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Formulation and Evaluation of Pediatric Herbal Cough Chocolate

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ABSTRACT :

Chocolate is a child's favorite snack, yet they detest medicine. Therefore, the goal of this research was to create chocolate that contains a medication. For example, medicated chocolate to stop coughing. Viral infections are the most common cause of coughing in children. Tulsi, also known as *Ocimum sanctum*, is a popular herbal treatment with a number of important therapeutic benefits, such as antitussive (cough-relieving) actions. The sweet gets its unique spiciness from ginger. A medicinal plant called *adulsa* contributes its inherent bitterness and respiratory health benefits. Customers are looking for fresh, aromatic, tasty, and healthful cuisine. Because of their many therapeutic benefits and historical usage in traditional medical systems, ginger and *adulsa* have become popular choices. Chocolate is a food that may be used to create a wide range of flavor and texture combinations. The five primary taste sensations that humans normally experience are sweet, sour, bitter, salty, and savory. Since sweet is one of the most pleasurable, sweetness-especially from high-calorie saccharides-plays a crucial role in making the formulation appealing, especially to young consumers.

Herbs used to treat the cough in pediatrics such as *Adulsa*, Ginger and Tulsi.

Key words: Medicated chocolate, cough, pediatric, *Adulsa*, Ginger, Tulsi, Honey, Antitussive activity.

Literature Review:

1. **Khartude et al. :** The chocolate is most loving food of children where as the medicine is hating substance. So, objective of present study was to formulate the chocolate that contain drug i.e., medicated chocolate to prevent the disease. In children cough, viral infection is most common diseases. *Ocimum sanctum*, Tulsi is the herbal drug which having several medicinal properties, antitussive activity is one of them. Thus, we have to formulate the chocolate with aqueous extract of tulsi that gives antitussive activity.
2. **Koka et al. :** For years, chocolate/cocoa has been prized for its flavor and potential health benefits. Because most medications are bitter, oral delivery of Revised on 22 July 2021, Accepted on 11 August 2021 these medications results in patient noncompliance, particularly in DOI: 10.20959/wjpps202111-21405 children. To solve these limitations, it is proposed that a dosage form be developed that is most suitable for pediatric patients.
3. **Tamboli et al. :** The chocolate is most loving food of children where as the medicine is hating substance. So, objective of present study was to formulate the chocolate that contain drug i.e., medicated chocolate to prevent the disease. In children cough, viral infection is most common diseases. *Ocimum sanctum*, Tulsi is the herbal drug which having several medicinal properties, antitussive activity is one of them. Thus, we have to formulate the chocolate with aqueous extract of tulsi that gives antitussive activity.
4. **Patole et al. :** The chocolate is most loving food of children where as the medicine is heating substance. So, objective of present study was to formulate the chocolate that contain drug i.e., medicated chocolate to prevent disease. In children cough, viral infection is most common diseases. *Ocimum Sanctum*, Tulsi is the herbal drug which having several medicinal properties, antitussive activity is one of them.
5. **Shreyash shinde et al. :** Herbs and spices play an important role for medicinal purposes. candy is a fast and effective delivery system for medications. The development of herbal candy using ginger and *Adulsa* represents an innovative approach to confectionary that merges traditional herbal remedies with the delightful world of sweet treats. Ginger infuses the candy with its distinctive spiciness. *Adulsa*, a medicinal plant adds a touch of natural bitterness and respiratory health properties.
6. **Sathe et al. :** Children's favorite food is chocolate, whereas medicine is a thing they hate. so, the purpose of this study was to develop chocolate that included a medicine, i.e., medicated chocolate, in order to prevent disease. In pediatrics cough, and viral infection are the most common diseases. *Cymbopogon Citratus* is an herb which is having several medicinal properties such as antimicrobial, antibacterial, activity, etc.

7. **Bhange et al. :** The aim of this study is to develop a pediatric - friendly herbal chocolate by combining medicine with one of children's favourite food, chocolate to make treatment more appealing. Cough and viral infections are common among children, and ocimum sanctum (Tulsi), a well known herbal remedy, has significant medicinal properties, including antitussive (cough relieving effects).
8. **Ghadage et al. :** Medicinal plants (including spices and herbs natural, safe and, offer wide range of cost effective, preventive and curative therapies which is useful in achieving goals of health for all (WHO;2002).Today, consumers are seeking for food that is healthy flavorful, fresh and aromatic Ginger (Zingiberofficinale) and Adulsa (Adhatodavasica) have emerged as popular choices due to their diverse medicinal properties and long-standing use in traditional medicine systems.

Need of work:

Children's favourite food is chocolate, whereas medicine is a thing they hate, so the purpose of this study was to develop chocolate that includes a medicine. Chocolate are attracted to the pediatrics towards the drugs. And herbs are purely extracted using and hence quickly relief from cough. Chocolate having colourish and smelling texture that helps to attracts the pediatrics.

Objectives:

1. Improved palatability
2. Natural ingredients
3. Antitussive properties
4. Drug delivery system
5. Masking unpleasant flavours
6. Anhydrous and resistant to microbial growth
7. Soothing effect

Introduction:

Cough:

Cough in pediatrics, whether acute or chronic, requires a systematic approach for diagnosis and management, focusing on identifying the underlying cause and providing appropriate treatment. Acute cough is often self-limiting and related to upper respiratory tract infections, while chronic cough (lasting over 4 weeks) warrants further evaluation.

Acute viral upper respiratory tract infections are the most frequent cause of coughing in children^[1]. When children initially start attending a childcare center, the incidence of upper respiratory tract infections and the accompanying cough is higher and typically occurs every three weeks^[2]. An upper respiratory tract infection-related cough usually goes away in three weeks. Children can get a cough from a variety of infectious reasons, including viruses, pertussis, mycoplasma, Chlamydia pneumoniae, fungus,

Here's a more detailed breakdown:

1. Types of Cough:

- Acute Cough: Typically caused by viral infections, resolves within a few weeks.
- Subacute Cough: Lasts 3-8 weeks.
- Chronic Cough: Lasts longer than 8 weeks (or 4 weeks, according to some guidelines).
- Refractory Cough: A chronic cough that doesn't respond to treatment.

2. Causes of Cough in Children:

- Acute Cough:

Upper respiratory tract infections (URTIs). Viral infections (common cold, influenza, etc.). Bacterial infections (less common).

- Chronic Cough:

Asthma.

Postnasal drip.

Gastroesophageal reflux (GERD). Allergies.

Persistent bacterial bronchitis (PBB). Upper airway cough syndrome.

Foreign body aspiration.

Infections (e.g., pertussis, mycobacterial infections). Cystic fibrosis.

Congenital heart disease.

• Other:

Habit cough.

Cough due to medication side effects (e.g., ACE inhibitors). Psychogenic cough.

3. Evaluation and Management:

History and Physical Exam:

A thorough history is crucial, including the duration, characteristics (wet/dry, frequency, timing), and any associated symptoms.

Chocolate:

Chocolate is a versatile food^[1] Chocolate is a great way to deliver active medications^[2]. Chocolate is a food that may be combined with a variety of substances to provide a distinctive flavor and texture. Cocoa is the primary ingredient of chocolate. The term "chocolate drug delivery system" refers to a medicine that is both incorporated into and released from chocolate^[3]. It is the greatest medication delivery method designed especially for kids. As a blend of several triglycerides, cocoa butter is the most significant component of chocolate^[4]. The herbal chocolate mixture is used to cure children's coughs and to strengthen the immune system^[5].

The process of making medicated chocolate involves combining the medication with a chocolate base. A chocolate drug delivery system is one in which the medicine is both released from and integrated into the chocolate^[6]. Children are more likely to take medicated herbal chocolate. In order to help reduce prevention, this project aims to make "medicated chocolate," which combines chocolate with medical ingredients. Children frequently suffer from viral infections and coughs. The therapeutic qualities of tulsi, ginger, and adulsa include antitussive (cough-relieving) actions. In this project focus on formulating medicated chocolate from extraction of herbs to provide anti-tusive benefits. Aim of this study to prepare the pediatric herbal cough chocolate and evaluate the parameters of prepared formulations.



Fig 1. Formulation of herbal cough chocolate

Physical properties of chocolate:^[7]

1. Cocoa butter and cocoa powder are the most prevalent forms of chocolate.
2. Producing in solid chocolate at room temperature that rapidly melts once inside the mouth.
3. A smooth glossy, shine and snap will come from a consistent crystal structure.

4. The crystal form of chocolate is the most stable.
5. As the room temperature of cocoa butter rises, it transforms into a less stable, form that melts below room temperature.

The following herbs to formulate chocolate for the cough -

1. Adulsa (used to treat cough, ability to help with respiratory issues)
2. Ginger (anti inflammatory and antioxidant properties, natural remedy for pediatric coughs)
3. Tulsi. (provide comfort from cough,soothe the throat and helps with mucus)

Drugs profile:

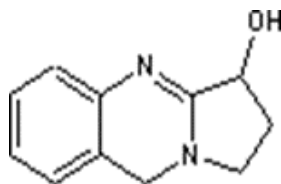
Herbal medicines for cough:

1. Adulsa:



Fig 2. Justicia adhatoda L.

Vasicine



Biological name - Justicia adhatoda L. Biological source - Adhatoda vasica L. Nees Family - Acanthacea

Apperance - dark green, lance - shaped leaves and small, white or purple - tinged flowers. Chemical constituents - alkaloids, vasicine and vasicinine , along with other compounds like flavonoids, tannins and essential oils.

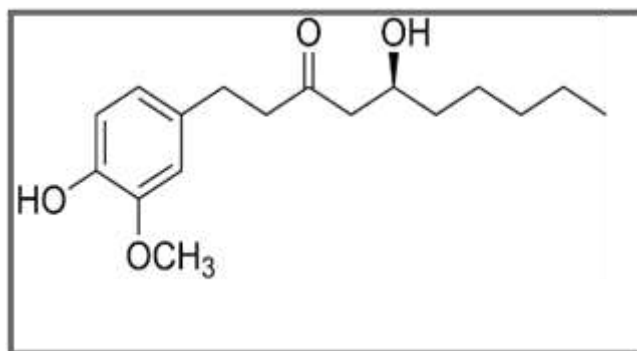
Uses - 1. Used in cough syrups to help relieve cough and colds especially in children.

1. It acting as decongestant and expectorant.
2. Used boosting immunity.
3. Used to treat cough, asthma, fever, bronchodilator,etc
4. Adulsa commonly used in traditional medicine.

2. Ginger:



Fig 3. Zingiber officinale



Gingerol

Biological name - Zingiber officinale

Biological source - rhizome (underground stem) of zingiber officinale plant. Family - Zingiberraceae

Apperance - It is reed - like herb with long, narrow, green leaves and rhizome is a rough, knotty, light brown to cream - coloured underground stem.

Chemical constituents - 1 to 12 % volatile oil , gingerol, alpha - zingiberol, gingerone, shogaol

Uses –

1. It is helpful natural remedy for pediatric coughs due to its anti -inflamamtoty & antimicrobial properties.
2. It can help fight off infections that might be causing the cough.
3. used as flavouring agent.
4. used in remedies of cough and asthma.

5. Tulsi:



Fig.4. Ocimum Henuiflorum Biological name -Ocimum Henuiflorum

Biological source - Tulsi is made from fresh and dried leaves of Ocimum Sanctum and ocimum basilicum plants^[8].

Family - lamiaceae

Apperance - It is a erect, much branched sub- shrub 30- 60 cm tall, with simple opposite green or purple leaves.

Chemical constituents - camphor, germacrene, caryoophyllene and bisabolene Uses –

1. It is ayurvedic cough reliever
2. Relives from cough and bronchitis.

Fig 5. Components of tulsi ^[9]

Treatment:

1. Adulsa - known for its expectorant properties, it helps loosen and expel mucus from expiratory tract, easing breathing and relieving cough^[10].
2. Ginger -Ginger has natural anti- inflammatory and pain-relieving properties, which can help soothe a sore throat and reduce cough- related discomfort^[11].
3. Tulsi (Holy Basil) - Tulsi is known for its anti-inflammatory and immune - boosting properties, which can help soothe the throat and reduce severity of coughs and colds^[11].

Advantages of herbal chocolate^[12]

1. Improved palatability
2. Natural ingredients
3. Antitussive properties
4. Drug delivery system
5. Masking unpleasant flavours
6. Anhydrous and resistant to microbial growth
7. Soothing effect

Formulation:

Sr.no	Ingredients	Quantity	Roles
1.	Adulsa	45gm	Common remedy for cough and respiratory disease
2.	Ginger	6 gm	Give spicy flavour and properties to relieve pain
3.	Tulsi	4 gm	Used to relieve cough
4.	Chocolate powder	5 gm	Used for flavour
5.	Sugar	40 gm	Used to texture and structure and sweetener

6.	Gelatin/ Honey	5 gm/ 5 ml	Used as binding agent
7.	Water	q.s	To dissolve sugar

METHODS:

Collection of plant material:

Gathering of plant specimens Adulsa, Ginger, and Tulsi picked from nearby botanical garden . Then dry and triturate using mortar and pestle. Make a powdered form. And using this powdered extract formulation of chocolate was done.

Procedure:

1. Take a water bath and heat it to 50 degrees Celsius. We used a ceramic dish to melt chocolate powder. melted into nature's free-flowing state.
2. Concurrently, sugar syrup was prepared.
3. Using a glass rod, thoroughly mix the simple sugar into the melted chocolate.
4. Pour in the herbal extract. Additionally, stir is constant.
5. After being poured into a chocolate mold, this extract was allowed to cool to room temperature.
6. Refrigerating the poured chocolate mold for six to seven hours allowed the chocolate mass to solidify entirely.

STEPS FOR PREPARATION:

1. **Procurement of ingredients :** All the ingredients are measured accurately.





Fig 6. Ingredients

2. **Sugar syrup:** prepared the simultaneously sugar syrup (sugar + water)



Fig 7. Sugar syrup

3. **Melting chocolate compounds:** The chocolate powder was melted with the help of porcelain dish upto free flowing nature.



Fig 8. Melted chocolate compound

4. **Chocolate moulds:** add the herbal extract in melted chocolate compound and stir continuous. And this extract was pour into chocolate mould.



Fig 9. Chocolate mould

5. **Set and chill:** poured chocolate mould was refrigerated upto 6 to 7 hrs, till whole mass completely solidified nature.



Fig 10. Prepared herbal chocolate

Evaluation parameters:

1. General appearance
2. pH
3. Dimension test
 - Height
 - Diameter
4. Hardness test
5. Solubility test
6. Physical stability

1. General appearance : ^[13]

- Colour : Dark brown
- Odor : Chocolaty
- Test : Slightly sweet
- Texture : Smooth
- Appearance : glossy, shine

2. PH : ^[14]

With a PH of 6.8 to 8.1 , processed (alkalized) Coca powder is deeper in colour, ranging from brownish red to almost black.

3. Physical stability:

Chocolate kept closely in tide container for 1 month at temperature. After 1 month, observe test sample of physical appearance for chocolate.

4. Dimension test: ^[15]

1. Height - 1.9
2. Diameter - 2.4

5. Hardness test: ^[16]

The hardness of chocolate was determined using the tablet hardness tester following a similar procedure reported for testing the hardness of tablet.

Result and Discussions:

The prepared herbal chocolate have antitussive activities was carried out.

By using prepared extract medicated chocolate prepared and evaluated for general appearance, dimensions, hardness and physical stability. From the above study, we concluded that the herbal chocolate is attractive for the pediatrics due to its colourness and smell and the chocolate provides smooth and creamy texture to the formulation and good for the masking the unpleasant taste. Also, good oral drug delivery system to give therapeutic effect.

Appearance:

Sr.no	Parameters	Results
1.	Colour	Dark brown
2.	Odor	Chocolaty
3.	Test	Slightly sweet
4.	Texture	Smooth
5.	Appearance	glossy, shine

Conclusion:

This study focused on creating a pediatric herbal chocolate with antitussive (cough- relieving) properties. Using herbal extract, a medicated chocolate formulation was developed and tested across multiple parameters, including physical stability, hardness, viscosity measurement of chocolate base. It is good oral drug delivery system to give therapeutic effect. Chocolate provides smooth and creamy texture to the formulation and good for masking the unpleasant taste associated with some drugs. The prepared herbal chocolate was more effective than the other compounds like suspension, emulsion, or other syrup because of its pure herbal extract. Prepared chocolate is colourish helps to attracts the pediatrics for the intake of cough relief drug.

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