

Phyllanthus Reticulatus- An Important Medicine Plant and Its Pharmacological Properties

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ABSTRACT

Herbals are a safer and more effective way to cure various problems in society. Scientific proof supporting the pharmacological actions of several sections of Phyllanthus reticulatus is now available after in vitro and in vivo studies. Analgesic, antibacterial, antifungal, antihuman immunodeficiency virus-1, anti-inflammatory, anti-plasmodial, hepatoprotective, and antifungal activity are among the pharmacological activities of the leaf, aerial, root, and stem. The plant contains tannic acid, alkaloids, terpenoids, flavonoids, phenolic compounds, and glycosides as main chemical constituents. This article's goal is to provide an overview of this plant's pharmacological activities. When we evaluate Phyllanthus reticulatus' pharmacological and therapeutic activities, we can see that it is a very good and important medicinal plant.

Keywords:-Phyllanthus reticulatus, fruit, flavonoid, Phyllanthus reticulatus

I. INTRODUCTION: -

Herbal medicines serve a significant part in healthcare. The biggest issue with herbal medication acceptance is a lack of education,

paperwork, and quality control. As a result, it is critical to undertake steps toward the standardization of plant materials utilized in medicine.[1].According to a WHO report, the majority of the population in underdeveloped nations is treated using plant medications for their primary healthcare needs. In modern times, the plant is used to make 25% of all medications in India. Phyllanthus reticulatus is a big straggling shrub that can reach a height of 8 to 10 feet. The minute blossoms of Phyllanthus reticulatus give a very fragrant scent. Topical Africa, Sri Lanka, South East Asia, China, Malaysia, and India are all home to the plant. The plant's fruiting and flowering season runs from July to March.

Analgesic[2], antibacterial[3], antifungal, antiviral[4], antihuman immunodeficiency virus-1(11), anti-inflammatory[5,6], anti-plasmodial, hepatoprotective[7], and hyperglycemic[8] properties have all been observed in this plant. Smallpox, syphilis, asthma, diarrhea, antioxidant[9], and bleeding are all treated with different parts of the plant. Phyllanthus reticulatus extract is also utilized to treat hypercholesterolemia in patients with atherosclerosis[10].Some plant images are given in figure no-1



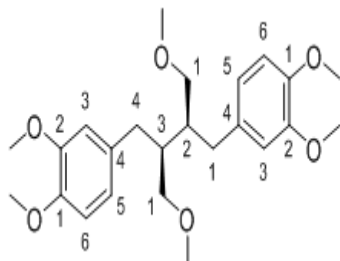
Fig.1 Shurbs and 2 leaves Phyllanthus reticulates

II. TAXONOMY: -

Domain: Eukaryota
Kingdom: Plantae
Class: Angiosperm
Order: Malpighiales
Family: Euphorbiaceae
Tribe: Phyllanthae
Genus: Phyllanthus
Species: Phyllanthus reticulatus

2.1 Plant Morphology:-

Phyllanthus reticulatus is a deciduous shrub with many branches that grow to be 0.5 to 4.5 meters tall. It can also be a habit of climbing. The stem has a diameter of about 2.5 cm. The bark is pale reddish brown or grey-brown in tint. (12). The plant's stems are light and fuzzy while it's young. The leaves and thin branches alternate. The pinnate leaflets are up to 25 cm long and quite big. The flowers are greenish-yellow in color and have a pleasant sweet fragrance. Blooms might appear ahead of or alongside the leaves. A female flower is grouped with a number of male blooms. From



← Phyllanthin structure

For example, pharmacokinetic investigations of retrojusticidin B, which is used to treat anti-HIV, revealed that bioavailabilities after dissolving in tween 80 and maize oil are 22% and 33%, respectively. (13).

2.2.2 Terpenoids:- Triterpenoids, sesquiterpenes, diterpenoids, and monoterpenes are the most important Terpenoids. There are three types of pentacyclic terpenoids: the oleanane type, the fidesane type, and the lupine type. Glochidene and

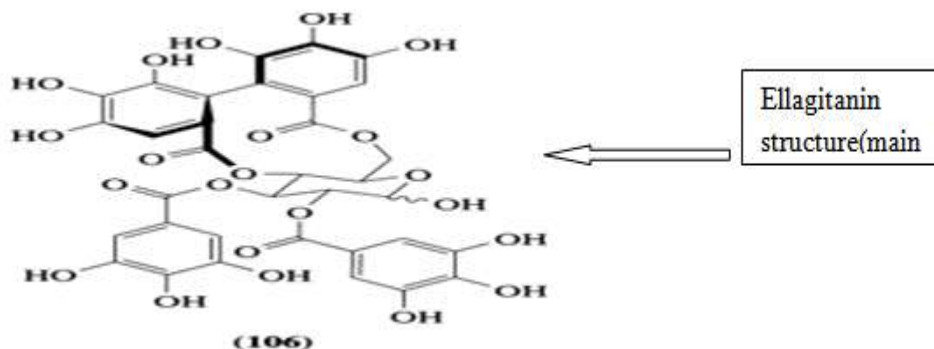
September to October, flowers are in bloom. The roundish berry fruits of *P. reticulatus* have a strong odor and a 4-6mm diameter. They start out green and soon become purple-black.

2.2 Chemical Components:- Phyllanthus species have a variety of chemical compounds, including terpenoids, alkaloids, glycosides, flavonoids, tannins, and saponins, according to phytochemical research. Phenol is the most abundant chemical component in the Phyllanthus plant. Other compounds discovered and isolated from Phyllanthus include tannins, triterpenoids, and flavonoids. The most important compounds detected in this species are corilagin, geraniin, and gallic acid.

2.2.1 Phenylpropanoids:- There are three types of lignins: lignins, simple phenylpropanoids, and coumarins. Phyllanthin is one of the most important chemical compounds discovered in Phyllanthus and is used to treat inflammation, immunomodulation, tumors, and hypotension.

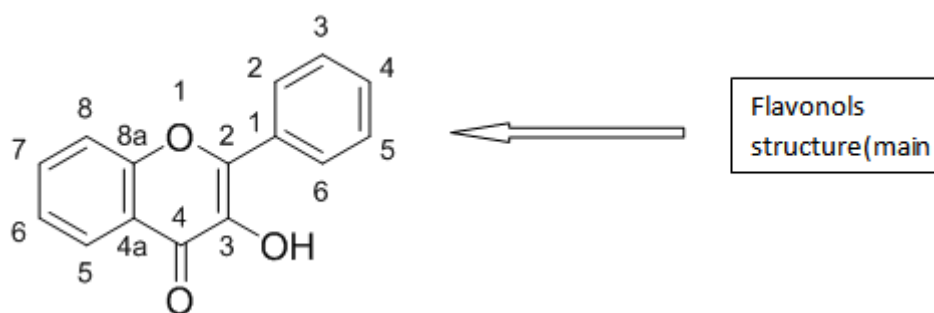
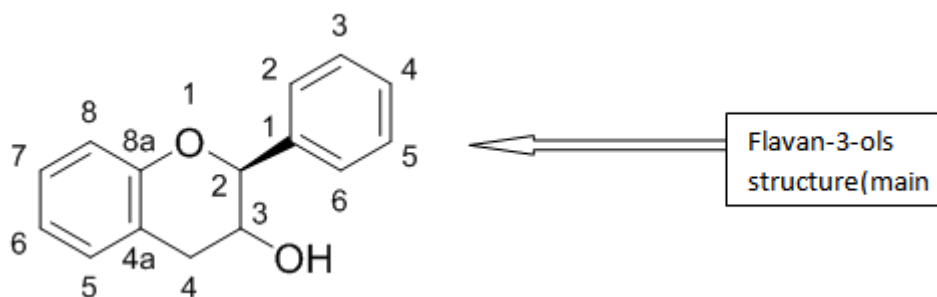
lupeol are two lupine-type triterpenoids that have anticancer properties.

2.2.3 Tannins:- In the Phyllanthus plant, it is the most significant chemical. Galloyl, hexahydroxy di phenyl hydrolyzes tannin (HHDP). Tanin has antiviral properties. Ellagitannins are the most important and largest of the tannin groups. Corilagin and geraniin, the other two most prominent chemicals in ellagitannins, have a variety of actions including antioxidant, anti-HIV, anticancer, and anti-hyperalgesic.



2.2.4 Flavonoids:- Flavonols, flavones, flavanonones, flavan-3-ols, flavononols, and isoflavones make up the majority of it. Flavan-3-ols and flavonols are two of the most important compounds in this group. The flavonols quercetin,

quercitrin, and rutin are the most prominent flavonols in the flavonols category. These flavonols have various activities such as anti-inflammatory, antioxidant, and so on.



2.2.5 Sterols:- Phyllanthus species contain a variety of sterols that have been extracted and identified. Sterols have a variety of anti-disease effects, and these features are also utilized to treat inflammation, viral infections, and hypertension.

hydroxyl groups. Several phenolic compounds have been extracted and discovered from the plant, the most notable of which is mucic acid and its derivatives.

2.2.6 Alkaloids:- Alkaloids have also been discovered in the phyllanthus plant, which have been extracted and named. Securinine and securinine-related compounds are the most important among them. The amide type of alkaloids is also important in alkaloids since these alkaloids have antimalarial properties

III. BIOLOGICAL ACTIVITY:-

2.2.7 Phenol and other:- The phenols are carried by a compound with one or more phenolic

3.1 Antidiabetic activity:- The extract of Phyllanthus reticulatus leaves is used to treat diabetic activities. The leaf extract can also be utilized to treat alloxan-treated mice for hypoglycemia effects. The medication dose range in this trial should be 500-1000 mg/kg body weight. The extract showed anti-diabetic and anti-

hyperglycemic effects after oral dosing respectively.

3.2 Hypocholesterolemic activity:- Phyllanthus reticulatus is a kind of Phyllanthus. Aqueous aerial extract exhibits hypocholesterolemic properties. Compared to hypercholesterolemic rats, the total cholesterol, VLDL cholesterol, triglyceride, LDL cholesterol, and protein carbonyl levels decreased after consuming the extract. After treating the animal, the aqueous extract showed substantial benefits such as lowering the atherogenic index and increasing the percentage of protection. The dosing range for this study should be 250mg/kg or 500mg/kg body weight..(14)

3.3 Antiplasmodial activity:-In a Plasmodium falciparum experiment, the leaves extract of Phyllanthus reticulatus was reported to have anti-plasmodial action against chloroquine-sensitive (K67) and chloroquine resist (ENT36) staining.(15)

3.4 Antimicrobial activity:-The microbes are treated with a methanolic extract of stem bark, which has antibacterial properties. We employed disc diffusion methods to measure antibacterial activity. Samples are obtained and dissolved in chloroform before being placed to sterile filter paper discs on the sample solution in this procedure. Kanamycin is a common antibiotic. Pet ether, carbon tetrachloride, and chloroform soluble plant extract have antibacterial action, as shown in the zone of inhibition. The antimicrobial action of the extract is demonstrated by the zone of inhibition.(16)

3.5 Hepatoprotective activity: - Phyllanthus reticulatus has been proven to have hepatoprotective properties. In rats, an ethanolic extract of the plant's aerial component displays hepatoprotective action against CCL4-induced liver injury. Significant changes in induced phenobarbital sleeping time and serum levels of SGPT, SGOT, SALP, and bilirubin(17) showed that the plant extract had hepatoprotective activity. After administering the plant extract, the extract was very prominent in the liver and hepatoprotective activity was observed.

3.6 Antibacterial activity:- The antibacterial property of the plant's leaf extract is utilized. The bacteria are treated with methanolic, chloroform, or hexane extracts. Both gram-positive and gram-negative bacteria were very susceptible to the extract.

Well, diffusion and broth dilution procedures were used to test antibacterial activity. The plant extract shows minimal inhibitory and antibacterial activities after being supplied. In the case of the

zone of inhibition, methanolic, chloroform, or hexane extracts produce better results. Microorganisms, on the other hand, are extremely sensitive to methanolic extract. As a result, the methanolic extract of the plant has the best antibacterial activity. (18)

3.7 Antinociceptive and Anti-hyperglycemic activity:- In mice, a methanolic extract of the leaves exhibits antinociceptive and antihyperglycemic properties. After administration of the medicine, the methanolic extract of leaves administered to mice in acetic acid produced gastric pain writhing tests showed that it has a very excellent considerable antinociceptive action. When compared to the conventional treatment, aspirin, 200 mg/kg body weight suppressed writhing by 50.5 percent after administration of a drug, and the greatest inhibition of writhing was 39 percent after administration of a drug.

In glucose-induced hyperglycemic mice, the leaves have anti-glycemic action that is dose-dependent. The extract's lowest and highest doses have the lowest and highest effects on serum glucose levels, respectively.

3.8 Cytotoxic activity:- cytotoxic action has been found in a methanolic preparation of the plant's stem bark. In a one-day in vivo experiment, DMSO solutions of the plant component extract were employed against Artemia saline to determine the cytotoxic activity. A.Saline was used to assess the lethal dose of the pet ether, carbon tetrachloride, and chloroform soluble fractions of the methanolic extract to brine shrimp.

Vincristine sulfate is used as a standard control. The chloroform soluble fraction of methanolic extract exhibits a significant cytotoxic activity when compared to the standard, pet ether. (19)

3.9 Analgesic and Anti-inflammatory activity:- Analgesic and anti-inflammatory properties of the plant We chose one of the liquids (petroleum ether, ethyl acetate, or methanol) to act as a solvent.

We employed the ethyl acetate extract at doses of 150 and 300 mg/kg body weight in the acetic acid-induced writhing test. Only at the 300mg/kg dosing level did both ethyl acetate and methanol extract a substantial elongation outcome of another tail flick approach. The methanolic extract of the plant is used significantly in the carrageenan-induced rat paw edema model.(20)

3.10 Antioxidant activity:-The antioxidant activity of the complete plant's methanolic and ethanolic extract has been demonstrated. When it comes to antioxidant activity, methanolic extract outperforms

all other ethanolic extracts. The antioxidant activity of the entire plant powder was 90 percent, compared to 85 percent for conventional butylated hydroxyl toluene (BHT). It showed antioxidant activity in various concentrations using various methods such as DPPH, beta carotene bleaching, superoxide anion radical scavenging reducing powder, and metal chelating test.(21)

3.11 Antiviral activity:- is a well-known medicinal plant used to cure gastrointestinal issues in Bangladesh and India. Using HBsAg-positive serum samples from hepatitis B virus-infected patients, the plant has antiviral activity against the virus. The anti-hepatitis B virus surface antigen (anti-HBsAg) activity of two semi-purified organic fractions identified as PR1 and PR2 of the fat-free ethanolic extract was tested using an in vitro system using the Reverse Passive Haemagglutination (R-PHA) method at both lower and higher concentrations (20 mg/ml and 40 mg/ml, respectively). The Anti-HBsAg antibody was detected using the SERRODIA-Anti-HBsAg-Diagnostic test. Both sample solutions had anti-HBsAg activity in this case. However, it was discovered that at lower concentrations, the sample had little inhibitory activity on HBsAg, whereas at greater concentrations, it has a strong inhibitory effect on the antigen. The Anti-HBsAg activity found in the fractions could be owing to the agents binding to the antibody binding sites on HBsAg. As a result, the sample solution has antiviral activity, according to the results.(22)

IV. CONCLUSION:-

The most crucial aspect of daily living is the requirement. Ethnomedicinal studies have gained a lot of attention in recent years since they provide us with a lot of information on both known and unknown medicinal plants. We reviewed the relevant works of literature on ethnobotanical, phytochemical, and pharmacological information on the *Phyllanthus reticulatus* plant in this article.

A review of the literature revealed that the plant has intriguing medicinal properties. The literature review also identifies the disorders for which *Phyllanthus reticulatus* is used as a medicine, however, its therapeutic efficacy has only been evaluated in a few cases. The plant has a clinical and pharmacological activity that should be investigated more in the future as a source of important phytochemicals for the pharmaceutical sector, given its wide variety of medical benefits.

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