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A MINI REVIEW ON TRADITIONAL USES, PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES OF *HOMONOIA RIPARIA*

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ABSTRACT

Medicinal plants are well known natural drug suppliers in most of medicinal system. Where the folk medicinal plants used by tribes and local indigenous peoples are giving valuable information with this regard. The current review study is based on such medicinal plant *Homonoia riparia* from the family Euphorbiaceae. *Homonoia riparia* is reported for ethno botanical studies and phytochemicals investigation and contents many important Phyto constituent in it as per literature.

I. INTRODUCTION

"Man ever desires of knowledge, has already explored many things, but more and greater still remains concealed; perhaps reserved for far distant generations, who shall prosecute the examination of their creator's work in remote countries and make many discoveries for the pleasure and convenience of life…." The above quotation of Linnaeus is the most appropriate introduction to this article which deals the relationship between medicinal plants and the total field of ethno botany. Plants have long been used medicinally. Nowadays advanced traditional medical systems such as Unani, Ayurveda and Chinese medicines uses herbs for the systematic treatment. The side effects, cost of treatment, development of resistance, inadequate supply of synthetic drugs etc., motivate the people to go for herbal treatment. WHO estimated that 80% of world population utilizes herbal remedies for their foremost health care need. Medicinal plants are the pillar of traditional medicines. India is one of the countries having the richest storehouse of medicinal plants. The phytoconstituents isolated from the medicinal plants can be developed to herbal medicines. The potential principles can be used as precursor or as a lead molecule for the drug discovery. So, it is very important to explore the medicinal plants and the phytoconstituents present in it. This can be a promising field for the researchers to introduce new molecules for the treatment as well as to understand the mechanism of action for the scientific confirmation.

II. MORPHOLOGY OF *HOMONOIA RIPARIA*

Homonoia riparia

Homonoia riparia (H. riparia) is a mangrove species that belongs to Euphorbiaceae family. This plant also known by the name Willow-Leaved Water Croton. Willow-Leaved Water Croton is a plant commonly found growing along small streams at low and medium altitudes, on banks, and in streambeds. It is a shrub growing to 1-3 m tall. The leaves are linear-lance shaped, 12-20 cm long, and 1.5-2 cm wide. Upper surface of the leaves is green and shining, and the lower surface brown and hairy. Reddish flowers are born in spikes 5-10 cm long, with obovate bracts, 1.5-2 mm long. Male flowers have 0.2 mm long stalks, 3 velvety sepals, 3-4 mm long. Female flowers have 5 oblong sepals, with tapering tips, about 1-2 mm long. The capsules are about 8 mm in diameter, hairy, and borne on solitary, hairy spikes, 5-12 cm long, in leaf axils. They show very broad distribution in south Asia, they found in India, China, Laos, Philippines, Taiwan, and throughout Malaysia to Papua New Guinea. This plant usually grows in wet soil. Flowering and fruiting during December to May. It is

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distributed throughout India, at lower elevations on the banks of rivers and streams especially among rocks of different states like Maharashtra, Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana and Odisha.

a. Taxonomical classification:

Kingdom:	**Plantae**
Phylum:	**Tracheophytes**
Class:	**Magnoliatae**
Order:	**Euphorbiales**
Family:	**Euphorbiaceae**
Genus:	**Homonoia**
Species:	***Homonoia riparia***

b. Common names in various Indian languages:

Marathi: Ran Kaner (रान कणेर)

Hindi: Sherni

Assamese: Hill-kadam, Lari

Kannada: Holenage, Nirgangile

Malayalam: Atthuvachi

Oriya: Thotthor

III. PHYTOCHEMISTRY

1. In the study carried out by the Yang, Liu, Qing, Wu & Zhu in 2007, Ethyl acetate fraction of the roots of this plant showed the presence of several compounds. Compounds were separated using silica gel column chromatography repeatedly with a gradient of PE-EtOAc, PE-Me_2CO, $CHCl_3$- Me_2CO and $CHCl_3$-MeOH. Different spectroscopic techniques like NMR, HMBC, IR and MS separately were used to elucidate the structure these various compounds. Their structures were identified as a new compound 1-oxo-aleuritolic acid (1), and twelve known compounds named as aleuritolic acid (2), 3-acetoxy-aleuritolic acid (3), taraxerone (4), taraxerol (5), methyl 3-acetoxy-12-oleanen-28-oate (6), 3-acetoxy-12-oleanen-28-ol (7), ursolic acid (8), lupenol (9), 3beta-acetoxy-lupenol (10), cleomiscosin A (11), chrysophanol (12) and gallic acid (13).

2. In another research carried out by the Seonju Park et al. in year 2014 showed the presence new flavonol glycoside, myricetin 3-*O*-(6″-3, 4-dihydroxybenzoyl)-β-glucopyranoside and 13 known compounds were isolated from the leaves of *Homonoia riparia*. Their structures were elucidated by spectroscopic methods.

3. In the year 2015, phytochemical screening of these species revealed the presence of several natural products such as alkaloids, carbohydrates, glycosides, carboxylic acids, flavonoids, phenols, steroids, saponins, tannins and terpenoids. The phytochemical constituents present in the extract can be held responsible for different medicinal activities of the plant.

4. Six new cycloartrane type triterpenes were isolated from this plant along with one known compound from the leaves of *Homonoia riparia* by the Lee et al. in year 2012. The isolated compounds were 24-methylenecycloartane-3β,6β,7β-triol(1), 24-methylenecycloartane-3β,6β,7β,16β-tetraol(2), 24-methylenecycloartane-3β,6β,16β-triol(3), 24-methylenecycloartane-3β,7β,16β-triol 3-O-β-d-xylopyranoside(4), 24-methylenecycloartane-3β,6β,16β-triol 3-O-β-d-xylopyranoside(5), and 24-methylenecycloartane-3β,6β,7β-triol 3-O-β-d-xylopyranoside(6) and 24-methylenecycloartane-3β,6β,7β,16β-tetraol 3-O-β-d-xylopyranoside(7). Riparsaponin is also isolated from the roots of *Homonoia riparia* by the same researchers in year 2017 which showed cytotoxicity.

5. Myricitrin is the major component of this plant and it reported to inhibit high glucose-induced apoptosis of human retinal pericytes. Presence of gallic acid is reported in methanolic extract of the crude drug. Myricetin 3-O-(6″-3,4-dihydroxybenzoyl)-βglucopyranoside a flavonol glycoside isolated from the leaves of this plant.

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Spectroscopic methods were used to analyze the compound. This study was carried by the Pyun, Kim, Lee, & Kim in year 2017.

IV. PHARMACOLOGICAL ACTIVITY

i. Angiogenesis inhibitory: An angiogenesis inhibitor is a substance that inhibits the growth of new blood vessels. Angiogenesis inhibitory activity was reported in leaves of *Homonoia riparia* (Lee et al., 2012). The newly isolated cycloartane types of compounds were responsible for the action. Miles assay was used to examine the VEGF-induced vascular permeability in rats in vivo and have shown angiogenesis inhibitory activity

ii. Antioxidant activity: Different fractions such as petroleum ether, ethyl acetate, butanol and aqueous fractions were made from crude methanol extract of the plant by means of liquid partitioning. *Homonoia riparia* shows the good antioxidant behavior (Xavier et al, 2017). Presence of phenolic compounds and flavonoids may be responsible for the Antioxidant potential of the plant

iii. Nephroprotective activity: In the study carried out by the Xavier et al. in 2017 showed that extracts and the fractions of this plant possess significant Nephroprotective activity. Crude methanol extract was made into different fractions of petroleum ether, ethyl acetate, butanol and water using liquid partitioning and these portions were analyzed for nephroprotective activity. Human Embryonic Kidney cells were tested against cisplatin induced toxicity by MTT assay. Both the extract and fractions exhibited the activity among which butanol and aqueous extract possesses the highest of the action

iv. Xanthine oxidase inhibitory effect: Dammarane type triterpenoids isolated from *Homonoia riparia* and structural elucidation was done on the basis of spectroscopic analysis. 11β-HSD1 inhibitory property was tested on mouse and showed potent inhibition (Xu, Zhao, Yang, Wang, & Zhao, 2014).

v. Antifungal activity: The aqueous and ethanol extracts of fresh and dry roots, leaves and flowers/fruits were used for the study for antibacterial effect of these plant, this study were carried out by Bapat & Mhapsekar et al. in year 2014. These extracts were tested on Trichophyton mentagrophytes and *T. rubrum* isolated from patients. Aqueous extract of dry leaves and male flowers of Homonoia riparia showed significant inhibition in the growth of *T. mentagrophytes*. Antifungal property of the extracts may be due to the occurrence of tannins, flavonoids, saponins, glycosides and alkaloids

vi. Anticancer activity: Riparsaponin is a compound isolated from the roots of *H. riparia* and is investigated for the anticancer activity on human oral carcinoma cells. Cytotoxicity was evaluated using MTT assay. Apoptotic effect of Riparsaponin was investigated by DAPI staining. It showed significant anti-proliferative effect on oral carcinoma cells at a concentration. The study reported that anticancer activity was possessed by inducing mitochondria–mediated apoptosis (Li &Wang, 2017).

V. CONCLUSION

The review of the plant *Homonoia riparia* makes available traditional uses, phytochemicals and scientific proof for many ailments. It contains a number of phytoconstituents, which are the important factors in the medicinal values of this plant. The present review summarizes some important pharmacological activities on *Homonoia riparia* and phytochemical investigations. However, no scientific evidence is available to show the property is due to a particular compound. The report demands further research on this species to explore the medicinal properties of *Homonoia riparia*.

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