



## PREPARATION AND EVALUATION OF MEDICATED HERBAL CANDY OF MAHUA FOR SORE THROAT

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Article DOI: <https://doi.org/10.36713/epra13393>

DOI No: 10.36713/epra13393

### ABSTRACT

*Madhuca longifolia commonly known as Mahua belonging to family Sapotaceae, is an Indian tropical tree, known for its sweet flowers which are edible and used by tribals for its medicinal purpose. The known pharmacological activity of the flowers of Madhuca longifolia are anti-inflammatory, anti-bacterial, anti-oxidant, analgesic, anti-pyretic and wound healing properties and has no side effect even after consumption of larger doses. The prevalence of throat infections is rising day-by-day due to the increasing pollution, bacterial infection, gastro-intestinal disease, injury, allergies etc. This study aimed to formulate and evaluate medicated herbal candy of Mahua flowers for sore throat. The candy was prepared using a combination of natural ingredients such as dried Mahua flowers, clove, cardamom, cinnamon, honey, corn syrup and lemon juice. The candies were evaluated for their physicochemical parameters and antibacterial properties. The antibacterial property was evaluated by measuring the Zone of Inhibition (ZOI) obtained from the experiment. The results showed that the candy had desirable taste, color, and texture and can be an alternative to conventional sore throat remedies.*

**KEYWORDS:** *Madhuca longifolia*, anti-inflammatory, antibacterial

### INTRODUCTION

A sore throat can be defined as painful, dry, or scratchy feeling in the throat. Pain in the throat is one of the most common symptoms seen in most of the population. Sore throats are mainly caused by infections or by environmental factors such as dry air and can also be caused by smoke, chemicals, injury etc. Based on the part of the throat they affect sore throat can be divided into three types: 1. Pharyngitis: Pharyngitis is a type sore throat in which swelling and soreness occur in the throat. 2. Tonsillitis: In this condition swelling and redness of the tonsils occur. 3. Laryngitis: Laryngitis can be defined as swelling and redness of the voice box or larynx.<sup>[5]</sup> Sore throats can be caused from infections to injuries. Some of the causes are Colds, the flu, and other viral infections. Mahua candy is a small, typically medicated tablet intended to be dissolved slowly in the mouth to temporarily stop cough, lubricate, and soothe irritated tissue of the throat usually due to a sore or strep throat, possibly from the common cold or influenza. Candy is prepared using natural ingredients that help relieve cough. No side effects are there. The medicated herbs are present in the candy helps soothe and lubricate the irritated throat tissue. People refer to cough drops as lozenges, due to their shape. Many cough drops are not suitable for children as they have pharmaceutical drug into it.

Nowadays this type of product “HARD CANDY” is required, that contains natural ingredients which can be safe for all age groups. Mahua candy contains mahua flowers, honey, Sugar, Cinnamon, Clove, Cardamom, and Lemon are commonly used in our home kitchen and are beneficial for human health.

*Madhuca longifolia*, also known as mahua, belongs to family Sapotaceae. Mahua flowers are rich source of sugars responsible for sweet taste. It contains Vitamin C which is responsible for antioxidant activities. It also contains Vitamin –A. Mahua flowers contain various minerals like calcium and Phosphorus, and few amounts of proteins and fats. Medicinal properties of madhuca flowers are Antibacterial, Antioxidant, Anti-inflammatory, Analgesic, Antipyretic, Anti-ulcer, wound healing activities.<sup>[7]</sup>

**Cinnamon:** Also, known as Cinnamon bark, Kalmi, Dalchini, Taj, Ceylon cinnamon. The known properties of cinnamon are astringent, stomachic and carminative. It has anti-inflammatory properties. It is anti-microbial so inhibiting the growth of bacteria



and fungi.<sup>[4]</sup>

**Clove:** Synonyms are Caryophyllum, Clove flower, Clove buds and Laung. Clove is used as carminative, stimulant, flavoring agent and as an anti-antiseptic. Clove is also used as Dentalanalgesic in toothache. It is also used as a spice in culinary purpose for flavoring the food dishes, pickles.<sup>[4]</sup>

**Cardamom:** Also known as Cardamom fruit, Cardamom seeds. Cardamom is used as carminative and Stimulant. In India, green cardamom is broadly used to treat in teeth and gums. It is also used to.<sup>[4]</sup>

**Honey:** Synonyms are Madhu, Honey purified, Mel and Madh. Honey is known for its anti-microbial and wound healing properties. It is commonly used as a home remedies in case of throat infection.<sup>[2]</sup>

## MATERIALS AND METHODS

**Table 1: Formulation table for Madhuca candy**

Sr no.	Ingredients	Quantity taken (1 tbsp. = 14.7 ml) (1 tsp. = 4.2 g)
1	Mahua pulp	2 tbsp
2	Clove	1 tsp
3	Cardamom	1 tsp
4	Cinnamon	1 tsp
5	Honey	2 tbsp
6	Sugar syrup	1 tbsp
7	Corn syrup	1 tbsp
8	Lemon juice	q.s

### Methods of making mahua candy

#### 1) Procedure for making mahua pulp

The dried flowers of madhuca longifolia were taken



The flowers were washed and cleaned to remove the foreign particles

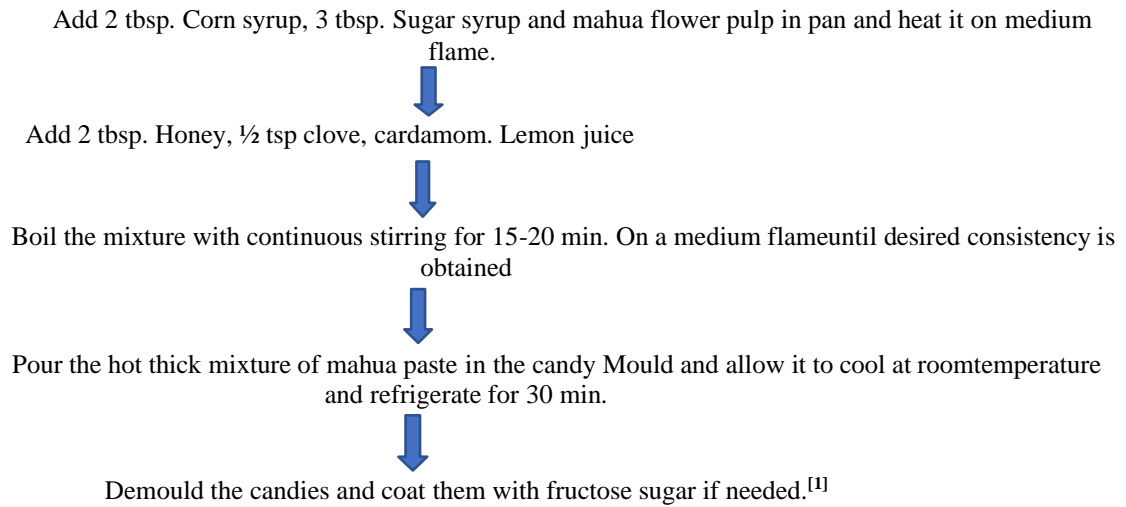


The cleaned flower was taken and soak them for 24 hrs.



The soaked flower were ground in the mixture and paste was prepared.<sup>[1]</sup>

## 2) Procedure for Making Mahua Candy:



**Fig 1: Medicated herbal candy of Mahua for sore throat**

## EVALUATION PARAMETERS FOR MAHUA CANDY

### 1) Physical parameters/ Sensory evaluation

The hard cough candy were examined in terms of the different organoleptic characteristics i.e., color, appearance, taste, texture, flavour, mouth feel and overall acceptability.

### 2) pH Measurement

The acidity or alkalinity of a candy was indicated by using lab pH meter, a scale from 1 to 14. 1%w/v solution of candy was prepared by dissolving 1 gm candy in 100ml distilled water and its pH was recorded.<sup>[9]</sup>

### 3) Ash Value

Weigh accurately about 3gm of the powdered drug in silica crucible. Place the powdered drug in Muffle furnace until the sample is turned into ash. and allow it to cool. Weigh the ash and calculate the % of the total ash in contrast to the air dried sample.

### 4) Shelf-Life Study

Shelf-life study was started from the 2<sup>nd</sup> day of making the product. Mahua candy was stored under the refrigerated condition for 4 weeks in its packaging materials. The product was observed at frequent intervals for any change in appropriate color, odour, texture, taste and moisture.<sup>[1]</sup> The observations are as follow:



**Table 2: Shelf-life study of mahua candy**

Day	Observation
Week 1	No change in color, odour, texture and taste
Week 2	No change in color, odour, texture and taste
Week 3	No change in color, odour, texture and taste
Week 4	No change in color, odour, texture and taste

## 5) Evaluation of Microbial Analysis

Determination of bacteria helps in analysis of sample quality after the production and storage practices. This is done by cup plate method and total plate count method (serial dilution method).

### 1) Serial dilution method

#### Procedure

- mix the bacterial suspension by rolling the test tubes between the palms of hands to ensure even dispersion of cells in the cultures.
- By using sterile pipette, aseptically transfer 1ml from the bacterial suspension to first flask containing 99ml saline solution.
- Discard the pipette in the beaker of disinfectant. The bacterial suspension has been diluted 100 times ( $10^{-2}$ ). Mix the contents of the first flask and transfer 1ml suspension to the second flask (containing 99ml saline) with a sterile pipette.
- This original culture is diluted ( $10^{-4}$ ). Mix the contents of the second flask and transfer 1ml suspension to third flask containing 99ml sterile solution with a sterile pipette.
- Finally, in the third flask bacterial suspension is diluted to  $10^{-6}$ .
- Add approximately 15 to 20ml nutrient agar medium into three large size test tubes, sterilize by autoclave at  $121^{\circ}\text{C}$  for 15 minutes and cooled at  $45^{\circ}\text{C}$ .
- Mix all the dilutions and transfer 1ml from each dilution to large size test tubes.
- Mix the bacterial suspension by rolling the test tubes between the palms of hands to ensure even dispersion of culture in the medium.
- Immediately pour the media of three test tubes into 3 sterile petri plates to solidify.
- Incubate these plates in an inverted position for 24 to 48 hours at  $37^{\circ}\text{C}$ .<sup>[3]</sup>

### 2) Cup plate method

#### Procedure

- Each petri dish was filled to a depth of 4-5 mm with a nutrient agar medium that was previously inoculated with suitable inoculums of suitable test organism, and then allowed to solidify.
- The petri dish were specially selected with flat bottom and were placed on level surface so as to ensure that the layer of medium is in uniform thickness.
- The petri dishes were sterilized at  $160-170^{\circ}\text{C}$  in hot air oven for 30 mins before use.
- Small sterile borer of uniform size was placed approximately at 10 cm height, having an internal diameter of approximately 6-8 mm and made of aluminium (or) stainless steel.
- Each plate was divided in to five equal portions along the diameter.  
To each portion one cylindrical cavity was made in medium with the help of sterile borer. Five cavities for test compounds were made. The petri dishes were incubated at  $37^{\circ}\text{C}$  for 18 hours. Diameter of the zone of inhibition (ZOI) was measured and the average diameter for each sample was calculated.<sup>[3]</sup>



6) Phytochemicals analysis of plant extract

**Table 3: Phytochemical analysis of plant extract**

Test for Carbohydrates	Test for Alkaloids	Test for Tannins	Test for Proteins
<p><b>Molisch’s Test:</b> 2-3 drops of Molisch’s reagent added to small amount of analyte in test tube and mixed well. Few drops of concentrated sulphuric acid added <b>drop-wise</b> along walls of test tube to facilitate the formation of purple to reddish brown color.</p>	<p><b>Mayer’s Test:</b> 2-3ml filtrate, add few drops Mayer’s reagent gives white ppts.</p>	<p><b>FeCl<sub>3</sub> Test:</b> To 2-3ml of aqueous or alcoholic extract, add few drops of 5% FeCl<sub>3</sub> solution. It will give black color precipitate.</p>	<p><b>Biuret’s Test:</b> 2mL filtrate + 1 drop of 2% copper sulphate sol, add 1mL of 95% ethanol, KOH pellets. It gives a pink colored solution.</p>
	<p><b>Hager’s Test:</b> 2-3ml filtrate with few drops Hager’s reagent gives Yellow ppts.</p>		
<p><b>Fehling’s Test:</b> Add sample to test tube and add Fehling’s solution in tube. The tube must kept in water bath and make observation and record if there is any development of brick red precipitate.</p>	<p><b>Wagner’s Test:</b> 2-3ml filtrate with few drops of Wagner’s reagent gives reddish brown ppts.</p>	<p><b>Lead acetate Test:</b> To 2-3ml of aqueous or alcoholic extract, add few drops of lead acetate solution. It gives white precipitate.</p>	<p><b>Millon’s Test:</b> 2mL filtrate, few drops of Millon’s reagent, gives a white precipitate.</p>
<p><b>Benedict Test:</b> Add sample in test tube and add Benedict’s solution to the test tube and heat it in water bath and observe the development of brick red color.</p>	<p><b>d) Dragendroff’s Test:</b> 2-3 ml filtrate with few drops of Dragendroff’s reagent gives red brick color.</p>		<p><b>Ninhydrin’s Test:</b> 2mL filtrate, add 2 drops of Ninhydrin solution (10mg ninhydrin + 200mL acetone), it gives a purple colored solution.</p>
			<p><b>Xanthoprotic test:</b> Sample extract, few drops of conc. nitric acid, it gives a yellow colored solution.</p>

**RESULTS AND DISCUSSION**

**1. Collection of dried flowers and soaked in water**



**Fig 2: Dried flowers of *Madhuca longifolia* soaked in wa**



**2. Pulp of Dried Mahua Flowers.**



**Fig 3: Pulp of dried flowers of Mahua**

**3. extract of Dried Mahua Flowers**



**Fig 4: Extract of dried flowers of Mahua**

**4. Result of Agar plate formation**



**Fig 5: Figure showing the agar plates**

**5. Antibacterial activity of candy**

**1. By Cup Plate method**



**Fig 6: Antibacterial activity by cup plate method**

**2. By Serial Dilution or total plate count method**

➤ Serial dilutions:



**Fig 7: Antibacterial activity by Serial dilutions**

➤ **Result**



**Fig 8: Positive result of antibacterial activity**

**Table 4: Table showing result of serial dilution**

Days	Dilutions used	Colony count (cfu/ml)
Day 2	$10^{-2}$	2
	$10^{-4}$	3
	$10^{-6}$	0
Day 3	$10^{-2}$	0
	$10^{-4}$	0
	$10^{-6}$	0





**6. Evaluation of candy**

**Table 5: Evaluation of candy**

Physicochemical parameters	Observations
Colour	Dark brown
Odour	Aromatic
Taste	Sweet
pH	4.5
Ash value	2.16 g
Shelf-life study (4 weeks)	Stable

**7. Final Finished Product**



**Fig 9: Final Product Prepared**

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