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Original Article

Formulation and Evaluation of Pineapple Based Herbal Cough Syrup

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ABSTRACT

The use of fruit extracts for therapeutic purposes is known as herbal medicine; most of the constituents in herbal syrup are derived primarily from plants. In addition to various natural medicine doses, syrup formulae are also offered. These days, syrup is used to treat the symptoms of a wide range of illnesses. Antioxidant syrups are used to treat cancer because the body produces free radicals due to oxidative reactions and other stressors. While the adulsa leaf extract serves as natural expectorant, the pineapple extract gives the orange peel syrup flavor. Alcohol and sugar are used as preservatives. Four formulations (labeled F1, F2, F3, and F4) were created with varying final volume proportions of syrup, alcohol, and sugar. Each formulation was created using parameters such as density, specific gravity, pH, and organoleptic qualities. The results showed that the herbal syrup formulation (F2) is more stable and elegant than the other formulations.

Keywords: Pineapple, Adulsa, cough Syrup, Orange peel, Herbal syrup

INTRODUCTION

There are several different types of drugs that are commonly used in combination to manage coughing. Prior to talking about the particular drug used, it is important to briefly review the reasons why coughing occurs, how it aggravates sickness, and if suppressing it is preferable. From prehistoric times, humans have used a range of plant resources for food, clothing, housing, and traditional medicine to address a variety of ailments. Cough medications are used not only to suppress the cough but also to reduce the discomfort associated with persistent coughing. Extra-thoracic symptoms including fever, lethargy, headaches, and back pain may require medical attention. [1]

Benefits of cough syrup include:

1. The ability to cover up the disagreeable taste of medication;
2. The fact that syrups are thicker than aqueous solutions, meaning that only a fraction of the medication dissolved in them reaches the taste buds.
3. The leftover medication is kept above the tongue by the thick syrup, which inhibits taste as it is consumed.
4. The high sugar content of syrups gives them a sweet flavor that helps cover up the bad taste of the drug.
5. As a result, syrups are commonly employed in pediatric therapies. Furthermore, syrups' thick consistency soothes irritated tissues. [2]

Cough:

The protective reaction of coughing helps to maintain the opening of your airways. Swallowing problems or another illness, such asthma or a respiratory infection, may be the cause of your coughing. Since coughing is a normal function used by your body to clear allergens from the upper (throat) and lower (lungs) airways, your doctor can help you identify the root of the

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problem. Coughing is a self-defense and healing mechanism used by your body. [3]

Cough types:

1. Wet cough: This condition is brought on by your respiratory system producing mucus to help rid your lungs and airways of an irritating cold or flu illness.
2. Dry cough: A dry cough is typically brought on by an irritated or inflamed airway. Their heightened sensitivity lowers their threshold to induce a cough. You may have a dry cough in the early stages of a respiratory infection while your body works to clear your airways of the virus. [4]

Pineapple is beneficial for coughing.

1. Pineapple may help with coughing due to bromelain's anti-inflammatory properties. According to results, taking bromelain orally may improve breathing, lessen congestion, and lessen coughing (Reliable Source).
2. Research has not yet demonstrated that pineapple juice specifically relieves coughs. However, it still possesses some properties, such as immune-stimulating and antibacterial properties, that help reduce cough symptoms. Its effectiveness will still depend on the cause of the cough, though.
3. Bromelain was shown to be a successful therapy for cough caused by angiotensin-converting enzyme (ACE) medications in a 2021 paper. Some people have dry coughs. ACE inhibitors, a drug used to treat high blood pressure.

Pineapple juice for sore throat:

1. Due to its anti-inflammatory properties, pineapple juice may help soothe sore throats. Additionally, pineapple juice is a great source of vitamin C, which supports immune system activation and infection control.
2. Bromelain from pineapple juice reduces inflammation and congestion and aids in the breakdown of mucus Trusted Source. This might lessen the discomfort and anguish associated with a sore throat.
3. Furthermore, bromelain has antiviral properties. Trustworthy source that might help stop infections that cause sore throats. [5]

Ingredients:

I. Pineapple

Taxonomical Classification.

1. Family – Bromeliaceous
2. Genus – Ananas
3. Species – Ananas Comosus
4. Orders – Bromeliaeds
5. phylum – Anthophyta
6. Kingdom – Plantae[6]

Medicinal use of pineapple:

1. Anti- properties: Bromelain in pineapple helps reduce inflammation and swelling, making it useful for treating conditions like arthritis.
2. Digestive aid: Bromelain also aids digestion by breaking down proteins.
3. Antioxidant properties: Pineapple is rich in vitamin C and other antioxidants that help protect against cell damage Wound healing Bromelain's anti-inflammatory properties may aid in wound healing.
4. Relief from sinusitis: Pineapple's anti-inflammatory properties may help alleviate sinusitis symptoms. [7]

Fig 1: Pineapple fruit

II. Adulsa

Taxonomical classification

1. Kingdom – Plantae
2. Division – Magnoliophyte
3. Class – Magnoliopsida
4. Order – Lamiales
5. Family – Acanthaceae[8]

Medicinal use of Adulsa

1. Anti-inflammatory effects: Adulsa has potent anti-inflammatory properties, making it useful for treating conditions like arthritis and other inflammatory diseases.
2. Antimicrobial properties: The plant's extracts have shown antimicrobial activity, which can help combat bacterial and fungal infections.
3. Antioxidant activity: Adulsa antioxidant properties help protect against oxidative stress and cell damage.
4. Wound healing potential: The plant's extracts have been found to promote wound healing by enhancing tissue repair and regeneration. [9]

Fig 2: Adulsa plant

III. Orange

Taxonomical classification

1. Kingdom – Plantae
2. Division – Magnoliophyte
3. Class – Dicotyledon
4. Order – Residue
5. Family – Rosaceae[10]

Medicinal uses of orange

1. Antioxidant Properties Oranges contain flavonoids, phenolics, and ascorbic acid, which contribute to their antioxidant and anti-inflammatory effects.

2. Cardiovascular Health Consuming oranges or orange juice may improve endothelial function and reduce the risk of atherosclerosis and heart disease.
3. Anti-Cancer Properties Orange peels contain flavonoids like polymethoxylated flavones (PMFs) and hesperidin, which may help prevent cancer.
4. Antimicrobial Properties Orange oil has been shown to be strongly antimicrobial, effective against several bacteria and fungi.
5. Anti-Anxiety Effects: The aroma of sweet orange oil has a marked anti-anxiety effect in humans. [11]

Fig 3: Orange

METHODOLOGY

Materials: Required material was collected from the local market.

Sr. No.	Ingredients	Role of ingredients
1	Pineapple Extract	Soothes throat, Anti-inflammatory properties
2	Adulsa Extract	Expectorant properties, helps relieve cough Anti-respiratory discomfort
3	Orange peel Extract	Adds flavor, aroma
4	Citric acid	Preservative and helps to balance pH
5	Sugar base	Sweeter

Method for Formulation of cough syrup

1. Take 280 grams of pineapple, chop it into little Pieces, and then add the pieces to 200 milliliters of Water. Heat the mixture slowly to extract the flavors. After filtering, the extract was allowed to cool. The Entire extract yields 14 milliliters of solution.
2. About 40 gm of finely chopped orange peel from two Oranges was combined with 200ml of water to make Extract. Next, a gentle boil was applied to the mixture. The extract was allowed to cool after filtering. The Entire extract is metered out to make a 10 ml solution.
3. 40 grams of Adulsa leaves were cooked in 200 Milliliters of water to create the extract. The extract was Allowed to cool after filtering. The entire extract is Metered out to make a 10 ml solution.
4. Weigh exactly 66.6 grams of sugar.
5. The extracts were combined to create 100 ml of syrup.
6. After making this syrup, it was sealed in an amber Bottle and stored in a cool location.

Fig 4: Pineapple Extract

Fig 5: Adulsa Extract

Fig 6: Orange peel

Fig7: Citric acid

Formulation Table

Sr No	Ingredients	F1	F2	F3	F4
1	Pineapple Extract	40 ml	40 ml	40 ml	40 ml
2	Adulsa Extract	16 ml	24 ml	10 ml	10 ml
3	Orange peel	10 ml	10 ml	10 ml	16 ml
4	Citric acid	4 ml	6 ml	8 ml	4 ml
5	Sugar base	30 ml	20 ml	32 ml	30 ml

Evaluation parameters

1.Density

1. To thoroughly clean the specific gravity bottle, use nitric or chromic acid. Rinse the bottle at least twice or three times with distilled water.
2. If required, rinse the bottle with an organic solvent, such acetone, and then allow it to dry.

3. Using the capillary tube Stopper (w) connected, weigh the dry, empty bottle.
4. After adding the unidentified liquid to the bottle and screwing on the stopper, use tissue paper to wipe away any remaining liquid that could have entered the tube. Weigh a container of an unknown liquid (w2) on an analytical balance.
5. Calculate the weight of the unknown liquid in grams (W3). The density formula Weight of test liquid / volume of test liquid = W3/v is the density of the test liquid (syrup).

Fig 8: Density bottle

2.Viscosity

1. To completely clean the Ostwald viscometer, use warm chromic acid. If necessary, use acetone or similar organic solvent.
2. Place the viscometer upright on a suitable stand.
3. Pour water into the dry viscometer until it reaches mark G. Determine, in seconds, how long it takes for water to flow from Mark A to Mark B.
4. Repeat step 3 at least three times to obtain an accurate reading.
5. Fill the viscometer to mark A after washing it with test liquid, then note how long it takes the liquid to reach mark B.
6. Calculating liquid densities according to the experiment's specifications

Fig 9: Ostwald's viscometer

3.pH determination

1. Glass electrode
2. pH paper

Syrup's pH was determined using two methods.

Fig 10: Glass electrode

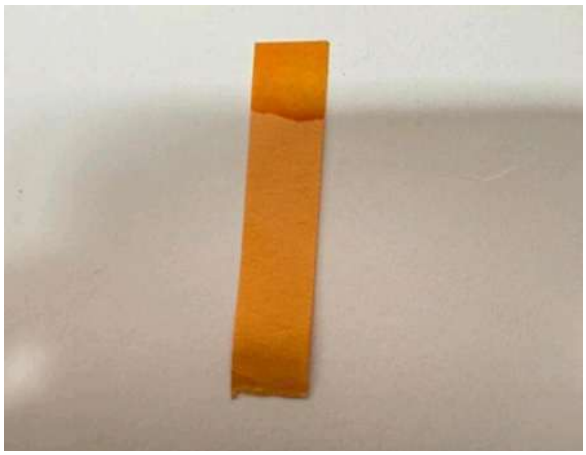

Fig 11: pH Paper

4.Specific gravity

1. Use chromic acid or nitric acid to thoroughly clean the specific gravity bottle.
2. Use filtered water at least twice or three times.
3. If required, use an organic solvent, such as acetone or to rinse the bottle and let it dry.
4. Weigh an uses a stopper for a capillary tube to empty a dry bottle.
5. To remove any remaining liquid from the side tube (W2), use tissue paper after pouring distilled water into the bottle and fastening the stopper.
6. Using a cork and water (Woz), weigh the battle using an analytical balance.
7. Repeat the procedure using the water substituted after the liquid under test has been emptied and dried as directed in stages 4 through 6.
8. Weigh a container with a cork and the liquid being examined using an analytical balance (W3). Weigh of liquid under test/Weight of water=was/W is the specific gravity of the liquid (syrup) is the specific gravity formula.

5.Consistency

1. Once it has cooled, check for uniformity. Put a drop of syrup between your thumb and index finger, then pull them apart to confirm. The issue arises if one string breaks between them.

6.Stability Study

PROCEDURE

The stability procedure for pineapple-based herbal syrup involves preparing samples according to formulation, filling sterile containers, and conducting microbial testing. Samples are then stored under various conditions (temperature, humidity, light) and tested at regular intervals (e.g., 1hr ,1, 3 months). Data is analyzed to determine microbial growth, and conclusions are drawn about optimal storage conditions, preservative use, and packaging. This procedure ensures the syrup's safety and quality,

enabling manufacturers to provide high-quality products to consumers.

Fig12: 1-hour

Fig 13: 1month

Fig 14: 3 months

Time Interval	Temperature condition	Observation
1 Hour	4° C	No microbial growth observed
1 Month	25° C	No microbial growth observed
3 Month	40° C	No microbial growth observed

Formulation and Labelling:

Fig 15: label

Fig 16: Formulation of Syrup

RESULT AND DISCUSSION:

Sr.No.	Evaluation Parameters	F1	F2	F3	F4
1	Colour	Light Yellow	Yellowish brown	Faint brown	Yellow
2	Odour	Fruity	Fruity	Fruity	Fruity
3	Taste	Sweet	Sweet	Sweet	Sweet
4	Density	1.19 g/ml	1.10 g/ml	1.24 g/ml	1.97 g/ml
5	Viscosity	3.56 cp	3.60 cp	3.66 cp	3.72 cp
6	Specific gravity	0.6132	0.6135 cp	0.6287	0.6124
7	Ph	6.2	6.5	6.3	6.7
8	Consistency	Clear	Clear	Clear	Clear

CONCLUSION

The project's objective was to develop and evaluate a herbal cough syrup. In comparison of F1, F3 and F4, formulations, F2 was more stable and viscous comparison to other trails. F2 give better effect other than F1, F3, F4. it give less side effect. F2 is more elegant than other three trials. Because of its antioxidant's qualities will be extremely advantageous for businesses and researchers to generate similar formulations on a large scale.

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