



FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP

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Abstract : The term herbal medicine describes the application of fruit extract to medical conditions, and most herbal syrup's original source was plants. Included as well are syrups created with dosages of natural medications. Syrup is now used to treat a wide range of ailments and lessen the symptoms of illnesses. Antioxidant syrup is used to treat cancer and related disorders because the body produces free radicals as a result of numerous oxidative reactions and stress-related conditions. To prevent the formation of bacteria, tulsi leaf extract is added, and alcohol and honey are utilized as preservatives. To flavor the syrup, orange peel is mixed with turmeric extract and betel leaf. PH, viscosity, and density were among the factors that were assessed at the laboratory scale during formulation. During examination, it was discovered that the formulation was stable and suitable for use. It was found that compared to other formulations, the herbal formulation produced more antioxidant activity. People used a variety of plants, roots, and leaves to treat a wide range of illnesses back in antiquity. An Ayurvedic remedy called herbal cough syrup helps treat a variety of chronic conditions in people, including colds, fevers, respiratory infections, and coughs. It is a safe, easily accessible herb combination that may be created at home at a minimal cost of production. Herbal syrup contains natural herbs with a variety of actions and effects to reduce colds and coughs, both acute and chronic. These herbs also work as cough suppressants with expectorant and antitussive characteristics. Examples of these herbs are tulsi, turmeric, honey, orange peels, and betel leaves. Based on my research, I have concluded that the safest herbal remedy for treating colds and coughs is herbal cough syrup.

Keywords: Medicine, Syrup, Disease, Tulsi, Turmeric, Herbal cough syrup, Dry cough, wet cough, decoction, Evaluation.

Introduction : Coughing is the term for an inflammation and fluid accumulation in the lungs caused by a bacterial, viral, or fungal illness. As a preparation, combination, and concentration decoction with honey sugar or occasionally alcohol, herbal syrup is defined^[1]. A powerful herbal decoction serves as the foundation for this type of syrup, and adding sugar or honey to the brew thickens and preserves it.^[2] Strong herbal decoctions serve as the foundation for this type of syrup, and adding honey to a decoction helps to preserve and thicken it.^[3] A cough is an abrupt, frequently recurring process that aids in clearing secretions, irritants, foreign particles, and microbes from the big breathing route. The brain signals the body to cough in order to expel a foreign object when there is an obstruction or discomfort in the throat or upper airway.^[4] Coughing is generally considered normal.^[5] Having a cough can help keep additional irritants and phlegm out of your throat.^[6] Still, a number of conditions might also be indicated by persistent coughing.^[7] The cough response occurs in three stages:^[8]

intake, forced exhale against a closed glottis, and a forceful lung release that occurs after the glottis opens.^[10]The latter is typically accompanied by a characteristic sound.^[11]One can either cough voluntarily or involuntarily.^[12]A cough can cause congestion, chest pain, and itching in the throat. Coughing repeatedly causes discomfort and inflammation, which in turn leads to additional coughing.^[13,14]Natural products themselves or substances derived from them are important sources of medications or lead molecules for the creation of synthetic pharmaceuticals.^[15]Manufacturers are drawn to insoluble forms of the therapeutic compounds in aqueous suspension or as dry powder for reconstitution since many antibiotic materials become unstable when kept in solution for a significant amount of time.^[16]Coughing is a common coughing reflex caused by a variety of microorganisms, bacteria, and viruses that aid in the disease's dissemination to new hosts. The majority of the time, an infection of the respiratory tract is the cause of irregular coughing, but other causes include respiratory tract choking, smoking, air pollution, asthma, GERD, post nasal drip, chronic bronchitis, lung tumors, heart failure, and medications like angiotensin converting enzyme (ACE)inhibitors.^[17]Numerous respiratory conditions, such as asthma, isolated chronic cough, idiopathic pulmonary fibrosis, chronic obstructive pulmonary disease, and cystic fibrosis, are linked to gastro-oesophageal reflux illness.^[18]More than 90% of adult instances of chronic cough, defined as a cough lasting more than eight weeks, are caused by post-nasal drip, asthma, eosinophilic bronchitis, and gastroesophageal reflux syndrome.^[19]Many different kinds of medications are used to suppress coughing, and they are frequently administered in combination. Prior to discussing the specific medication utilized, it is crucial to quickly go over the sort of cough produced, how it contributes to sickness, and whether or not it should be suppressed.^[20]

Advantages of herbal syrup:

1. No side effects
- 2.No Harmless
3. Easily available
- 4.Easy to adjust the dose for child's weight
5. No nursing is required, which main and the patient can take it with no help.
6. The liquid dosage form is executed for products like cough medicines.
7. Herbs Grow in common places.
8. Antioxidant by retarding the oxidation as sugar is Hydrolyzed into cellulose and dextrose
- 9.Good patient compliance especially paediatric patients as syrup are sweet in test
10. It is a preservative by retarding the growth of bacteria, fungi and mould as osmotic pressure.^[21]

Disadvantage of herbal syrup:

- 1.Sedimentation of solid occasionally gives foot from of product.
- 2.Dose precision cannot be achieved unless suspension suspensions are packed in unit dosage forms.
- 3.Same microbial contamination take place it preservation not added in accurate proportion.
- 4.Also herbal medicine having another disadvantage is the risk of self dosing of herbs which is very rare.
- 5.Fluctuation in storage temperature may cause crystallisation of sucrose from saturated syrup.^[22,23]

Type of cough

Dry cough

Wet cough

Dry cough : A cough is a reflex action that clears your airway of irritants and mucus. There are two types of cough: productive and nonproductive. A productive cough produces phlegm or mucus, clearing it from the lungs. A nonproductive cough, also known as a dry cough, doesn't produce phlegm or mucus. Many things from allergies to acid reflux can cause a dry cough. In some cases, there's no obvious cause. Regardless of the cause, an ongoing dry cough can seriously impact your day-to-day life, especially if it's worse at night. Keep reading to learn more about the possible causes of a dry cough and ways to find relief.

Wet cough : A wet or productive cough is the opposite of a dry cough. It is a cough that brings up fluid, such as phlegm. It can be a sign of a respiratory infection, congestive heart failure, and other conditions. Coughing is a reflex that occurs in response to irritation in the throat or lungs. It is the body's way of

removing irritants such as fluid and phlegm. A wet cough occurs when fluid in the airways triggers the coughing reflex. Another name for a wet cough is a productive cough, since it produces phlegm.

Classification of cough. : Depending on duration, a cough can be classified as acute, subacute, or chronic. Acute coughs last less than 3 weeks and often result from a cold or other upper respiratory tract infection such as flu, pneumonia, or whooping cough. Subacute coughs, which last between 3 and 8 weeks, are frequently the residual cough after an illness or infection has resolved. Chronic coughs, which typically last longer than 8 weeks, can be caused by medical conditions and medications.^[3] A cough can further be classified as productive or nonproductive. The productive cough produces phlegm or mucus, which may have come from the lungs or the nasal sinuses. Some causes of a productive cough include viral illnesses, bacterial infection, postnasal drip, tobacco use, or the reflux of stomach acid. Nonproductive cough does not produce sputum. This may be the result of the residual effects of a viral illness or bacterial infection, bronchospasm, allergies, medications, exposure to irritants, asthma, or airway blockage. Children are prone to develop cough from causes specific to their age group, including croup, bronchiolitis, respiratory syncytial virus, second hand smoke, and emotional or psychological problems (psychogenic cough).^[24]

- Acute cough- Not more than 3 weeks duration.
- Chronic cough- More than 3 weeks.
- Dry cough- No mucus or secretion.
- Wet cough- with mucus or secretion.
- Cough from chest and throat- productive and non-productive.
- Paroxysmal cough- spasmodic and recurrent.
- Bovine cough- soundless cough due to paralysis of larynx.
- Psychogenic cough- self-conscious activity of the patient to draw

Aim and objective

Aim : The aim of the project is formulation and evaluation of the herbal syrup .

Objectives:

- It can relieve symptoms of cold and cough such as congestion, coughing and sore throat.
- It can help soothe and improve the respiratory system.
- It can boost the immune system and helps the body fight infection.
- It can reduce inflammation in respiratory system.
- It can help to loosen and expel mucus from the lungs, thus providing relief from congestion.
- It can reduce coughing and help you sleep better.
- It is a natural and safe alternative to prescription medication.
- Herbal syrup was used to sweeten the test better medicinal herbs to make them more palatable and prolong preservation.
- Clinical investigation is need of future concern.
- Accelerated stability studies are need of future concern.^[21]

Material and method :

Ingredients :

5. 1.TURMERIC :-



Figure no.1:Turmeric powder

Synonyms:-Curcuma

Biological source:-Turmeric is prepared rhizome of *Curcuma longa* Linn. (Zingiberaceae). It is perennial herb of ginger family, having thick rhizome; native to Southern Asia; extensively cultivated in India, China Indonesia and other tropical countries.

Chemical Constituents:-Turmeric contains 3-7% orange-yellow colored volatile oil which is mainly composed of turmerone (60%), α , β -atlantone and zingiberene (25%) with minor amounts of 1,8 cineole, α -phellandrene, δ sabinene and borneol. Others than above it contains yellow coloring matter including 0.3-5.4%.

Uses:-It is used as an antioxidant in capsules tablets and flavouring tea. It is recommended as a food supplement to treat liver problems menstrual difficulties hi marej test pain etc.^[25]

5.2.Tulsi leaves :

TULSI:-



Figure no.2 :Tulsi Leaves

Synonyms:- Sacred basil, Holy basil

Biological Source:-Tulsi consists of fresh and dried leaves of *Ocimum sanctum* Linn. (Syn. *Ocimum tenuiflorum*) umily Lamiaceae, and contains not less than 0.40 per cent eugenol on dried basis.

Geographical Source:-It is herbaceous, multi branched annual plant found throughout India. It is considered as acred by Hindus. The plant is commonly cultivated in garden and also grown near temples. It is propagated by seeds, Currently Tulsi is cultivated commercially for its volatile oil.

Chemical constituents:-It contains approximately 70 per cent eugenol, carvacrol (3%) and eugenol-methyl-ether (20%). Italso contains caryophyllin. Seeds contain fixed oil with good drying properties.

Uses:-The oil is antibacterial and insecticidal. The leaves are used as stimulant, aromatic, anticatarrhal, spasmolytic, and diaphoretic. The juice is used as anantiperiodic. Tulsi has expectorant and inflammatory properties.^[26]

5.3.Betal leaf :



Figure no.3: Betal leaf

Scientific name: Piper betel

Family: Piperaceae

In spite of its alienness, the plant is much more popular in India than in any other country of the world since the antiquity. This would be evident from the numerous citations laid down in the ancient literature, particularly the Indian scriptures.

Vernacular Names:

Sanskrit: Tamboolavalli, Tamboola, Tamboola vallika

English: Betel leaf plant.

Hindi: Pan

Malayalam: Vetta, Vettila

Bengali: Pan^[27]

Plant description: A perennial dioecious creeper. Stems semi woody, climbing by means of short adventitious roots. Leaves 10-20 cm long, broadly ovate, slightly cordate and often unequal at the base, shortly acuminate, glabrous, glaucous on both sides, bright green or yellowish, petiole stout 2.0-2.5 cm long. Male spikes cylindrical dense. Female spikes 2.5-5.0cm long, pendulous. Fruits rarely produced, often sunk in the fleshy spike, forming nodule-like structures . Betel leaf is the most valuable home remedy for common illness^[27].

- **Traditional uses of Betel leaves:**

The use of betel leaf can be traced as far back as two thousand years. Betel leaves help to heal the following illnesses. Such as:

5.3.1 Headache: Betel leaf is a popular home remedy for headache. The betel leaf has analgesic and cooling properties. It can be applied with beneficial results over the painful area to relieve intense headache.

5.3.2 Scanty or Obstructed Urination: Betel leaf juice is credited with diuretic properties. Its juice, mixed with dilute milk and sweetened slightly, helps in easing urination.

5.3.3 Weakness of Nerves: Betel leaves play a vital role in the treatment of nervous pains, nervous exhaustion and debility. The juice of a few betel leaves, with a teaspoon of honey, will serve as a good tonic. A teaspoon of this can be taken twice a day.

5.3.4 Sore Throat: Betel leaf is an excellent household remedy in the treatment of cough and sore throat. Local application of the leaves is effective in treating sore throat. The crushed fruit or berry should be mixed with honey and taken to relieve irritating cough.

5.3.5 Respiratory Disorders: Betel leaves are useful in pulmonary affection in childhood and old age. The leaves, soaked in mustard oil and warmed, may be applied to the chest to relieve cough and difficulty in breathing.

5.3.6 Constipation: In the case of constipation in children, a suppository made of the stalk of betel leaf dipped in castor oil can be introduced in the rectum. This instantly relieves constipation^[27,28].

5.4. Orange peel :



Figure no. 4: Orange peel

Orange peel is the peel of an orange fruit. An orange is a fruit of various citrus species in the family Rutaceae it primarily refers to *Citrus × sinensis*, which is also called sweet orange, to distinguish it from the related *Citrus × aurantium*, referred to as bitter orange. The sweet orange reproduces asexually (apomixis through nucellar embryony); varieties of sweet orange arise through mutations. The orange originated in a region encompassing Southern China, Northeast India, and Myanmar, and the earliest mention of the sweet orange was in Chinese literature in 314 BC. As of 1987, orange trees were found to be the most cultivated fruit tree in the world. Orange trees are widely grown in tropical and subtropical climates for their sweet fruit. The fruit of the orange tree can be eaten fresh, or processed for its juice or fragrant peel. As of 2012, sweet oranges accounted for approximately 70% of citrus production^[29,30].

5.4.1 Orange Peels Help Prevent Cancer : As per studies, the flavonoids in orange peels inhibit a protein (termed as RLIP76) that is linked to cancer. The peels also contain another compound called limonene, which can cut cancer risk. Improve Lung Health Thanks to their excellent vitamin C content, orange peels help break down congestion and cleanse the lungs. Vitamin C also boosts immunity, and this helps ward off and prevent lung infections.

5.4.2 Aids Diabetes Treatment : The peels are rich in pectin, a fiber that is known to regulate blood sugar levels. This sure can help people with diabetes. Studies have also shown how treatment with orange peel extract can help prevent diabetic nephropathy . And then, we have the protein we discussed earlier – RLIP76. Elimination of this protein from the system prevents diabetes – and this is what orange peel does.

5.4.3 Strengthen Heart : Orange peels are rich in a flavonoid called hesperidin, which has shown to lower blood cholesterol and blood pressure levels . The peel also has anti-inflammatory properties, and since heart disease is caused by inflammation, they can help in this regard.

5.4.4 Help In Weight Loss : Oranges are low in calories, which is one reason they are a great addition to a weight loss diet. And they are filled with dietary fiber, which controls your appetite and discourages binging.

5.4.5 Boost Eye Health : Though there is less information on this, some sources say that compounds like limonene, decanal, and citral in orange peels can help boost eye health. They have anti-inflammatory properties that fight infections and improve vision.

5.4.6 Make Skin Glow : Orange peel is considered a boon for the skin as it treats blackheads, dead cells, acne, and blemishes. It also brightens your face. You can also add milk or curd to get that extra glow or for removing tan^[29,30].

5.5. Honey :



Figure no.5 : Honey

Synonyms:

Madhu, madh .

Biological source: Honey is viscid and sweet secretion stored in the honey comb by various species of bees.

I.e APIs florea , APIs dorsata, APIs florea, APIsindica belonging to family Apidaeae.

Chemical constituents:

1. Fibers test for artificial invert sugar.
2. Reduction of feelings solution.
3. Limit test

Uses:

1. Laxative, bactericidal.
2. Sedative, alkaline characters.
3. It is use in food cold.
4. It is use in flavoring agent.
5. It is use in medium in preservative of cornea.
6. Sweetening agent.

7. Vehicles.^[31]

Honey Uses In Cough Syrup : Honey was almost the only source of sugar available to the ancients and was valued for its medicinal benefits. It was used to make mead, a fermented beverage, and was mixed with wine and other alcoholic drinks. Honey for cough is a better and a cheaper treatment option than the drugs purchased from over-the-counter. Honey relieves inflammation in the throat or the lungs due to its viscous and sticky nature that helps in relieving the mucous membranes. In the case of bacterial infection, the antibacterial properties of honey ensure relief from cough. We all know that honey is a powerhouse of antioxidants which strengthens the immune systems to defend your airways from bacteria and foreign objects. Some experiments conducted on the children of age two and older with common cold and respiratory tract infections were given up to 2 teaspoons of honey before bedtime. Honey proved miraculous in reducing nighttime coughing and improving sleep. The research also proved that honey was as effective as the cough suppressant, than dextromethorphan. Thus, honey for cough cure is definitely worth it.

5.6. Alcohol : It uses in small quantity act as preservative. Alcohol, sometimes referred to by the chemical name ethanol, is a depressant drug that is the active ingredient in drinks such as beer, wine, and distilled spirits (hard liquor). It is one of the oldest and most commonly consumed recreational drugs, causing the characteristic effects of alcohol intoxication ("drunkenness"). Among other effects, alcohol produces happiness and euphoria, decreased anxiety, increased sociability, sedation, impairment of cognitive, memory, motor, and sensory function, and generalized depression of central nervous system (CNS) function.^[19] Ethanol is only one of several types of alcohol, but it is the only type of alcohol that is found in alcoholic beverages or commonly used for recreational purposes; other alcohols such as methanol and isopropyl alcohol are significantly more toxic. A mild, brief exposure to isopropanol, being only moderately more toxic than ethanol, is unlikely to cause any serious harm. Methanol, being profoundly more toxic than ethanol, is lethal in quantities as small as 10–15 milliliters (2–3 teaspoons)^[32].

Table. 1: Role of ingredients in herbal syrup.

Sr.no.	Ingredients	Role
1.	Turmeric	Antioxidant
2.	Tulsi Leaves	Antibacterial, Antiviral, Antioxidant, Vitamin A, C
3.	Betal leaf	Antioxidant, Antiseptic, Stimulant, Vitamin C
4.	Orange peel	Flavoring agent
5.	Honey	Sweetening agent
6.	Alcohol	Preservative

PREPARATION OF HERBAL SYRUP :**Table. 2: Formulation - For 50ml.**

Sr.no.	Ingredients	Quantity
1.	Turmeric extract	9ml
2.	Tulsi leaves extract	3ml
3.	Betal leaves extract	3ml
4.	Orange peel extract	3ml
5.	Honey	30ml
6.	Alcohol	2ml

Procedure:**Figure no. 6 :All ingredients with measurement**

1. 20gm Turmeric powder obtained from turmeric rhizome were added into 100ml of water then heated slowly to get extract. The extract was filtered and then cool.
2. 20gm peel obtained from two oranges was cut into small piece added to 100 ml of water then heated slowly to get extract. The extract was filtered and then cool.
3. 20gm of tulsi leaves added into 100 ml of water, heated slowly to get extract. The extract was filtered and then cool.
4. 20gm of betel leaves added into 100 ml of water, heated slowly to get extract. The extract was filtered and then cool.
5. Weight accurately 30ml of honey.
6. All extract are mixed with each other and 50ml of syrup was obtained.
7. This obtained syrup was transferred to amber color bottle, close it tightly and place it into cool place.

**Figure no.7:filtration of ingredients**

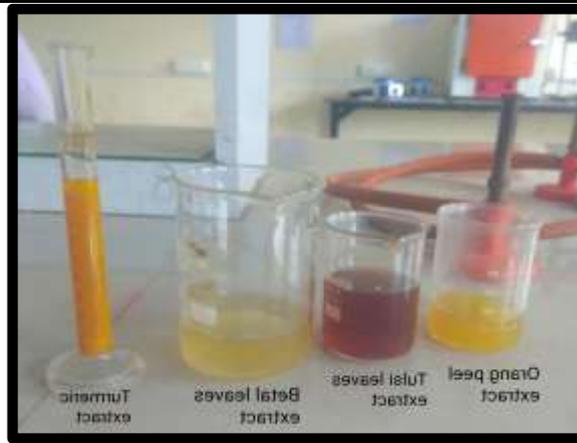


Figure no.8: Extract of ingredients

Table no.3:Parameters for extraction

Parameters	Value
Temperature	600c
Water	100 ml
Weight (ingredients)	20 gm
Time (heated for)	30 min
Filter paper	Whatman filter paper

Evaluation Parameters:

1.Colour examination:

- 1)2ml of prepared syrup was taken and smelled.
- 2)Then odour was observed.

2.Odour examination:

- 1)2ml of prepared syrup was taken and smelled.
- 2)Then odour was observed .

3.. Taste examination:

A pinch of final syrup was taken and examined the taste of syrup.

4. Procedure to determine density

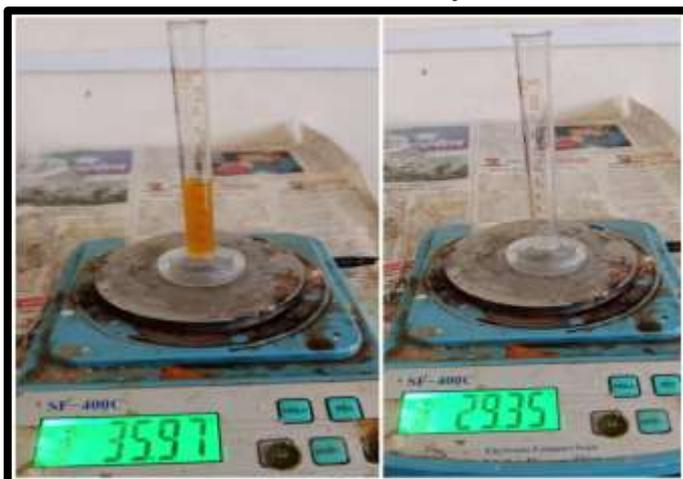


Fig.no.9:Density

1. Density of the syrup is determined by using density bottle method by measuring the weight and volume. Density is calculated as a substance mass per the volume it occupies.
2. The symbol " ρ " is used to denote density. (36)

5. Procedure to determine Specific gravity



Fig.no.10: Specific gravity

1. Clean thoroughly the specific gravity bottle with chromic or nitric acid.
2. Rinse the bottle at least two to three times with purified water.
3. If required, rinse the bottle with an organic solvent like acetone and dry.
4. Take weight of empty dry bottle with capillary tube stopper.
5. Fill the bottle with distilled water and place stopper; wipe out excess liquid from side tube using tissue paper (w_2).
6. Weight bottle with stopper and water on analytical balance (w_2).
7. Repeat the procedure for liquid under test by replacing the water after emptying and drying
8. as mentioned in step 4 to 6.
9. Weight bottle with stopper and liquid under test on analytical balance (w_3).

Formula for specific gravity: Specific gravity of liquid under test (syrup) = weight of liquid under test / weight of water = w_3/w_2

6. Procedure to determine Viscosity

1. Thoroughly clean the Ostwald viscometer with warm chromic acid and if necessary used an organic solvent such as acetone.
2. Mount viscometer in vertical position on a suitable stand.
3. Fill water in the dry viscometer up to mark G.
4. Count time required, in seconds for water to flow from mark A to mark B.
5. Repeat step 3 at least 3 times to obtain accurate reading.
6. Rinse the viscometer with test liquid and then fill it up to mark A, find out the time required for liquid to flow to mark B.
7. Determination of densities of liquid as mentioned in the density determination experiment.



Fig.no.11:Digital pH meter

1. 10 ml of prepared syrup taken in 100 ml of volumetric flask
2. Make up volume to 100 ml with distilled water
3. Sonicate for 10 min
4. pH was measured by using a digital pH meter.

8.Stability testing:

- 1 Stability testing of the prepared herbal syrup was performed on keeping the samples at accelerated temperature condition.
- 2 The final syrup was taken in culture tubes.
- 3 Then kept at accelerated temperature at 4 degree calciosome temperature and 47 degree Celsius respectively.
- 4 The samples were tested for all the physicochemical parameters (colour, odour, taste) turbidity and at the interval of 24 hr, 48 hr and 72 hr to observe any change.

Result : The study's findings imply that the synthesized herbal formulations have antitussive properties. The component used in the herbal cough formulation was chosen because of its demonstrated ability to both prevent and treat coughing. The produced syrup satisfies all physical requirements and has a notable antitussive effect.

Table 4 :Organoleptic evaluation

SR.No.	Organoleptic characters	Observation
1.	Color	Yellowish brown
2.	Odour	Aromatic
3.	Taste	Sweet

Table 5: Physicochemical evaluation

SR.No.	Parameter	Observation
1.	Density	1.32gm
2.	Specific gravity	0.7499
3.	Viscosity	0.013a
4.	pH determination	
	pH paper	Neutral
	pH meter	6.53

Discussion : Herbal products are now seen as a sign of safety in contrast to synthetic medications, which are seen to be harmful to both humans and the environment. Nonetheless, for ages, herbs were valued for their flavoring, medicinal, and aromatic properties. It is time to market them internationally. The made herbal syrup has antioxidant properties. About 100 mg of vitamin C can be found in one kiwi fruit. Clinical evidence demonstrated that during a 28-day fruit eating period, there was a decrease in plasma lipid levels and platelet aggregation. Kiwi fruit eating on a daily basis lowers the risk of cancer, particularly colon cancer. It is also used to treat sleep disorders and insomnia. It facilitates innate slumber. Since free radical molecules can harm cells when present in excess, research has shown that vitamin C has an antioxidant activity that is of importance. Via its ability to increase white blood cell activity, vitamin C also supports the immune system in the body. The results of this investigation indicate that the synthesized herbal formulations have antitussive properties. The component used in the herbal cough formulation was chosen because of its demonstrated ability to both prevent and treat coughing. The produced syrup satisfies all physical requirements and has a notable antitussive effect.

Conclusion : All of these formulations' formulation studies met requirements. Additionally, the resulting syrup's color, flavor, density, and viscosity were all satisfactory. The ultimate formulation that was produced is reliable. The formula was arrived at by reducing the inaccuracy. Because the formulation combines antioxidant and vitamin C qualities, it will be very beneficial for enterprises and researchers to produce similar formulations on a wide scale. We successfully made the herbal honey-based immune booster syrup by utilizing all the herbal products, and we conducted all the evaluation tests necessary to support the conclusion that the prepared immune booster syrup may be stable for an extended period of time. The study emphasized that sugarcane juice, which is used to manufacture gur and honey, offers a variety of nutrients and has favorable health impacts, in contrast to white sugar, which is connected to disorders like diabetes and obesity. This is accurate despite a dramatic increase in the consumption of goods with added sugar. Using honey and its byproducts more frequently may boost immunity and general health.

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