preventing numerous life-threatening conditions. The dragon fruit extract has been found to reduce oxidative damage and aortic stiffness in STZ-induced diabetes in rats. Oxidative stress is known to be the cause of diabetes-related vascular complications.

Anticancer activity

It has been discovered that dragon fruit, a naturally occurring source of phytoconstituents, has anticancer activity. Individual phytoconstituents like stigmast-4-en-3-one, alpha-amyrin, beta-amyrin, beta-sitosterol, and dragon fruit peel extract be cytotoxic against PC3, Bcap-37, and MGC-803 cancer cell lines, according to research. The dragon fruit extract's ability to scavenge nitric oxide may be responsible for its ability to inhibit the proliferation of MCF-7 cells. Target-specific cytotoxicity of nanoparticles made with aqueous ammonia and dragon fruit extract against MCF-7 breast cancer cells has been demonstrated. The organic product strip has been found to have preferable antiproliferative activity over the natural product tissue, and mythical serpent natural product strip removes have higher flavonoid and polyphenol content and antiproliferative movement against disease cells. Green synthesis of gold nanoparticles with caps made of dragon fruit extract has also been looked into for cancer treatment. The nanoparticles showed selective cytotoxicity against MCF-7 cells. In general, the studies suggest that the treatment of breast cancer, particularly with dragon fruit extract, may be effective.

Antidiabetic and diabetes complication

The efficacy of dragon fruit, particularly white dragon fruit in treating diabetes and preventing its complications. It talks about several studies that have shown that dragonfruit can lower blood glucose levels, keeps insulin in the body, improves lipid profiles, and treat wounds caused by diabetes. Additionally, dragon fruit reduces insulin resistance and diabetes-related cardiovascular complications. Dragon fruit may be more effective than diabetes in preventing diabetes in prediabetic people, according to a meta-analysis. Dragon fruit's overall potential as a natural treatment for diabetes and its complications.

Nutraceutical activity

Nutraceuticals are functional food products that claim to be good for your health. As a source of prebiotics, polyunsaturated fatty acids, antioxidant vitamins, and polyphenols, dragon fruit is mentioned as having nutraceutical properties. By increasing the activity of the bacteria in the colon, prebiotics improves overall health. Dragon fruit powder made from whole fruit can be used as a health supplement and has been found to be a good source of protein, fat, ash, fiber, and antioxidants. Scientists have likewise removed glucose, fructose, and oligosaccharides from white dragon fruit and red dragon fruit involving ethanol as a dissolvable. It was discovered that the extracted oligosaccharides had prebiotic properties, such as being non-degradable and stimulating the growth of lactobacilli and bifidobacteria, as well as activating colonic bacteria.

RESULT

1. Evaluation of Dragon Fruit Powder

Table 4: Evaluation Parameters of Powder.

Parameters	Results
Angle of Repose	31.19
Bulk Density (gm/cm ³)	0.881
Tap Density (gm/cm ³)	0.989
Carr's Index (%)	10.92
Hausner Ratio	1.122

2. Evaluation of Gutika

Table 5: Evaluation Parameters of Gutika.

Parameters	Results	Specification
Uniformity	0.700	±5% of average weight
Disintegration time	45min	Not more than 60 minutes
Hardness	9.0kg/cm ²	NLT 10kg/cm ²
Total ash	7.0%	Not more than 20%±
Water-soluble ash	3.40%	Not more than 10%
Acid-insoluble ash	2.96%	Not more than 10%
Friability	0.49%	Not more than 1% w/w
%LOD	8.20%	Not more than 10%

CONCLUSION

Before using a formulation for medicinal purposes, thorough research is required. The medicinal product's therapeutic efficacy depends on the quality of the ingredients used to make it. Sita (sugar), Guda (jaggery), Guggulu, and Madhu (honey) are the components of gutika, which is an herbal formulation. Herbal Gutika was prepared in accordance with

traditional sources and following standard operating procedures in this study. Prior to the preparation, the drug's raw materials were identified and verified. Due to its abundant phytoconstituents and high nutritional value, dragon fruit has significant potential health benefits.

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