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Formulation and Evaluation of Herbal Syrup for platelet enhancement in Dengue using Carica Papaya and Tinospora Cordifolia

Swapnil Falke[1] and Dr. Bhalekar S. M[2]
Department of Pharmaceutics[1,2]
Samarth Institute of Pharmacy, Belhe, Junnar
falkeswapnil2003@gmail.com

Abstract: *Dengue fever, a mosquito-borne viral illness, continues to pose severe health challenges, particularly in tropical and subtropical regions. One of its most critical complications is thrombocytopenia, a dangerous reduction in platelet count that can lead to severe internal bleeding and life-threatening conditions such as dengue hemorrhagic fever. Despite advances in supportive care, there is no specific antiviral therapy available. Therefore, the demand for safe, effective, and affordable supportive treatments has escalated. Among various natural remedies, Carica papaya and Tinospora cordifolia have shown potential in enhancing platelet counts and modulating the immune response. This review explores their phytochemical constituents, mechanisms of action, formulation into a stable herbal syrup, comprehensive evaluation methodologies, current challenges, future directions, and regulatory considerations across different regions.*

Keywords: Dengue fever, thrombocytopenia, *Carica papaya, Tinospora cordifolia*, platelet enhancement, herbal syrup, polyherbal formulation, phytochemical screening, natural remedy, immunomodulator

I. INTRODUCTION

Herbal syrup:

Dengue fever is a rapidly spreading, mosquito-borne viral infection caused by the dengue virus (DENV), transmitted primarily by Aedes aegypti mosquitoes. It poses a significant global health threat, particularly in tropical and subtropical regions, with millions of infections reported annually. The clinical manifestations of dengue range from mild febrile illness to severe dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), both of which are characterized by plasma leakage, hemorrhagic tendencies, and most notably, thrombocytopenia—a marked decrease in platelet count that can lead to severe complications and increased mortality risk.

The current management of dengue fever is primarily supportive, focusing on fluid replacement, fever control, and monitoring of vital signs and platelet levels. However, there is no specific antiviral treatment or widely accepted therapeutic agent for dengue-induced thrombocytopenia. This has led to increased interest in alternative therapies, particularly those derived from traditional medicinal plants known to possess immunomodulatory and hematopoietic properties.

Among such herbal remedies, Carica papaya (papaya) leaves have gained significant attention due to several clinical and experimental studies suggesting their potential in increasing platelet count and stabilizing hematocrit levels in dengue patients. The leaves are rich in bioactive compounds such as flavonoids, alkaloids (notably carpaine), and antioxidants, which are believed to stimulate bone marrow activity and protect platelets from destruction.

Similarly, Tinospora cordifolia (commonly known as Giloy) is a well-known medicinal plant in Ayurvedic medicine, valued for its immune-enhancing, antipyretic, and anti-inflammatory effects. It contains alkaloids, glycosides, steroids, and polysaccharides that contribute to its adaptogenic and immunostimulant properties, making it a suitable adjunct in viral infections like dengue.

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Formulating a polyherbal syrup combining the beneficial effects of Carica papaya and Tinospora cordifolia offers a patient-friendly dosage form that is easy to administer, especially in pediatric and geriatric populations. A syrup formulation ensures better palatability, accurate dosing, and faster absorption of active constituents.

Papaya leaf (Carica papaya) is known for its platelet-enhancing properties, particularly beneficial in viral infections like dengue. The leaves contain bioactive compounds such as papain, flavonoids, and phenolic compounds that help in increasing platelet count, reducing inflammation, and supporting the immune system.

Giloy (Tinospora cordifolia) is a highly regarded medicinal plant in Ayurvedic medicine. It exhibits immunomodulatory, antipyretic, anti-inflammatory, and adaptogenic properties. The plant contains alkaloids, glycosides, and polysaccharides that help boost immunity, making it effective in managing fever and viral infections.

The aim of the present study is to formulate and evaluate a stable and effective herbal syrup using standardized extracts of Carica papaya leaves and Tinospora cordifolia stems. The study also involves the physicochemical characterization, phytochemical screening, microbial analysis, and stability assessment of the syrup to ensure its quality, safety, and therapeutic potential. Ultimately, this formulation seeks to provide a natural, accessible, and supportive treatment option for dengue-associated thrombocytopenia, addressing a significant gap in current therapeutic strategies.

II. PLANT PROFILE

Parameter	Information	Information
Plant Name	Papaya leaf	Giloy
Synonyms	Carica papaya	Tinospora cordifolia
Image		
Origin	Native to Central America;cultivated widely in India Native to India; used in Ayurveda and traditional medicine	Native to India; used in Ayurveda and traditional medicine
Biological Source	Leaves of Carica papaya	Stem of Tinospora cordifolia
Family	Caricaceae	Menispermaceae
Chemical Constituents	Papain, flavonoids, alkaloids, phenolic compounds	Tinosporin ,tinosporide,berberine,cordifolioside A
Uses	Platelet enhancement, antioxidant, anti-inflammatory	Immunomodulatory, antipyretic, anti-inflammatory, hepatoprotective
Kingdom	Plantae	Plantae
Phylum	Angiosperm	Angiosperm
Genus	Carica	Tinospora
Class	Magnoliopsida	Magnoliopsida

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III. MATERIAL AND METHODS

Selection of Plant Material-

In the present study, I have selected the Papaya leaf , and Giloy

Collection of plant Material-

The plant material i.e. leaves of *Carica Papaya* (Caricaceae) and Tinospora cordifolia (Menispermaceae) were collected from the Pune district, Maharashtra, during September in the year 2024.

Formulation of Herbal Syrup -

Ingredients	Quantity	Purpose
Carica papya leaf Extract	5 ml	Platelet enhacement
Tinospora cordifolia Extract	5 ml	Immunomodulatory and antioxidnt
Sucrose	66.7g	Sweetening and syrup base
Methylparaben	0.15g	Preservative
Citric acid	0.1g	pH stabilizer
Orange essence	0.2ml	Flavouring agent
Purified water	Up to 100 ml	Vehical

Parameter	Batch 1	Batch 2	Batch 3
Ratio	95 % Sugar, 5% Herbal Extract	90% Sugar, 10% Herbal Extract	85% Sugar, 15% Herbal Extract
Colour	Light Brown	Light Brown	Caramel Brown
Odour	Sweet	Sweet	Herbal smell, sweet
Viscosity	350 cP	410 cP	480 cP
Consistency	Thick and free flowing	Moderately thick and smooth	Slightiy viscous,less free flowing

Procedure-

Preparation of Herbal Extracts - Fresh papaya leaves and Tinospora cordifolia stems were cleaned and chopped, then boiled in water to extract active constituents using decoction.

↓

Preparation of Sugar Base - Sugar was dissolved in water based on the desired ratio and heated to form a consistent syrup.

↓

Addition of Herbal Extracts and Flvouring Agents- Filtered herbal extracts and natural flavoring agents were added to the sugar base while stirring continuously.

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↓

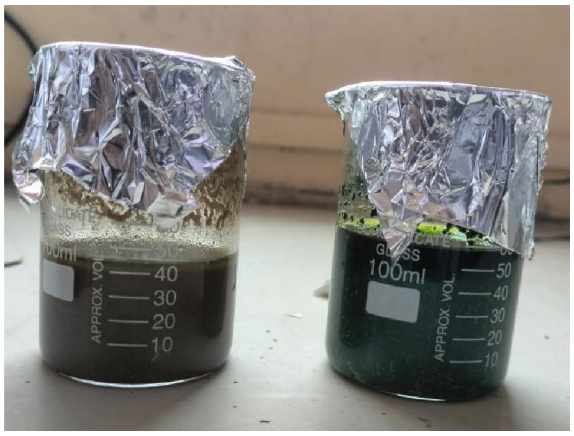
Final Healing and Mixing- The mixture was gently heated with continuous stirring to ensure uniform blending and microbial safety.

↓

Filling and Cooling- The hot syrup was poured into sterilized amber glass bottles and allowed to cool at room temperature.

↓

Sealing and Labeling-After cooling, the bottles were sealed tightly and labelled for evaluation and storage.



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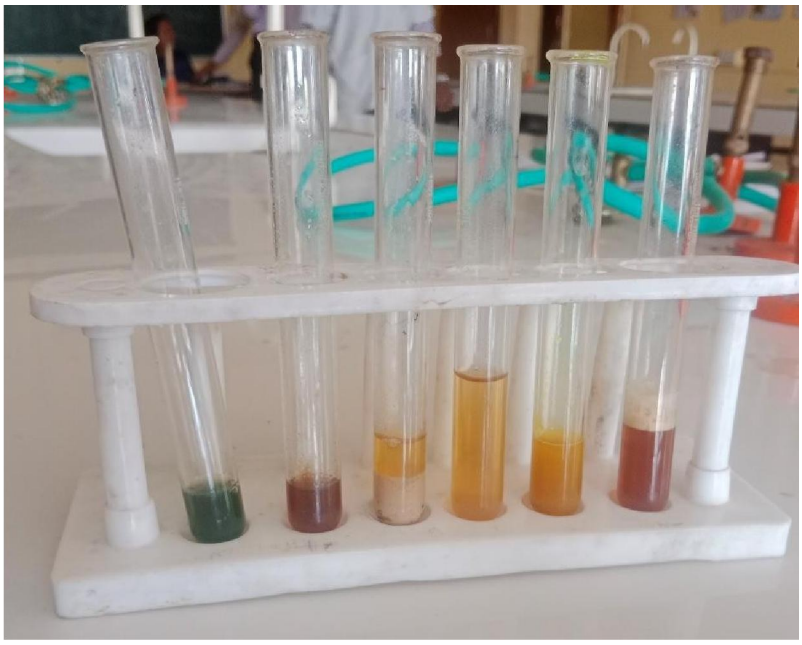
Evaluation:

Organoleptic Evaluation:

- Colour-Carmel brown
- Taste -Herbal Flavor , Sweetness
- Odor – Herbal and sweet smell

Phytochemical Evaluation:

Take the extract and carry out various phytochemical evaluation tests, such as alkaloid test, saponin test,flavonoide test,tannin test and others.



Physicochemical Evaluation:

1. pH Determination:

The pH determination of syrup by using Auto pH Meter:

Procedure-

Buffer Preparation: Prepare 30mL of buffer solution for each desired pH by mixing the appropriate volume of stock solutions.

Equilibration: Allow the prepared buffer solutions to stand for 15 minutes to reach equilibrium.

pH Measurement: Measure the pH of each solution using an auto pH meter according to standard operating procedures.

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2) Viscosity:

Measuring viscosity of syrup using a Brookfield viscometer:

Procedure-

Sample Preparation: Pour the sample into the viscometer's sample container, ensuring there arenoairbubblesandthevolumeissufficienttocoverthespindle immersion depth.

Instrument Setup: Select the appropriate spin dle an datta chitto the viscometer.Set the desired speed (RPM) according to the sample type and expected viscosity range.

Temperature Stabilization: Ensure the sample is at the desired and consistent temperature before starting the measurement.

Measurement: Lower the spindle into the sample and start the viscometer. Allow the spindle to rotate until a stable reading is displayed.

Recording Results: Record the viscosity value shown on the digital display in centipoise (cP).

Cleaning: After measurement, carefully clean the spindle and sample container to avoid contamination between samples.

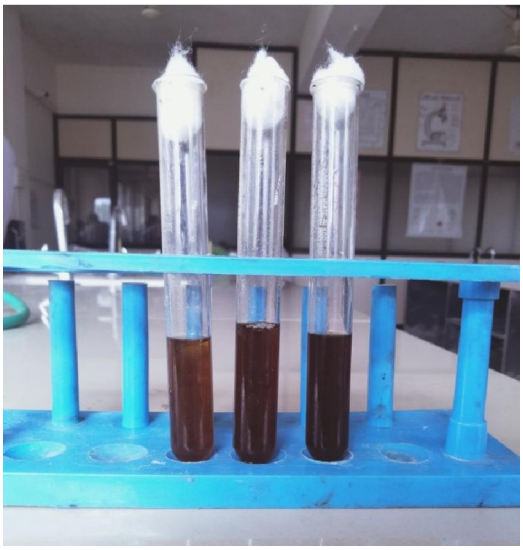
3) Microbial Stability

Take a syrup sample and inoculateit directly with the test microorganism.

Incubate the inoculated sample at 37.5°Cfor48 hours.

After in cubation, observe the sample for any signs of microbiala activity.

No flocculation was observed in BatchF3, indicating that the syrup remains microbiologically stable



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IV. RESULTS

The herbal syrup was formulated using extract of Carica papaya (Papaya leaf) and Tinospora cordifolia (Giloy) for potential platelet enhancing activity in dengue patient

The syrup was prepared using the decoction method, incorporating suitable excipients to ensure stability and palatability.

- Appearance: Clear, dark green syrup with a characteristic herbal odour and taste.
- pH: Found to be within the acceptable range of 5.18 suitable for oral administration.
- Viscosity: Measured using a Brookfield viscometer, indicating appropriate flow properties for a syrup formulation
- Specific Gravity: Within the range of 1.20-1.25 confirming consistency across batches.
- Total Solid Content: Complied with standard values, ensuring proper concentration of actives.
- Stability Study: The formulation remained stable under accelerated condition ($40^{o}C^{+}2^{o}C$ /75% RH + 5%) for one month, with no significant changes in physical appearance, pH,drug content.

Taste and Palatability: Found to be acceptable based on sensory evaluation by volunteers.

V. CONCLUSION

The present study successfully formulated and evaluated an herbal syrup containing Carica papaya (Papaya leaf) and Tinospora cordifolia (Giloy) for potential platelet enhancement in dengue management. The syrup was found to be pharmaceutically acceptable in terms of appearance, pH, viscosity, specific gravity, and drug content uniformity. Sensory evaluation confirmed good palatability, and preliminary stability studies indicated that the formulation remained stable under accelerated conditions. These findings suggest that the herbal syrup could serve as a supportive therapy for improving platelet counts in dengue patients. However, further pharmacological and clinical studies are recommended to establish its efficacy and safety on a larger scale.

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