FORMULATION AND EVALUATION OF HERBAL SYRUP

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ABSTRACT
Herbal medicine refers to the use of fruit extract for therapeutic purposes, and the majority of herbal syrup was initially obtained from plants. Syrups that have been developed using herbal medication dosages are also included. Today, syrup is used to treat a variety of illnesses and relieve disease symptoms. Because the body produces free radicals as a result of various oxidative reactions and stress-related conditions, antioxidant syrup is used to treat cancer and treat the condition. Tulsi leaf extract is added as an antibacterial agent to stop the growth of bacteria, and sugar and alcohol are used as preservatives. Kiwi extract is added to orange peel to flavour the syrup. A number of parameters, including pH, viscosity, and density were evaluated during formulation at the laboratory scale. The formulation was found to be stable and ready for use during evaluation. It was discovered that the herbal formulation produced more antioxidant activity than other formulations.

Keywords: Medicine, Syrup, Disease, Tulsi, Kiwi Fruit.

I. INTRODUCTION
An herbal syrup is prepared by combining a concentrated decoction with either honey or sugar, and sometimes alcohol. The base of such a syrup is a strong herbal decoction. Mixing a decoction with honey or sugar helps to thicken and preserve the decoction. This increases the shelf life of the decoction and often creates a soothing application that benefits situations such as sore throat, cough, dry irritated tissues, and digestive issues. The added sweetener can also help to increase the palatability of some herbs. Many folks, including children, find syrups to be delicious.

Herbal syrups make a yummy addition to beverages and food. Combine a spoonful or two of syrup with carbonated water to create a tasty and healthful herbal soda. You can also make a quick cup of tea by adding a spoonful of syrup to hot water. Enjoy your syrup by drizzling it on foods like yogurt, oatmeal, biscuits, and ice cream or just enjoy by the spoonful.

In today’s era the herbal products are the symbol of safety in contrast to the synthetic drugs which are regarded as unsafe to human being and environment. Although, herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries. It’s time to promote them globally.

Any herbs can be used to make delicious herbal syrup though some lend themselves especially well to this form of herbal preparation. Some examples of herbs commonly used in syrups include elderberry, ginger, Astragalus, hawthorn, rose hips, licorice, schizandra, Echinacea, as well as tasty, sweet spices like cinnamon, cloves, and cardamom. Other herbs that aren’t so tasty such as dandelion, horeshound, elecampane, and vervain are often extracted into syrup form to increase palatability. Feel free to experiment with herb choices when making this wonderful form of herbal preparation.

Why not use some lovely nervines and adaptogens such as lemon balm, St. John’s wort, holy basil, and ashwagandha to help support your nervous system? Or try a combination of herbs used to soothe digestive issues such as fennel, ginger, cinnamon, dandelion root, or marshmallow. Great herbs to use in syrups for respiratory issues include thyme, elecampane, and licorice.

It is defined as a thick sticky liquid consisting of a concentrated solution of sugar and water with or without addition of flavorings agent or medicinal substance.

Advantages of herbal syrup:
- No side effects
- No Harmless
- Easily available
- Easy to adjust the dose for child’s weight
Herbs Grow in common place.

Disadvantage of herbal syrup:
- Microbial contamination take place if preservatives are not added in accurate proportion.
- Herbal medicine having another disadvantage is the risk of self dosing of herbs which is very rare.
- Fluctuation in storage temperature may cause crystallization of sucrose from saturated syrup.

II. FOLLOWING ARE THE INGREDIENTS USED IN FORMULATION

Kiwi Fruit

**Scientific name:** Actinidia

**Family:** Actinidiaceae

Kiwifruit or Chinese gooseberry is the edible berry of several species of woody vines in the genus Actinidia. The most common cultivar group of kiwifruit (Actinidia deliciosa 'Hayward') is oval, about the size of a large hen's egg: 5–8 centimetres (2–3 inches) in length and 4.5–5.5 cm (1+3⁄4–2+1⁄4 in) in diameter. It has a thin, fuzzy, fibrous, tart but edible light brown skin and light green or golden flesh with rows of tiny, black, edible seeds. The fruit has a soft texture with a sweet and unique flavour. Kiwifruit is native to central and eastern China. The first recorded description of the kiwifruit dates to the 12th century during the Song dynasty. In the early 20th century, cultivation of kiwifruit spread from China to New Zealand, where the first commercial plantings occurred. The fruit became popular with British and American servicemen stationed in New Zealand during World War II, and later became commonly exported, first to Great Britain and then to California in the 1960s[1,13].

![Fig.1 Kiwi Fruit](image)

Tulsi Leaves

**Scientific name:** Ocimum tenuiflorum

**Family:** Lamiaceae

Tulsi is cultivated for religious and traditional medicine purposes, and also for its essential oil. It is widely used as a herbal tea, commonly used in Ayurveda, and has a place within the Vaishnava tradition of Hinduism, in which devotees perform worship involving holy basil plants or leaves[2].

Holy basil is an erect, many-branched subshrub, 30–60 cm (12–24 in) tall with hairy stems. Leaves are green or purple; they are simple, petioled, with an ovate blade up to 5 cm (2 in) long, which usually has a slightly toothed margin; they are strongly scented and have a decussate phyllotaxy. The purplish flowers are placed in close whorls on elongated racemes. The three main morphotypes cultivated in India and Nepal are Ram tulsi (the most common type, with broad bright green leaves that are slightly sweet), the less common purplish green-leaved (Krishna or Shyam tulsi) and the common wild vana tulsi (e.g., Ocimum gratissimum)[3,14].
Betel 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[9]

**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[9].

**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:

- **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.

- **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.

- **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.

- **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.

- **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.

- **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[9,15].

**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[6,16].

![Fig.4 Orange](image-url)
- **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.

- **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 (2). 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.

- **Strengthen Heart**
  Orange peels are rich in a flavonoid called hesperidin, which has shown to lower blood cholesterol and blood pressure levels (3). The peel also has anti-inflammatory properties, and since heart disease is caused by inflammation, they can help in this regard.

- **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.

- **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.

- **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 [6,16].

**Sugar**
Sugar is the generic name for sweet-tasting, soluble carbohydrates, many of which are used in food. Simple sugars, also called monosaccharides, include glucose, fructose, and galactose. Compound sugars, also called disaccharides or double sugars, are molecules made of two bonded monosaccharides; common examples are sucrose (glucose + fructose), lactose (glucose + galactose), and maltose (two molecules of glucose). White sugar is a refined form of sucrose. In the body, compound sugars are hydrolysed into simple sugars. Sugars are found in the tissues of most plants. Honey and fruits are abundant natural sources of simple sugars. Sucrose is especially concentrated in sugarcane and sugar beet, making them ideal for efficient commercial extraction to make refined sugar [18].

![Fig.5 Sugar](image-url)
Sugarcane refers to any of several species, or their hybrids, of giant grasses in the genus *Saccharum* in the family Poaceae. They have been cultivated in tropical climates in the Indian subcontinent and Southeast Asia over centuries for the sucrose found in their stems.

**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.

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).

**Table. 1**: Role of ingredients in herbal syrup.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Ingredient</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kiwi fruit</td>
<td>Antioxidant, High Vitamin C</td>
</tr>
<tr>
<td>2.</td>
<td>Tulsi leaves</td>
<td>Antibacterial, Antiviral,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antioxidant, Vitamin A,C</td>
</tr>
<tr>
<td>4.</td>
<td>Betel leaves</td>
<td>Antioxidant, Antiseptic,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stimulant, Vitamin C</td>
</tr>
<tr>
<td>5.</td>
<td>Orange peel</td>
<td>Flavoring agent</td>
</tr>
<tr>
<td>6.</td>
<td>Sugar</td>
<td>Preservative</td>
</tr>
<tr>
<td>5.</td>
<td>Alcohol</td>
<td>Preservative</td>
</tr>
</tbody>
</table>

**III. MATERIALS AND METHODS**

**PREPARATION OF HERBAL SYRUP**

**Table. 2**: Formulation No.1 (F1) - For 50ml.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kiwi fruit extract</td>
<td>9 ml</td>
</tr>
<tr>
<td>2.</td>
<td>Tulsi leaves extract</td>
<td>3 ml</td>
</tr>
<tr>
<td>3.</td>
<td>Betel leaves extract</td>
<td>3 ml</td>
</tr>
<tr>
<td>4.</td>
<td>Orange peel extract</td>
<td>3 ml</td>
</tr>
<tr>
<td>5.</td>
<td>Sugar</td>
<td>30 ml</td>
</tr>
<tr>
<td>6.</td>
<td>Alcohol</td>
<td>2 ml</td>
</tr>
</tbody>
</table>

**Procedure:**

1. Four kiwi fruits (average weight of one fruit around 30 gm) were taken and its outer coat was removed, then cut it into small pieces, then obtained pieces 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 sugar.
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.

Table 3: Parameters for Extraction

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>60°C</td>
</tr>
<tr>
<td>Water</td>
<td>100ml</td>
</tr>
<tr>
<td>Weight (Ingredients)</td>
<td>20g</td>
</tr>
<tr>
<td>Time (Heated for)</td>
<td>30 min</td>
</tr>
<tr>
<td>Filter Paper</td>
<td>Whatman Filter Paper</td>
</tr>
</tbody>
</table>

Table 4: Formulation 2 (F2) - For 50ml.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kiwi fruit extract</td>
<td>5ml</td>
</tr>
<tr>
<td>2.</td>
<td>Tulsi leaves extract</td>
<td>3ml</td>
</tr>
<tr>
<td>3.</td>
<td>Betel leaves extract</td>
<td>3ml</td>
</tr>
<tr>
<td>4.</td>
<td>Orange peel extract</td>
<td>2ml</td>
</tr>
<tr>
<td>5.</td>
<td>Sugar</td>
<td>34ml</td>
</tr>
<tr>
<td>6.</td>
<td>Alcohol</td>
<td>3ml</td>
</tr>
</tbody>
</table>

Fig.6 Extract of Ingredients

Table 5: Formulation 3 (F3) - For 50ml.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kiwi fruit extract</td>
<td>7ml</td>
</tr>
<tr>
<td>2.</td>
<td>Tulsi leaves extract</td>
<td>4ml</td>
</tr>
<tr>
<td>3.</td>
<td>Betel leaves extract</td>
<td>5ml</td>
</tr>
<tr>
<td>4.</td>
<td>Orange peel extract</td>
<td>4ml</td>
</tr>
<tr>
<td>5.</td>
<td>Sugar</td>
<td>29ml</td>
</tr>
<tr>
<td>6.</td>
<td>Alcohol</td>
<td>1ml</td>
</tr>
</tbody>
</table>
The formulation number 2 and 3 was rejected. Formulation number 1 was accepted.

IV. EVALUATION PARAMETER

1. Procedure to determine density
   1. Clean thoroughly the specific gravity bottle with chromic acid or nitric acid.
   2. Rinse the bottle at least two to three times with distilled water.
   3. If required, rinse the bottle with an organic solvent like acetone and dry.
   4. Take the weight of empty dry bottle with capillary tube stopper (w1).
   5. Fill the bottle with unknown liquid and place the stopper, wipe out excess liquid from outside the tube using tissue paper.
   6. Weight bottle with unknown liquid on analytical balance (w2).
   7. Calculate weight in grams of unknown liquid (w3).

   Formula for density: Density of liquid under test (syrup) = weight of liquid under test /volume of liquid under test = w3/v

2. Procedure to determine 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 (w2).
   6. Weight bottle with stopper and water on analytical balance (w2).
   7. Repeat the procedure for liquid under test by replacing the water after emptying and drying as mentioned in step 4 to 6.
   8. Weight bottle with stopper and liquid under test on analytical balance (w3).

   Formula for specific gravity: Specific gravity of liquid under test (syrup) = weight of liquid under test /weight of water = w5/w4.

3. 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 dry viscometer up to mark G.
   4. Count time required, in second for water to flow from mark A to mark B.
   5. Repeat step 3 at least 3 times to obtained accurate reading.
   6. Rinse 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 density determination experiment.

   Formula for viscosity
   \[
   \text{Viscosity} = \frac{\text{Density of test liquid} \times \text{Time required to flow test liquid}}{\text{Density of water} \times \text{Time required to flow water}} \times \text{Viscosity of water}
   \]

4. pH determination:
   The pH determination of syrup by using two techniques.
   a) Glass electrode. b) pH paper.

   Procedure for glass electrode
   1. Prepare 30ml buffer of each pH. The volume of the stock solution to be taken. Prepare the buffer by mixing appropriate volume.
   2. Allow the solution for 15minutes to establish equilibrium.
   3. Measure the pH of solution using a pH meter.
V. RESULT

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Organoleptic Characters</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Color</td>
<td>Yellowish green</td>
<td>Yellowish green</td>
<td>Yellowish green</td>
</tr>
<tr>
<td>2.</td>
<td>Odor</td>
<td>Aromatic</td>
<td>Aromatic</td>
<td>Aromatic</td>
</tr>
<tr>
<td>3.</td>
<td>Taste</td>
<td>Sweet</td>
<td>Sweet</td>
<td>Sweet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Density</td>
<td>1.07gm.</td>
<td>1.06gm.</td>
<td>1.09gm.</td>
</tr>
<tr>
<td>2.</td>
<td>Specific gravity</td>
<td>0.5195</td>
<td>0.5289</td>
<td>0.5135</td>
</tr>
<tr>
<td>3.</td>
<td>Viscosity</td>
<td>0.0036Pa.s 3.60cp.</td>
<td>0.0037Pa.s 3.70cp.</td>
<td>0.0036Pa.s 3.60cp.</td>
</tr>
<tr>
<td>4.</td>
<td>pH Determination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pH paper</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>pH meter</td>
<td>6.53</td>
<td>5.41</td>
<td>6.03</td>
</tr>
</tbody>
</table>

VI. DISCUSSION

In today's era the herbal products are the symbol of safety in contrast to the synthetic drugs which are regarded as unsafe to human being and environment. Although, herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries. It's time to promote them globally.

The prepared herbal syrup is having anti-oxidant activity. One kiwi fruit contains about 100 mg vitamin C. Clinical data was proved that the platelet aggregation and plasma triglyceride level were reduced after 28 days of fruit consumption. The daily consumption of kiwi fruits is reduced the harm of cancer, especially colon cancer. It also used in treatment of insomnia, to treat sleep disorder. It helps to promote natural sleep.

There is interest in the antioxidant role of vitamin C, as research has found the vitamin to neutralize free radical molecules, which in excess can damage cells. Vitamin C is also involved in the body's immune system by stimulating the activity of white blood cells.

ACKNOWLEDGEMENT

I would like to express my gratitude to the management and principal of the SSJP's Ojas College of Pharmacy, Jalna for giving all the facilities required to carry out the project work.

VII. CONCLUSION

The formulation studies of all these formulation were within specifications. Also the properties of prepared syrup like colour, odour, taste, density, viscosity were satisfactory. The final formulation (F1) was obtained is stable than formulations F2, F3. The formulation (F1) was obtained by minimizing the error in formulation F2, F3. The formulation (F1) having vitamin C and antioxidant property hence it will be very helpful for researchers as well as industries to make the similar formulations on large scale.

VIII. REFERENCES


[17] https://theherbalacademy.com/herbal-syrup
