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FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP

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ABSTRACT : A new review suggests that there is little evidence that such treatments provide any real efficiency, despite the fact that cough medications are currently among the most widely used over-the-counter medications in the world. A cough is an explosive, strong exhalation used to expel fluids and foreign objects from the tracheobronchial tract. The purpose of this review study was to compile information on the plants used in traditional culture and ethnobotany to treat and relieve cough, which is a common condition in both children and adults.The most typical issue that all people experience is a cough.
There are two feathers of coughs dry cough and wet cough. A wet cough produces mucus and mucous, but a dry cough does not. The saccharinity is the most well- known and frequently used lozenge form for treating coughs and snap since it's simple for cases to take. The ideal of this study is to develop a herbal cough saccharinity and to check theanti-bacterial exertion of the excerpt of Nagarmotha, Pippali, Liquorice, Ginger, Amla, Honey used for the expression of herbal cough saccharinity against different bacteria(Staphylococcus aureus,E.coli, Salmonella sp. Pseudomonas aeruginosa,B.subtilis), and to estimate the physicochemical parameter of cough saccharinity as well.
This study aims to develop a herbal cough syrup while assessing the turbidity, colour, scent, and taste parameters in relation to variations in fast stability testing. Quality of the final herbal cough syrup was evaluated utilising variables such as viscosity, pH, colour,both physical look and scent. Clove oil functions as an expectorant when it comes to treating respiratory conditions like colds, bronchitis, cough, asthma, and upper respiratory infections.

KEYWORDS : Dry cough, Wet cough, Anti-bacterial activity, Extraction, Evaluation, Herbal cough syrup

INTRODUCTION : For thousands of years, nature has served as a source for therapeutic agents, and an astounding number of contemporary medications have been separated from these sources, notably plants, with many of them based on their traditional medical applications. Novel natural product requirements will be optimised utilising medicinal chemistry and combinatorial chemical and biosynthetic technology based on their biological activities to produce efficient chemotherapeutic and other bioactive drugs.[1]

Public interest in natural remedies, particularly herbal therapy, has grown significantly over the past few decades, primarily in industrialised countries but also in developing nations.[2]Patients of all ages frequently experience cough related to acute and chronic illnesses. Common causes of cough include bacterial or viral infections of the upper respiratory tract, air pollution, smoking, foreign bodies, asthma, and eosinophilic bronchitis. It's possible that treating the cough's aetiology alone won't be enough; desensitising the cough pathways is also crucial.[3] Treatment for a cough relies on the purpose it serves. When a cough points to an

underlying sickness, treatment should also make an effort to control, prevent, or stop the condition. This tendency has developed substantially, not only in developing nations but also primarily in industrialised nations.[4,5]

The oral administration of liquid pharmaceuticals has typically been justified on the grounds of simplicity of administration to patients who have difficulty swallowing solid dosage forms. Cough Syrup is a liquid dosage form. Sugar and clean water are condensed together to create syrup. Syrups are distinguished from other types of solutions by their high sugar content. The presence of medication or other flavourings in syrups is debatable. Non-medicated or flavoured syrups are ones that contain a flavouring component but no medication. Flavoured syrups are frequently employed as delivery systems for unpleasant-tasting pharmaceuticals; the end product is medicated syrup. Syrups frequently have a preservative since the high sugar content makes them vulnerable to contamination.

This research article describes the formulation and evaluation of a multi-herbal anti-tussive syrup that includes some natural remedies like Nagarmotha (Cyperus Rotundus), Pipli, Long pepper (Piper Longum), Liquorice (Glycyrrhiza Glabra), Ginger (Zingiber Officinale), Amla (Indian Gooseberry), and Honey (as a base). These natural medication mixtures in the form of powder that are cough suppressant are converted into syrup. These are far preferable to over-the-counter medicines because they are nontoxic, not dangerous, and don't have any negative effects on the body.

Plants used in herbal expectorants : These plants aid the body in clearing the lungs of extra mucus. However, the term is frequently used to refer to a treatment that tones the respiratory system. Expectorants include herbal medications like nagarmotha, liquorice, and pipper longum.[6]

Stability Testing Of Herbal Formulation : Stability Testing Of Herbal Formulation Stability testing studies give substantiation on how the quality of herbal products varies with time under the influence of environmental factors similar as temperature, light, oxygen, humidity, presence of other constituents or excipients in lozenge form, microbial impurity, flyspeck size of medicine, trace essence impurity, filtering from vessel, and other factors. These studies help to establish recommended storehouse conditions, shelf life, and check period for herbal products.[7- 9]

ADVANTAGES AND DISADVANTAGES OF HERBAL MEDICINE[10]

- **ADVANTAGES**

1. Improve immunological reaction.
2. Greater acceptance in the culture.
3. Greater suitability for the human body.
4. Less expensive and no/fewer negative effects.
5. Organic and freely accessible.
6. Manages serious illnesses like Alzheimer's and other.

- **DISADVANTAGES**

1. Wild herb poisoning danger.
2. Lack of adequate regulation.
3. There are no dosing guidelines.
4. Herbs and contemporary medicine interact.
5. Unsuitable for many health conditions

MATERIALS AND METHODS :

The following herbal medications are used to create herbal syrup with expectorant and antipyretic properties.

Nagarmotha	Cyperus rotundus	cyperaceae	Expectorant
Pippali	Piper longum	Piperaceae	Expectorant
Liquorice	Glycyrrhiza glabra	Leguminosae	Expectorant
Ginger	Zingiber officinale	Zingiberaceae	Antipyretic
Amla	Phyllanthus emblica	Phyllanthaceae	Antipyretic
Honey	Apis melifera	Apidae	Sweetening agent
Lemon Oil	Citrus limon	Rutaceae	preservatives

Table no:-1 lists and describes the herbal ingredients that were used.

Nagarmotha : Nagarmotha (Cyperus rotundus) rhizomes that had been dried and torn were used. These are readily accessible in dried form in the market, however they must be dried in sunlight for close to 4 to 5 hours.Then, for formulation purposes, 20 to 30g of dried nagarmotha were obtained.

Pippali : The pippali (Piper longum) dried and ripped fruit section was employed. These have an oval form and are coloured orange and yellow. Like other medications, these are offered on the market. For formulation, roughly 10 to 20g of the medication were taken.

Liquorice : The liquorice plant (Glycyrrhiza glabra), either dried and peeled or unpeeled, was used.These can also be found in dried form in the market. After that, between 20 and 30g of liquorice were eaten for formulation.

Ginger : Ginger (Zanzibar officinal) rhizomes, either fresh or dried, were employed. These are conveniently offered on the market in both dried and powdered forms. After that, between 10 and 20g of the medication were taken for formulation.

Amla : The fruit of the plant (Emblica officinalis) was used both fresh and dried. These are as accessible on the market as other medications. For formulation, roughly 10 to 20g of the medication were taken.

Honey : Any commercially available brand-named honey can be used (commercially available Dabur honey of 250 ml was utilised), as long as it has already been filtered and stabilised. 40 to 50 ml of honey were used for formulation.

Peparation method for syrup

Making a powdered drug[11]

Using a mortar and pestle, the required quantity of each dried crude drug—nagarmotha, pippali, liquorice, ginger, and amla—was crushed into a fine powder. Each drug was powdered separately, then each drug was collected in a separate vessel and weighed. Each drug needed to fully fill the required amount.

Maceration-based extraction

Each powdered medication was used for the maceration procedure. Each drug was placed separately in a beaker containing 400–500 ml of distilled water, or water that had been treated with alcohol to make it nearly 5% (2-4 ml of alcohol per 100 ml of water). After adding the proper amount of water—13 to 14 times the amount of drug—these beakers were left undisturbed for roughly 17 to 24 hours.

Herbal Cough Syrup Methodology[12]

The following procedures were used to make herbal cough syrup:

1. Quantities of crude herbs were taken.

2. All of the herbs were placed in a beaker with enough water, cooked until only one-third remained, and then strained.

3. Different concentrations of syrup solution (40%, 50%, and 60%w/v) were made.

4. Used muslin cloth and filter paper to separate the syrup solution and aqueous herb extract.

5. Add sugar solution gradually while continuously stirring the filtered extract.

6. A 100 ml volume was created.

7. Preservative and flavour were added, then it was tested.

Creation of herbal cough medicine

1. Each herb was consumed.

2. 500 cc of water is combined with herbs.

3. After the boiling extract was cooled and filtered, all ingredients were heated until the total volume was reduced to one-fourth of what it had been.

4. To make the final syrup, filtrate was taken.

Formula Table :

Sr. no	Ingredient	Quality(In ml)
1	Nagarmotha	10ml
2	Pippali	10ml
3	Liquorice	6ml
4	Ginger	6ml
5	Amla	5ml
6	Honey	9ml
7	Lemon oil	4ml

Table no :- 2 Formulation no 1(F1)- 50ml

Sr.no	Ingredient	Quantity(In ml)
1	Nagramotha	9ml
2	Pippali	9ml
3	Liquorice	8ml
4	Ginger	7ml
5	Amla	5ml
6	Honey	5ml
7	Lemon oil	3ml
8	Alcohol	4ml

Table no:- 3 Formulation no 2(F2) – 50 ml

Sr.no	Ingredient	Quantity(In ml)
1	Nagarmotha	14ml
2	Pippali	14ml
3	Liquorice	16ml
4	Ginger	15ml
5	Amla	15ml
6	Honey	20ml
7	Lemon oil	6ml

Table no :- 4 Formulation no 3(F3) – 100ml

Formulation 3 (F3)underwent the following evaluation criteria.

Sr.no	Ingredients	Quantity(In mg)
1	Adulsa	25mg
2	Yashti	20mg
3	Ringni	20mg
4	Tulsi	20mg
5	Khair sal	8mg
6	Sunth	4mg
7	Miri	2mg
8	Javkhar	2mg
9	Kapoor	2mg
10	Menthol	8mg
11	Syrup base	q.s
12	Sodium Benzoite	0.01%

Table no :- 5 Formulation no 4 (f4) – 100ml (Marketed preparation)

Preformulation study of the raw ingredient used in the formulation (HERBAL SYRUP)

- **Moisture content :**

1. 2 gm sample in a petridish was weighed and taken.
2. For one hour, I heated the petridish in a hot air oven at 100°C.
3. After cooling, the sample was once more weighed.
4. Determined the moisture content.[13]

- **Determination of ethanol extractive value :**

1. For 24 hours, 5 gm of air-dried medication was taken with 100 ml of ethanol in a closed flask.
2. Frequent shaking for 6 hours, followed by 18 hours of standing.
3. Quickly filtered the sample after that.
4. The filtrate was then evaporated in a petridish for 25 ml.
5. After that, weigh after drying at 105°C.
6. Determined the value of ethanol.[13,14]

- **Determination of water extractive value :**

1. For 24 hours, 5 gm of air-dried medication was taken with 100 ml of chloroform in 1000 ml of water (or 2.5 ml of chloroform in 1000 ml of water).
2. Frequent shaking for the first six hours.
3. Permitted to stand for 18 hours.
4. In a petridish, evaporated 25 ml of the filtrate to dryness.
5. Weigh and dry at 1050 C.
6. Determined the extractive value of water.[13,15]

- **Solubility testing :**

1. I put 2 gm of a powdered medication into acetone, ethanol, chloroform, and distilled water.
2. After that, the drug's solubility was investigated.[16]

- **TLC (Thin Layer Chromatography) :**

1. The slurry was made (5g of silica gel G in 12.5 ml of water), and it was then spread out onto a TLC plate.
2. After the coated plate spent 30 minutes in the air, it spent another 30 minutes in a hot air oven at 1000C.
3. A suitable mobile phase (ethanol) was added to the TLC chamber, which was then sealed and left for a while.
4. After the solvent front has reached the top of the TLC plate, the plate was removed, the solvent position was marked, and the plate was then heated in a hot air oven at 1000C for 30 minutes.
5. After applying the sample solution, which has been diluted, to the TLC plate using a capillary tube, the TLC plate should be put within the Iodine chamber.
6. After sampling
7. Calculated the RF value.

Formula:- RF Value = Distance travelled by component / Distance travelled by solvent

- **Determination of total Ash value –**

1. Determined the porcelain dish's weight by weighing it.
2. I weighed 2gm of the medication powder into a dish.
3. The dish was supported by a hob with a flame that was about 2 cm high and heated the food. heated almost to the point of evaporation.
4. Next, the dish was cooled.
5. Calculated the percentage of the entire Ash value after weighing the Ash value.[17]

- **UV spectroscopy method :**

1. The ginger extract calibration curve was created in methanol at a maximum wavelength of 281.40 nm.
2. To create the calibration curve, methanol was utilised.
3. A stock solution of 100 ml of methanol and 100 mg of crude extract was created.
4. Different concentrations of this stock solution were obtained by diluting it.
5. A UV spectrophotometer was used to scan the final solution for the maximum in the 200–400 nm region.[16]

➢ Evaluation parameter of formulation (Herbal syrup)

- **Colour examination:**

1. A 2 ml prepared syrup sample was placed in a watch glass and placed against a white background under a white tube light to test the colour.
2. Its colour was assessed using the naked eye.

- **Odour examination:**

1. Two ml of the ready syrup were taken and smelled.
2. After that, scent was noticed.

- **Taste examination:**

A small amount of the finished syrup was sampled to assess its flavour.[18]

- **pH examination:**

1. Disturbed water was used to clean and wash the glass electrode.
2. The electrode was inserted into PH 7 buffer solution, and the PH meter's calibrate knob was turned to 7 to set the value.
3. The electrode was taken out, cleaned, and washed with distilled water.
4. The electrode's placement was in a solution of PH 4 buffer.Change the value.
5. After that, the electrode was inserted into the syrup, and the pH was measured.[19]

- **Density examination :**

1. I cleaned the bottle of specific gravity.
2. Distilled water was used to clean the bottle at least twice.
3. Calculated the empty dry syrup bottle's weight using the stopper (w1).
4. After placing the stopper on the bottle and adding the final amount of syrup, wipe any extra syrup off the exterior of the tube.
5. Calculate the syrup's weight in gm(w2).
6. Calculate the weight in syrup gm (w3).

- **FORMULA OF DENSITY**

Density of liquid under test (syrup)=weight of syrup under test / volume of final syrup under test =W3/V.

- **Viscoty examination:**

1. Used acetone or other suitable organic solvent to thoroughly clean the Ostwald viscometer.
2. Set the viscometer on a suitable stand in a vertical position.
3. I filled the dry viscometer with water to the G mark.
4. The time it took for water to flow from point A to mark B was measured in seconds.
5. To get an accurate reading, this step was repeated at least three times.
6. After cleaning the viscometer with a sample liquid and filling it to mark A, notice how long it takes for the liquid to reach mark B.[20]

- **Formula for viscosity:**

Viscosity= Density of the test liquid *time required to flow test liquid/density of of water*time required to flow water*100

- **Procedure to determine Specific gravity :**

1. Use chromic or nitric acid to completely clean the specific graveness bottle.
2. Wash the bottle with clean water at least doubly or three times.
3. If necessary, wash the bottle with an acetone- suchlike organic detergent and let air sot.
4. With a capillary tube breach, weigh an empty, dry bottle.
5. Place the breach on the bottle after filling it with distilled water, and use towel paper to wipe down any fat liquid from the side tube(w2).
6. Use an logical balance to weigh a bottle of water and a cork(w2).
7. After evacuating and drying as described in way 4 through 6, repeat the process for the liquid under test by substituting the water.
8. Put the bottle with the cork on and weigh it along with the liquid being tested(w3).

- **Formula for specific gravity:**

Specific gravity of liquid under test (syrup) = weight of liquid under test /weight of water = w_5/w_4.

- **Stability testing:**

1. The synthesised herbal syrup underwent stability testing while samples were kept under. accelerated temperature conditions.
2. Culture tubes were used to receive the finished syrup.
3. After that, the temperature was maintained at accelerated levels of 4, 16, and 47 degrees Celsius, respectively.
4. The samples were examined for all physicochemical characteristics (colour, aroma, and taste), as well as turbidity, at intervals of 24 hours, 48 hours, and 72 hours to look for changes.[21]

RESULT AND DISCUSSION :

Component / Ingredients	Nagarmotha	Pippali	Liquorice	Ginger	Amla
Moisture content (%)	**1.5%**	**1.5%**	**4.5%**	**1%**	**11%**
Water extractive value(%)	**20.16%**	**15.96%**	**4.04%**	**4.08%**	**44.36%**
Ethanolic extractive value(%)	**20.72%**	**16%**	**56.92%**	**23.06%**	**4.2%**

Table no:- 6 Preformulation study result of herbal cough syrup

Sample	Distance travelled by sample	Distance travelled by solvent	Rf value
Powder	3.5	6.3	0.55

Table no:-7 Determination of Rf value TLC

Sr.no	Solvent	Solubility
1	Water	Insoluble
2	Ethanol	Soluble
3	Methanol	Soluble
4	Chloroform	Soluble
5	Acetone	Insoluble

Table no:- 8 Determination of solubility of sample

Observation , Calculation Of Evaluation Parameters

- **Determination of specific gravity of liquid**

Observation –

1. Weight of empty specific gravity bottle (w1) = 13.58g
2. Weight of specific gravity bottle + Distilled water (w2) = 23.20g
3. Weight of specific gravity bottle + Syrup solution (w3) = 21.85g

Calculation –

1. Mass of the liquid sample (syrup solution) = W3 – W1 = 21.85 – 13.58 = 8.27
2. Mass of distilled water = W2 – W1 = 23.20 – 13.58 = 9.62
3. Specific gravity of liquid (syrup solution) = Mass of liquid / Mass of equal volume of water (Distilled water). = 9.13/ 9.36
4. Specific gravity of syrup solution **= 0.859**

➢ **Determination of density of liquid**

1. Density of water at room temperature (p1) = 0.997g/ml (Standard value)
2. Specific gravity of syrup solution = 0.859
3. Specific gravity of liquid = Density of liquid (Syrup Solution) / Density of Distilled water.
4. Density of liquid (Syrup Solution) (p2) = specific gravity of liquid (syrup solution) x Density of Distilled water.
   (p2) = 0.859 x 0.997
   (p2) = 0.85642 g/ml
5. Density of liquid sample (syrup solution) **= 0.85642 g/ml**

➢ **Determination of viscosity of liquid**

1. Viscosity of liquid (n2) = P2 t2 / P1 t1 x n1
2. P1 = Density of water (g/ml)
3. P2 = Density of test sample (syrup solution)
4. N1 = Viscosity of water (cp)
5. N2 = Viscosity of test sample (syrup solution)
6. T1 = Mean time of flow of flow of water from A to B
7. T2 = Mean time of flow of test (sample syrup)
8. Viscosity of water at room temp n1 = 0.997 cp
   = (0.85642 x 95.3 / 0.997 x 25.14) x 0.997
   = 1.56 x 0.997
9. Viscosity of syrup solution at room temp is **= 1.55 cp**

Liquid Sample	**Time of flow (sec)**			**Mean time (t)(sec)**	**Density (p)g/ml**	**Viscosity(n)cp**
	1	2	3			
Distiiled water	25.14	25.16	25.12	25.14	0.997 g/ml	0.8937 cp
Syrup solution	94	96	96	95.3	0.85642 g/ml	1.55 cp

Table no :- 9

Fig no :- 1 Density

Fig no :- 2 Specific gravity

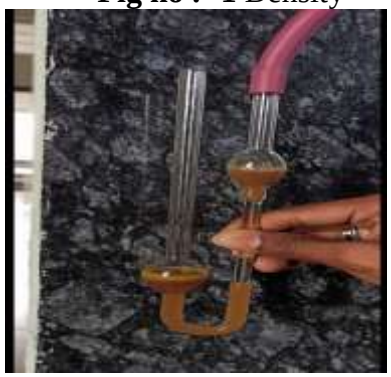

Fig no:- 3 Viscosity

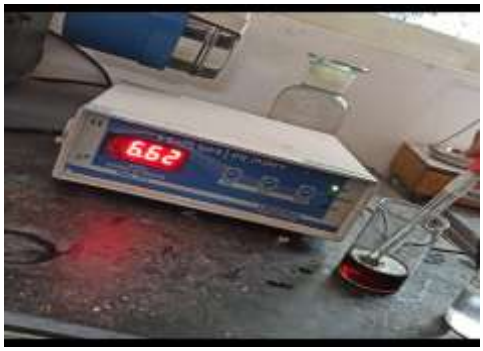

Fig no:- 4 pH meter

Fig no:- 5 pH paper

RESULT :

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Table no :- 10 Result of four evaluation parameter.

Sr.no	Parameter	F1	F2	F3	F4
1	Density	0.85642 g/ml	0.98603 g/ml	0.97008 g/ml	0.441679 g/ml
2	Specific gravity	0.859	0.989	0.973	0.443
3	Viscosity	1.55 cp	3.73 cp	3.71 cp	2.05 cp
4	PH determination				
	a) PH paper	Neutral	Neutral	Neutral	Neutral
	b) PH meter	6.34	6.46	6.88	6.08
5	Organoleptic character				
	a) Color	Brownish red	Brownish red	Brownish red	Brownish red
	b) Odor	Alcoholic	Alcoholic	Alcoholic	Aromatic
	c) Taste	Sweet	Sweet	Sweet	Sweet
	d) Apperance	Clear	Clear	Clear	Clear

Conclusion : On the basis of readily available standard data, our overall study aims to identify general physical and chemical criteria that are crucial for the identification of crude pharmaceuticals. The completed herbal cough syrup's physicochemical characteristics were as follows:The physical properties of the herbal cough syrup—PH, Viscosity, Density, Specific Gravity, colour, odour, and taste—were all good. Due to the low likelihood of adverse effects, herbal products are in high demand.

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