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SWIETENIA MAHAGONI Linn. – A PHYTOPHARMACOLOGICAL REVIEW

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ABSTRACT

Swietenia mahagoni Linn. is a commonly used herb in Ayurvedic medicine. This review supports all updated information on its phytochemical and pharmacological activities, traditional uses and scientific approach. The plant extracts and its chemical marker or target molecule limonoids like swietenolide, have been widely used for the treatment of a large number of human ailments. The chemical entities of this plant has been used as Antibacterial activity, Antimicrobial Activity, Antioxidant activity, Anti ulcer activity, Antifungal activity, Anti – HIV activity, Anti-inflammatory, Analgesic and Antipyretic activity, Hypoglycemic activity, Platelet Aggregation Inhibitors activity etc. Scientifically proved activities are related with traditional concept. Scientific evidence exists with respect to their major and minor constituents. Swietenia mahagoni Linn is one of the most important controversial and effective natural origin that has a tremendous future for research. The novelty and applicability of Swietenia mahagoni Linn. are hidden Such things should be overcome through modern scientific concept.

Key words: Swietenia mahagoni Linn, swietenolide, Pharmacological activities.

INTRODUCTION

Swietenia mahagoni (Linn.) Jacq., (Meliaceae), *Swietenia fabrilis* Salisbury, *Cedrus mahogany* (L.) Miller (Schmidt at el 1994) is a large, deciduous, and economically important timber tree native to the west Indies which is commonly known as “mahogani,” which has 146 genera and about 1,500 species [1,2]. Mahogany can reach 75 feet in height with a 50-foot-spread but is more often seen at 40 to 50 feet tall and wide. The leaves are evergreen or semievergreen, alternate¹, pinnate, 12–25 centimetres (4.7–9.8 in) long, with four to eight leaflets, each leaflet 5–6 centimetres (2.0–2.4 in) long and 2–3 centimetres (0.79–1.2 in) broad; Flowers are unisexual and the trees monoecious. The dense, strong wood of Mahogany is quite resistant to wind-damage on properly trained trees, making this tree all the more ideal for use as a shade tree or street tree. The five-inch-long, brown, woody fruit capsules hang from slender, fuzzy stalks in winter and split while still on the tree when ripe to release winged seeds [3]. This tree is mainly cultivated at tropical zones, such as India,

Malaysia, and Southern China.

CHEMICAL CONSTITUENT:-

It contains alkaloids, terpenoids, anthraquinones, cardiac glycosides, saponins, phenols, flavonoids, volatile oils, phospholipid and long chain unsaturated acid [1,4,5]. These plant specially contains 45 limonoids like swietenolide, 2-hydroxy-3-O-tigloylswietenolide, [2] swiemahogins A and B [6] belonging to the structural classes andirobin, gendunin, mexicanolide and phragmalin, triterpens, tetranortriterpenes, and chlorogenic acid [7,8].

It also contains triterpenoid [9], tetranortriterpenoid, swietenine dimeric triterpenoid. Previous chemical investigations on *S. mahagoni* resulted in the isolation of some tetranortriterpenoids, limonoids and related compounds like swietenine acetate; 3,6-di-*O*-acetylswietenolide; 2- α -hydroxymexicanolide; 3-*O*-tigloylswietenolide; 6-acetylswietenine; 6-acetyl-3-tigloylswietenolide, etc [10,11].

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Traditional uses

Traditionally Leaves have been used for Diarrhea, febrifuge, colds, catarrh. The seed have been used for leishmaniasis, abortion medicine [12], cancer, amoebiasis, coughs, chest pains, intestinal parasitism [5], hypertension, diabetes and malaria as a folk medicine in Indonesia [10]. The bark has been used as an astringent for wound [11]. The decoction of the bark of these mahoganies is extensively used as febrifuge, which could be associated with its use as an antimalarial drug. *Swietenia mahagoni* seeds have been applied as a folk medicine for the treatment of hypertension, diabetes, and malaria [13].

This plant has various types of medicinal values like antimalarial and antidiarrhoeal effects [14,15]. The plant extracts have been accounted to possess antibacterial and antifungal activities [16]. Limonoids obtained from *S. mahogani* have antifungal activity [9]. It may also be used as a potential agent for diabetes therapy due to its agonistic activity to PPAR γ [17]. The antifeedant activity of the limonoids from this plant has been reported recently [8]. The extract of this plant showed ameliorative effects on diabetic mice [17] antimicrobial properties [18](Guon at el 2003., [9] platelet aggregation inhibitory [19], and anti-human immunodeficiency virus (HIV) activities [20]. Chlorogenic acid from the methanol extract of this plant displayed human immunodeficiency virus protease inhibitory activity [21]. The seed extracts of *S. mahogani* has also been found to inhibit plateletactivating factor (PAF)-induced platelet aggregation [19].

Pharmacological activity:-

Antibacterial activity

Swietenolide (1) and 2-hydroxy-3-O-tigloylswietenolide (2) these two compound are isolated from the methanolic extract of the seed of *Swietenia mahagoni*. The antibacterial activity of these compounds was assessed against eight multiple-drug-resistant bacterial strains (clinical isolates) by the conventional disc diffusion method. While both compounds were active against all test organisms but compound 2 displayed overall more potent activity than compound 1 [2]. Antibacterial activity of the chloroform and ethanolic extract of leaf, bark and seed was checked in the conc of 500 μg disc⁻¹ it was found that chloroform extract of leaf and bark showed activity against most of the test bacteria. Chloroform extract of seed shows activity against only bacillus magaterium, salamonella paratyphi, shigella dysenteriae. Highest activity of chloroform extract was recorded 16 mm discs⁻¹ in case of seed against *S. paratyphi*. Bark ethyl extract shows good activity against all test bacteria [18,22].

Antimicrobial Activity

The whole methanolic extract of the seed of *Swietenia mahagoni* is also give antimicrobial activity against Gram-positive, Gram-negative, yeast and fungus

strains was evaluated based on the inhibition zone using disc diffusion assay, minimal inhibition concentration (MIC) and minimal bactericidal concentration (MBC) values. The SMCM seed extract had inhibitory effects on the growth of *Candida albicans*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Streptococcus faecalis* and *Proteus mirabillase* and illustrated MIC and MBC values ranging from 25 mg/ml to 50 mg/ml. The crude extract was subjected to various phytochemicals analysis. It gives presence of alkaloids, terpenoids, antraquinones, cardiac glycosides, saponins, and volatile oils as major active constituents [1,18].

Antioxidant activity

Methanolic extract of the seed of *Swietenia mahagoni* contain phenol and flavonoid which give antioxidant activity in vitro. The extract has potent antioxidant activity against free radical scavenging activity (DPPH), xanthine oxidase inhibition (XOI), hydrogen peroxide scavenging activity (HPSA) and ferric-reducing antioxidant power (FRAP) assays [4].

Cytotoxic activity

Crude ethanolic extracts of seed, bark and leaf of *Swietenia mahagoni* and their various fractions gives significant cytotoxic effect by using brine shrimp lethality bioassay [22].

Anti ulcer activity

Mahogany seed extract contains high amount of long chain unsaturated fatty acid. Long chain fatty acids have found anti-ulcer properties the mechanism of which is postulated to be associated with the inhibition of gastric bacterial metabolism. Mahogany seed extract was found to have a potential effect on the healing of gastric ulcers in rats [5].

Antifungal activity

Limonoids from *S. mahogany* were tested for antifungal activity against the groundnut rust *Puccinia arachidis*. Mexicanolide, 3B-acetoxy-mexicanolide, 3B-hydroxymexicanolide, 2A, 3B-dihydroxymexicanolide from *K. senegalensis*, and 6-acetylswietenine and 6-acetyl-3-tigloylswietenolide from *S. mahogani* effectively reduced the number of rust pustules on detached groundnut leaves [9].

Anti – HIV activity

Methanolic extract of *Swietenia mahogany* bark contains chlorogenic acid, metylesters, catechin, galocatechin. Which shows significant HIV-1 protease inhibition action. The samples also suppressed the formation of syncytia in co-cultures of MOLT-4 and MOLT-4/HIV-1 cells [21].

Anti-inflammatory, Analgesic and Antipyretic activity

Methanolic extract of seed of *Swietenia mahogany* shows anti-inflammatory, analgesic, and antipyretic activities. The anti-inflammatory activity was evaluated using acute, sub-chronic, and chronic models of inflammation in rodents while analgesic activity was evaluated using Writhing, Tail clip method, Tail-flick method and antipyretic activity was evaluated using Brewer's yeast-induced pyrexia. The extract produces anti-inflammatory activity through dual inhibition of the cyclooxygenase and lipo-oxygenase pathways of arachidonic acid metabolism. The extract enhanced peritoneal cell exudates along with macrophage significantly. The triterpenoids present in *Swietenia mahogany* may be responsible for these activities.

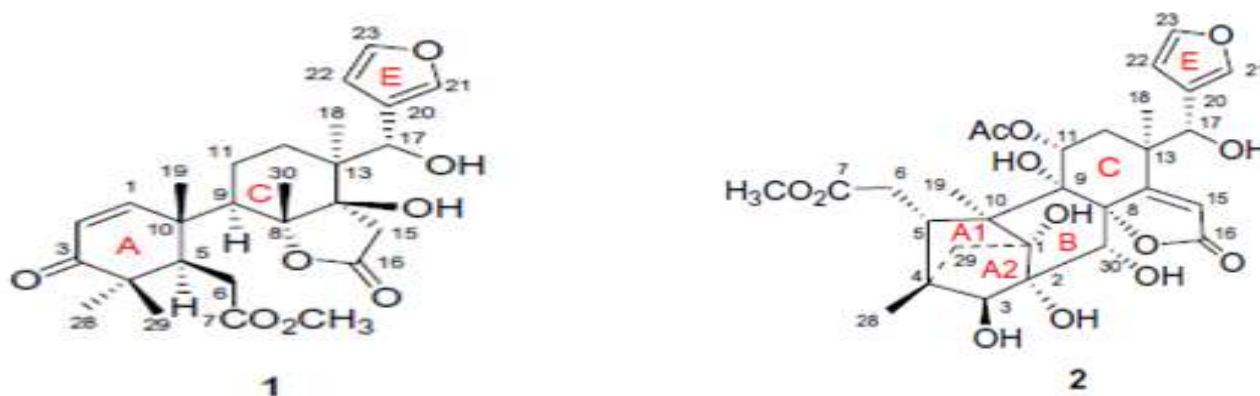
Hypoglycemic activity

Swietenia mahogany exhibited moderate effects on decreasing the blood glucose levels of the diabetic mice. So it may be used as a potential agent for diabetic therapy.

Platelet Aggregation Inhibitors activity:

The ether extract from the seeds of *Swietenia mahagoni* Jacq. (Meliaceae) was found to inhibit platelet-activating factor (PAF)-induced platelet aggregation. Systematic separation of the extract afforded twenty eight tetranortriterpenoids related to swietenine and swietenolide showed a strong inhibition against PAF-induced aggregation *in vitro* and *in vivo* assays.

Fig. 1: Swietenolide , 2: 2-hydroxy-3-O-tigloylswietenolide



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