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RESEARCH ARTICLE

ETHNOPHARMACOLOGICAL PROFILE OF *RICHARDIA SCABRA*: FROM FOLK MEDICINE TO SCIENTIFIC VALIDATION

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ABSTRACT

The Rubiaceae family's *Richardia scabra*, often known as Florida Pusley, is known locally in Bangladesh as "Riim-raaz." Because of its wide spectrum of pharmacological actions, the herb *Richardia scabra*, which has long been utilized in folk medicine, has attracted increasing scientific attention. Strong antibacterial, anti-cancer, anti-inflammatory, and neuropharmacological properties, particularly in its petroleum ether and methanol extracts, have been shown in recent studies to support its traditional applications. The MTT assay was used to investigate the cytotoxicity of the *R. scabra* compound on HeLa cells.The compound's IC_{50} of 46.09 µg/mL indicated that it was cytotoxic in a dose-dependent manner. Furthermore, it frequently stopped the cell cycle, primarily in the G0/G1 and S phases, which is encouraging for its potential application as a lead chemical in the treatment of cancer. Carrageenan-induced paw edema in mice demonstrated *R. scabra* anti-inflammatory properties. Methanolic extract (MRS) demonstrated its safety and effectiveness by dramatically reducing inflammation (116.00±3.67 inhibition) at 200 mg/kg, with no toxicity even at 4000 mg/kg. Methanolic (MRS) and petroleum ether (PRS) extracts both show CNS depressive, anxiolytic, and antidepressant effects in terms of neuropharmacological action.

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INTRODUCTION

Richardia scabra also named Florida Pusley of the Rubiaceae family, is also locally termed as 'Riim-raaz' in Bangladesh. Which originated in North America. regarded as a weed species that grows throughout the various areas of China, encompassing the provinces of Hunan, Guangdong, and Hong Kong. R. It is a branching plant that possesses unusual qualities due to its hairy stems and leaves. Although it is usually prostrate, it can grow up to 80 cm every year. In addition to its ability to treat dermatitis and asthma, the entire plant is used as an emetic and tonic. This plant's roots havediaphoretic properties. Thus far, research on several medicinal plants has been conducted both domestically and abroad, yielding important insights on *Richardia scabra*. The blades are either ovate or elliptic. Its leaves are opposite each other, thickly papery, light green on the back, rough on the sides, and heavily covered with coarse white hair. The inspection of the transverse section revealed the distinctive qualities of the roots, stems, and leaves. Under a microscope, the pollen grains, calcium oxalate cluster crystals, non-glandular hairs, stone cells, and capillaries were examined. It can be regarded as a distinguishing characteristic to determine its true identity. Drying membrane to become densely papery, having the feature of the cuneate to the base acute. Corolla is white. The seeds are three to four inches long and are either black or brown. The primary components of *scabra* include coumarin, alkaloids, and flavonoids. [1-2]

Pharmacological Activity

Antimicrobial activity: Petroleum ether and methanol extracts from the mature Indian leaves of *Richardia scabra* that have antimicrobial properties. The antibacterial zone inhibition of the investigated materials was ascertained using the disc diffusion method, the antifungal activity was ascertained using the agar plug method, and the minimum inhibitory concentration was ascertained using the microtube-dilution technique. When tested against ten bacterial and four fungal species, both extracts demonstrated strong antibacterial and antifungal properties. For bacterial strains, the *R. scabra*

Leaf of *Richardia scabra*

Flower of *Richardia scabra*

methanol extract's minimum inhibitory doses varied from 12.5 to 100 µg/mL. Simple sugar, terpenoids, fatty acids, alkaloids, steroids, and flavonoids were identified as phytoconstituents in the extracts. [3]

Anti-Cancer activity: Due to the inadequate reports in the literature regarding the effects of heraclenin on cancer cell lines, the MTT assay, which gauges cell viability, was used to screen for the cytotoxicity of natural products. The results demonstrated that Compound 3 exhibited dose-dependent activity against treated HeLa cells (a human cervical cancer cell line) at different concentrations (6.25, 12.5, 25, 50, and 100 µg/ml), with an IC50 value of 46.09 µg/ml. This is the first report of its sort to test the heraclenin's cytotoxicity. It caused a decrease in the proportion of G2-M phase and caused cell cycle arrest in the G0/G1 phase at roughly 51.2% and S phase (30.2%).[4]

Anti-inflammatory activity: Carrageenan-induced paw edema in mice, and OECD recommendations, the safety of the methanolic extract of *Richardia scabra*(MRS) as well as its anti-inflammatory and central nervous system depressant properties were assessed. Until the dose reached 4000 mg/kg, no mortality, toxicity, or behavioral abnormalities were seen. In the carrageenan-induced paw edema model, MRS at 200 mg/kg showed the highest percentage inhibition (116.00±3.67) of paw edema and was significant ($p < 0.05$, compared to control).

Neuropharmacological activity: In the open field test, methanolic extract of *Richardia scabra* discovered a substantial ($p < 0.05$, vs.control) depressing impact at 200 & 400 mg/kg for 60 & 60 & 120 & 180 min, respectively.MRS 400 mg/kg caused a gradual decrease in movement from 30 to 120 minutes, but a significant ($p < 0.05$, vs.control) increase in movement during 180 minutes was seen using a hole cross test. The findings of this investigation indicate that MRS may contain CNS depressants and anti-inflammatory substances.[1]Richardia scabra (whole plant) petroleum ether extract's neuropharmacological activity was assessed utilizing the hole cross test, raised plus-maze, and y-maze, respectively. The antidepressant and depressive properties of PRS 200 mg/kg and 400 mg/kg were seen in the Y-maze test. Once more, the elevated plus maze test showed that all extracts, even those at 200 and 400 mg/kg, exhibited depressive and anxiolytic properties. Both extracts (PRS 200 mg/kg and 400 mg/kg) demonstrated rising and decreasing movement at several observations in the hole cross test. The current study's findings indicate that PRS may be the source of anxiolytic, antidepressant, and CNS depressive medications.[5]

DISCUSSION

From Folk Medicine to Scientific Validation: *Richardia scabra*, a plant traditionally used in folk medicine, has attracted mounting scientific interest for its multiplicity of pharmacological activities. Recent research has supported its traditional uses, demonstrating strong antimicrobial, anti-cancer, anti-inflammatory, and neuropharmacological activities, especially in its petroleum ether and methanol extracts. The antimicrobial activity of *R. scabra* was evaluated with a variety of standard procedures such as disc diffusion, agar plug, and microtube-dilution methods. Both petroleum ether and methanol extracts of mature Indian leaves showed strong antibacterial and antifungal activities against ten bacterial and four fungal organisms. It was especially interesting that the methanolic extract showed a minimum inhibitory concentration of 12.5-100 µg/mL against bacterial strains. Phytochemical analysis depicted the existence of terpenoids, alkaloids, flavonoids, steroids, fatty acids, and simple sugars that are responsible for its antimicrobial activity. In studying its anti-cancer activity, heraclenin—a *R. scabra* compound—was tested for cytotoxicity by the MTT assay on HeLa cells. The compound was found to be dose-dependently cytotoxic with an IC_{50} of 46.09 µg/mL. In addition, it arrested cell cycle at high frequency mostly in G0/G1 and S phases, which is a promising step towards its use as a lead compound in anticancer treatment. Anti-inflammatory activity of *R. scabra* was established by the carrageenan-induced paw edema model in mice. Methanolic extract (MRS) at 200 mg/kg significantly inhibited inflammation (116.00±3.67 inhibition) with no toxicity even at 4000 mg/kg, evidencing its safety and efficacy. For neuropharmacological action, methanolic (MRS) and petroleum ether (PRS) extracts both exhibited CNS depressant, anxiolytic, and antidepressant activity. Open field, hole cross, elevated plus-maze, and Y-maze behavioral tests revealed significant locomotor activity and anxiety-related behavior alterations in response to doses of 200 and 400 mg/kg. The changes were time-dependent and suggestive of possible CNS-modulating activity.In summary, *Richardia scabra*, a long-held treasure of folk medicine, now also has robust scientific support for its diverse pharmacological attributes. Such a synergy between ancient lore and contemporary authentication paves the way for new therapeutic uses and drug development.

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