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Review Article

BHUMYAMALAKI (*PHYLLANTHUS AMARUS SCHUM*. & THONN.) IN LIVER DISORDERS: AN INTEGRATIVE REVIEW OF AYURVEDIC AND CONTEMPORARY EVIDENCE

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ABSTRACT

Bhumyamalaki (*Phyllanthus amarus* Schum. & Thonn.) is an important medicinal plant described in Ayurveda for the management of *Kamala, Yakrit Vikara*, and other hepatobiliary disorders. Contemporary research has increasingly explored its hepatoprotective potential. **Objective:** To review the Ayurvedic properties, phytochemistry, and hepatoprotective evidence of *Bhumyamalaki* and related *Phyllanthus* species in liver disorders. **Materials and Methods:** A narrative review was conducted using classical Ayurvedic texts and electronic databases including PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect. Studies evaluating phytochemistry, pharmacological activities, hepatoprotective effects, antiviral activity, and clinical outcomes of Phyllanthus species were reviewed. **Results:** *Bhumyamalaki* is characterized by *Tikta-Kashaya Rasa*, *Sheeta Virya*, and *Kapha-Pittashamaka* properties. Major phytoconstituents include phyllanthin, hypophyllanthin, geraniin, corilagin, flavonoids, tannins, and polyphenols. Experimental studies demonstrate hepatoprotective activity across diverse models of liver injury, while limited clinical studies suggest beneficial effects in non-alcoholic fatty liver disease. **Conclusion:** The available evidence supports the classical Ayurvedic use of *Bhumyamalaki* in liver disorders and highlights its potential as a natural hepatoprotective agent. Further phytochemical standardization and well-designed clinical trials are required to establish its therapeutic efficacy in evidence-based hepatology.

INTRODUCTION

Bhumyamalaki (*Phyllanthus amarus* Schum. & Thonn.), known as *Tamalaki* in Ayurvedic literature, has been extensively described in *Charaka Samhita* and various *Nighantus*.[1] It is traditionally indicated in *Kamala*, *Pandu*, *Pittaja Vikara*, and *Yakrit Vikara*. The drug possesses *Tikta-Kashaya Rasa*, *Sheeta Virya*, and *Pittashamaka* properties, which may contribute to its therapeutic utility in liver disorders.[2]

Chronic liver diseases (CLD) represent an escalating global health burden, driven by metabolic dysfunction, viral hepatitis, and alcohol-associated liver injury.

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Recent analyses estimate that liver diseases account for nearly 2 million deaths annually, corresponding to approximately 4% of all global mortality, with cirrhosis and hepatocellular carcinoma (HCC) constituting the predominant contributors.[3] The global prevalence of non-alcoholic fatty liver disease (NAFLD), currently recognized as the leading cause of chronic liver disease worldwide, ranges between 25% and 30%, reflecting parallel rises in obesity and type 2 diabetes.[4,5] Viral hepatitis remains a substantial component of this burden; the World Health Organization reports that 296 million individuals currently live with chronic hepatitis B virus (HBV) infection, highlighting persistent gaps in diagnosis and antiviral coverage.[6,7] The multifactorial pathogenesis of CLD characterized by oxidative stress, inflammation, metabolic derangements, immune dysregulation and progressive fibrosis underscores the need for therapeutic strategies with broad mechanistic reach. Current pharmacotherapies offer limited protection against hepatocellular injury, and liver

transplantation remains the only definitive treatment for many end-stage conditions.

In this context, medicinal plants with multimodal bioactivity have garnered significant interest as potential hepatoprotective agents. The botanical identity of *Bhumyamalaki* has long been debated, with different authors associating it with *Phyllanthus amarus* Schum. & Thonn., *P. niruri* L., *P. fraternus* G.L. Webster, and other closely related *Phyllanthus* species. Contemporary ethnopharmacological studies predominantly recognize *Phyllanthus amarus* Schum. & Thonn. as the Ayurvedic *Bhumyamalaki* and have documented its ethnomedicinal uses, phytochemistry, and pharmacological activities while acknowledging historical taxonomic confusion with *P. niruri* and related species.[8] Accordingly, *Bhumyamalak*i is considered as *Phyllanthus amarus* Schum. & Thonn. in this review, while evidence from other *Phyllanthus* species has been included where relevant to comprehensively evaluate the hepatoprotective potential of the genus.

The *Phyllanthus* genus contains diverse bioactive metabolites including lignans (phyllanthin, hypophyllanthin), flavonoids, ellagitannins, terpenoids, and phenolic acids many of which have demonstrated antioxidant, anti-inflammatory, antiviral, and cytoprotective effects.[9,10] Among these, *Bhumyamalaki* (*Phyllanthus amarus* Schum. & Thonn.) and several related *Phyllanthus* species have traditionally been used in Ayurveda and other traditional systems of medicine for the management of *Kamala* (jaundice), hepatitis, and other hepatobiliary disorders.

Preclinical studies consistently report attenuation of chemically induced hepatic injury through reduction of lipid peroxidation, restoration of endogenous antioxidant enzymes, modulation of proinflammatory signaling pathways such as NF-κB, activation of Nrf2-associated antioxidant responses, and suppression of profibrogenic mediators including TGF-β.[11,12] Additionally, inhibition of HBV replication and antigen expression has been documented in vitro, supporting the traditional use of Phyllanthus species in viral hepatitis.[13]

Although clinical evidence remains limited, randomized controlled trials suggest that *Phyllanthus amarus* supplementation may improve metabolic and liver-related parameters in patients with non-alcoholic fatty liver disease.[14] However, variability in extract preparation, inadequate phytochemical standardization, and small sample sizes limit the clinical translation of these findings.[15] Given the growing burden of liver disease, a critical evaluation of the hepatoprotective potential of *Phyllanthus* species is warranted. This review integrates Ayurvedic and contemporary evidence to evaluate the hepatoprotective potential of *Bhumyamalaki* (*Phyllanthus amarus* Schum. & Thonn.) and related *Phyllanthus* species, emphasizing pharmacological mechanisms, standardization challenges, and translational relevance for modern hepatology.

MATERIALS AND METHODS

Literature Search Strategy

The present narrative review was based on a comprehensive literature search of PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect for studies published between 2010 and December 2025. Classical Ayurvedic texts, including *Charaka Samhita* and *Bhavaprakasha Nighantu*, were consulted to compile the traditional properties, therapeutic indications, and classical uses of *Bhumyamalaki*.

Inclusion and Exclusion Criteria

Studies were included if they:

- Were published in English.
- Reported preclinical (in vitro or in vivo) or clinical studies on the hepatoprotective effects of *Phyllanthus amarus* or related *Phyllanthus* species.
- Included systematic reviews, randomized controlled trials, observational studies.
- Included classical Ayurvedic literature describing the nomenclature, properties, therapeutic indications, and uses of *Bhumyamalaki.*

Studies were excluded if they

- Were duplicate publications, conference abstracts without full text, or editorials.
- Lacked adequate methodological details.
- Focused exclusively on non-hepatic outcomes.

Data Extraction and Synthesis

Data extracted from the included studies comprised study design, experimental model, plant species and extract, Ayurvedic nomenclature, classical properties (*Rasa, Guna, Virya,* and *Vipaka*), therapeutic indications, treatment regimen, hepatoprotective outcomes, and safety data. Owing to heterogeneity in study design, extract standardization, and outcome measures, findings were narratively synthesized. Preclinical and clinical evidence were evaluated separately, with emphasis on hepatoprotective efficacy, pharmacological mechanisms, standardization challenges, translational relevance, and future research priorities.

RESULTS

Classical review of *Bhumyamalaki*

Nirukti of *Bhumyamalaki*: *"Bhuviamalaki iti Bhumyamalaki"* (भुवि आमलकी इति) [16]

- *Bhumi*: Refers to growth close to ground level.
- *Amalaki*: Refers to the leaf's physical resemblance to the *Amla* tree (*Emblica officinalis*).

Bhumyamalaki (*Phyllanthus amarus* Schum. & Thonn.), known as *Tamalaki* in Ayurvedic literature, is described in the classical texts of Ayurveda including *Charaka Samhita* and various *Nighantus*. Owing to its *Tikta-Kashaya Rasa*, *Sheeta Virya*, and *Pittashamaka* properties, it has been indicated in conditions such as *Kamala*, *Pandu*, *Yakrit Vikara*, *Pittaja Vikara*, and other hepatobiliary disorders. These classical attributes provide the Ayurvedic rationale for its therapeutic use in liver diseases.

The *Rasapanchaka* of *Bhumyamalaki* described in *Bhavaprakasha Nighantu* is presented in table 1.[17]

भूम्यामलकिका प्रोक्ता शिवा तामलकीति च ।
बहुपत्रा बहुपत्रा बहुफला बहुवीर्याऽजटाऽपि च ॥२७७॥
भूधात्री वातकृत्तिक्ता कषाया मधुरा हिमा।
पिपासाकासपित्तास्त्रकफकण्डूक्षतापहा ॥२७८॥

Table 1: Ayurvedic Properties (*Rasapanchaka*) of *Bhumyamalaki*

Ayurvedic Property	Description
Rasa	*Tikta, Kashaya*
Guna	*Laghu, Ruksha*
Virya	*Sheeta*
Vipaka	*Madhura*
Dosha Karma	*Kapha-Pittashamaka*

The predominance of *Tikta-Kashaya Rasa, Sheeta Virya*, and *Kapha-Pittahara* properties provides the Ayurvedic rationale for the use of *Bhumyamalak*i in *Pitta*-dominant disorders, particularly *Kamala*, *Yakrit Vikara*, and *Pandu*. These classical attributes correlate with contemporary evidence demonstrating antioxidant, anti-inflammatory, antiviral, and hepatoprotective activities of *Phyllanthus* species, thereby supporting its traditional use in hepatobiliary disorders.

Table 2: Therapeutic indications (*Vyadhi karma*) of *Bhumyamalaki* described in Ayurvedic *Nighantus*

Nighantu	**Major therapeutic indications (*Vyadhi Karma*)**
Dhanvantari Nighantu[18]	*Pittashamaka*, *Kasaghna*, *Drishtiroganashaka*, *Dahashamaka*
Shodhala Nighantu[19]	*Vishaghna*, *Putradayaka*
Madanapala Nighantu[20]	*Pipasa*, *Kasa*, *Pitta-Rakta Vikara*, *Krimi*, *Pandu*, *Kshata Nashaka*
Kaiyadeva Nighantu[21]	*Pandu*, *Pitta-Rakta Vikara*, *Kushtha*, *Visha*, *Shwasa*, *Trishna*, *Daha*, *Hidhma*, *Kasa*, *Kshatakshaya*
Raja Nighantu[22]	*Pittashamaka*, *Mehahara*, *Mutraroga*, *Dahanashaka*
Bhavaprakasha Nighantu[23]	*Kasahara*, *Shwasahara*, *Mutrajanana*, *Sransana*, *Dahashamaka*, *Shothahara*, *Vranaropana*, *Kamala*, *Yakrit-Plihavriddhi*, *Mutraroga*, *Raktavikara*
Priya Nighantu[24]	*Prameha*, *Pandu*, *Kapha-Pitta Vikara*, *Kamala*
Gunaratnamala[25]	*Pipasa*, *Kasa*, *Pitta-Rakta-Kapha Vikara*, *Pandu*, *Kshata*

The classical Ayurvedic literature describes *Bhumyamalaki* as a valuable drug for *Kamala, Pandu, Yakrit Vikara, Pitta-Rakta Vikara*, and other *Pitta*-dominant disorders. Its *Tikta-Kashaya Rasa, Sheeta Virya,* and *Kapha-Pittashamaka* properties provide the Ayurvedic rationale for its use in hepatobiliary diseases. Contemporary studies further support its hepatoprotective potential.

The reviewed literature comprised ethnomedicinal, phytochemical, experimental, and clinical studies on *Bhumyamalaki* (*Phyllanthus amarus* Schum. & Thonn.) and related *Phyllanthus* species. The findings were organized into botanical characteristics, traditional therapeutic uses, phytochemical composition, and hepatoprotective evidence. Related *Phyllanthus* species were included to provide a comprehensive overview of the genus.

Table 3 summarizes the botanical characteristics, traditional uses, and major phytoconstituents of *Bhumyamalaki* and related *Phyllanthus* species. These species are traditionally used for jaundice, hepatitis, hepatomegaly, and other hepatobiliary disorders. Major phytoconstituents identified include lignans, tannins, flavonoids, polyphenols, terpenoids, and phenolic compounds, particularly phyllanthin, hypophyllanthin, geraniin, corilagin, gallic acid, and ellagic acid.

Table 3: Traditional therapeutic uses, major phytoconstituents, and hepatoprotective relevance of selected *Phyllanthus* species

S.No.	Species	Common/ Traditional Name	Traditional therapeutic uses	Major phytoconstituents
1	*Phyllanthus amarus*	*Bhumyamalaki*	Jaundice, viral hepatitis, hepatic dysfunction	Phyllanthin, hypophyllanthin, geraniin, amariin
2	*Phyllanthus niruri*	*Bhumyamalaki*	Jaundice, hepatitis, hepatomegaly, liver disorders	Phyllanthin, hypophyllanthin, corilagin, flavonoids
3	*Phyllanthus urinaria*	Chamber bitter	Hepatitis, liver diseases	Brevifolin derivatives, corilagin, tannins
4	*Phyllanthus fraternus*	Traditionally used as *Bhumyamalaki*	Hepatobiliary disorders, jaundice	Lignans, flavonoids, tannins
5	*Phyllanthus emblica*	*Amalaki*	Liver disorders, *Rasayana*, metabolic disorders	Gallic acid, ellagic acid, emblicanin A & B
6	*Phyllanthus acidus*	Star Gooseberry	Hepatic ailments, digestive disorders	Flavonoids, polyphenols, vitamin C
7	*Phyllanthus maderaspatensis*	Bhumi Nelli	Traditional liver disorders	Phenolics, flavonoids, tannins

Note: Compiled from published literature on *Phyllanthus* species and their phytochemical constituents.[26, 27]

Table 4 summarizes experimental studies evaluating the hepatoprotective activity of selected *Phyllanthus* species. The reviewed evidence demonstrates protection against chemically induced liver injury, alcohol-induced hepatotoxicity, viral hepatitis, and oxidative stress-mediated hepatic damage through multiple complementary mechanisms.

Table 4: Experimental evidence supporting the hepatoprotective activity of selected *Phyllanthus* species

S.No.	Species	Plant part / Extract or Compound	Experimental model	Major hepatoprotective findings	Ref.
1.	*Phyllanthus amarus*	Root, ethanol extract	Phenylhydrazine-induced neonatal jaundice in mice	Reduced bilirubin levels and improved hepatic function	[28]
		Aerial part (geraniin and amariin)	Ethanol-induced hepatotoxicity in rats	Hepatoprotective activity with improved liver histology	[29]
		Leaves (lignans)	GalN/LPS-induced acute hepatitis in mice	Reduced inflammatory and hepatotoxic markers	[30]
		Leaves (phyllanthin)	CCl_4-induced hepatotoxicity	Reduced lipid peroxidation and oxidative damage	[31]
2.	*Phyllanthus niruri*	Aerial parts (phyllanthin, hypophyllanthin and related lignans)	Experimental hepatotoxicity models	Reduced oxidative stress, enhanced antioxidant defence, and protected hepatocytes against liver injury	[32]
3.	*Phyllanthus urinaria*	Brevifolin carboxylate	Hepatitis B virus model	Demonstrated antiviral activity against HBV-associated liver injury	[33]
4.	*Phyllanthus fraternus*	Root alcoholic fraction	CCl_4-induced hepatotoxicity in rats	Significant hepatoprotective activity	[34]
		Aerial part aqueous extract	CCl_4-induced hepatotoxicity in rats	Restoration of liver biochemical markers	[35]
5.	*Phyllanthus emblica*	Fruit extract	Paracetamol-induced hepatotoxicity in rats	Reduced hepatic injury and restored liver enzyme levels	[36]
6.	*Phyllanthus*	Leaf extract (kaempferol-	*In vivo* CCl_4 induced	Demonstrated antioxidant and	[37]

	acidus	rich fraction)	hepatotoxicity	hepatoprotective activity	
7.	*Phyllanthus maderaspatensis*	Hydroalcoholic extract	Galactosamine-induced hepatotoxicity	Reduced serum AST and ALT levels and improved hepatic architecture	[38]

Table 4 summarizes experimental evidence demonstrating hepatoprotective activity of *Phyllanthus* species against diverse liver injury models, including carbon tetrachloride-, ethanol-, galactosamine-, and paracetamol-induced hepatotoxicity, and viral hepatitis. The protective effects include reduced oxidative stress and inflammation, restoration of antioxidant defence, improved hepatic biochemical markers, and preservation of hepatic architecture, supporting the traditional Ayurvedic use of *Bhumyamalaki* in *Kamala*, *Yakrit Vikara*, and other hepatobiliary disorders.

DISCUSSION

Bhumyamalaki (Phyllanthus amarus Schum. & Thonn.) is described in Ayurvedic classics for the management of *Kamala* and other *Pittaja* disorders, reflecting its therapeutic importance in liver diseases.[39] This review integrates classical Ayurvedic knowledge with contemporary scientific evidence. Experimental and clinical evidence suggests that *Bhumyamalaki* exerts hepatoprotective effects through multiple complementary mechanisms, largely attributed to its diverse phytoconstituents.[40] Overall, the available evidence supports the traditional use of *Bhumyamalaki*; however, clinical studies are required to establish its therapeutic efficacy.

Overview of Findings

The reviewed evidence demonstrates hepatoprotective activity of *Bhumyamalaki* and related *Phyllanthus* species against chemically induced hepatotoxicity, alcohol-induced liver injury, viral hepatitis, and oxidative liver damage. These findings support the classical Ayurvedic use of *Bhumyamalaki* in *Kamala* and other hepatobiliary disorders through multiple mechanisms.

Antioxidant Mechanisms of Hepatoprotection

Oxidative stress plays a central role in the pathogenesis of liver injury by promoting lipid peroxidation, hepatocellular damage, and impaired hepatic function.[41,42] Experimental studies demonstrate that *Bhumyamalaki* and related *Phyllanthus* species possess significant antioxidant activity, primarily attributed to phyllanthin, hypophyllanthin, geraniin, corilagin, gallic acid, ellagic acid, and tannins.[43] These phytoconstituents scavenge reactive oxygen species, reduce lipid peroxidation, and preserve hepatocyte integrity, thereby protecting against oxidative liver injury. Thus, antioxidant activity is a principal mechanism underlying the hepato-protective effects of *Phyllanthus* species.

Anti-inflammatory and Hepatocellular Protective Effects

Inflammation is a major contributor to the progression of liver injury, promoting hepatocellular degeneration and fibrosis.[44] Experimental studies demonstrate that *Bhumyamalaki* and related *Phyllanthus* species exert hepatoprotective effects through suppression of inflammatory responses and preservation of hepatic architecture. Ethanol-induced hepatotoxicity, CCl_4- induced liver injury, and D-galactosamine/lipopolysaccharide-induced hepatitis models consistently showed attenuation of hepatic damage following treatment with *Phyllanthus* extracts. These findings suggest that *Bhumyamalaki* protects the liver through antioxidant and anti-inflammatory mechanisms while enhancing hepatocellular recovery.

Antiviral Potential and Clinical Relevance in Hepatitis

In addition to antioxidant and anti-inflammatory activities, *Bhumyamalaki* and related *Phyllanthus* species exhibit antiviral properties that further contribute to their hepatoprotective potential. Experimental studies have reported inhibitory activity against hepatitis viruses, including suppression of hepatitis C virus entry by bioactive constituents isolated from *Phyllanthus urinaria* and anti-hepatitis B virus activity of phytoconstituents from other *Phyllanthus* species.[45,46] These findings suggest that hepatoprotection is mediated not only through attenuation of oxidative and inflammatory damage but also through inhibition of viral infections associated with chronic liver disease, providing a scientific rationale for the classical use of *Bhumyamalaki* in *Kamala* and viral hepatitis-associated liver disorders.

Phytoconstituents and Mechanisms Responsible for Hepatoprotective Activity

The hepatoprotective activity of *Bhumyamalaki* and related *Phyllanthus* species is largely attributed to their diverse phytochemical composition. Lignans, particularly phyllanthin and hypophyllanthin, are the principal bioactive constituents associated with antioxidant, anti-inflammatory, and hepatoprotective effects. Other phytoconstituents, including geraniin, corilagin, gallic acid, ellagic acid, flavonoids, tannins, and polyphenols, also contribute through free radical scavenging and protection against hepatocellular injury. Collectively, these compounds exert hepatoprotective effects by scavenging reactive oxygen species, enhancing endogenous antioxidant defence, suppressing inflammatory responses, inhibiting lipid peroxidation, modulating apoptotic pathways, and

preserving hepatocellular membrane integrity. Their synergistic actions explain the multitargeted hepatoprotective effects of *Phyllanthus* species and provide a pharmacological basis for the classical use of *Bhumyamalaki* in *Kamala* and other liver disorders described in Ayurveda.[47]

Ayurvedic Perspective of *Bhumyamalaki* in Liver Disorders

Bhumyamalaki (*Phyllanthus amarus* Schum. & Thonn.) is an important medicinal plant described in Ayurveda for the management of *Kamala*, *Yakrit Vikara*, *Pandu*, and other *Pittaja* disorders. It possesses *Tikta* and *Kashaya Rasa*, *Laghu* and *Ruksha Guna*, *Sheeta Virya*, and *Madhura Vipaka*.[48] These attributes are traditionally associated with Pitta pacification, improvement of *Agni* and metabolism, and maintenance of normal hepatic function, supporting its use in hepatobiliary disorders.[49] Contemporary pharmacological evidence provides a scientific basis for these classical indications and highlights the therapeutic potential of *Bhumyamalaki* in integrative liver disease management.

Limitations and Future Perspectives

Despite substantial experimental evidence supporting the hepatoprotective potential of *Bhumyamalaki* and related *Phyllanthus* species, several limitations remain. Most evidence is derived from in vitro and animal studies, limiting clinical translation.[50] Heterogeneity in plant species, extraction methods, phytochemical composition, dosage regimens, and experimental models hinders direct comparison and reproducibility. Although preliminary clinical studies are promising, human evidence remains limited by small sample sizes and short follow-up. Future research should emphasize phytochemical standardization, identification of key bioactive constituents, elucidation of molecular mechanisms, and well-designed multicentric randomized controlled trials to establish the safety, efficacy, and clinical applicability of *Bhumyamalaki*.[51]

CONCLUSION

Bhumyamalaki (*Phyllanthus amarus* Schum. & Thonn.) and related *Phyllanthus* species exhibit significant hepatoprotective potential supported by classical Ayurvedic knowledge and contemporary scientific evidence. These species are rich in bioactive phytoconstituents that exert hepatoprotective effects through multiple complementary mechanisms.

Experimental studies consistently demonstrate protection against diverse liver injury models, supporting their traditional use in *Kamala* and other hepatobiliary disorders. However, further phytochemical standardization, mechanistic studies, and well-designed multicentric clinical trials are required to establish their long-term safety, efficacy, and clinical applicability. Integrating Ayurvedic knowledge with contemporary scientific research may strengthen the evidence base for *Bhumyamalaki* and facilitate its broader application in evidence-based Ayurveda and integrative hepatology.

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