Formulation & Evaluation of herbal candy for treatment of dengue

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ABSTRACT

Dengue fever is the one of the fleetly expanding mosquito- borne viralcomplaint in the world, with high mortality and morbidity rates especially intropical and tropical regions. The mosquito involved in the transmissionof dengue is Aedes. The rotation of dengue complaint is told bycolorful factors similar as, geomorphology, downfall, temperature and rapid-fireurbanization or globalization. The clinical symptoms range fromunapparent to severe forms and fatal issues. Dengue is a most importantpublic health problem due its quick expansion encyclopedically and its burdens arepresently unfulfilled because of absence of precise treatment, easyindividual system for the early phase of infection and successful and well organized vector control system.

INTRODUCTION

Dengue fever is a viral illness transmitted primarily by Aedes mosquitoes, particularly Aedes aegypti and, to a lesser extent, Aedes albopictus. It is widespread in tropical and subtropical regions, including parts of Southeast Asia, the Pacific Islands, the Caribbean, and Central and South America. The disease is caused by four closely related but antigenically distinct dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4), which belong to the Flaviviridae family. Symptoms typically include sudden onset of fever, severe headaches, joint and muscle pain, fatigue, nausea, vomiting, and rash. In severe cases, dengue can progress to dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS), which can be life-threatening without proper medical care. There is no specific antiviral treatment for dengue, but supportive care can help manage symptoms and prevent complications. Prevention efforts mainly focus on vector control measures, such as eliminating mosquito breeding sites and using insecticides, as well as personal protective measures like wearing long-sleeved clothing and using mosquito repellents.

Previous

Dengue fever, a viral illness transmitted primarily by Aedes mosquitoes, poses a significant global health threat. It's prevalent in tropical and subtropical regions, including parts of Southeast Asia, the Pacific Islands, the Caribbean, and Central and South America. The disease is caused by four dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) and manifests with symptoms such as sudden fever, severe headaches, joint and muscle pain, nausea, vomiting, and rash. In severe cases, dengue can progress to dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS), potentially leading to fatalities. Prevention efforts largely focus on mosquito control and personal protective measures.

World History

World history encompasses the story of human civilization from prehistoric times to the present day. It includes the development of societies, cultures, economies, politics, and technologies across different regions and time periods. Major themes in world history include the rise and fall of empires, the spread of religions and ideologies, the exchange of goods and ideas through trade and conquest, the impact of technological innovations, and the struggles for power, equality, and human rights.

Key events and developments in world history include the rise of ancient civilizations such as Mesopotamia, Egypt, Greece, and Rome; the expansion of empires like the Persian, Byzantine, Mongol, and Ottoman Empires; the Age of Exploration and the European colonization of the Americas, Africa, and Asia; the Renaissance and the Enlightenment; the Industrial Revolution and the rise of capitalism; the World Wars and the Cold War; decolonization and the emergence of new nation-states; and contemporary issues such as globalization, environmental challenges, and the advancement of technology.

Studying world history helps us understand the interconnectedness of human societies, the complexities of cultural exchange and conflict, and the forces that have shaped the modern world. It provides valuable insights into the diversity of human experiences and the lessons we can learn from the past to inform our present and future endeavors.

India

Dengue is a significant health concern in India. The country experiences outbreaks of dengue fever, particularly during the monsoon season, when mosquito populations thrive. Large urban areas, such as Delhi and Mumbai, are particularly susceptible due to factors like population density and inadequate sanitation infrastructure. The Indian government and health organizations regularly implement measures to control mosquito populations and raise awareness about dengue prevention. Despite these efforts, dengue remains a public health challenge in India, with thousands of cases reported annually. Early detection, proper medical care, and community efforts to reduce mosquito breeding sites are crucial in combating the spread of dengue in India.

1. Natural and Herbal Remedies for Dengue Prevention

Dengue is transferred by the bite of a mosquito belonging to Aedes family, is a viral disease and in previous few years has grasped shocking levels. Today pervasive in more than 125 countries, approximately 50-270 million people are affected by this disease each year which results in a substantial

number of demises . Indeed, dengue seems to be overhauling malaria, in terms of indisposition and monetary effect of this disease .Tactlessly, because of absence of sufficient investigation methods in the developing and under developed countries, the precise level of the problems are not yet identified. Tourists from non-endemic zones to the dengue affected zones too are unprotected from the chance of getting infection.This marks it a global public health alarm; as it is affecting unexpectedly people from those countries, where the disease is not dominant. In early 19th century, Dengue I virus appeared. In all over tropical and subtropical areas, dengue is most common. Epidemics have happened in recent times in the Caribbean, also Puerto Rico, In Cambodia, Costa Rica in Central America, Vietnam, Cuba and South America Philippines and Malaysia. From 2001 to 2008, the cases reported were 1020333, the Western Pacific Region countries have reported with the uppermost records of cases and deaths. The 1st incurable epidemic of DHF happened in Pakistan in 1994 . Home remedies for treating or preventing dengue are most effective. These home remedies are natural and pure with no side effects. They provide aid from various symptoms related naturally with dengue.

Effective natural remedies for dengue

A lot of natural or herbal drugs or medicines motivate the immune system. In spite, struggling against a particular disease, whole immune system is stimulated by these herbal medicines, facilitating the body to fight bacteria, viruses and diseases by proliferating the extent of white blood cells to avert signs and symptoms. For instance dengue is a viral disease, herbal anti-viral are specified.

2. Herbal medicine to control Dengue Virus Echinacea

Echinacea (also called coneflowers) is an exceptionally famous herb, particularly for treating the colds and flu. In the daisy family Asteraceae, Echinacea is a genus of herbaceous flowering plants. The plant has real anti-viral properties as it motivates cells to yield additional proteins and interferon, made and discharged by lymphocytes in reaction to the occurrence of bacteria and viruses. Echinacea will likewise avert and treat dengue, because the colds are viral. Echinacea certainly increases Interferon and consequently motivates the immune system as a whole .

Ipecacuanha

On account of Hemorrhagic dengue, a homoeopathic doctor can make use of home remedies as Ipecac root or Ipecacuanha (Carapichea ipecacuanha). Carapicheaipecacuanha is a member of flowering plants from family Rubiaceae. This is prepared from the dried roots of the plant and helps to stop bleeding alluding to a hospital if they need intravenous fluids or blood transfusion. To avoid pandemic disease as dengue, Ipecacuanha could be recommended daily throughout the peak seasons of dengue. Statutory remedies might be assumed at the beginning of the peak season and recurring once every 4 weeks in the course of the peak season.

3. Supplements that stimulates the immune system

Vitamin C (ascorbic acid) raises interferon to protect contrary to dengue. Vitamin C at adequately high dosages can avert viral disease and significantly speed regaining from a severe infection of virus. Vitamin C upgrades numerous roles of the immune system, particularly making of Interferon that helps to keep cells from being septic by a virus. The recommended dosage is 500 mg for 6 days .Zinc raises number of interferon to protect against dengue and is the key nutrient to sustain the regular functioning of the immune system. Inappropriately, Zinc shortage is tremendously common. Zinc is key factor to legitimate T cell and Natural Killer Cell function activity. Supplementation of Zinc enhances the making of Interferon in our bodies. Dosage suggested is 25mg once on daily basis.

Mosquito repellants

The important oil citronella is a very effective mosquito repellant available from pharmacies and can be safely utilized on kids under 12 months. A mixture of eucalyptus, tea tree, and lavender, calendula oil and citronella (equal amounts) helps to stop the mosquito bites and stops the disease . Vitamin B1 (thiamine) is water soluble vitamin that contributes a lot in metabolic chemical reactions occurring in the human body. If vitamin B1 is ingested more than body's requirements, excess amount is expelled in urine and from skin by perspiration. The way vitamin B1 is removed by the skin provides the possibility to avert mosquitoes. Particularly if commercially available mosquito repellents are not available, this thiamine could be justified regardless of an attempt.

4.Fruits rich in vitamin C

Fruits rich in vitamin C like Embellica officinalis (amla) and kiwi (Actinidia)are recommended for dengue treatment as vitamin C supports improved iron absorption and it is also a chelator. Outbreak with dengue can be countered by vitamin C at 500mg for kids. There are also tales that

supplements of chlorophyll were utilized contrary to dengue fever. Chlorophyll comprises magnesium that too is a chelator .

Orange juice is deliberated to be the major rival of the disease. To treat dengue fever, orange is an efficacious home remedy. It is an efficacious home remedy to treat the dengue fever. Drinking of black grape juices twice or thrice a day is the alternative but very effective home remedy to treat the dengue fever. It will enhance the blood counts in the body. Vitamin C content in guava (Psidium guajava) is 5 times greater than that found in oranges.

Besides its fruit, the guava leaves are thought to be beneficial in dengue fever anticipation. Extract from guava leaf may possibly hinder the dengue virus. Guava was also capable of raising the platelet numbers to 100,000 platelets per cubic millimeter deprived of side effects. Taking 3 or 4 fruits of guava or its juice is recommended on daily basis, until the symptoms and signs are decreased 15. Natural treatment for dengue fever is Papaya (Carica papaya) juice.

The Papaya leaf's juice is a certain treatment for platelet shortage. The raw papaya leaf's extract helps to increase platelets, also identified as thrombocytes. A tea prepared from the papaya leaves may help some patients having dengue fever; however it is not clear whether the patients improved on their own or as a result of taking the tea .

5. Actinidia (kiwi fruit)

Encouraging the consumption of kiwis during this dengue season, Shubha Rawal, Director of Sourcing and Marketing at IG International, revealed, "Kiwi has many nutrition qualities. It is rich in vitamins E, K and A, antioxidants and fiber. These nutrients are essential for our bodies. Kiwi also helps to balance the body's electrolyte level and is good for heart health. Kiwi can be used in several recipes. Kiwi is beneficial at the time of dengue as it boosts immunity and helps in the formation of red blood cells."Encouraging the consumption of kiwis during this dengue season, Shubha Rawal, Director of Sourcing and Marketing at IG International, revealed, "Kiwi has many nutrition qualities. It is rich in vitamins E, K and A, antioxidants and fiber. These nutrients are essential for our bodies. Kiwi also helps to balance the body's electrolyte level and is good for heart health. Kiwi can be used in several recipes. Kiwi is beneficial at the time of dengue as it boosts immunity and helps in the formation of red blood cells."

6. Carica papaya(leaf)

The leaves of Carica papaya have been used to treat thrombocytopenia in Dengue fever in areas where the virus is endemic. This case series describes the use of C. papaya leaf liquid extract (CPLE) as an adjunctive therapy for four patients receiving standard-of-care treatment for chronic immune thrombocytopenic purpura (ITP). The cases presented here indicate that CPLE may prove beneficial in the management of chronic ITP for patients interested in alternative therapy before progressing to second-line treatments. A larger clinical trial is warranted to evaluate CPLE as an adjunctive therapy in chronic ITP.

7.Aloe Vera

According to Baba Ramdev, aloe vera increases platelets count significantly. Regular consumption of its juice can cure dengue fever. Aloe Vera is one of the most useful herbs as it is used in a number of other treatments as well. He suggested to consume aloe vera in form of juice.

8. Tulsi

Ocimum sanctum, known as Tulsi in Hindi, is an aromatic herb native to tropical regions of Asia. Tulsi leaves have been used to prevent dengue fever traditionally. The inhibitory action of Tulsi leaves against the dengue virus has been observed in lab studies.2 For making tulsi tea, boil few fresh tulsi leaves in water. Let it simmer for a while and strain it in a cup. You can add a few drops of lemon juice or a teaspoon of honey for taste.

9. Pomegranate

pomegranate It also lessens weakness and keeps your body stimulated. This fruit is packed with vitamins, minerals, and other nutrients that aids in reducing fatigue and exhaustion. Pomegranate helps dengue sufferers in maintaining the necessary blood platelet count and recovering from dengue more quickly.

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RATIONALE OBJECTIVE AND PLAN OF WORK

Aim : Formulation and Evaluation of Herbal Candy Based on Indian Medicinal Plants for Dengue Therapy.

Objective:

1.Formulation and Evaluation of Herbal Candy Based on Indian Medicinal Plants for Dengue Therapy.

2.Ensure the candy formulation maintains the stability and efficacy of the active ingredients throughout its shelf life.

3.Evaluate the potential of the herbal candy in alleviating symptoms and reducing the severity of dengue infection.

4.Assess the candy's ability to enhance immune response and aid in the recovery process for dengue patients.

Plan of work :

1.Literature Review: Conduct research on Indian medicinal plants known for their antiviral properties and their effectiveness against dengue.

2.Selection of Ingredients: Choose herbs that have documented antiviral properties and are safe for consumption.

3.Formulation Development: Experiment with different formulations to create a candy that is palatable, stable, and retains the medicinal properties of the herbs.

4.Evaluation: Conduct clinical trials or laboratory studies to evaluate the efficacy of the herbal candy in treating dengue.

ROLE OF SELECTED DRUG IN THE HERBAL CANDIES

1.Kiwi Fruit

Biological Name - Actinidia deliciosa

Family Name - Actinidia deliciosa

USES - • Kiwi has a high potassium content, which might help minimise the effects of sodium in the body, which otherwise can cause high blood pressure.

• Vitamin E, folate and magnesium also have many health benefits that help form bones.

• Kiwi contains antioxidants, vitamins, carotenoids and fibres, which might help with cancer healing.

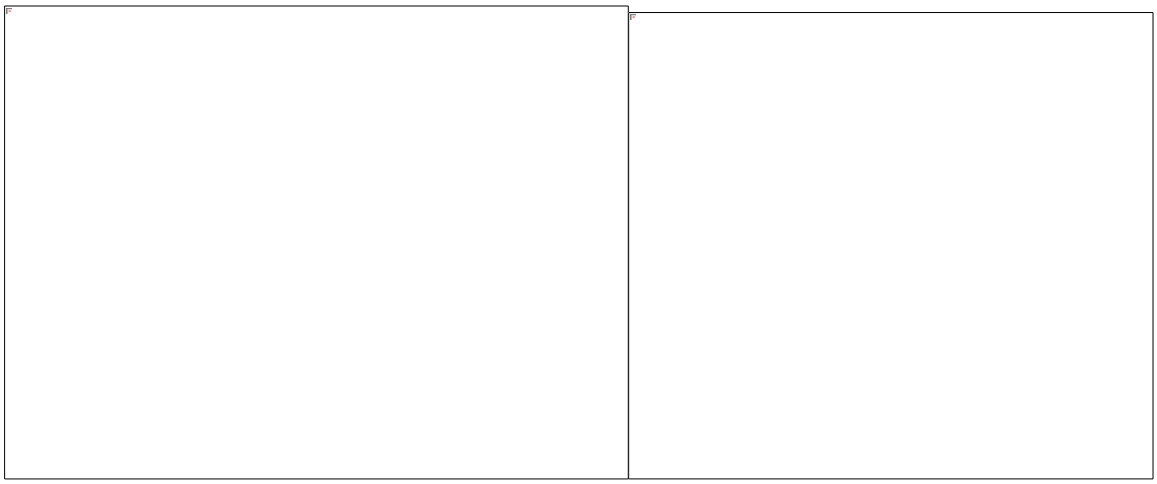


Fig.no1.of Kiwi fruit (Actinidia deliciosa)

Kiwi is one of the most recommended fruits for platelet count. It is said that having 1-2 kiwi fruits can increase platelet count.

1.4 Kiwi Kiwi also contains a lot of vitamin C, vitamin E, vitamin K, folate and potassium, which have a good effect on the immune system, increase platelet count, and electrolytes in the body.

2.**Papaya Leaf**

Biological Name - Caricapapaya

Family Name - Caricaceae

USES - • Most of the time, papaya leaf juice is used to treat the symptoms of dengue fever. Dengue is usually marked by fever, tiredness, headaches, nausea, skin rashes, and vomiting.

• Papaya leaf teas can help with stomach problems like gas, bloating, and heartburn. The fibre in papaya leaves helps keep the digestive system healthy.

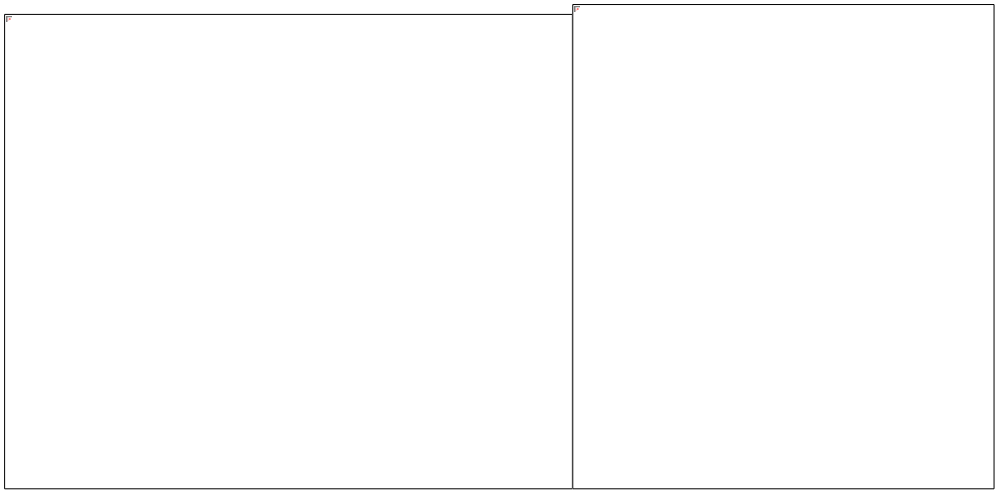


Fig.no.2 .Caricapapaya leaf

In addition to its effect against the virus, the papaya plant also appears to be effective against the Aedes mosquito. Thus, if proved to be effective, this plant could control dengue at two levels, at the level of transmission as well at the host level.

In addition to ripe papaya fruit, even a mixture made from papaya leaves is very beneficial in increasing the platelet count. R

3.**Pomegranate**

Biological Name - Punicagranatum

Family Name - Lythraceae

USES - • High levels of cholesterol or other fats (lipids) in the blood (hyperlipidemia). Taking pomegranate doesn't seem to lower cholesterol in people with or without high cholesterol.

• Pomegranate may help our immune system as it is rich in iron. Iron is essential to maintain normal platelet counts. Thus, pomegranate seeds might help reduce fatigue. It may also help with stable functioning of the immune system.

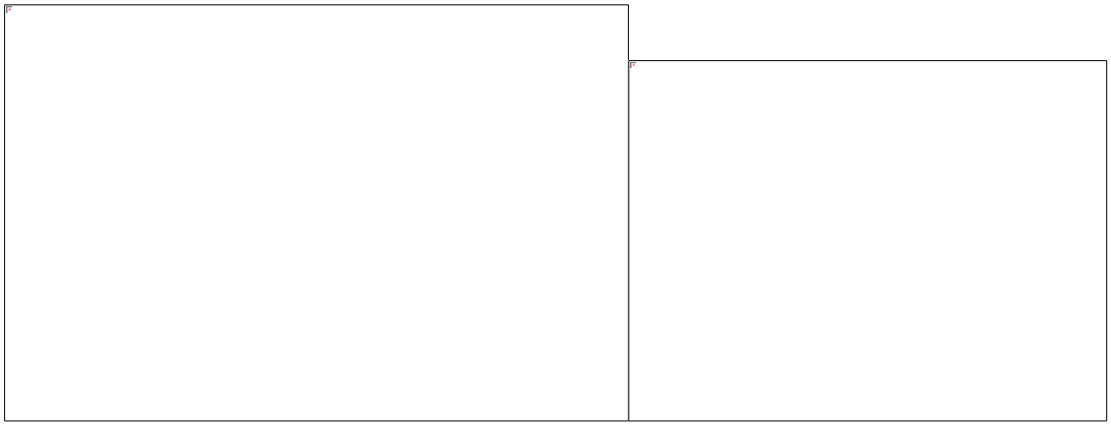


Fig no.3 Punicagranatum

This fruit is packed with vitamins, minerals, and other nutrients that aids in reducing fatigue and exhaustion. Pomegranate helps dengue sufferers in maintaining the necessary blood platelet count and recovering from dengue more quickly.

4.**Aloevera**

Biological Name - Lobarbadensis Miler

Family Name - Asphodelacae

USES - • Aloe helps maintain digestive health by supporting the mucosal tissues in your gut. It can also help with maintaining balanced stomach acidity and supporting overall digestive comfort. Aloe can help support the immune system and overall gut health. It can also help maintain healthy cholesterol and support natural joint comfort

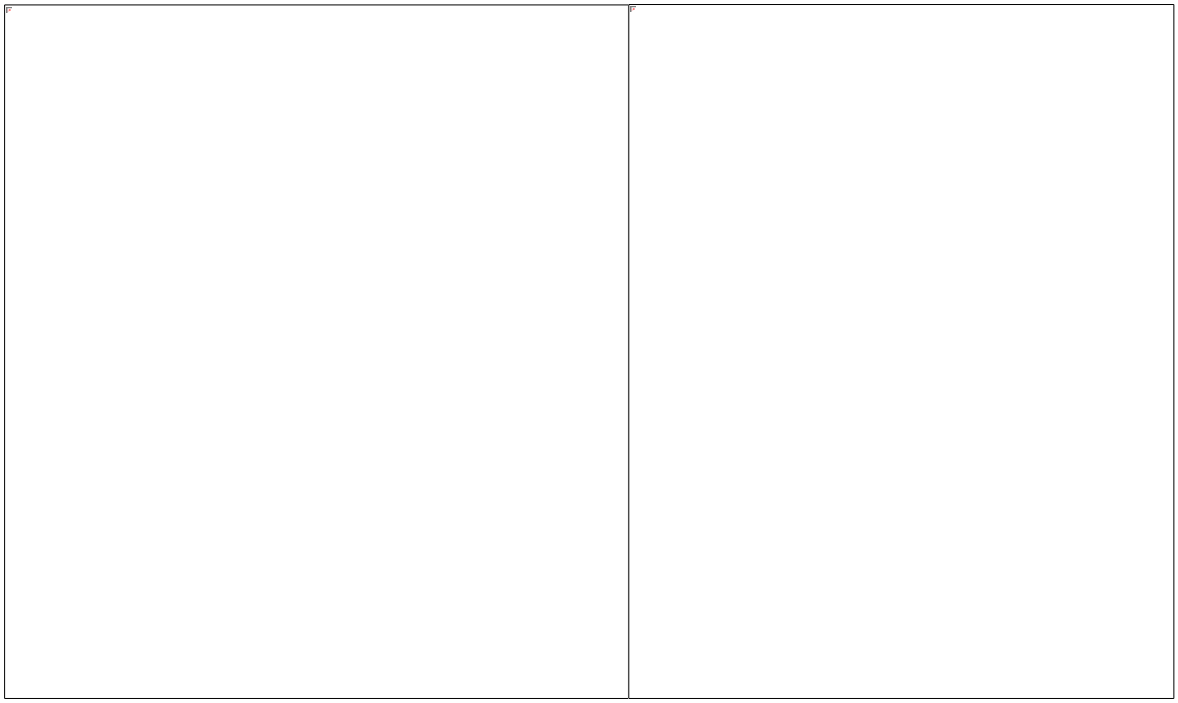


Fig.no.4 .Aloevera

Aloe Vera: According to Baba Ramdev, aloe vera increases platelets count significantly. Regular consumption of its juice can cure dengue fever. Aloe Vera is one of the most useful herbs as it is used in a number of other treatments as well.

5.**Tulsi**

Biological Name - Ocimumtenuiflorum

Family Name - Lamiaceae

USES - • This plant is well known for its medicinal and spiritual properties in Ayurveda which includes aiding cough, asthma, diarrhea, fever, dysentery, arthritis, eye diseases, indigestion, gastric ailments, etc.

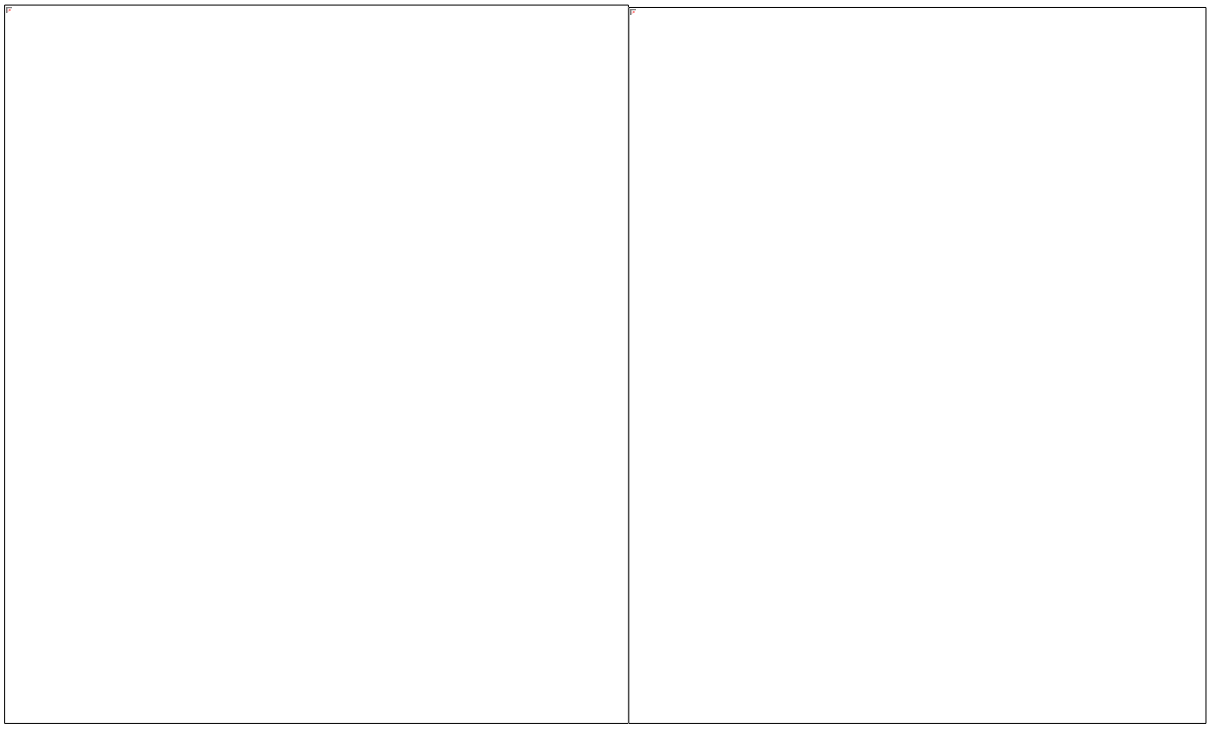


Fig.ni.5 Tulsi

Tulsi leaves have been used to prevent dengue fever traditionally. reported to reduce dengue fever-related symptoms like fever, headache, skin blister, nose and mouth bleeding.

MATERIAL AND METHODOLOGY

3.1 Selection of Herbs

Table-1: Herbs selected for the preparation of herbal candy are mentioned in the.

S No.	Herbal plants Name	Biological name	Family name
1.	Kiwi fruit	Actinidia chinensis	Actinidiaceae
2.	Papaya leaf	Carica papaya L	Caricaceae
3.	pomegranate	Punicagranatum	Punicaceae
4.	Tulsi leaf	Ocimumtenuiflorum	Lamiaceae
5.	Alovera	Asphodelaceae	Asphodelaceae (Liliaceae)

Materials

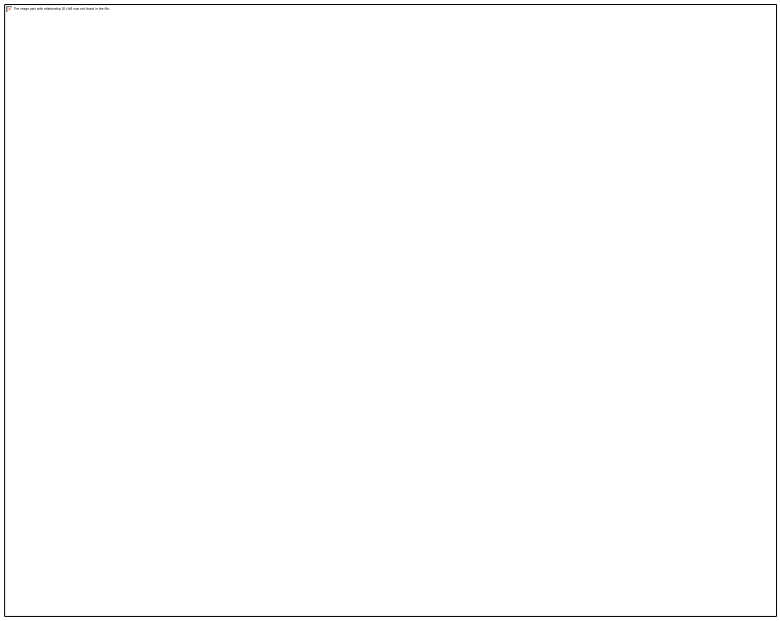
Table-2: Materials used for making candies

S No.	Herbal plants Name	Quantity
1.	Kiwifruit	70mg

2.	Papaya leaf	70mg
3.	pomegranate	24.5mg
4.	Tulsi leaf	30mg
5.	Alovera	5.5 mg
6.	Sugar	8.5mg
7.	Water	43ml

PROCEDURE FOR MAKING CANDY-

- Water and sugar were mixed in a deep bottom saucepan and allowed to boil, added slight butter and salt. Stirred the mixture with a wooden spoon.
- All powders were added one by one with the help of spatula with constant stirringFlavoring agent and preservative were added to the mixture.
- Content was Poured immediately into the candy mold (Sprayed with vegetable oil so thatthe mixture does not stick with the wall of candy mold) and allowed to cooled by placing in the cooling racks.
- After cooling stored properly at a suitable temperature



EVALUATION

EVALUATIONS OF HERBAL CANDY

Quality Evaluation of Herbal Candy:

Sensory Evaluation of Herbal Candy:

The parameters for evaluation include appearance, colour, taste, flavour, consistency ofherbal candy.

ANALYSIS OF HERBAL CANDY

Preliminary Phytochemical Analysis

Preliminary phytochemical analysis includes the tests for the presence of carbohydrates, proteins, glycosides, tannins, polyphenols and flavonoids in the prepared herbal candy by following standard procedures. The tests followed are as follows(14,15)

Tests for carbohydrates

1. Tests for Carbohydrates

a) Molish's test (General test):

To crushed candy sample, added few drops of □-naphthol solution in alcohol, shaken and added concentrated H2SO4 from sides of the test tube was observed for violet ring at the junction of two liquids.

b) Fehling's test:

Crushed candy was treated with 1 ml Fehling's A and 1ml Fehling's B solutions mixed and boiled for one minute. Heated in boiling water bath for 5-10 min was observed for yellow, then brick red precipitate.

2. Tests for Steroids

a) Salkowski reaction:

1 gm of crushed candy was added to 2 ml chloroform and 2 ml concentrated H2SO4 was added. Shake well, whether chloroform layer appeared red and acid layer showed greenish yellow fluorescence was observed.

b) Libermann - Burchard test:

1 gm of crushed candy was added to 1-2 ml acetic anhydride and 2 drops concentration H2SO4 from the side of test tube observed for first red, then blue and finally green colour.

3. Tests for Alkaloids

a) Dragendorff’s test:

The crushed candy was treated with few drops Dragendroff’s reagent observed for orange brown precipitate.

b) Mayer's test:

The crushed candy was treated with few drops Mayer's reagent observed for precipitate.

c) Hager's test:

The crushed candy was treated with Hager’s reagent observed for yellow precipitate.

d) Wagner's test:

The crushed candy was treated with few drops of Wagner's reagent observed reddish brown precipitate.

4. Tests for Flavonoids

a) Shinoda test:

To powder candy, added 5 ml 95% ethanol, few drops concentrated HCl and 0.5 g magnesium turnings. Pink colour was observed.

To small quantity of residue, added lead acetate solution observed for Yellow coloured precipitate. Addition of increasing amount of sodium hydroxide to the residue whether showed yellow colouration, which was decolourised after addition of acid was observed.

b) Ferric chloride test:

To powder candy, added few drops of ferric chloride solution observed for intense green colour.

5. Tests for polyphenols

a) Ferric chloride test:

1 gm of crushed candy was treated with 5% freshly prepared ferric chloride solution; deep blue colour came out (26)

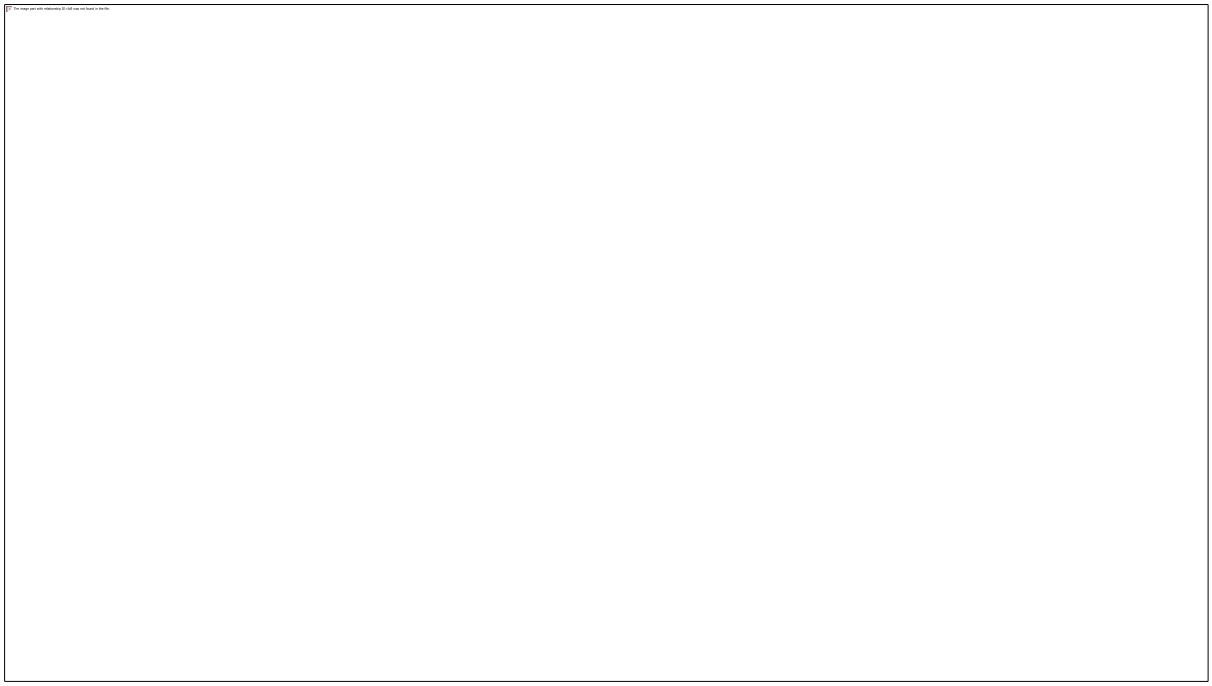


Fig. Preliminary Phytochemical Test

RESULTS AND DISCUSSION:

1. Herbal Candy Formulation:

- Provide details of the ingredients used, including the specific Indian medicinal plants selected and their concentrations.

- Describe the manufacturing process of the herbal candy.

- Present the physical characteristics of the candy such as color, texture, and shape.

2. Analytical Characterization:

- Report on the phytochemical analysis to determine the presence of bioactive compounds in the herbal candy.

- Include data on the concentration of key compounds known for their anti-dengue properties.

3. Sensory Evaluation:

- Summarize the sensory evaluation conducted to assess the taste, aroma, and overall acceptability of the herbal candy.

- Present any feedback or preferences expressed by the participants.

4. Stability Studies:

- Discuss the stability of the herbal candy over time, including changes in color, texture, and active ingredient concentration.

Discussion:

1. Efficacy of Herbal Candy:

- Interpret the results of the analytical characterization in relation to the intended therapeutic effects.

- Discuss the potential synergistic effects of the herbal ingredients in combating dengue virus.

2. Sensory Acceptability:

- Analyze the sensory evaluation data and its implications for consumer acceptance and compliance with therapy.

3. Stability and Shelf-life:

- Address any observed changes in the stability studies and their impact on the candy's efficacy and marketability.

4. Comparison with Existing Therapies:

- Compare the proposed herbal candy with existing therapies for dengue treatment in terms of efficacy, safety, and convenience.

5. Future Directions:

- Propose future research directions, such as clinical trials to evaluate the efficacy of the herbal candy in dengue patients, optimization of formulation, or scale-up studies for commercial production.

6. Limitations:

- Discuss any limitations of the study, such as sample size, duration of stability studies, or constraints in manufacturing processes.

Table-3: Evaluation Test of candy

Parameter	Result
Colour	Brown
Test	Sweet& Bitter
Flavour	Pleasant
Shape	Heart & Diamond
Consistency	Solid

Table-4: Phytochemical Test

Compound	Result
Carbohydrate	Present
Alkaloids	Present
Flavonoids	Present
Terpenoids	Present
Polyphenol	Present

CONCLUSION

In summary, our research has successfully developed a herbal candy utilizing Indian medicinal plants for potential dengue therapy. The candy showed promising characteristics, including the presence of anti-dengue bioactive compounds and positive sensory acceptability. However, further clinical trials are needed to confirm its efficacy and safety in treating dengue patients. Despite limitations, this study underscores the potential of herbal-based therapies in addressing infectious diseases like dengue, highlighting the need for continued research and collaboration in this field.

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