INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA):IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

To Study The Preparation Formulation And Evaluation Of Medicated Lollipop

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ARTICLE INFO

Received: 14 April 2024
Accepted: 18 April 2024
Published: 23 May 2024
Keywords:
Vasapatra, Ayurveda, Rasapanchak, Pharmacological properties
DOI:
10.5281/zenodo.11264459

ABSTRACT

Adhatoda vasica (L.) Nees is also known as Justicia adhatoda L. belongs to the family Acanthaceae and is considered the most significant plant in the world. It is commonly known as Vasaka, Vasica, Adosa, Malbur nut and is distributed in various regions of India and throughout the world. It is a wellknown plant in Ayurveda and Unani medicinal system. This plant has been used in the indigenous medicinal system of India for more than 2000 years. The plant has great medicinal importance and is used to treat various diseases and disorders mainly respiratory tract diseases like cough, symptoms of common cold, asthma, tuberculosis and chronic bronchitis. All the parts of the plant are used in medicines. Vasicine is the main chemical constituent present in this plant which possesses various medicinal properties and is used in different Ayurveda formulations. Also, it contains various reported pharmacological properties like antispasmodic, sedative, expectorant, antitussive, oxytocic, antibacterial, anti-diabetic, wound healing, abortifacient, antiasthma and anti-pyorrhea.

INTRODUCTION

Throat infections are the most common disease in today's world. However, it is not taken too seriously by people. Long-term throat infections can lead to severe throat problems like pharyngitis and also cancer. Acute sore throat is a symptom often caused by an inflammatory process in the pharynx, tonsils, or nasopharynx. Most of these cases are of viral origin and occur as a part of the common cold. A sore throat is pain, scratchiness or irritation of the throat that often worsens when you swallow. The most common cause of a sore throat (pharyngitis) is a viral infection, such as a cold or the flu. A sore throat caused by a virus resolves on its own. Strep throat (streptococcal infection), a less common type of sore throat caused by bacteria, requires treatment with antibiotics to prevent complications. Sore throats may be caused by viral infections, Bacterial infections, irritants, and injuries. Signs and

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

symptoms might include pain or a scratchy sensation in the throat, pain that worsens with swallowing or talking, difficulty swallowing, sore, swollen glands in your neck or jaw, swollen, red tonsils, white patches or pus on your tonsils, hoarse or muffled voice. Common infections causing a sore throat might result in other signs and symptoms, including fever, Cough, Runny nose, Sneezing, Body aches, Headache, Nausea or vomiting. Adhatoda Vasica has been used to treat respiratory and other allergic conditions for years. It has been shown to treat many other diseased conditions like diabetes, ulcers etc. Vasicine is the main active ingredient of adhatoda vasica. It has been used in the Ayurvedic system of medicine in the treatment of various ailments of the respiratory tract both in children and adults. All parts of the plant have been used for its therapeutic beneficiary effect from ancient times. The invention aims in the formulation of sweet hard lollipops using medicinal plant extract/s, especially for administration to pediatric patients for better patient compliance using the juice of vasaka leaves. Oral drug delivery is the most favored route for the administration of various medications and tablets are the most widely accepted dosage form. Solid dosage forms are popular because of the ease of administration, accurate dosage, self-medication, pain avoidance, and most importantly patient compliance. Among the major problems faced by many patients with the conventional tablet dosage form is difficulty in swallowing. This problem is more apparent when drinking water is not easily available to the patient taking medicine. Difficulty in swallowing (Dysphagia) is a common problem in all age groups, especially the elderly and pediatrics, because of physiological changes associated with those groups. Other categories that experience problems inducing conventional oral dosage forms including the mentally ill, uncooperative, and patients suffering from nausea, motion sickness, sudden episodes of allergic attack, or coughing. These problems led to the development of a novel type of solid oral dosage form hence, attractive, taste masking formulations are needed. In the case of liquid oral preparations, there is a high incidence of noncompliance and ineffective therapy in pediatric patients. The intravenous route is highly unacceptable to pediatric patients due to pain during administration. Pediatricstric differ from adults in many aspects of pharmacotherapy, including capabilities for drug administration, medicine-related toxicity, and taste preferences. Hence, pediatric medicines are formulated to best suit the patient's age, size, physiologic condition, and treatment requirements. In spite of all its disadvantages, the oral route still remains the most preferred route because of its ease of ingestion, pain avoidance, and versatility ease of administration to pediatric, geriatric, and neurodegenerative disease patients, local action, rapid release products, and buccoadhesive systems -to release the drug in a controlled fashion.

Anatomy of Buccal Mucosa:

The buccal mucosa is comprised of the mucosal surfaces of the cheeksand lips, which form the anterolateral boundaries of the oral vestibule. It is contiguous with the mucosathat lines the floor of the mouth and alveolar ridges. There are approximately 800–1000 minor salivaryglands located throughout the buccal mucosa as well as other parts of the contiguous oral mucosa. The thickness of the epithelium in the buccal area in adult humans is about 500-800m and of 100cm an average surface area. Buccal mucosa becomes recently a very attractive site for the administrationof various Pharmaceutical dosage forms due to the potential benefits offered by this route.

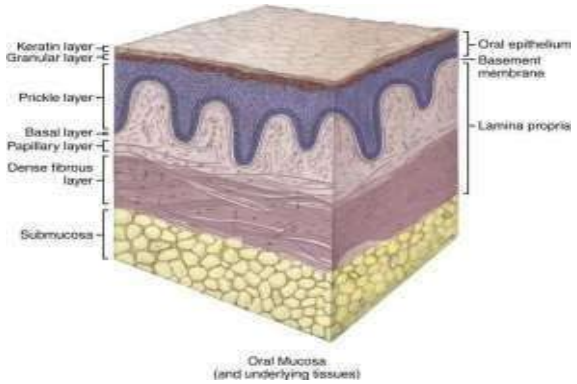


Figure 01: Structure of mucosa

Composition of Mucus Layer:

Mucus is a translucent and viscid secretion that forms a thin, contentious gel, mean thickness of this layer varies from about 50-450µm in humans secreted by the global cells lining the epithelia or by special expensive glands with mucus cell acini. It has the following general composition-

Water- 95%

Glycoprotein and lipids- 0.5-3.00%

Mineral salts- 1%

Free proteins- 0.5-1.0%

Advantages of Oral Mucosal Drug Delivery System:

1. Bypass of the gastrointestinal tract and hepatic partake system, increasing the bioavailability of orally administered drugs that otherwise undergo hepatic first-pass metabolism. In addition, the drug is protected from degradation due to the pH and digestive enzymes of the middle gastrointestinal tract.
2. The large contact surface of the oral cavity contributes to rapid and extensive drug absorption.
3. Oral mucosal delivery occurs is less variable between patients, resulting in lower inter-subject variability as compared to transdermal patches.
4. Improved patient compliance due to the elimination of associated pain with injections; the convenience of administration as compared to injections or oral medication.
5. Sustained drug delivery.
6. A relatively rapid onset of action can be achieved relative to the oral route, and the formulation can be removed if therapy is required to be discontinued.
7. Increased ease of drug administration.
8. In comparison to TDDS, mucosal surface does not have a stratum corneum. Thus, the major barrier layer to transdermal drug delivery is not a factor in oral mucosal routes of administration. Hence oral mucosal systems exhibit a faster initiation and decline of delivery than do transdermal patches.

Medicated Lollipop:

Lollipops are solid dosage forms, containing the medicament in a sweetened and flavored base, intended to dissolve slowly in the mouth. Lollipops have mainly contained the additives like sweetening agents, flavoring agents, coloring agents, opacifiers, and stabilizing agents. Medicated lollipops are slow-dissolving delivery systems. They dissolve in the oral cavity within 1 to 10 minutes. Lollipops are large sugar-boiled confectionary of various flavors attached to a plastic stick that can be consumed over a long period of time through licking. The plastic stick is used to hold the confection (medicament) together. Lollipops are solid unit dosage form of medicament which is meant to be dissolved in the mouth (or) pharynx. The development of lollipops dates back to 20th century and is still in commercial production. Most of the lollipop preparations are available over-the-counter medications. Lollipops provide a palatable means of dosage forms administration and enjoy its position in pharmaceutical market owing to its several advantages but it suffers from certain disadvantages too. They contain one (or) more medicament usually in a flavored, sweetened base. Lollipops are most often used for localized effects in the mouth. They can also be used for systemic effects if the drug is well absorbed through the buccal lining.[1]

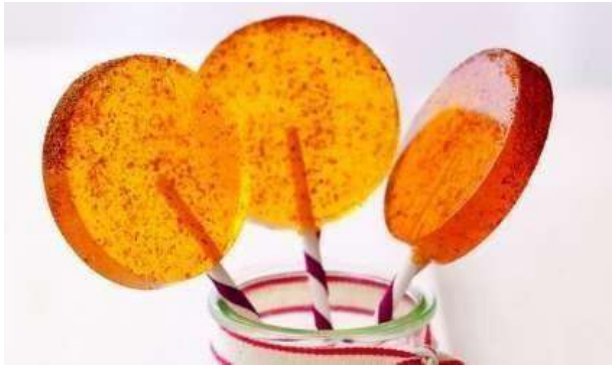


Figure 02 : Medicated lollipops

History of Lollipops:

The idea of an edible candy on stick is very simple, and it is probable that the lollipops has been invented and reinvented numerous times. The first confectioneries that closely resemble what we call lollipops date to the middle ages, when the nobility would often eat boiled sugar with the aid of stick or handles. The invention of the modern lollipops is still something of mystery but a number of American companies in the early 20th century have laid claim to it. According to the book food for thought: extraordinary little chronicles of the world, they were invented by George smith of New Haven, Connecticut, who started making large boiled sweet mounted on stick in 1908. he named them after a racehorse of the time, lolly pop and trademarked the lollipop name in 1931. The term 'lollipop' was recorded by English lexicographer Francis Grose in 1796. The term derived from the term "lolly" means tongue and "pop" mean slap. The first references to the lollipop in its modern context date to the 1920. Alternatively, it may be a word of Romany origin being related to the Roma tradition of selling toffee apples sold on stick. Red apple in the Romany language is loli phaba [2]

Advantages of Medicated Lollipops:

1. Do not require water intake for administration. Technique is non-invasive and it is the case with parenteral.
2. Lollipops are early to prepare with minimum amount of equipment and time.
3. Lollipops can be given to those patients who have difficulty in swallowing.
4. Having formulas that are easy to change and can be patient specific.
5. Bypass of the gastrointestinal tract and hepatic partake system, increasing the bioavailability of orally administered drug that otherwise undergo hepatic first-pass metabolism. In addition, the drug is protected from degradation due to pH and digestive enzyme of the middle gastrointestinal tract.
6. It can reduce dosing frequency.
7. Systemic absorption of drug can be possible through buccal cavity.[3]

Mechanism of action of Medicated Lollipop:

With our lollipop delivery system, a drug is absorbed more rapidly through the mucosa of the mouth, than when the drug is swallowed and absorbed via the digestive system. The dose can be easily controlled by administering a lollipop until the desired effect is achieved. fun to consume. Additionally, they don't require water, which means they can be taken anywhere and anytime.

HOW DOES IT WORK?

Medicated lollipops release drugs slowly as a patient sucks or rotates a lollipop in the mouth. The medicine acts locally or systemically after absorption by buccal mucosa. [4]

Types of Medicated Lollipops:

I. Hard Lollipop:

Hard lollipops might be considered solid syrups of sugars. These dosage forms are made by heating sugars and other ingredients together and then pouring the mixture into a mold. Hard lollipops are similar to hard candy. In fact, many hard lollipops formulas are modifications of hard candy formulas. The dosage form needs low moisture content. So water is evaporated off by boiling the sugar mixture during the compound process. Hard candy lollipops are mixtures of sugar and other carbohydrates in an amorphous (non-crystalline) (or) glassy condition.

- These lollipops can be considered solid syrups of sugars and usually have a moisture content of 0.5%
- 1.5%. Hard lollipops should not disintegrate but instead provide a slow, uniform dissolution (or) erosion over 30 minutes.

II. Soft Lollipops:

Soft lollipops have become popular because of ease with they can be extemporaneously prepared and their applicability to a wide variety of drugs. The base usually consists of a mixture of various PEGs, acacia (or) similar materials glycerol gelatin (or) an acacia: sucrose base. These lollipops may be coloured and flavored and they can be either slowly dissolved in the mouth (or) chewed, depending on the intended effect of the incorporated drug. [5]

Types of delivery of medicated lollipop:

The medicated lollipop is often used in children to treat pain from painful surgery or diagnostic procedures. Medicated lollipops obviously comprise the incorporation of a drug into a candy matrix, which is subsequently placed in the buccal area. A proportion of the dissolved drug diffuses across the oral mucosa and is absorbed, while the remainder is absorbed or eliminated via the gastrointestinal tract. They are widely used for topical delivery in the oral cavity and systemic delivery into blood stream.

Types:

a. Medicated lollipops for local drug delivery.
b. Medicated lollipops for systemic drug delivery

Uses of Medicated Lollipop:

Medicated lollipops are commonly used to treat problems such as infections and inflammation of the oral cavity. Topical preparations are often preferable to systemic meds due to the local effect. Advantages of using a medicated lollipop versus oral dosage forms include a reduction in gastric irritation, bypass of first pass hepatic metabolism and more rapid onset of action.Lollipops can provide a retention time of up to 30 minutes in the mouth, compared to a conventional form of lozenges having a retention time of about 7 minutes. In particular, it is easier for a child to hold a lollipop in the mouth than it is to retain a lozenge.Oral thrush is a disorder caused by infection of the mouth due to the fungus (yeast) Candida albicans. Lollipops containing antifungal medications can provide an attractive alternative formulation in the treatment of oral thrush in pediatric patients.

Lollipops can be compounded for:

- Treatment of infection or inflammation
- Topical anesthetic
- Sedation
- Smoking cessation
- Nausea [6]

DRUG AND EXCIPIENT PROFILE

Active ingredients

1. Vasaka (Adhatoda vasica Nees):

a. Classification:

Kingdom:

Plantae Division:

Angiosperma

Class:

Dicotyledoneae

Order:

Tubiflorae

Family:

Acanthaceae

Genus:

Adhatoda

Species:

vasica Nees

Figure 03: Adhatoda Vasica

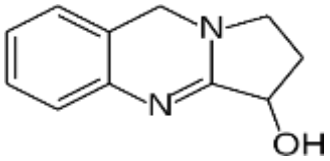
b. Part used:

Leaves

c. Phytochemistry:

Leaves contain vasicine as the major bioactive pyrralazoquinazoline alkaloid. Also contain other alkaloids viz., vesical, adhatonine, vaticinate, vaticinal, vasicinolone: aliphatic hydro ketones viz., 37-hydroxyhexatetracont-1-en-15 one and 37 -hydroxy hentetracontan-19- one.

d. Marker constituent: Vasicine



Molecular formula:

C11H12N2O

Molecular Weight:

188.23

e. **Therapeutic use:**

Bronchodilator, expectorant

f. **Macroscopic characters:**

Color and Appearance:

Leaves are simple, petiolate, broad, glabrous, and mostly elliptic- lanceolateto ovate-lanceolate. They have a slightly crenate or entire margin. The dorsal surface is green in colorbut the ventral one is slightly pale. 8-12 pairs of bilateral veins that are reticulated.

Taste:

Bitter

Odor:

Characteristic odor[7]

2. Ginger (Zingiber officinale Roscoe):

a. Classification:

Kingdom:

Plantae Division:

Angiosperms

Class:

Monocotyledoneae

Order:

Scitaminaea

Family:

Zingiberaceae

Genus:

Zingiber

Species:

officinale Roscoe

Figure 04:Ginger

b. Part used:

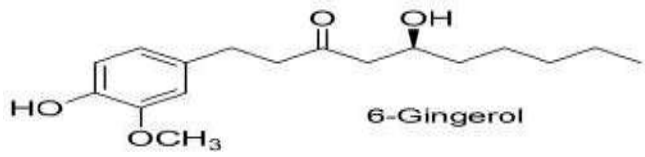
Rhizome

c. Phytochemistry:

Contains oleoresin (-5.3 8.6%) comprising of nonvolatile pungent principles (gingerols mainly [6]-gingerol), nonpungent substances (fats and waxes) and volatile oil (-1.5-2.2%) containing sesquiterpene hydrocarbons viz., a-zingiberene,ß-sesquiphellandrene and ar-curumene as major constituents (The composition of volatile oil varies according to origin and changes upon storage). lipids (-6-8%), proteins (-10%), strach (-40-60%). Contains numerous monoterpene and sesquiterpene hydrocarbons and their oxygenated derivatives in volatile oil, other pungent principles viz., shogaols (anhydro-gingerols, generally absent in fresh ginger), paradols, gingerdiols, gingerdiacetates, gingerdiones, 6-ginger sulfoni acid, gingerenones anda number of diarylheptanoids; diterpenes; ginger glycolipids A, B & C.

d. Marker constituent:

6-Gingerol



Molecular Formula:
C17H26O4
Molecular Weight:
294,40

e. Therapeutic use:
Carminative, antiemetic, anti-inflammatory.

f. Macroscopic characters:

Color & Appearance:
Yellowish Brown or light brown. Scraped rhizome with butt external surface showing longitudinal striations and occasional loose fibers, outer surface dark brown and more or less covered with cork which shows conspicuous, narrow, longitudinal and transverse ridges.

Odor:
Aromatic
Taste:
Pungent[8

3. Turmaric:

a. Classification:

Kingdom:
Plantae
Division:
Angiospermae
Class:
Monocotyledoneae
Order:
Scitamineae
Family:
Zingiberaceae
Genus:
Curcuma
Species:
longa Linn.

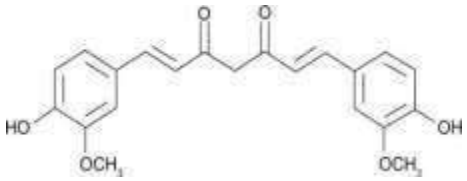
Figure 05: Turmeric

b. Part used:
Rhizome

c. **Phytochemistry:**
Major bio-active consents of the rhizomes are curcuminoids, the yellow colouring principles, of which curcumin constitutes the major; Essential oil with high content of bisabolane derivatives. It also contains desmethoxycurcumin, bisdesmethoxycurcumin dihydrocurcumin; common phytosterols, fatty acids and polysaccharides, viz., ukonan A,B,C & D

d. Marker Constituent:

Curcumin (diferuloyl methane)



Molecular Formula:
C21H20O6
Molecular weight:
368.39

e. **Therapeutic use:**
Anti-inflammatory, stomachic, tonic, spasmolytic.

f. Macroscopic Characters:
Color and Appearance: The central or primary rhizome ovate, oblong or cylindrical to elongate, conical and varies from 3-8 cm in length and 2 or 3 cm in diameter. Externally yellowish to yellowish brown with root scars and annulations.
Odor:
Aromatic.
Taste:
Warmly aromatic and bitter.[9]

4. Clove:

a. Classification:

Kingdom:
Plantae
Division:
Magnoliophyta
Class:
Dicotyledons
Order:

Myrtales

Family:

Myrtaceae

Genus:

Syzygium

Species:

S. aromaticum

Figure 06: Clove

b. Part used:

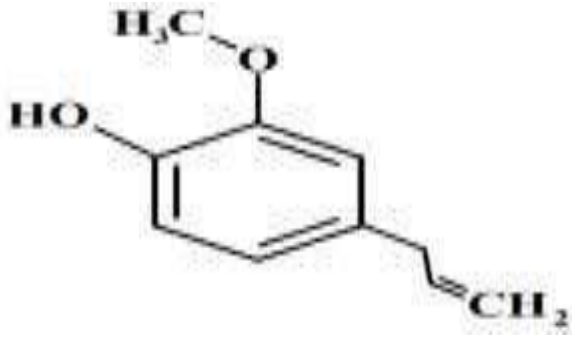
Flower Bud.

c. Phytochemistry:

Clove contains about 15 to 20 percent of volatile oil; 10 percent to 13 percent of tannin (gallotannic acid), resin, chromone, and eugenin. The volatile oil of the drug contains eugenol (about 70 to 90 percent), eugenol acetate, Caryophyllenes, and small quantities of esters, ketones, and alcohol. Oil of the clove is colorless to pale yellow in colour. It becomes thick and darker in color on storage. It has a specific gravity of 1.038-1.06, the refractive index is 1.527 to 1.535 and it boils at 250°C.

d. **Marker constituent:**

Eugenol



Molecular formula:

C10H12O2

Molecular Weight:

164.2 g/mol.

e. **Therapeutic use:**

Analgesic, Antibacterial, Antiviral.

f. Macroscopic Characters:

Color:

Crimson to dark brown

Odor:

Slightly aromatic

Taste:

Pungent and aromatic followed by numbness

Size:

About 10 to 17.5 mm in length, 4 mm in width, Size, and 2 mm thick.

Shape:

Hypanthium is surmounted with 4 thick acute divergent sepals surrounded by a domeshapedcorolla. The corolla consists of unexpanded membranous petals with several stamens and a single stiff prominent style. Cloves are heavier.[10]

5. Honey:

a. Synonym:

Madhu, Honey Purified, Mel Biological Source

b. Biological source:

Honey is a sugar secretion deposited in the honeycomb by the bees, Apis mellifera, Apis dorsata, and other species of Apis, belonging to the family Apidae, order Hymenoptera.

c. Description:

Color:

Pale yellow to yellowish-brown liquid

Odor:

Characteristic, pleasant

Taste:

Sweet and faintly acid

Figure 07: Honey

Chemical Constituents:

Honey is an aqueous solution of glucose 35 per cent (± 3 percent), fructose 45 percent (+ 5 per cent and sucrose about 2 per cent. The proportion of sugar may vary depending upon the source of nectar and the enzymatic activity responsible for converting nectar into the honey. The other constituents of honey are maltose, gum, traces of succinic acid, acetic acid, dextrin, formic acid, colouring matters, enzymes (invertase, diastase, and inulase) and traces of vitamins. Proteins and pollen grains from various flowers are also found in honey. Since, honey is a saturated solution of sugar, on keeping, it starts crystallising. A product which contains crystallised dextrose is called as Granulated honey. Heating of honey serves the purpose of minimising the granulation. Artificial invert sugar, an adulterant of honey contains furfural which is detected by Fiehe's test. It gives instant red colour with resorcinol in hydrochloric acid.

Standards of Quality:

It is soluble in water, but insoluble in alcohol. It has to pass limit tests for chloride and sulfate It is a syrupy thick liquid, translucent when fresh, and on keeping it becomes opaque and granular due to the crystallization of glucose.

Uses:

Honey is used as a demulcent and sweetening agent. It is readily assimilated and hence is a good nutrient for infants and patients. It is antiseptic and applied to burns and wounds. It is a common ingredient of several cough mixtures, cough drops, and vehicles for Ayurvedic formulations. Currently, it is used in the preparation of creams, lotions, soft drinks, and candies also. [11]

Excipients

Excipient for Medicated Lollipop and their Functions:

Thousands of different excipients are used in medicines and make up, on average, about 90% of each product.

The ideal characteristics of an excipient are given as:

- Chemically stable
- Nonreactive
- Low equipment and process
- Sensitive
- Inert to human body
- Non toxic
- Acceptable with regards to organoleptic
- characteristics Economical
- Having efficiency in regards with the intended use.

1. Sugar

The main ingredient in a standard lollipop is sugar. Sugars are fully hydrated carbon chains, meaning that there is a water molecule attached to each carbon. Sugars come in two forms; straight-chain and ring form. When sugars are in straight-chain form, aldehyde, and ketone groups are open, which leaves them very susceptible to reaction. In this state, sugars are unstable. In-ring form, sugars are stable and therefore exist in this form in most foods, including lollipops. Sugar is a very versatile ingredient and is used in a wide variety of food products. Sugar interacts differently depending on the presence of other ingredients and on various treatments. When heated enough to break the molecules apart, sugar generates a complex flavor, changes color, and creates a pleasing aroma. Sugar can form two types of solids in foods; crystalline and glassy amorphous. Crystalline solids can be found in food products such as fondant, fudge, and buttercreams, while glassy amorphous solids can be found in products such as lollipops, marshmallows, and caramels. Glassy amorphous solids result when moderate sugar concentrations (50% solutions) are heated to high temperatures, eliminating nearly all moisture. The final moisture content is around 1%-2%, whereas the final moisture content in crystalline candies is 8%-12%. Some common inhibitors used in lollipop

production are corn syrup, cream of tartar, honey, and butter.

2. Water

The second most important ingredient in lollipop production is water. Although the moisture content falls to less than 2% at the end of the lollipop-making process, water is required at the start of the process.

3. Coloring agent

Additional colorings can be added to the final product, but are not a part of the main structure of a simple lollipop.

4. Flavoring agents

Flavoring agents are additives substances that give a tablet an additional taste or flavor. In particular, they help in masking the unpleasant tastes of drugs/excipients and instead improve the quality of their taste. This is especially important in the case of pediatric patients, as it could significantly impact their willingness to take a formulation and their adherence to medications. The flavor of a formulation is often matched with its color, which further enhances patient acceptability. It is worth noting that sweetening agents are also often used as flavoring agents. Due to their high sensitivity to heat, the use of flavoring agents in processes involving elevated temperatures should be avoided. There are different flavoring agents are present in the market.[12]

MATERIALS AND METHOD

Material:

Table 01: Material and their occurrence

Sr. No.	Material	Occurrence
1	Vasaka	Fresh leaves of *A. vasica*, leaves were collected from the plants growing in the medicinal garden Abasaheb kakade college of B pharmacy Bodhegaon
2	Ginger	The dried rhizome of the zinger is collected from the Pharmacognosy lab of Abasaheb kakade college of B pharmacy Bodhegaon
3	Turmeric	The driedd rhizome of the turmeric is collected from the Pharmacognosy lab Abasaheb kakade college of B Pharmacy Bodhegaon
4	Clove	The clove buds are collected from the Pharmacognosy lab ofAbasaheb kakade college of b Pharmacy Bodhegaon
5	Honey	Honey is collected from the Pharmacognosy lab Abasaheb kakade college of B Pharmacy Bodhegaon
6	Sugar	Sugar is collected from the grocery store.
7	Water	Water is collected from the Pharmacognosy lab of Abasaheb kakade college of B Pharmacy Bodhegaon
8	Coloring agent	The coloring agent is collected from the grocery store.
9	Flavoring agent	The flavoring agent is collected from the grocery store.

Methods:

Methods of extraction:

1. vasaka:

For the preparation of swarms from fresh leaves of A. vasica, leaves were collected from the plants growing on our campus. For the preparation of swarms from dry leaves, the leaves were dried at 55° in a hot air oven, stored in an airtight container, and powdered to 40 mesh whenever required. Where 100 g of dry leaf powder, and 200 ml of water were added and macerated for 24 h at room temperature. The above mixture was taken in 4 layered muslin cloth and squeezed to take out the juice. The juice obtained was measured.[13]

2. Turmeric

Dried rhizomes were triturated using a mortar and screened through a sieve with mesh 80 to obtain a uniform powder. The turmeric powder was stored in the refrigerator to prevent moisture uptake. The Soxhlet extraction, as the reference method, was performed as follows: 15 g ground turmeric powder was weighed and put in the Soxhlet apparatus which was gradually filled with acetone as the extraction solvent. After Soxhlet extraction, extracts were concentrated using a process of evaporation by using a water bath.[14]

3. Clove:

The ground clove bud samples (30 g) were weighed and quantitatively transferred into a filter paper extraction thimble and inserted into a 500-ml reflux flask, then extracted with 250 ml absolute ethanol for about 6 h in a Soxhlet apparatus. After Soxhlet extraction, extracts were concentrated using a process of evaporation by using a water bath.[15]

4. Ginger:

For maceration, 10 g of ginger were each weighed and placed in a round bottom flask adding 200 mL of appropriate organic solvent ie. ethanol. The sample was then refluxed at 90℃ for 30 minutes. After solvent extraction, the ginger for each extract was then filtered through a cotton-wrapped muslin cloth with an additional 100 ml of the same fresh solvent into a conical flask. The extracts were then passed through a filter paper (Whatman No.1). The extracts of ginger were then evaporated using a water bath.[16]

Formulation table for two lollipops:

Table 02 : Formulation table

Sr. No.	Content	Quality given			Category
		F1	F2	F3	
1.	Vasaka extract	35 gm	35 gm	35 gm	Bronchodilator expectorant
2.	Clove extract	2.5 gm	2.4 gm	2 gm	Antibacterial
3.	Ginger extract	4 gm	3 gm	5 gm	anti-inflammatory
4.	Turmeric extract	7 gm	6 gm	5 gm	Anti-inflammatory
5.	Honey	10 ml	6 ml	7 ml	Demulcent and sweetening agent
6.	Sugar	35 gm	40gm	30 gm	Sweetening agent
7.	Citric acid	0.6 gm	0.5 gm	0.5 gm	Flavor
8.	Water	q.s	q.s	q.s	Solvent

EXPERIMENTAL WORK / FORMULATION PROCESS

Figure 8: Measured quantity of sugar and water

1. **Take a given quantity of sugar and water.**

Figure 09: Dissolution

2. **Dissolve the sugar in water into a bowl and heat it over a burner. Starr continuously so it does not burn.**

Figure 10: Boiling

3. **Add honey and oil the mixture for about 10 min.**

Figure 11: Addition of Colour

4.Add food color and flavor when the sugar

Figure 12: Addition of extract

5. **Add the liquid extract as per the given quantity. Mixture has boiled.**

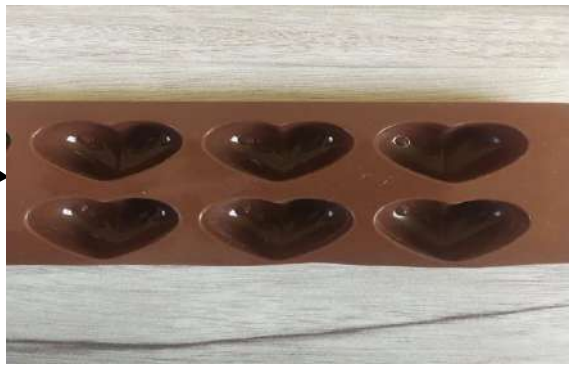


Figure 13: Pouring the Mixture in Mould

6. **Put lollipop sticks in the lollipop mould and fill the lollipop mould.**

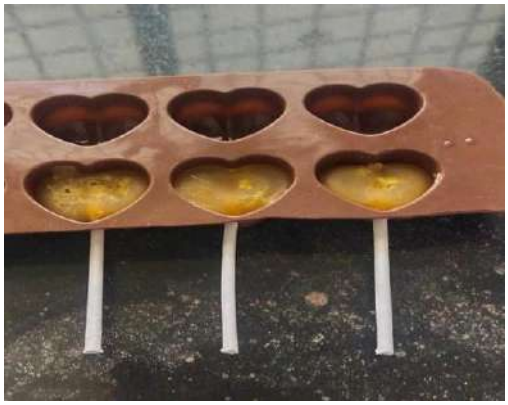


Figure 14: Cooling Of Lollipops

7. **Let the lollipop cool for at least 15 min. before removing them from the mould.**

Figure 15: Formulated Lollipops

8. **Remove the lollipops from the mould.**

Figure 16: Packaging of lollipop

9. **Pack the lollipops in clear or colored wrappers. Pack all the prepared lollipops in a glass container.[17]**

EVALUATION TEST

Evaluation parameters for the lollipops are given as below

a. General Appearance
b. Weight variation test
c. Hardness
d. Thickness
e. Friability

1. General Appearance:

To check the colour, odour, taste, shape, and touch.

2. Weight variation test:

The weight variation test is run by weighing 5 lollipops individually, calculating the average weight, and comparing the individual lollipops' weight to the average. The measure of weight variation is expressed as a percentage using the formula. The requirements are met if the weights of not more than two of the lolipop differ from the average weight.

Figure 17: Weight Variation Test

3. Hardness:

Lollipops require a certain amount of strength, or hardness and resistance to friability, to withstand mechanical shocks of handling in manufacture, packaging and shipping. The hardness of lollipop was determined using Monsanto hardness tester. It is expressed in kg/cm2. The hardness of 5 lollipops was determined and the average value with standard deviation was recorded.

Figure 18: Hardness Test

4. Thickness:

Thickness of lollipops was measure by using Vernier caliper. It was determined by checking the thickness of 5 lollipops and the average value with standard deviation was recorded.

5. Friability:

Roche friabilator was used for testing friability. Five lollipops were weighted accurately and placed in the tumbling apparatus that revolves at 25 rpm for about four minutes. Then the lollipops were weighted and percentage loss in lollipop weight was determined.

F= Initial weight – Final weight / Initial weight x 100.

Figure 19: Friability Test

General appearance

Table 03: Parameters for general occurrences

Sr. No.	Parameters	Observations		
		F1	F2	F3
1	Color	Faint yellow	Faint yellow	Yellow
2	Odor	Sweet	Sweet	Sweet
3	Taste	Sweet	Sweet	Sweet
4	Shape	Heart Shape	Heart Shape	Heart shape
5	Touch	Soft	Hard	Hard

Observation of evaluation test for F1

Table 04: Observation of evaluation test for formulation 1

Sr. No	Weight Uniformity(mg)	Hardness Kg/cm	Thickness (mm)	Friability (%)
1	8.1	39.2	12.30	1.12
2	7.9	38.56	11.25	1.65
3	7.61	40.23	11.57	0.90
4	8.2	38.45	11.02	1.56
5	7.40	40.06	12.20	1.02

Observation of evaluation test for F2

Table 05: Observation of evaluation test for formulation 2

Sr. No	Weight Uniformity(mg)	Hardness Kg/cm	Thickness (mm)	Friability (%)
1	7.76	45.88	11.34	0.40
2	7.34	47.40	11.27	0.46
3	7.21	49.20	10.97	0.37
4	7.87	50.70	11.64	0.32
5	7.65	52.71	11.20	0.52

Observation of evaluation test for F3

Table 06: Observation of evaluation test for formulation 3

Sr. No	Weight Uniformity(mg)	Hardness Kg/cm	Thickness (mm)	Friability (%)
1	7.10	38.88	12.34	0.50
2	7.65	37.40	11.27	0.58
3	7.61	40.20	10.57	0.70
4	7.30	39.70	11.64	0.58
5	7.40	40.71	12.57	0.74

RESULT AND DISCUSSION:

The formulation of lollipops is an easy and time-saving process. It is a formulation that is more organoleptically accepted particularly by pediatric patients. Medicated lollipops will be ideal dosage forms for pediatric patients. These will have additional advantages of patient compliance, convenience, and comfort for efficient treatment including low dose, immediate onset of action, reduced dosage regimen, and economic. This will offer a better innovative dosage form. Lollipops enjoy an important position in pharmacy and will continue to remain the same in future pharmacy and will continue to remain at the same in future. Vasaka has proven bronchodilator activity. Thus, herbal lollipops are formulated from an aqueous extract of vasaka with a bitter taste masked with sugar and are easy for pediatric patients to administer. It can also be an ideal choice for traveling patients as it eliminates the need for water for its administration. The cost of the formulation is reduced as it is easy to manufacture this formulation on a large scale.

SUMMARY AND CONCLUSION:

In the present study, an attempt was made to formulate and evaluate herbal lollipops of vasaka extract for the treatment of cough, cold, and sore throat. The main interest in such formulation was for the development of a new herbal dosage form and to see the effect of different herbal drugs on a cough, cold, and sore throat. Herbal lollipops of vasaka extract were prepared by heating and congealing methods. In this study, various formulations were developed using citric acid, and sugar. Evaluation parameters like thickness, weight variation, and hardness show that they were within the limits. It can be concluded that the formulations F3 show better results as compared to F1 & F2. The formulation containing color improves the texture, appearance of the lollipops.

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HOW TO CITE: Khandagale Sandip Suresh, Mahalkar Ram Babasaheb, Madane Somnath Jotiram, Patil Onkar Ganpat, Dabhade Sakshi kailasrao, Salve Dvitiya Shantilal, To Study The Preparation Formulation And Evaluation Of Medicated Lollipop, Int. J. of Pharm. Sci., 2024, Vol 2, Issue 5, 1275-1291. https://doi.org/10.5281/zenodo.11264459