

Research Article

Nutraceutical Tablet for thrombocytopenia prevention

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ABSTRACT

The growing prevalence of thrombocytopenia has created a critical need for safe, effective, and affordable treatment alternatives. Thrombocytopenia, characterized by a decreased platelet count, can result from various causes, including viral infections, autoimmune disorders, and bone marrow dysfunction. It increases the risk of severe bleeding, delayed wound healing, and immune system compromise. Medicinal plants have been widely used in traditional medicine systems for managing various health disorders. Among them, Carica papaya (papaya) and Murrayakoenigii (curry leaves) have gained attention for their significant pharmacological properties. Papaya leaves contain bioactive compounds such as flavonoids, alkaloids, and papain enzymes, which have been reported to enhance platelet production, support immune function, and exhibit anti-inflammatory properties. Meanwhile, Curry leaves (Murrayakoenigii) contain several bioactive compounds that may help prevent thrombocytopenia. Some of the key compounds present in curry leaves include

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Introduction: ^[1,2]

Thrombocytopenia is global health concerns affecting millions of people worldwide. Both conditions can lead to severe complications if left unmanaged, necessitating effective treatment strategies. Conventional pharmaceutical drugs are available for their management; however, these medications often come with significant side effects, high costs, and limited accessibility in certain regions. This has driven

the search for natural, plant-based alternatives that are safer, cost-effective, and readily available.

These compounds may help prevent thrombocytopenia by:

1. Enhancing platelet production: By stimulating the production of platelets in the bone marrow.
2. Reducing platelet destruction: By protecting platelets from oxidative stress and inflammation.

3. Improving blood clotting: By enhancing the blood clotting process.

Overall, the combination of these bioactive compounds in curry leaves may help prevent thrombocytopenia and support overall health.

This study focuses on formulating a nutraceutical tablet incorporating standardized *Carica papaya* and *Murrayakoenigii* to offer a natural and effective approach to managing thrombocytopenia. In future I will make this review information, and this process will include the selection of methods, standardization of bioactive compounds, and evaluation of tablet stability, bioavailability, and therapeutic efficacy. The goal is to develop a plant-based nutraceutical that can serve as a complementary or alternative therapy, minimizing reliance on synthetic drugs.

Thrombocytopenia: ^[5]

Thrombocytopenia is a hematological disorder characterized by an abnormally low platelet count, typically below 150,000 platelets per microliter of blood. Platelets, or thrombocytes, play a crucial role in blood clotting and wound healing, and their deficiency can lead to increased bleeding risk, delayed clot formation, and compromised immune function.

Causes of Thrombocytopenia:

1. Infections: Viral infections such as dengue fever, chikungunya, hepatitis, and HIV can significantly reduce platelet counts.

2. Autoimmune Disorders: Conditions like immune thrombocytopenic purpura (ITP) cause the immune system to attack and destroy platelets.

3. Bone Marrow Disorders: Leukemia, aplastic anemia, and chemotherapy-induced suppression can impair platelet production.

4. Drug-Induced Thrombocytopenia: Certain medications, including anticoagulants and antibiotics, can contribute to platelet destruction.

Management of thrombocytopenia: ^[5,6]

It includes platelet transfusions, corticosteroids, and immune-modulating drugs, which are costly and have potential side effects. This has led to increased interest in natural compounds that can enhance platelet production and function.

Medicinal plants have long been used in traditional medicine for treating various ailments. Many plant-based compounds exhibit anti-inflammatory, antioxidant, and immunomodulatory properties, making them valuable therapeutic agents. Two such plants, *Carica papaya* and *Murrayakoenigii*, have demonstrated promising effects in managing thrombocytopenia and diabetes.

Carica Papaya (Papaya) and its Benefits:

Carica papaya, commonly known as papaya, has been found to possess anti-thrombopoietic benefits, which can help prevent or manage thrombocytopenia (low platelet count). Here are some of the anti-thrombopoietic benefits of *Carica papaya*:

Anti-Thrombopoietic Compounds: ^[4]

1. Papain: A proteolytic enzyme found in papaya, which has been shown to have anti-thrombopoietic activity.

2. Chymopapain: Another proteolytic enzyme found in papaya, which has been found to have anti-inflammatory and anti-thrombopoietic effects.

3. Flavonoids: Papaya contains flavonoids like quercetin, kaempferol, and rutin, which have been found to have anti-thrombopoietic effects.

Mechanisms of Action:

1. Inhibition of platelet aggregation: Papaya extracts have been found to inhibit platelet aggregation, which can help prevent thrombosis.
2. Enhancement of platelet production: Papaya extracts have been found to enhance platelet production in the bone marrow, which can help increase platelet count.
3. Antioxidant and anti-inflammatory effects: Papaya extracts have been found to possess antioxidant and anti-inflammatory effects, which can help protect against oxidative stress and inflammation-induced thrombocytopenia.



Figure.1 Curry leaves



Figure.2 Papaya leaves

MurrayaKoenigii (Curry Leaves) and its Benefits:

[3,7]

Murrayakoenigii, commonly known as curry leaves, has been found to possess anti-thrombopoietic benefits, which can help prevent or manage thrombocytopenia (low platelet count). Here are some of the anti-thrombopoietic benefits of Murrayakoenigii:

1. Volatile oils: Murrayakoenigii contains volatile oils like caryophyllene, which have been shown to possess anti-thrombopoietic activity.
2. Flavonoids: The leaves of Murrayakoenigii are rich in flavonoids like quercetin, kaempferol, and rutin, which have been found to have anti-thrombopoietic effects.

3. Alkaloids: Murrayakoenigii contains alkaloids like mahanimbine, which have been shown to possess anti-thrombopoietic activity.

Mechanisms of Action:

1. Inhibition of platelet aggregation: Murrayakoenigii extracts have been found to inhibit platelet aggregation, which can help prevent thrombosis.
2. Enhancement of platelet production: Murrayakoenigii extracts have been found to enhance platelet production in the bone marrow, which can help increase platelet count.
3. Antioxidant and anti-inflammatory effects: Murrayakoenigii extracts have been found to possess antioxidant and anti-inflammatory effects, which can help protect against oxidative stress and inflammation-induced thrombocytopenia.

Tablet formulation and development:^[8]

Nutraceutical formulations are gaining popularity as safe and effective alternatives to conventional drugs. A tablet formulation containing *Carica papaya* and *Murrayakoenigii* extracts could provide a standardized, stable, and convenient dosage form for the prevention of thrombocytopenia. The development process involves the selection of ingredients, formulation techniques, and quality control measures.

Selection of Active Ingredients:

Carica papaya leaf: Rich in flavonoids, alkaloids, and glycosides, which stimulate platelet production and improve immune function.

Murrayakoenigii leaf: Contains mahanimbine, flavonoids, and essential micronutrients that support hematopoiesis and reduce oxidative stress.

Excipients Used in Formulation:

To ensure the proper manufacturing and stability of the tablet, various excipients are required:

- Binders: Starch
- Disintegrants: Sodium starch glycolate to facilitate tablet breakdown in the digestive system.
- Lubricants: Magnesium stearate to prevent sticking during tablet compression.
- Coating agents: Hydroxypropyl methylcellulose (HPMC) for controlled release and enhanced stability.

Tablet Manufacturing Process^[1]

1. Drying Process: Carica papaya and Murrayakoenigii are Dried and make a powder.
2. Granulation: Wet or dry granulation is used to prepare the powdered mixture for compression.
3. Tablet Compression: The granulated mixture is compressed into tablets using a tablet press.
4. Coating and Packaging: Tablets are coated for stability and packaged to maintain shelf-life

Challenges:

1. Lack of Standardization

Variability in the composition of Carica papaya and Murrayakoenigii extracts due to differences in plant sources, growing conditions, and extraction methods.

Absence of a universal standard for active compounds like flavonoids, alkaloids, and phenolics that contribute to platelet enhancement.

Conclusion:

The use of Carica papaya and Murrayakoenigii in nutraceutical formulations for the prevention of thrombocytopenia presents a promising, natural alternative to conventional platelet-enhancing therapies. Scientific studies have demonstrated their potential in increasing platelet counts, particularly in conditions such as dengue-induced thrombocytopenia. The rich phytochemical profile of these plants, including flavonoids, alkaloids, and antioxidants,

contributes to their immunomodulatory and hematopoietic properties.

In conclusion, while Carica papaya and Murrayakoenigii-based nutraceuticals hold great potential for thrombocytopenia management, scientific validation, regulatory support, and technological innovations are necessary to transform them into widely accepted, evidence-based therapeutic options.

Conflict of Interest:

No Conflicts of interest.

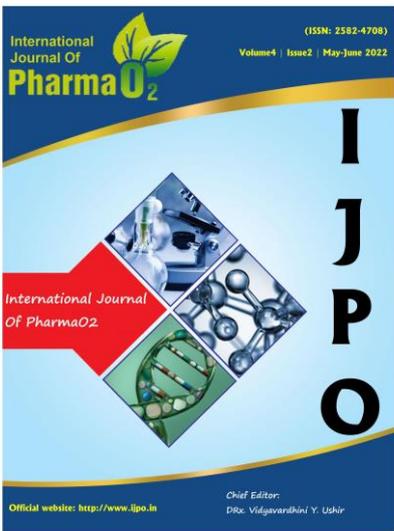
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