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# Phyllanthus Niruri - A Comprehensive Review of its Phytochemistry, Pharmacologycal Properties, And Therapeutic Applicaton

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**Abstract:** *Antimicrobial, hepatoprotective, and renoprotective properties. Advanced extraction methods have improved the yield of its active compounds. Mechanistically, it works by reducing oxidative stress, regulating inflammation, and protecting cells from damage.Although preclinical results are promising, clinical studies are still limited. Early trials indicate potential benefits in managing hepatitis B and kidney stones, but further research is needed to confirm efficacy, optimal dosage, and long-term safety. The review highlights P. niruri as a promising natural therapeutic agent that warrants more clinical investigation.*

**Keywords:** Phyllanthus niruri, Chanca Piedra, Bhumi Amla, phytochemicals, phyllanthin, pharmacological activities, traditional medicine, hepatoprotective, nephroprotective, ethnobotany

## I. INTRODUCTION

The name Phyllanthus means “leaf and flower,” referring to the way the plant’s flowers and fruits seem to grow directly from the leaves.[1] Phallantus niruri is A common member of the Euphorbiaceae family, Phyllanthus niruri is a tiny annual herb that grows in both the tropical and subtropical parts of the world.[2]

Phyllanthus niruri, commonly known as Bhumi Amla in india [3]Chanca Piedra which translates to “stone breaker” has long been used as a traditional remedy for eliminating gallstones.[4] In the Chinese Pharmacopoeia, a shrub-like species of the Phyllanthus plant is known as “Ye Xia Zhu.” [5]

The phytochemical investigation revealed bioactive compounds in Phyllanthus niruri L. leaf extracts that show promise for herbal pharmaceutical applications. This research aimed to profile these therapeutically relevant phytochemicals. [6]

Phyllanthus niruri has been shown to have strong antimicrobial activity. It can effectively act against several important foodborne bacteria, including Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Bacillus cereus, and Salmonella typhi.[7]

Plants have been used in traditional medicine for thousands of years. Around 13,000 plant species are used as medicines worldwide, and nearly 25% of modern drugs come from plants in the form of teas, extracts, or purified compounds.[8] Several components of P. niruri have been found to contain active phytochemicals, including flavonoids, alkaloids, terpenoids, lignans, polyphenols, tannins, coumarins, and saponins.[9]

The leaves and fruit have been used to cure gallstones and jaundice, kidney stones, liver disorder and viral infection in traditional medical systems like Ayurvedic, siddha and Unani therapy.[10] Traditionally, Phyllanthus niruri has been used to treat various gastrointestinal and genitourinary problems [11] It may play a role in treating ulcers and urinary tract stones,[12]

The perennial tropical herb Phyllanthus niruri has long been used in traditional medicine across South and Southeast Asia to treat a wide variety of ailments, including kidney stones, indigestion, jaundice, diarrhoea, and genitourinary infections in folk medicine. herbal remedies like P. niruri have been utilized for centuries to manage numerous health conditions such as inflammatory, malignant, diabetic, hypertensive, and cardiovascular disorders. In Ayurvedic

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medicine, this plant has been valued for thousands of years for its broad therapeutic applications In Malay traditional medicine, P. niruri—commonly known as "dukong anak"—is used to relieve coughs and kidney-related problems. In South India, where it is called Bhumyamalaki, the herb is believed to treat syphilis, gonorrhoea, and constipation. In northern India, it is referred to as "pitirishi" and is a popular household remedy for tuberculosis, bronchitis and asthma. The name Phyllanthus itself translates to leaf and flower.[13]

Niruri (Bhumi Amla) is a small weed that grows up to about 50–70 cm tall. It has thin, oval leaves arranged alternately in rows with a glaucous underside. The plant bears small, pale green monoecious flowers often tinged with red and produces tiny, silky, seed-filled capsules. Its smooth bark and herbaceous branches are light green. Bhumi Amla grows easily in most soils under full sun or partial shade and propagates mainly by seeds. It is commonly found in open areas, waste grounds, and dry deciduous forests across coastal and moderate climates of India, usually on humid, sandy soils up to 1000 m altitude.[3]

The compounds found in P. niruri include flavonoids, alkaloids, triterpenes, tannins, lignans, polyphenols, and sterols. These compounds play a role in various therapeutic activities, including antiviral, antimicrobial, anti-hepatic, antitumor and antidiabetic [14]

Phyllanthus niruri is often regarded as a "wonder plant" because of its wide range of health benefits. It has been extensively studied for its species classification, floral morphology, phytochemical composition, and diverse pharmacological activities.[15]

Fig: - Phyllanthus niruri

Table: - scientific classification of Phyllanthus niruri

| Scientific Classification: - | |
|---|---|
| Domain: - | Eukaryota |
| Kingdom: - | Plantae |
| Family: - | Phyllanthaceae |
| Order: - | Malpighiales |
| Clade: - | Angiosperms, Eudicots, Rosids |
| Genus: - | Phyllanthus |
| Species: - | P. niruri |
| Latin Name: - | Phyllanthus niruri Linn English Name: - Gulf leaf flower. |


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Vernacular Names of the Plant in India
Assamese: - Holpholi, Poram-lokhi
Bengali: -Noar
Hindi: - Chalmeri, Harfarauri, Bhuiaonla
Kannada: -Kirunelli, Nela Nelli
Konkani: - Bhuin-avalae
Telugu: -Ratsavusirike, Nela Usiri
Tamil: - Arunelli, Keela Nelli
Malayalam: -Arinelli, Kizhanelli, Nellipuli
Marathi: - Rayavali, Bhuiavli Oriya: -Narakoli
Sanskrit: - Amala, Bhumyamlaki, Sukshmadala, Vitunika, Bhoodatri [16]

**Geographic Distribution**

Phyllanthus niruri is a widespread field weed found across tropical and subtropical regions of China, the Americas, and Asia. The genus Phyllanthus (L) Murr. comprises 600–700 species that are distinguished by only subtle morphological differences.

This annual herb thrives in various Indian states, including Jharkhand, Bihar, and Chhattisgarh, where it emerges naturally after the first monsoon rains. The plant is also commonly found in coastal areas. In India, germination typically occurs in the second week of June, with fruiting beginning in mid-July to early August. The plant completes its life cycle by the end of the rainy season, though under favorable conditions, it can persist until mid-winter.[17]

Different Parts of a Selected Plant

eaves: -Numerous, small, green, subsessile, tightly spaced, elliptic, ablong, obtuse, with stipules and a short petiole, they are arranged alternately on either side of the stem. leaves having the highest concentration of lignans.

Fig: - leaves of Phyllanthus niruri

Flower

The flowers are axillary, tiny, yellowish, and abundant. These blooms are unisexual and monoecious; the females are solitary in nature, while themaleshave one to three sessile stamens.

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Fig: flower of -phyllanthus niruri

Fruit: -The fruit is a tiny, flattened, globose capsule that is smooth and has a diameter of 2-3 mm.Its horizontal branches are 30 to 60 cm in height and 1 to 2.5 mm in width.

Fig: - fruit of Phyllanthus niruri Root: - It is huge somewhat branching. [18]

Fig: - Root of Phyllanthus niruri

Field Planting Protocol

Land Preparation and Nutrient Management: Thorough land preparation through ploughing, harrowing, and leveling creates optimal soil tilth. Initial soil enrichment includes 20 tonnes FYM per hectare. Nursery bed preparation requires 10 t/ha FYM supplemented with biological inoculants (100 g each of Azospirillum, Phosphobacter, and Trichoderma). Pre- transplant basal application consists of 25-30 t/ha FYM with biofertilizers (2.5 kg each of Azospirillum and Phosphobacter).

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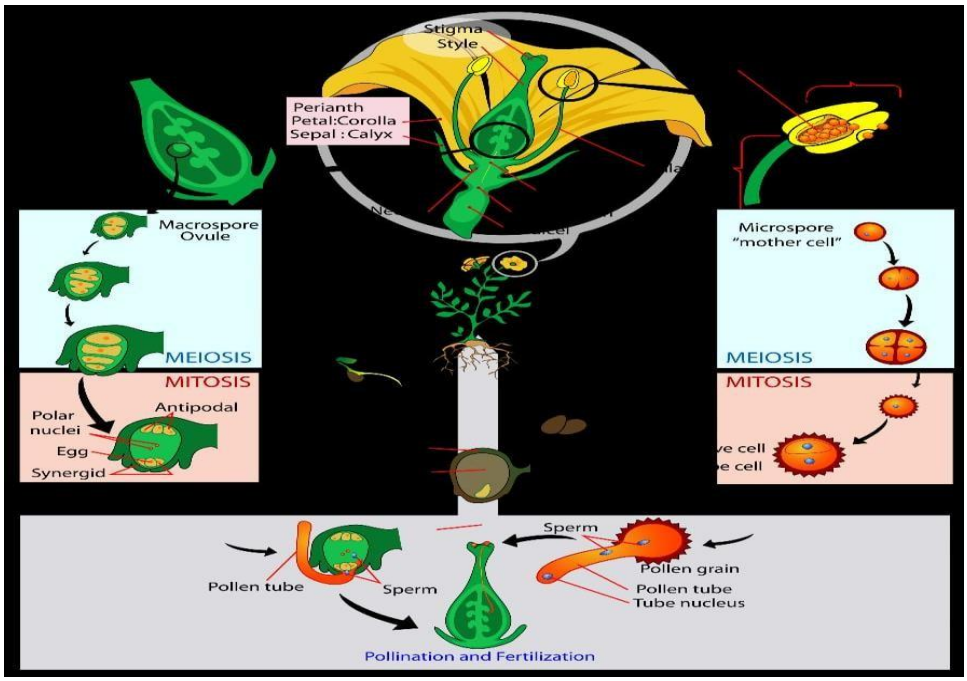


Fig: - Reproduction in Phyllanthus niruri

**Transplanting and Optimum Spacing:**

After the first monsoon shower, 15–20-day-old seedlings of Phyllanthus niruri, measuring about 8–10 cm in height, are transplanted in rows with 30 cm spacing. If rainfall is delayed, the field should be irrigated immediately after transplanting. For one hectare of land, approximately 4.0 lakh seedlings are required when planted at a spacing of 25 × 25 cm.

**Life Cycle:**

Like other flowering plants, P. niruri undergoes a generational life cycle. The dominant phase is the sporophytic (diploid) stage, while the gametophytic (haploid) stage is reduced. The plant bears monoecious flowers, meaning both male and female reproductive structures occur on the same plant.

Microspores, which develop into pollen grains (male gametophytes), are produced in the microsporangium located on the anthers. Megaspores, which form the female gametophyte, develop within the megasporangium. During pollination—either by wind or insects— microspores are transferred to the ovule. The male and female gametophytes then fuse to form a diploid zygote.

The zygote develops into an embryo enclosed within a seed that contains stored food. After seed germination, the embryo undergoes mitotic divisions, eventually growing into an adult

P. niruri plant.[19]

**In Vitro Immunomodulating Effects of Phyllanthus niruri**

Studies have shown that Phyllanthus niruri can influence the immune system in several ways: Ma'at et al. (1996) found that P. niruri extract (50–200 mg/kg) can reduce both cellular and humoral immune responses in experimental models.

Nworu et al. (2010) reported that the aqueous extract of the plant (12.5–200 µg/ml) can strongly stimulate immune cells such as lymphocytes and macrophages.

o The extract can reduce the release of pro-inflammatory cytokines like TNF-α from activated macrophages.

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o It can increase the expression of CD69, promote the proliferation of T and B lymphocytes, and enhance the release of important immune-signalling molecules like IFN-γ (Th1) and IL-4 (Th2).
o These effects may be due to the activation of MAPK pathways, which help regulate immune cell activity.
o The extract also reduces nitric oxide (NO) production in bone marrow macrophages in treated mice.
o Overall, these studies suggest that P. niruri can boost and regulate various immune functions.

In Vivo Immunosuppressive Effects of Phyllanthus niruri
Research on animals has shown that Phyllanthus niruri (especially its methanol extract) can affect both the innate and adaptive immune systems.
o The extract can reduce cellular immune responses by inhibiting DTH (delayed-type hypersensitivity) reactions in mice.
o DTH is an important defense mechanism controlled mainly by Th1 cells, which release IFN-γ to activate macrophages and cause inflammation.
o Cytotoxic T cells and memory T cells also play a role in this response.
o Giving P. niruri extract to mice helped regulate the levels of primary and secondary antibodies.
o Porto et al. (2013) found that a standardized extract of P. niruri reduced swelling (edema) and neutrophil migration, showing anti-inflammatory and immunosuppressive effects.
o In chickens infected with Mycoplasma gallisepticum, the extract reduced the total number of white blood cells, showing its ability to influence immune cell counts.
o The plant's effects can vary because its chemical composition changes based on soil, geography, genetic variation, and environmental conditions. Therefore:
o Proper quality control and standardization of the plant extract are essential.
o The immune effects can differ depending on the type of extract, animal model, disease condition, dosage, and treatment method.
P. niruri shows immunosuppressive activity in animal studies, but its effects depend heavily on how and where the plant extract is prepared.[20]
Recommended Dosage Of Bhumi Amla
o Leaf juice (Swaras):10 to 20 ml per day, preferably on an empty stomach for maximum absorption.

Fig: - Leaf juice

o Bhumi amla powder (Churna): 3 to 6 grams per day, either in a single dose or divided into two doses. It can be taken with honey, warm water, or buttermilk based on the condition being trated. [20]

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Fig: - Bhumi amla powder

o Capsules: - 1-2 times in day, helps in improving digestion and supports normal detoxification processes.


Fig: - Capsule

o Tablets: 1-2 times in day after miles, it supports liver function and promotes digestion and immunity.[23]


Fig: - Tablets Pharmacologycal Activity of Phyllanthus niruri

1. Antidiabetic Effects of Phyllanthus niruri

Many scientific studies show that Phyllanthus niruri can help lower blood sugar levels, especially in diabetes.When a bio-ethanol extract of P. niruri was combined with Moringa oleifera and given to diabetic rats, it significantly reduced fasting blood sugar within 2–3 hours.

→ This happened because the extract helped stimulate β -cells in the pancreas to release insulin.

Extracts from the aerial parts of P. niruri can:

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o Reduce glucose absorption
o Increase glucose storage in the body
o Boost liver glycogen production
o Increase hexokinase activity in the liver
→ These actions help lower overall blood sugar levels.

Both aqueous and ethanol extracts of P. niruri showed strong antidiabetic effects in rats with type 2 diabetes.The extract can also slow down carbohydrate digestion and protect pancreatic tissue, which helps regulate blood sugar better.

Human studies (Devi et al., 1986) reported that P. niruri showed:
o Hypoglycemic effect (reduced blood glucose in diabetic patients)
o Hypotensive effect (lowered blood pressure in hypertensive patients)
o Diuretic effect (increased urine output)

More studies in 2007 and 2010 also confirmed that extracts of P. niruri led to a significant drop in blood glucose when tested in diabetic animals for several days.

Water extracts not only reduced blood sugar but also lowered triglycerides and improved insulin secretion.All these studies clearly show that Phyllanthus niruri has strong antidiabetic properties and can help reduce high blood sugar levels, making it a promising herbal treatment option for diabetes.[21]

2. Phyllanthus niruri has been used to inhibit the hepadnaviridae extensively for hepatitis B virus.

Mechanism of action: -

Phyllanthus niruri is known for its strong antiviral activity, especially against hepadnaviruses. It has been widely used in traditional medicine to treat jaundice and Hepatitis B infection.

Studies show that extracts of P. niruri can inhibit about 50% of Hepatitis B viral DNA polymerase, an enzyme essential for the virus to replicate its genetic material. By blocking this enzyme, the plant extract prevents the formation of new viral DNA, thereby reducing viral multiplication.

In addition, P. niruri can bind to the endogenous viral DNA polymerase as well as the Hepatitis B surface antigen in in-vitro studies, further preventing the virus from infecting liver cells.

DNA polymerase is an essential viral enzyme that helps the virus make new DNA. When Phyllanthus niruri extract inhibits this enzyme, the virus cannot produce its DNA. As a result, the virus is unable to multiply, leading to a strong antiviral effect.

When phyllanthin binds to the Hepatitis B surface antigen (HBsAg), it disrupts the viral envelope. This damage to the virus's outer structure prevents it from entering or infecting liver cells. Through this mechanism, phyllanthin acts as an effective anti-Hepatitis B agent.[22]

3. Hypoglycaemic Activity

Chronic hyperglycaemia leads to increased oxidative stress, a well-recognized factor contributing to the onset and progression of diabetes and its related complications. Animal studies on Phyllanthus niruri extracts have shown dose-dependent reductions in fasting blood glucose levels, enhanced glucose tolerance, and restoration of pancreatic tissue structure.

These effects are believed to result from the inhibition of enzymatic pathways involved in intestinal carbohydrate digestion and glucose metabolism The bioactive compounds in the extract may exhibit insulin-mimicking properties or stimulate insulin secretion, as evidenced by increased hepatic glycogen content and enhanced liver hexokinase activity

Despite these promising findings, the antidiabetic potential of P. niruri remains inconclusive, as studies across different Phyllanthus species have reported varying results.This inconsistency may stem from differences in experimental models used to induce diabetes, extraction methods, and dosage levels. Consequently, direct comparison of outcomes among studies is challenging, making it difficult to establish the definitive antidiabetic efficacy of P. niruri, although it has long been used in traditional medicine for managing non–insulin- dependent diabetes.

4. Anti-Inflammatory, Antinociceptive, and Analgesic Activity

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Research on the anti-inflammatory, antinociceptive, and analgesic properties of P. niruri has primarily been conducted using animal models. Intraperitoneal administration of methanolic extracts from dried callus tissue demonstrated significant antinociceptive effects across five different pain models, indicating the plant's analgesic potential. However, the precise mechanism of action remains unclear, as molecular studies on its influence on pain pathways are lacking.

Obidike et al.reported that the anti-inflammatory and antinociceptive effects of P. niruri were likely mediated through the peripheral nervous system. In his study on rats, the whole-plant chloroform extract inhibited the writhing response, reduced yeast-induced fever, and alleviated albumin-induced inflammation with an effect comparable to aspirin. It also increased pain threshold in the Randall–Selitto test but not in the hot plate test, suggesting peripheral rather than central involvement in its analgesic action.

Conversely, other studies have indicated that hydroalcoholic and spray-dried standardized extracts may produce both peripheral and central analgesic effects. This highlights the need for further investigation to clarify P. niruri's mechanism of analgesia. Studies attempting to isolate active compounds have found that only spray-dried leaf extracts exhibited significant anti-allodynic and anti-edematogenic activities, which correlated with gallic acid concentration. Additionally, corilagin—a tannin abundantly present in P. niruri—has been identified as an antihyperalgesic compound that acts through modulation of the glutamatergic system.

Corilagin demonstrated a dose-dependent reduction in acetic acid–induced writhing and displayed notable neurogenic analgesic effects, suggesting it may suppress the release of inflammatory mediators or directly interact with peripheral nociceptors or bradykinins. Its antihyperalgesic action may also stem from the inhibition of nitric oxide synthesis within the glutamatergic pathway.

5. Hypolipidaemic Activity of Phyllanthus niruri: -.

• Mechanism

P. niruri extracts:

o Reduce serum lipid

(total cholesterol, triglycerides, LDL, VLDL, apo-LDL).

o Restore enzyme activity related to lipid metabolism (LCAT, hepatic lipoprotein lipase).

o Normalize cholesterol biosynthesis and increase LDL receptor activity.

o Enhance bile acid excretion, possibly due to flavonoids that promote lipid catabolism and reduce bile acid and cholesterol reabsorption.[2]965.

Comparative effects:

o Activity is dose-dependent and in one study was greater than glibenclamide.

o Some weight gain was noted, resembling side effects of thiazolidinediones— indicating the need for caution in diabetic or obese patients.[24]

6. Antimicrobial Activity

Ibrahim et al. (2013) investigated the antimicrobial and antifungal properties of Phyllanthus niruri using its methanolic extract against both Gram-positive and Gram-negative bacteria. The bacterial cultures were grown on agar media and treated with the extract. Results showed that higher concentrations of the methanolic extract exhibited strong bactericidal effects against both bacterial types. Microscopic analysis revealed complete disruption and rupture of the bacterial cell walls upon exposure to the extract.

In another study, Rajeshwar et al. (2008) evaluated the antimicrobial activity of P. niruri against several Gram-positive and Gram-negative bacteria, including Bacillus cereus, Escherichia coli, and Vibrio cholerae, at a maximum concentration of 750 mg/mL/disc. The extract demonstrated significant activity against Bacillus cereus and E. coli, but not against Staphylococcus aureus or Vibrio cholerae, indicating that the plant's antimicrobial potential may be species-specific.

Similarly, Shanmugam et al. (2014) assessed the antimicrobial activity of P. niruri extracts prepared using three solvents—methanol, ethanol, and water—in varying ratios. Bacterial cultures were exposed to different concentrations

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of each extract, and zones of inhibition were measured. The largest inhibition zones were observed with methanolic and ethanolic extracts at a concentration of 30% w/v. The study attributed the bactericidal activity to the presence of phytochemicals such as saponins, tannins, and flavonoids.[25]

7. Anti-ulcer and Gastroprotective Activity of Phyllanthus niruri

The anti-ulcer potential of Phyllanthus niruri has been demonstrated using stress-induced ulcer models, including indomethacin- and ethanol-induced gastric ulcer models. The plant extract significantly reduced ulcer formation, and its protective effect was attributed to cytoprotective mechanisms, likely involving enhanced prostaglandin synthesis (Okoli et al., 2009).

Similarly, Abdulla et al. (2010) investigated the gastroprotective properties of P. niruri leaf extract in rats with ethanol-induced gastric mucosal injury. Administration of the extract at a dose of 1000 mg/kg resulted in a marked reduction in ulcer area, along with decreased oedema and inhibition of leukocyte infiltration in the submucosa. These protective effects were associated with the tannin content of the extract, which exerts an astringent action, thereby strengthening the gastric mucosal barrier and preventing ulcer formation.

8. Antimalarial Activity of Phyllanthus niruri

The antimalarial activity of P. niruri has been confirmed through various in vitro studies. Tona et al. (1999) reported that ethyl alcohol and dichloromethane extracts of the whole plant inhibited Plasmodium falciparum growth by more than 60% at a concentration of 6 µg/mL. Moreover, a compound isolated from aqueous extracts, 1-O-galloyl-6-O-luteoyl-α- D-glucose, demonstrated potent antiplasmodial activity with an $IC_{50}$ of 1.4 µg/mL (Subeki et al., 2005).

Mustofa and Wahyuono (2007) further evaluated methanolic, chloroformic, and aqueous extracts of P. niruri against chloroquine-resistant (FCR-3) and chloroquine-sensitive (D- 10) strains of P. falciparum. The extracts showed $IC_{50}$ values ranging from 2.3–3.9 µg/mL for the methanolic extract, 132.6–200.4 µg/mL for the chloroformic extract, and 2.9–4.1 µg/mL for the aqueous extract. The cytotoxicity index (CI) of the methanolic extract (median CI = 41.3) was lower than that of the aqueous extract (CI = 106.8) after 24 hours, indicating a favorable therapeutic margin and potent antiplasmodial activity.

9. Kidney-Protective Activity of Phyllanthus niruri

Oxidative stress caused by the overproduction of reactive oxygen species (ROS) during hyperglycemia contributes significantly to cellular injury and the development of diabetic nephropathy, a leading cause of end-stage renal failure (Tiwari et al., 2013).

Studys on diabetic adult male Wistar rats have shown that the aqueous leaf extract of P. niruri exhibits renoprotective effects. Treatment with the extract led to reduced lipid peroxidation and preserved the activity of key antioxidant enzymes, including superoxide dismutase (SOD), catalase, and glutathione peroxidase, which are essential for maintaining normal kidney function. These findings suggest that P. niruri protects renal tissues from oxidative damage by maintaining antioxidant enzyme balance and preventing dysfunction (Giribabu et al.) [2]

10. Cardioprotective Activity

Only one major animal study has examined how Phyllanthus niruri protects the heart. In this study, rats were pre-treated with P. niruri extract before receiving doxorubicin, a drug known to cause heart damage. The extract helped protect the heart by:

o Keeping cardiac biomarkers at normal levels
o Restoring important antioxidant enzymes
o Reducing lipid peroxidation in heart tissue
o This shows that P. niruri may reduce doxorubicin-induced cardiotoxicity.

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11. Antiplatelet and Vasorelaxant Activity

A compound from P. niruri called methyl brevifolin carboxylate showed two important effects:

Vasorelaxant effect: It relaxed rat aortic blood vessels by reducing calcium entry into cells, which decreases noradrenaline-induced contraction.

Antiplatelet activity: The same compound also helped prevent platelet aggregation, which may reduce the risk of blood clots.[24]

12. Anti-Ulcer Activity

Certain compounds in P. niruri, such as acidic heteroxylan and other polysaccharides, have been shown to:

o Reduce gastric lesions caused by 65% and 78% ethanol

o Demonstrate protective effects against peptic ulcers

o This indicates that P. niruri has significant anti-ulcer potential.

13. Nematicidal Activity

Two prenylated flavones isolated from the hexane extract of P. niruri were found to have nematicidal activity.

They showed moderate effectiveness against two plant-parasitic nematodes.[10]

14. Antiviral Activity (Hepatitis B)*

Phyllanthus niruri exhibits inhibitory activity against hepadnaviruses and is commonly employed in treating jaundice and hepatitis B [34]. The Phyllanthus genus suppresses duck hepatitis B virus replication by inhibiting DNA polymerase activity by 50%.[26

Phytochemical Contituentes

Phyllanthus niruri exhibits a wide range of pharmacological activities, including anticancer, antioxidant, anti-inflammatory, and analgesic effects. These therapeutic properties are attributed to its diverse phytochemical constituents. The plant contains several classes of bioactive compounds such as alkaloids, flavonoids, steroids, and saponins. Numerous clinical and preclinical studies have been conducted to explore the specific roles of these phytochemicals in disease prevention and treatment. Notably, many of these compounds interact with various cellular signaling pathways, either protecting cells or inducing cell death as part of their mechanism of action. Some of the key phytochemicals are listed in Table.

1. Alkaloids

Alkaloids present in Phyllanthus niruri contribute significantly to its pharmacological actions, particularly its anti-inflammatory and antiviral effects. Important alkaloids include:

o Phyllanthine and hypophyllanthine – Demonstrate notable hepatoprotective activity

o Nor-securinine – Recognized for its anti-inflammatory and antimicrobial properties

2. Flavonoids

Flavonoids are key contributors to the antioxidant and anti-inflammatory potential of P. niruri [27]

The principal flavonoids identified are:

o Quercetin – A powerful antioxidant that helps mitigate oxidative stress [28]

o Rutin – Known for its vasoprotective and nephroprotective effects [29]

o Kaempferol – Exhibits strong anti-inflammatory and anticancer activities [30]

3. Lignans

Lignans, a class of polyphenolic compounds, contribute to various biological activities in P. niruri. Notable lignans include:

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o Phyllanthin and hypophyllanthin – Possess hepatoprotective and antihepatotoxic properties [9].
o Secoisolariciresinol – Known for its anticancer and antioxidant effects [31]

4. Tannins

Tannins are responsible for the astringent nature of P. niruri and contribute to its antimicrobial and antiurolithiatic activities. Key tannins identified are:
o Ellagic acid – Displays antiviral and anticancer properties [32]
o Corilagin – Exhibits strong anti-inflammatory and nephroprotective effects [33].
o Geraniin – A potent polyphenol with notable antioxidant and anti-urolithiatic activities [34]

5. Terpenoids

Terpenoids are important contributors to the anti-inflammatory, antiviral, and hepatoprotective actions of P. niruri. Major terpenoids include:
o Lupeol – Possesses significant anti-inflammatory and anticancer activity [35]
o Friedelin – Known for its hepatoprotective and nephroprotective properties [36]
o Ursolic acid – A triterpenoid with potent antioxidant and antimicrobial effects [37]

Adverse Effects

Phyllanthus niruri (Bhumi Amla) has the potential to lower blood pressure; therefore, individuals taking antihypertensive medications should exercise caution. Since alcohol and certain drugs can cause drowsiness, using Phyllanthus niruri may intensify this effect—care should be taken when operating machinery or driving.

When consumed in appropriate amounts, Bhumi Amla is generally safe and well-tolerated. However, excessive intake may aggravate the body's Vata Dosha and occasionally cause dysentery or diarrhea. Pregnant and breastfeeding women are advised to avoid Bhumi Amla juice.

Research has shown that this herb can significantly restore reduced glutathione (GSH) levels and antioxidant enzymes while decreasing lipid peroxidation. Nonetheless, some studies suggest that Phyllanthus niruri may have adverse effects on the kidneys and testes.

Additionally, Phyllanthus niruri may increase the risk of bleeding. Individuals with bleeding disorders or those taking anticoagulant or antiplatelet medications should use it cautiously, as dosage adjustments might be necessary.

Other possible side effects include anorexia, chills, diarrhea, disturbed sleep, dizziness, swollen lymph nodes, fatigue, fever, headache, hives, increased urinary sodium, potassium, and chloride levels, increased urine volume, joint and muscle pain, lung issues, malaise, nausea, rash, tingling sensations in the skin, and mouth soreness.[38]

Interactions with Drugs

Phyllanthus niruri may raise the risk of bleeding when used with medications that also increase bleeding risk. These include aspirin, anticoagulants (blood thinners) such as warfarin (Coumadin®) or heparin, antiplatelet drugs like clopidogrel (Plavix®), and nonsteroidal anti- inflammatory drugs (NSAIDs) such as ibuprofen (Motrin®, Advil®) or naproxen (Naprosyn®, Aleve®).

Phyllanthus niruri may enhance the drowsiness caused by certain medications. Examples include benzodiazepines such as lorazepam (Ativan®) and diazepam (Valium®), barbiturates like phenobarbital, narcotics such as codeine, some antidepressants, and alcohol. Use caution when driving or operating machinery.

Phyllanthus niruri may interact with various types of medications, including those used for inflammation, pain relief, or wound healing. It may also interact with drugs that affect immune function, liver health, or urine output; ACE inhibitors, ARBs, and endothelin inhibitors; agents that mimic acetylcholine; and those that protect against radiation or chemotherapy side effects. Additionally, interactions may occur with medications for blood, digestive, eye, heart, or kidney disorders; gout or xanthine oxidase inhibitors; vasodilators; and drugs used to treat cancer, diarrhea, fever, HIV/AIDS, malaria, obesity, or urinary stones.

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Other possible interactions include antibiotics, antivirals, cholesterol-lowering drugs, fertility agents, interferons, and nonsteroidal anti-inflammatory drugs (NSAIDs).[39]

Clinical Trials and Human Studies

Although most research on Phyllanthus niruri has been preclinical, a growing body of clinical evidence now supports its therapeutic potential. In a double-blind study involving patients with HBV infection, treatment with Phyllanthus niruri extract led to a significant reduction in both viral load and liver function parameters (Gupta et al., 2024). Additionally, pumilucidin B—a compound found in Phyllanthus niruri—may exhibit pharmacological effects consistent with the World Health Organization's 2024 recommendations for this plant, including antimicrobial activity and the ability to decrease the size, number, and density of kidney stones in patients receiving regular Phyllanthus niruri supplementation [40]

Marketed Formulation [38]

| Form | Brand Name | Company Name | Does |
|---|---|---|---|
| Tablets | Sabal serrulata 1x MTTabs | Dr. Willmar Schwabe India Pvt. Ltd. | 2–4 tablets, 2–3 times a day |
| Powder | VAAIMAI Keelanelli Powder | SIXER SQUARE, Salem | 1 spoon |
| Powder | Sidhara Betta Herbals Phyllanthus Niruri Whole Plant Powder | Sidhara Betta Organics Pvt. Ltd. | 1 spoon |
| Powder | Keelanelli Neruri Powder | Gtee Scinagro Processing Pvt. Ltd. | ½ teaspoon |
| Capsules | Morpheme Remedies | Morpheme Remedies | 2–4 tablets, 2– |

Future Research Directions

While Phyllanthus niruri demonstrates considerable therapeutic potential, future research should focus on large-scale clinical trials to determine optimal dosing and evaluate its long- term safety. Moreover, further studies are needed to elucidate the specific pathways involved in its effects on conditions such as diabetes and inflammation. Additionally, its potential role as an adjuvant in polytherapies could significantly advance the treatment of complex diseases.[40]

## II. CONCLUSION

In conclusion, Phyllanthus niruri represents a valuable medicinal plant with scientifically validated therapeutic properties that bridge traditional wisdom and modern pharmacology. Its multi-targeted pharmacological profile, coupled with relatively safe toxicity profile, positions it as a promising candidate for development of evidence-based herbal formulations and integration into contemporary healthcare systems. However, translating its traditional use and preclinical promise into standardized clinical applications requires continued rigorous scientific investigation and collaborative efforts between traditional medicine practitioners and modern pharmaceutical researchers.

## REFERENCES

[1] Pawara AJ, Sonje PD, Khairnar HD. Formulation and evaluation of Phyllanthus niruri L. leaf extract in the management of hepatotoxicity. J Med Plants Stud. 2024;12(3):92-102.

[2] Kaur N, Kaur B, Sirhindi G. Phytochemistry and pharmacology of Phyllanthus niruri L.: a review. Phytother Res. 2017;31(7):980-1004

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[3] Rani P, Pooja. Phyllanthus niruri: A comprehensive review of its botanical, phytochemical, and therapeutic potential. J Adv Biol Biotechnol. 2025;28(8). https://journaljabb.com/index.php/JABB/article/view/2839.
[4] EthnoPharm [Internet]. Kerry Hughes, The Ethnobotanical Explorer; c2025 [cited 2025 Nov 25]. Available from: https://ethnopharm.com/
[5] Rithikha R, Yokesh S, Aravindan S, Mahaswetha K, Gokulraj G, Divya C, et al. Review on medicinal plant Phyllanthus niruri and its effects. Int J Membr Sci Technol. 2023;10(5):436-443. doi:10.15379/ ijmst.v10i5.2523.
[6] Singh MK, Ahmad S. Phytochemical Profile of Phyllanthus niruri and Evaluation of its Potent Bioactive Compounds. Bioscience Biotechnology Research Communications. 2020;13(3):1545–51. DOI: 10.21786/bbrc/13.3/82.
[7] Pathania R, Najda A, Chawla P, Kaushik R, Khan MA. Low-energy assisted sodium alginate stabilized Phyllanthus niruri extract nanoemulsion: characterization, in vitro antioxidant and antimicrobial application. Biotechnol Rep (Amst). 2022;33e00711. doi10.1016/j.btre.2022.000711
[8] Kikakedimau NS, Nzuki BM, Masele JC, Tawika PM, Kidaha NG. Traditional uses, phytochemistry and pharmacological properties of Phyllanthus niruri L. Afr J Plant Sci. 2013;7(10):469-476.
[9] Bagalkotkar G, Sagineedu SR, Saad MS, Stanslas J. Phytochemicals from Phyllanthus niruri Linn. and their pharmacological properties: a review. J Pharm Pharmacol. 2006;58(12):1559-70.
[10] Narendra K, Swathi J, Sowjanya KM, Satya AK. Phyllanthus niruri Linn. — A review on its ethnobotanical, phytochemical and pharmacological profile. J Pharm Res. 2012;5(9):4681–91. ResearchGate
[11] Liang YC, Chiang LC, Lin CC. Phytochemistry and pharmacology of Phyllanthus niruri L.: a review. Phytother Res. 2017;31(3):329–348. (Based on a review article summarizing its traditional use in many systems.)
[12] Fletcher J. Phyllanthus niruri: Benefits, uses, and risks. Med News Today. 2020 Feb 25.
[13] Calixto JB, Santos AR, Filho VC, Yunes RA. A review of the plants of the genus Phyllanthus: their chemistry, pharmacology, and therapeutic potential. Med Res Rev. 1998;18(4):225-58.
[14] Windayani N, Rukayadi Y, Syah YM, Cahyanto T. Lignans from Phyllanthus niruri L. and their antifusarium properties. J Kimia Valensi. 2022;8(2):153–162. doi:10.15408/jkv.v8i2.25057.
[15] Uparkar MS, Ganatra SH. Qualitative phytochemical screening and identification of phytoconstituents from Phyllanthus niruri Linn. by GC-MS. Res J Pharm Technol. 2020;13(8):3618-3622. doi:10.5958/0974-360X.2020.00640.X
[16] G C, R M, S V, R S N, MS M. Antimicrobial activity of Phyllanthus niruri (Chanka piedra) [Internet]. J Nutr Metab Health Sci. 2020 [cited 2025 Nov 10];3(4):103-108. Available from: https://doi.org/10.18231/j.ijnmhs.2020.021
[17] Paithankar VV, Raut KS, Charde RM, Vyas JV. Phyllanthus Niruri: A magic herb.
Research in Pharmacy. 2015;1(4):1-9. (updatepublishing.com)
[18] Yagnik P, Ansari R, Desai T. Review on Antimicrobial Screening of Phyllanthus niruri against Pathogen Responsible For UTI and Its Pharmacological Profile. Int J Pharm Res Appl. 2022;7(4):32-40. doi:10.35629/7781-07043240.
[19] Basavaraju M, Gunashree BS. Phyllanthus Niruri L: A holistic medicinal plant with modern therapeutics. In: Medicinal Plants. Bangalore: Scientist R Academy; 2022. p. 12. ISBN: 978-93-5593-624-0. Mechanisms of Action of Phyllanthus Species and Their Bioactive Metabolites on the Immune System. Front. Pharmacol., 07 August 2019 Sec. Ethnopharmacology Volume 10 - 2019 | https://doi.org/10.3389/fphar.2019.00878
[21] Sibiya AM1, Ramya AK1, Vaseeharan B2, Bioactive Molecules from Phyllanthus Niruri and Investigating their effects against Diabetes. MedDocs Publishers LLC June 15, 2020
[22] Venkateswaran PS, Millman I, Blumberg BS. Effects of an extract from Phyllanthus niruri on hepatitis B and woodchuck hepatitis viruses: in vitro and in vivo studies. Proc Natl Acad Sci U S A. 1987; 84:274 –278.
[23] Anantam Ayurveda. Bhumi Amla (Phyllanthus niruri): Bhumi Amla Benefits [Internet]. Pathardi (India): Anantam Ayurveda; 2025 Mar 28 [cited 2025 Nov 25]. https://anantamayurveda.com/bhumi-amla-phyllanthus-niruri-bhumi-amla-benefits/.

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[24] Lee NY, Khoo WK, Adnan MA, Mahalingam TP, Fernandez AR, Jeevaratnam K. The pharmacological potential of Phyllanthus niruri. J Pharm Pharmacol. 2016;68(8):953-69. doi:10.1111/jphp.12565.
[25] Shanmugam S, Gayathri N, Kannappan N. Antibacterial activity of different solvent extracts of Phyllanthus niruri against selected bacterial pathogens. Int J Pharm Sci Res. 2014;5(7):2805–2810.
[26] Singh S. Phyllanthus niruri (Stonebreaker): merging ancient remedies and contemporary science in kidney stone management and holistic health. World Journal of Pharmaceutical Research. 2025;14(10):168-181 [Internet]. [cited 2025 Nov 25]. https://d2z1jgbdsyo9jj.cloudfront.net/data/articles/772c60c5-d7b2-4d8e-a93e- 9af92a0e7d8e/772c60c5-d7b2-4d8e-a93e-9af92a0e7d8e.pdf?Expires=1764056235&Key- Pair-Id=K14PFPZ3OJALO9&Signature=…
[27] Sen S, De B, Devanna N, Chakraborty R. Antioxidant flavonoids from Phyllanthus niruri. J Nat Prod. 2014;77(5):1096-105.
[28] Krithika R, Mohankumar R, Verma RJ, Shrivastav PS, Mohamad IL, Gunasekaran P, et al. Isolation, characterization and antioxidative effect of phyllanthin against $CCl_4$-induced toxicity in HepG2 cell line. Chem Biol Interact. 2009;181(3):351-8.
[29] Lai CH, Fang SH, Iizuka T, Nagai M, Taniguchi A, Moriyama H, et al. Inhibitory effects of methyl brevifolincarboxylate isolated from Phyllanthus niruri L. on platelet aggregation. Biol Pharm Bull. 2007;30(2):382-4.
[30] Inchoo M, Chirdchupunseree H, Pramyothin P, Jianmongkol S. Endothelium- independent effects of phyllanthin and hypophyllanthin on vascular tension. Fitoterapia. 2011;82(8):1231-6.
[31] Araujo Junior RF, Soares LA, da Costa Porto CR, et al. Growth inhibitory effects of Phyllanthus niruri extracts in combination with cisplatin on cancer cell lines. World J Gastroenterol. 2012;18(31):4162–8.
[32] Asare GA, Addo P, Bugyei K, et al. Acute toxicity studies of aqueous leaf extract of Phyllanthus niruri. Interdiscip Toxicol. 2011;4(4):206–10.
[33] Asare GA, Bugyei K, Sittie A, et al. Genotoxicity, cytotoxicity and toxicological evaluation of whole plant extracts of the medicinal plant Phyllanthus niruri (Phyllanthaceae). Genet Mol Res. 2012;11(1):100–11.
[34] Barros ME, Schor N, Boim MA. Effects of an aqueous extract from Phyllanthus niruri on calcium oxalate crystallization in vitro. Urol Res. 2003;30(6):374–9.
[35] Bashir MK, Ismail S, Ma HQ, Abdullah NH, Hussin AH. The in vitro and ex vivo effect of Phyllanthus niruri methanol extract on hepatic glutathione S-transferase activity in STZ- induced diabetic Sprague Dawley rats. Asian J Pharm Clin Res. 2015;8(5):156–9.
[36] Bhattacharjee R, Sil PC. Protein isolate from the herb Phyllanthus niruri protects liver from acetaminophen-induced toxicity. Pathophysiology. 2006;13(2):95–102.
[37] Murugaiyah V, Chan KL. Determination of four lignans in Phyllanthus niruri L. by a simple high-performance liquid chromatography method with fluorescence detection. J Chromatogr A. 2006;1108(2):253–7.
[38] Phyllanthus Niruri: Nature's Healing Herb. Pharmaceutical Sciences & Analytical Research Journal. 2024;8(1):[page numbers unknown]. https://academicstrive.com/PSARJ/PSARJ180060.pdf
[39] Kamruzzaman HM, Hoq MO. A review on ethnomedicinal, phytochemical and pharmacological properties of Phyllanthus niruri. J Med Plants Stud. 2016;4(6):173-80.
[40] Kumar V, Singh D, Narayan. An updated review on Phyllanthus niruri: its phytochemistry, pharmacological activity, medicinal use and traditional use. Int J Pharm Sci. 2024;3(3):2022-2027.