A REVIEW ON PHYTOCHEMISTRY AND PHARMACOLOGICAL ASPECTS OF *Derris scandens* (Roxb.) Benth

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ABSTRACT

Objective: Traditional herbal medicines were very important and play a vital role. Scientific research was trending of the isolation of active compounds of herbal origin. The secondary metabolites have prominent therapeutic effect like treatment for musculoskeletal pain, antimicrobial, antioxidant effects so in the present review study was based on the overall significance of active constituents, pharmacological aspects, identification tests for active constituents were discussed in which the one can review all the important information and the research done in the *Derris scandens*Benth which may be helpful for the future research work. Conclusion: It may remain as the fundamental source of chemical diversity and an important source of drug discovery. This study highlights the bioactive metabolites produced by *Derris scandens*.

Keywords: Secondary metabolites, Diversity, anti-inflammatory, antimicrobial, antioxidant, anticancer.

INTRODUCTION

*Derris scandens* (ROXB)Benth. *(Family Leguminosae)* is distributed in South East Asia and Australia [1]. In India, it is distributed in subhimalayan tract, south India. It is a garden plant. The stem was widely used in traditional medicine as an anti-tussive, diuretic, expectorant, anti-dysentery agent and for treatment of muscle pains [1], cough and diarrhea. Insecticidal constituents rotenone and lonchocarpic acid were also reported from the roots of *D. scandens*, these compounds demonstrated insect antifeedant activity. The use of *D. scandens* as folk medicine and the antimicrobial activity of the crude extract helped phytochemical investigation. Previous studies indicated the presence of coumarins, isoflavones, flavones, isoflavone glycosides and phenyl coumarins as chemical constituents from *D. scandens* [1]. It is an anti-dysentery agent and in curing diarrhea lead to propose the hypothesis that plant parts may have bactericidal, antifungal, anti-protozoa, antialgal properties.

CLASSIFICATION

Kingdom: Plantae [2]
Order: fabales
Family: Leguminosae
Genus : Derris
Species : scandens

VERNACULAR NAMES

English: Hog creeper[2]
Hindi: Tupbael
Marati : Garudvel
Oriya: Mahaguno
Telugu: Chirutalibaadu, nallateega

SYNONYMS

*Derris scandens* (Roxb.)Benth[3]
*Dalbergia scandens* (Roxb)
*Derris timoriensis*(DC)
*Dalbergia timorienses* (DC)
*Milletia littoralis* Dunn

Images of *Derris scandens*

Fig 1: A POD of *Derris scandens* in Hyderabad (Ref eflooraindia)

Fig 2: Flowers of *Derris scandens* (ref eflooraindia)

Fig 3: *Derris scandens* image (Ref Wikipedia)
MACROSCOPIC CHARACTERS

*Derris scandens* is a climbing shrub. Leaves are compound which are 3–6 inches long; rachis is channelled, leaflets are elliptical, oblong, axillary, racemose long[4]. Each node contains 3–4 flowers; flowers are pink and white in colour. Calyx is grey and corolla is silky. Stamens are united by filaments. Legume pod contains five seeds.

CHEMICAL CONSTITUENTS

Phytochemical investigation of *Derris scandens* resulted in scandenin, scandenin A, Betulinic acid, lupeol, β amyrin, β sitosterol and β sitosterol glucopyranoside from the different parts of *Derris scandens* like flower, leaf, stem, and root. All the chemical constituents mentioned above are secondary metabolites. Secondary metabolites are defined as small organic molecules produced by an organism that is not essential for the plant growth development and reproduction. Secondary metabolites specifically modulate health maintaining processes, including excretion of waste and toxic products from organ systems of the body. It means secondary metabolites sustains the overall functional condition of the cells within organ systems of the body. The group of metabolites working with an enzyme during the entire process of metabolism is called metabolome.
Table 1: Patent ID and Patent Title for different chemical constituents.

<table>
<thead>
<tr>
<th>Molecular weight</th>
<th>Molecular formula</th>
<th>Patent ID</th>
<th>Patent Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>434.488 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US209143279</td>
<td>Methods and composition for treating metabolic disorders. Compounds, composition, and methods for preventing skin whitening.</td>
</tr>
<tr>
<td>456.711 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US8563754</td>
<td>Systems and methods for identifying combinations of compounds of therapeutic interest.</td>
</tr>
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<td>456.729 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US209269772</td>
<td>Coumarin compounds as melanogenesis modifiers and uses thereof.</td>
</tr>
<tr>
<td>426.727 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US8772252</td>
<td>Methods of treating arthritic conditions using (+)-2-[1-(3-ethyl-4-methoxyphenyl)-2-methylsulfonyl]ethanol 1, 3-dione. Inhibitors of Brutons Tyrosine kinase</td>
</tr>
<tr>
<td>426.729 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US8802717</td>
<td>Betulinic acid antioxidant potential of Derris scandens</td>
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<tr>
<td>426.729 g/mol</td>
<td>C_{23}H_{29}O_{6}</td>
<td>US957079</td>
<td>Betulinic acid Pharmacological activities</td>
</tr>
</tbody>
</table>

Pharmacological activities

- The effective intake of oral dosage form D. scandens was prominent on reducing pain score was not significantly different from those of non-steroidal anti-inflammatory drugs at any time points (3, 7, 14 days and overall [6]. The overall pain reduction in the D. scandens group was significantly no change when treated with NSAIDs.
- Two coumarins, four triterpenes, and two steroids were isolated from the roots and stem extracts of D. scandens. They are proved to have anti-dysentery activity and in curing diarrhea lead us to propose the hypothesis that plant parts may have bactericidal, antifungal, anti-prototaxia/antialgal properties [7].
- The antioxidant potential of an Ethanol extract of Derris scandens [8] and was proved and evaluated using diphenylpcrylhydrazyl free radical (DPPH), Phosphomolybdenum total antioxidant assay, reducing power assay and hydrogen peroxide assay.
- It is observed that methanolic extracts of Derris scandens possess potent antioxidant activity. The presence of most general phytochemicals might be responsible for their therapeutic effects [9]. It further reflects a development of novel chemotherapeutic agents and in future may serve for the reproduction of synthetically improved therapeutically active agents.
- The efficacy and safety of D. Scandenin Benth extract compared with Naproxen [10] for therapy of patients with knee osteoarthritis.
- A study of the efficacy of Derris scandens Benth 50% ethanol extract compared with diclofenac for the alleviation of low back pain [11].
- Pretreatment with D. scandens extract before gamma irradiation significantly increased clonogenic survival and decreased the proportion of radiation-induced abnormal nuclei of Hep-2 cells [12]. Further, the extract was found to enhance radiation-induced G2/M phase arrest, induce Akt activation, and increase motility of Hep-2 cells [13]. The study thus indicated that D. scandens extract had the potential of radioresistance of Hep-2 cells [14].
- Topical administrations of crude extract of Derris scandens proved to methods of treat symptoms of reduced skin elasticity [15]. These compositions are effective in stimulating LOXL-1, activity, inhibiting calcineurin activity, and stimulating glycosaminoglycan synthesis in skin cells and can thus reduce age-related skin damage and improve the appearance of fine lines, wrinkles, skin sagging and other symptoms of skin aging and skin damage.
- The different extracts of D. scandens exhibit appreciable antibacterial, antifungal and antialgal activities [17,18,19]. A preliminary study showed that scandenin showed strong antibacterial activity and convincing antifungal and antialgal properties.
- 2-glucosidase enzyme inhibitor and free radical scavenging constituents [20] from Derris scandens Benth were isolated, characterized and chemomicrobial quantification.
- Ethanol extract from Derris scandens Benth was proved to mediate radiosensitization via two distinct mods of cell death in human colon cancer HT-29 cells [21]. (PMID:24644423)
- Scandenin, a constituent of the roots of Derris scandens, was isolated had noted as a very important therapeutic active ingredient [22].
- The aqueous extract of Derris scandens was proved to have [23] antimicrobial properties against S aureus, S epidermidis, and E coli.
- The methanolic extract of Derris scandens showed top 2 poison activity against the mutant yeast cells [24]. The compounds isolated from the extract were found to be 5,7,4 trihydroxy 6-8diprenylloflavone and lupaligenin.
- An ELISA was established for GTG determination in Derris scandens; the GTG-PAb can react with GTG amidogenistin, but genistin was not found in Derris [25]. So ELISA
can be used for high throughput quality control of GTG content in Derris scandens.

REFERENCES

4. Vimal Ketniratsaikul. The study by its Clinical Trials.gov identifier (NCT number): NCT00503828, Department of Rehabilitation Medicine, Faculty of Medicine, Siriraj Hospital.