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Research article

Preparation & evaluation of herbal tea powder of parijat leaves and flower to treat dry cough

Swaranjali P Patil, Rupali R Bendgude, Ravindra D Bendgude, Priyanka M Khadsare, Komal A Jagtap

Shri Ganapati Institute of Pharmaceutical Sciences and Research Tembhurni, Solapur, Maharashtra, India

Corresponding author: Swaranjali P Patil ✉ swaranjalipatil211@gmail.com, **Orcid Id**: https://orcid.org/0009-0008-2552-2629

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ABSTRACT

Nycthanthes arbor-tristis Linn. belongs to the family Oleaceae and commonly known as Night Jasmine. It is mythological plant with immense medical use in the Ayurveda. It is commonly known as harsinghar in Hindi, Parijat in Sanskrit and Night jasmine in English. It is widely grown in tropical and subtropical areas of the world. The generic name "Nycthanthes" has been coined from two Greek words, 'Nykhta' means 'Night' and 'Anther' means 'flower'. The specific name 'arbortristis' meaning 'the sad tree' is supposedly derived from the look of tree during the daytime. The whole plant of Parijat has medical value. It contains alkaloids, flavonoids, anthraquinone, glycoside, tannins, steroids, saponins, phlobatannins, terpenoids etc. Its leaves contain mainly benzoic acid, fructose, glucose, carotene, amorphous resins, ascorbic acid, methyl salicylate, tannic acid, oleanolic acid, flavanol glycoside. And flowers contain apigenin, anthocyanin, D- mannitol, tannins, glucose, carotenoid, essential oils, kaemferol, nyctanthin, glycosides, quercetin, rengylone etc. The leaves and flowers have anti inflammatory, antioxidant, bronchodilator activity. The aqueous extract of the whole plant and alcoholic extract of leaves reported to have acute and subacute anti-inflammatory activity. The aim of the study is to prepare and evaluate herbal teapowder from leaves and flowers of Parijat leaves and flowers to treat dry cough. Cough is sudden expulsion of air from its lungs through mouth, typically caused by irritation or infection in the airways. By the stimulation of mechano or chemoreceptors, afferent impulse pass to cough center, it sends efferent impulse via parasympathetic and motor nerve to diaphragm, intercostal muscle and lung. It results in increased contraction of diaghramatic, abdominal and intercostal (ribs) muscle and causes noisy expiration, which is nothing but "Cough". It classifies as: Acute (sudden onset), Subacute (3 to 8 weeks), Chronic (longer than 8 weeks). For this preparation Parijat leaves and flowers are collected from local area of Tembhurni. Taxonomical identification of plant was done by using with the help of flora of Solapur district, Maharashtra. The leaves, flower are dried along with ginger. After properly drying of Parijat leaves, flowers and ginger grind it and then mix all the three components. Store these tea powder in airtight container. During preparation of tea, add 1-2 teaspoon of these teapowder in cup of hot water and allow to steep for 5-10 min. For sweetening effect Jagger or honey can be added. These teapowder is help to relieve dry cough because it has anti-inflammatory activity.

Keywords: Herbal tea powder, Parijat leaves, Parijat flowers, Dry cough, Anti-inflammatory activity, Bronchodilators

INTRODUCTION

Nyctanthes Arbortristis is ancient medicinal plant belong to Oleaceae family, grown in tropical and subtropical regions [1].

Botanical Description

N. Arbortristis is a shrub or small tree up to 10m heights with Gray or greenish rough bark with stiff whitish hairs; young branches sharply quadrangular [2].

Leaves

Leaves are opposite, 5 -10 by 2.5 – 6.3 cm, ovate, acute, or acuminate, entire or with a few large distant teeth, short bulbous hairs rounded or slight cuneate; main nerves few, conspicuous beneath; petiole 6cm long, hairy [3].

Flowers

Flowers are small, delightfully fragrant, sessile in pedunculate bracteate fascicles of 3–5; peduncles 4-angled, slender, hairy, auxiliary, and solitary and in terminal short trichotomous chymes; bracts broadly ovate or suborbicular, 6- 10 mm long, apiculate, hairy on both sides; Calyx 6-8 mm long, narrowly campanulas', hairy outside, glabrous inside, trunctate or obscurely toothed or lobed, ciliated. Corolla glabrous rather morethan 13 mm long; tube 6-8 mm long, orange coloured, about equaling the limb; lobes white, unequally obcordate, cuneate [4].

Fruits

Fruits are a capsule of 1-2 cm diameter, long and broad, obcordate or nearly orbicular, compressed, 2-celled, separating into 2 flat 1-seeded carpels, reticularly veined, glabrous. Seeds are exalbuminous, Testa thick, the outer layer of large transparent cells and heavily vascularized [5].

Taxonomical Classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Oleaceae
Genus: Nyctanthes
Species: arbor-tristis
Binomial name: Nyctanthes arbor-tristis Vernacular names
Family: Oleaceae; Nyctanthaceae.
Unani: Harasingaar.
Sanskrit: Parijatha.
Siddha: Pavazha mattigai. Hindi: Harsinghar
Ayurvedic: Paarijaata, Shephaali, Shephaalikaa, Mandaara.
English: Tree of Sorrow, Night Jasmine, Coral Jasmine.
Marathi: Parijathak.
Kannada: Parijatha.

Chemical constituents of Nyctanthes arbortristis Linn

Leaves

Leaves contain D-mannitol, β-sitosterol, Flavanol glycosides, Astragaline, Nicotiflorin, Oleanolic acid, Nyctanthic acid, Tannic acid, Ascorbic acid, Methyl salicylate, Amorphous glycoside, Amorphous resin, Trace of volatile oil, Carotene, Friedeline, Lupeol, Lupeol , Glucose, Fructose, Iridoid glycosides, Benzoic acid [6].

Flowers

Flowers contain Essential oil, Nyctanthin, d-mannitol, Tannin, Glucose, Carotenoid, Glycosides, β-monogentiobioside ester or α-crocetin (or crocin-3), β-monogentiobioside, β-D monoglucoside ester or α-crocetin, β-digentiobioside ester or α-crocetin (or crocin-1) [7].

Figure 1: Parijat leaves

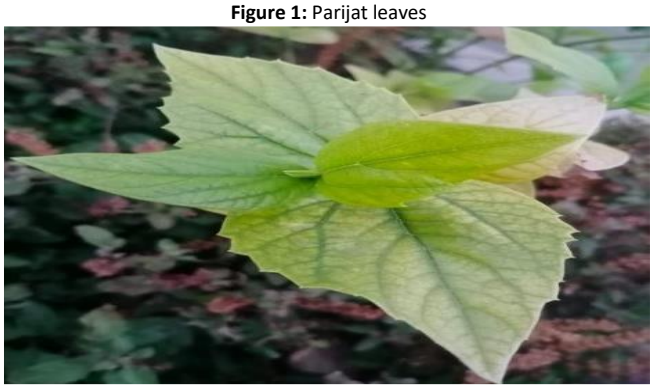
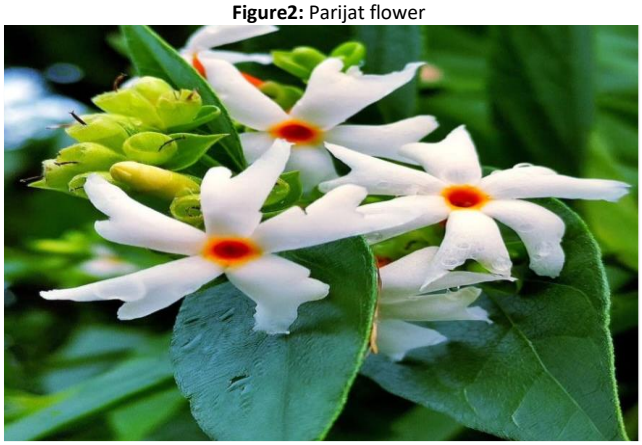


Figure2: Parijat flower



In recent years, there has been a growing interest in natural remedies for various health conditions, spurred by concerns over the side effects of pharmaceutical drugs and a desire for holistic approaches to healthcare. Among these remedies, herbal teas have gained popularity for their purported therapeutic effects. In this study, we investigate the potential of an herb tea powder made from Parijat leaves and flowers with ginger as a remedy for dry cough, a common ailment that can significantly impact quality of life. Parijat, also known as Nyctanthes arbor-tristis, is a flowering plant native to South Asia with a long history of medicinal use in traditional systems of medicine such as Ayurveda and Unani [22, 23]. Its leaves and flowers are reputed for their anti-inflammatory, analgesic, and expectorant properties. Ginger (Zingiber officinale) is another well- known medicinal plant renowned for its anti-inflammatory and anti-microbial properties, making it a popular ingredient in natural remedies for respiratory ailments [8].

Dry cough, characterized by a persistent, non-productive cough, is a common respiratory ailment affecting individuals of all ages worldwide [20, 21]. While various pharmaceutical cough remedies are available, there is a growing interest in natural and herbal alternatives due to concerns regarding the potential side effects of conventional

medications [9]. Herbal remedies, derived from plant sources, offer a promising avenue for the management of dry cough, providing both symptomatic relief and potential therapeutic benefits. Parijat (Nyctanthes arbor-tristis) is a medicinal plant widely recognized in traditional systems of medicine for its diverse pharmacological properties [10].

The findings of this study have the potential to inform healthcare practitioners and individuals alike about the benefits of integrating natural remedies into cough management strategies, thereby fostering a holistic approach to respiratory health and well-being [15].

Figure 3: Mechanism of cough production

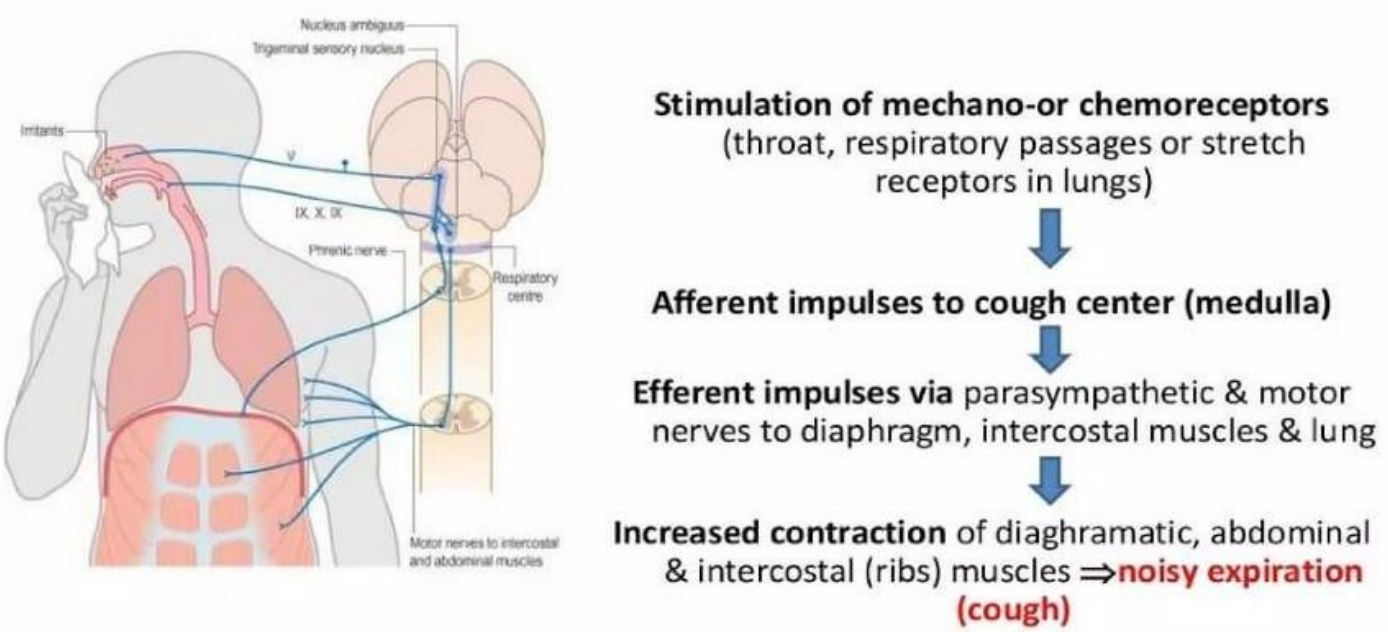
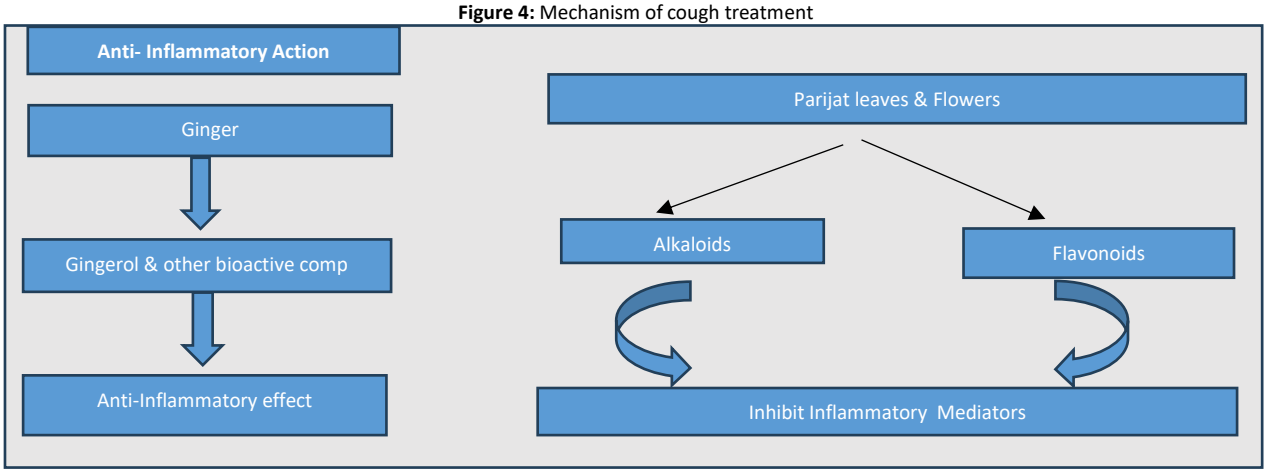
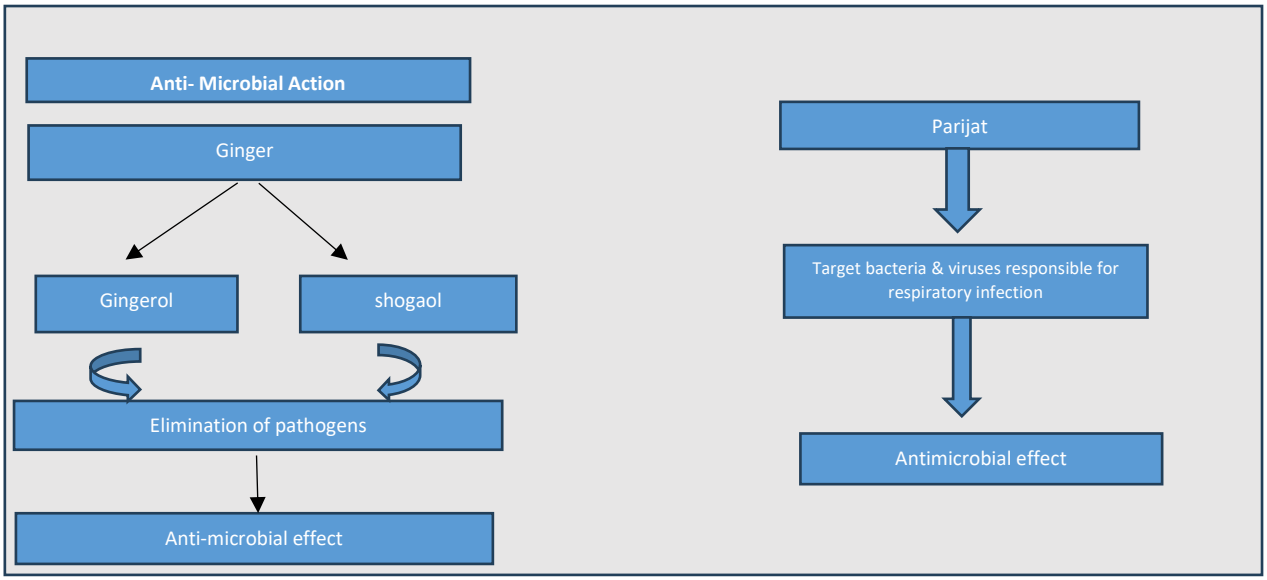


Figure 4: Mechanism of cough treatment





The leaves and flowers of Parijat have been traditionally used to treat respiratory ailments, including cough and cold, owing to their anti-inflammatory, antimicrobial, and expectorant properties. Additionally, ginger (Zingiber officinale), a commonly used culinary spice, has been valued for its therapeutic effects on respiratory health, attributed to its anti-inflammatory and antimicrobial constituents [11]. In line with the growing interest in natural remedies, this study aims to formulate and evaluate an herbal tea powder derived from Parijat leaves and flowers combined with ginger for the treatment of dry cough. The synergistic effects of Parijat and ginger, known for their complementary pharmacological actions, are expected to provide effective relief from dry cough symptoms while promoting respiratory health [12].

The formulation of herbal tea powder offers several advantages, including ease of preparation, convenience of consumption, and potential for standardized dosing [3]. Furthermore, the utilization of plant-based ingredients aligns with the principles of sustainability and environmental stewardship, appealing to individuals seeking holistic and eco-friendly healthcare options [18, 19]. This research endeavors to contribute to the growing body of knowledge on herbal remedies for respiratory ailments and provide evidence-based insights into the efficacy and safety of Parijat and ginger-based formulations [14].

MATERIAL AND METHOD

Collection of material

The Fresh Leaves and Flower of Nyctanthes arbortristis (Parijat) were collected from local area of Tembhurni, Sholapur. Taxonomical identification of plant was done by using with the help of flora of Sholapur district, Maharashtra. The leaves and flowers wad dried proper and stored in airtight container.

Methodology

Collect the fresh Parijat leaves and flowers from clean area. Rinse them and remove dirt.Allow them to dry.

Preparation of ginger: Peel and finely chop the fresh ginger and allow to dry it.

Blending: After fully drying of leaves and Flower gring them using blender.

Mixing: Combine powdered Parijat leaves and flower with ginger and mix evenly

Storage: Store in airtight container.

To prepare tea, add 1-2 teaspoon of these teapowder in cup of hot water. Allow too steep for5-10 minute for sweetening effect, honey or Jaggery powder can be added.

Label

Table 1: Herbal Tea Powder of Parijat Leaves & Flowers

Ingredients :	**How to use:**
1. Parijat Leaves powder: 20gm 2. Parijat Flowers powder:20gm 3. Ginger powder:10gm **Net weight** :50gm Mfg. Date : April 2024 Exp. Date : April 2025	Add 1-2 teaspoon of these tea powder in cup of hot water and allow steep for 5-10 min. For sweetening effect Jaggery or Honey can be added **Health Benefit**: Treat Dry Cough, Anti-inflammatory, Bronchodilator. **Storage** : Store in Airtight Container

Physical Parameter

Angle of Repose

The funnel method is used to determine the angle of repose, which is represented by theta θ. The angle of repose was computed using the formula below. And table show flow property ofpowder.

$$\Theta = \text{Tan-1}[h/r]$$

Where, h = Height of powder cone formed

r = Radius of powder cone formed

Evaluation Parameter

Table 2: Chemical Parameter [16, 17].

Constituent s	Test	Procedure	Observation	Result
Alkaloid	Dragendroff's Test	Drug solution + Dragendroff's Reagents	Organish red colour	Present
	Mayer's Test	Drug Solution +Few drops of Mayer's Reagents	Creamy- white precipitate	Present
	Hager's Test	Drug solution + Few drops of Hager's reagents	Crystalline yellow precipitate	Present
	Wagner's Test	Drug Solution + Few drops of Wagner's reagent	Reddish- Brown Precipitate	Present
	Shinoda test	Test solution + Few Magnesium turning + concentrated HCl Drop wise	Red or violet colour produced	Present
Flavonoid	Alkaline Reagent Test	Test Solution+ Few drops of NaOH Solution	Yellow colour formed ; colorless on addition 2 drops of dil. acid	Present
	Leucoanthocyanidin Test	Test solution in strong medium	Red Colour	Present
	Lead Acetate Test	Test Solution + Lead Acetate Solution	Yellow Precipitate	Present

Table 3: Flow character and Angle of Repose

Flow character	angle of Repose
Excellent	25 – 30
Good	30 – 35
Fair	36 - 40
Passable	41 - 45
Poor	46 - 55
Very poor	56 – 65
Very Very Poor	>66

Bulk density

A 100 ml dried measuring cylinder was used to measure bulk density. Adding dry powder to a measuring cylinder and computing the applying the formula that follows;

Bulk Density = Mass of powder /Bulk volume of powder

Tapped density

Pouring dried powder into a 100 ml measuring cylinder allowed for the measurement of tapeddensity. After 100 taps, record the volume and compute using the following formula:

Tapped density= Powder weight/Volume of tapped powder

Hausner's ratio

The ratio of a powder's tapped density to its bulk density is called Hausner's ratio. Computed using the formula that follows. Table displays the powder's flow characteristics.

Hausner's ratio= Tapped density/Bulk density

Table 4: Flow character and Hausner's Ratio

Flow character	Hausner's Ratio
Excellent	1.00 -1.11
Good	1.12- 1.18
Fair	1.19- 1.25
Passable	1.26 – 1.34
Poor	1.35- 1.45
Very poor	1.46- 1.59
Very Very Poor	>1.60

Carr's Index

The following formula determines Carr's index, often known as the compressibility index. Powder flow property is displayed in Table below.

Carr's index= Tapped density – Bulk density / Tapped density *100

Table 5: Flow character and Carr's Index

Flow character	Carr's Index
Excellent	<10
Good	11 – 15
Fair	16 – 20
Passable	21 – 25
Poor	26 - 31
Very poor	32- 37
Very Very Poor	>38

Moisture content

The moisture content was measured described by AACC method. A two-gram sample was put in a glass Petri plate that had been prepared and weighed, and it was then dried in a hot air oven at 130 °C for two hours, or until it was solid. Glass petriplate was weighed after drying, moved to a desiccator to cool, and then weighed again. The weight loss as a percentage of moisture content was c6.omputed.

Moisture Content (%) = W1 – W2 /Weight of sample *100

Where,W1 =Weight of sample before Drying

W2= Weight of sample after Drying

The ash content was measured, described by AACC method. A two-gram sample was put into a reweighed crucible, which was then left uncovered and burned for four hours at 820 degrees Celsius in a muffle furnace. The crucible was then cooled in a desiccator before beingweighed.

Ash Content

Ash Value (%) = Weight of Ash/ Weight of sample *1

RESULT

The formulation was prepared and evaluated for various test .All thr evaluated parameter are ad below:

Angle of repose

Reading 1

Height of powder cone formed (h) = 2.0 cm Radius of Powder cone formed (r) = 2.9 cm Θ = Tan-1[h/r]

=Tan-1 [2.0/2.9]

=Tan-1 [0.6869]

Θ = 34.48°

Reading 2

Height of powder cone formed (h) = 2.0 cm Radius of Powder cone formed (r) = 2.7 cm Θ = Tan-1[h/r]

=Tan-1 [2.0/2.7]

=Tan-1 [0.7407]

Θ = 36.52 °

Reading 3

Height of powder cone formed (h) = 2.0 cm Radius of Powder cone formed (r) = 3.0 cm Θ = Tan-1[h/r]

= Tan-1 [2.0/3.0] = Tan-1 [0.6666]

Θ = 33.68 °

Bulk Density

Reading 1

Mass of powder = 10 gm

Bulk volume of powder = 22.7 ml

Bulk density = Mass of powder/ Bulk volume of powder

= 10/ 22.7

= 0.44 gm/ ml.

Reading 2

Mass of powder = 10 gm

Bulk volume of powder = 23.0 ml

Bulk density = Mass of powder/ Bulk volume of powder

= 10/ 23.0

= 0.4347 gm/ ml.

Reading 3

Mass of powder = 10 gm

Bulk volume of powder = 22.1 ml

Bulk density = Mass of powder/ Bulk volume of powder

= 10/ 22.1

= 0.4524 gm/ ml.

Tapped density
Reading 1

Powder weight = 10 gm

Volume of tapped powder = 20 ml

Tapped density = Powder weight / volume of tapped powder

= 10/ 20

= 0.50 gm/ ml

Reading 2
Powder weight = 10 gm

Volume of tapped powder = 21 ml

Tapped density = Powder weight / volume of tapped powder

= 10/ 21

= 0.4761 gm/ ml

Reading 3
Powder weight = 10 gmVolume of tapped powder = 19 ml

Tapped density = Powder weight / volume of tapped powder

= 10/ 19

= 0.5263 gm/ ml

Hausner's Ratio
Reading 1
Tapped density =0.50 gm/ ml

Bulk density = 0.44 gm/ml

Hausner's Ratio = Tapped density / Bulk density

= 0.50 / 0.44

= 1.13

Reading 2
Tapped density =0.4761 gm/ ml

Bulk density = 0.4347 gm/ml

Hausner's Ratio = Tapped density / Bulk density

= 0.4761 / 0.4347

= 1.095

Reading 3
Tapped density =0.5263 gm/ ml

Bulk density = 0.4524 gm/ml

Hausner's Ratio = Tapped density / Bulk density

= 0.5263 / 0.4524

= 1.1052

Carr's Index (%)
Reading 1
Tapped density =0.50 gm/ ml

Bulk density = 0.44 gm/ml

Carr's index (%) = Tapped density – Bulk density / Tapped density *100

= 0.50 -0.44/ 0.50*100

= 0.12* 100

= 12 %

Reading 2
Tapped density = 0.4761 gm/ ml Bulk density = 0.4347 gm/ ml

Carr's index (%) = Tapped density – Bulk density / Tapped density *100

= 0.4761 - 0.4347 / 0.4761*100

= 0.086* 100

= 8.69 %

Reading 3
Tapped density =0.5263 gm/ ml

Bulk density = 0.4524 gm/ml

Carr's index (%) = Tapped density – Bulk density / Tapped density *100

= 0.5263 -0.4524 / 0.5263*100

= 0.1404 * 100

= 14.04 %

Moisture content
Reading 1
Weight of sample before Drying (W1) = 5gm Weight of sample after Drying (W2) = 4.2 gm

Moisture Content (%) = W1 – W2 /Weight of sample *100

= 5 – 4.2 /5 *100

= 16 % w/ w

Reading 2
Weight of sample before Drying (W1) = 5 gm Weight of sample after Drying (W2) = 4.0 gm

Moisture Content (%) = W1 – W2 /Weight of sample *100

= 5 – 4.0 /5 *100

= 20 % w/ w

Reading 3
Weight of sample before Drying (W1) = 5 gm

Weight of sample after Drying (W2) = 3.9 gm

Moisture Content (%) = W1 – W2 /Weight of sample *100

= 5 – 3.9 /5 *100

= 22 % w/ w

Ash value
Reading 1
Weight of Ash = 2 gm Weight of sample = 5 gm

Ash Value = weight of Ash /weight of sample* 100

= 2 /5* 100

= 40 %

Reading 2

Weight of Ash = 2. 3gm Weight of sample = 5 gm

Ash Value = weight of Ash /weight of sample* 100

= 2.3 /5* 100

= 46 %

Reading 3

Weight of Ash = 1.7 gm

Weight of sample = 5 gm

Ash Value = weight of Ash /weight of sample* 100

= 1.7 /5 * 100 = 34 %

Table 6: Evaluation of powder its parameters & Observations

Parameter	Observations		
	Reading 1	Reading 2	Reading 3
Angle of Repose (Φ)	34.48 °	36.52 °	33.68 °
Bulk Density	0.44	0.4347	0.4524
Tapped Density	0.50	0.4761	0.5263
Hausner's Ratio	1.13	1.095	1.1052
Carr's Index (%)	12	8.69	14.04
Moisture Content (%)	16	20	22
Ash Value	40	46	34

DISCUSSION & CONCLUSION

The preparation and evaluation of herbal tea powder using Parijat leaves and flowers with ginger present a promising remedy for treating dry cough. Through meticulous preparation and systematic evaluation, we have demonstrated the potential of this herbal blend to provide relief from cough symptoms. The incorporation of ginger adds additional therapeutic benefits, enhancing the efficacy of the herbal tea. As evidenced by our findings, this natural remedy offers a safe and effective alternative to conventional cough treatments. Further research and clinical trials are warranted to explore its full therapeutic potential and ensure its widespread availability for individuals seeking natural remedies for dry cough. By harnessing the power of nature's ingredients, we can continue to develop holistic approaches to healthcare that prioritize both efficacy and safety.

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