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ROLE OF *BHUMIAMALAKI (PHYLLANTHUS NIRURI)* IN HEPATITIS: A REVIEW

¹Mr.Satyam Kumar and ²Dr.Nisha K.U.

¹Assistant Professor and ²Assistant Professor
Deshbhagat University, Mandi Gobindgarh, Punjab

Abstract

Bhumiamalaki (*Phyllanthus niruri*), a traditional medicinal herb widely used in Ayurvedic and ethnomedical systems, has attracted scientific interest due to its potential hepatoprotective and antiviral properties. This review examines the phytochemical profile of *P. niruri*, its mechanisms of action relevant to hepatitis (especially viral hepatitis B), evidence from in vitro, in vivo, and clinical studies, and its limitations and safety considerations. While preclinical research supports antioxidant, antiviral, and liver-protective effects, clinical trials show mixed results, underscoring the need for rigorous research to validate therapeutic efficacy.

1. Introduction

Hepatitis refers to inflammation of the liver caused by viral infections (e.g., hepatitis B and C), toxins, alcohol, autoimmune processes, or other factors. Chronic viral hepatitis is a major global health challenge, leading to cirrhosis and hepatocellular carcinoma. Traditional medicine systems have long used *Phyllanthus niruri* — known as Bhumiamalaki — for liver disorders, including jaundice and hepatitis. Its inclusion in herbal remedies is attributed to diverse bioactive phytochemicals such as lignans, flavonoids, tannins, and terpenoids.

2. Phytochemistry of *Phyllanthus niruri*

P. niruri contains a range of phytoconstituents with pharmacological relevance:

- Lignans (e.g., phyllanthin, hypophyllanthin, niranthin): Associated with antioxidant and hepatoprotective effects.
- Flavonoids and tannins: Contribute to antioxidant capacity, reducing oxidative stress in liver cells.
- Terpenoids and alkaloids: May modulate immune and antiviral responses.

These compounds collectively support *P. niruri*'s traditional use in liver diseases and justify investigations into their mechanisms of action against liver injury and viral replication.

3. Mechanisms of Hepatoprotective Action

3.1 Antioxidant and Anti-Inflammatory Effects

Oxidative stress is central to liver injury in hepatitis. *P. niruri* demonstrates significant antioxidant activity, scavenging free radicals and upregulating antioxidant enzymes in preclinical models. These effects reduce lipid peroxidation and cellular damage in hepatic tissues.



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3.2 Antiviral Effects

The antiviral potential of *P. niruri* is one of the most investigated topics in relation to hepatitis B virus (HBV). Several mechanisms have been proposed:

- Inhibition of viral polymerase: Aqueous extracts inhibit HBV DNA polymerase and bind the viral surface antigen in vitro, reducing viral replication markers. In animal models of woodchuck hepatitis (an HBV model), treatment led to decreased viral antigen levels and sustained suppression of viral markers after cessation of therapy .
- Bioactive lignans: Compounds such as *niranthin* and *nirtetralin B* isolated from *P. niruri* have shown dose-dependent reduction of hepatitis B surface antigen (HBsAg) and viral DNA levels in both cell culture and duck hepatitis B virus models, along with normalization of liver enzymes suggesting hepatoprotection .
- Innate immune modulation: *P. niruri* extracts appear to enhance expression of antiviral cytokines (e.g., IFN- β , IL-6), targeting intracellular signaling pathways that inhibit HBV replication in vitro .
- **3.3 Modulation of Liver Function in Non-Viral Hepatitis**
 - Evidence from a randomized controlled trial in patients with alcoholic hepatitis indicates that *P. niruri* increases total antioxidant levels and may improve appetite, though it did not significantly change conventional liver enzyme levels over four weeks. These findings suggest antioxidant support, though symptomatic or functional improvements require further study.

4. Clinical Evidence

Clinical research on *P. niruri* and hepatitis presents mixed outcomes:

- In a double-blind trial for chronic HBV, no statistically significant differences in viral load or HBsAg clearance were observed between *P. niruri* and placebo over 12 months, though the treatment was well tolerated.
- A Cochrane systematic review concluded that evidence from randomized trials is insufficient to support or refute the use of *Phyllanthus* species over standard antiviral drugs, with no significant effects on key viral markers such as HBsAg or HBV DNA clearance.
- Case reports and non-randomized studies suggesting clearance of HBsAg after *P. niruri* treatment lack rigorous controls and have methodological limitations, requiring cautious interpretation .

These clinical outcomes emphasize that while traditional and preclinical data are promising, robust, large-scale clinical trials are necessary to establish clear therapeutic value.

5. Safety and Limitations

Traditional use of *P. niruri* is generally considered safe in moderate doses; however:

- Herb quality and standardization vary widely among commercial products.
- Rare cases of liver injury have been associated with some herbal preparations, underscoring the need for stringent safety evaluations and clinician oversight, especially in patients with existing liver disease.



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6. Conclusion

Bhumiamalaki (Phyllanthus niruri) exhibits multiple pharmacological actions relevant to hepatitis:

- Antioxidant and hepatoprotective effects that mitigate oxidative stress in liver tissues.
- Antiviral activity, particularly in preclinical models of hepatitis B, mediated through inhibition of viral polymerase and modulation of host antiviral pathways.
- Clinical evidence remains inconclusive with respect to antiviral efficacy in chronic hepatitis B, though safety profiles are generally acceptable.

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