

ACTINIOPTERIS RADIATA (LINN.): A COMPREHENSIVE REVIEW

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ABSTRACT

Actiniopteris radiata Linn. is an important medicinal plant, is fern widely distributed throughout Africa and adjacent Islands, Madagascar, Arabia, Iran, Afghanistan, Nepal, India, Sri Lanka, Burma and Australia. The plant contains several chemical constituents like Hentriacontane, Hentriacontanol, Hentriacontanone, β -sitosterol, Quercetin-3-rutinoside, β -sitosterol palmitate. The plant is claimed to possess anti-histaminic activity, anti-cholinergic, anti-microbial activity, anti-inflammatory activity, anti-helmenthic activity, analgesic activity, anti-tubercular activity and used as styptic. The present article reveals the detailed exploration of phytoconstituents and pharmacological activities of *Actiniopteris radiata* is an attempt to provide for further research.

Key Words: *Actiniopteris radiata* Linn, Quercetin-3-rutinoside, anti-tubercular activity.

INTRODUCTION:

Plants are indispensable to human beings for their entire life. The history of herbal medicine starts from the ancient human civilization. The wealth of India is stored in the enormous natural flora which has been gifted to Indians.^{1,2}

The importance of medicinal and aromatic plants has been emphasized from time to time due to their more safety and less side effects. *Actiniopteris radiata* is an epilithic epiphyte, tiny terrestrial fern. It belongs to the family Actiniopteridaceae. It is an important medicinal plant widely distributed

throughout Africa and adjacent Islands, Madagascar, Arabia, Iran, Afghanistan, Nepal, India, Sri Lanka, Burma and Australia. The Literature reported that the traditional medicinal preparations from whole plant have long been used as folklore medicine for treatment of various diseases.

Taxonomical Classification: ^{3,4}

Kingdom : Plantae - Plants

Phylum : Magnoliophyta - Flowering

Class : Magnoliopsida - Dicotyledons

Order : Malpighiales

Family : Actiniopteridaceae

Subfamily : Euphorbioideae

Tribe : Euphorbieae

Genus : *Actiniopteris* - Linnaeus, 1753

Specific epithet : *radiata*

Botanical name : *Actiniopteris radiata*.

SYNONYMS

Sanskrit - Mayurishika

Telugu - Nemali adugu

English-Peacock's tail

BOTANICAL DESCRIPTION: ^{4,5}

The plants are 8-25 cm high rooting in the crevices of rocks or in between in the joints of bricks walls in most and sandy places. The rhizomes is oblique to horizontal, 1.5 to 2.0 cm in length, densely covered with wiry roots, palaea and leaf bases. The young leaves show cricinate venation but the lamina becomes flat at an early stage of development. The laminae are stiff and rough to touch. The sporangia are sub-marginal on an inter-marginal vein covering almost the entire biaxial surface of segment.



Actiniopteris radiata whole plant

ETHNOMEDICAL USES: ³⁻⁵

Whole plant paste is applied on cuts and wounds: past with sugar is given to kill intestinal worms twice for 3 days: paste with sugar is also given two times a day as an aphrodisiac, also used as tonic to increase the potency. The plant paste with sugar candy is given as a cooling agent in case of syphilis. The paste of two fronds is given daily two times a day to children to cure rickets. The whole plant paste mixed with cow's milk is given for the treatment of piles and leucorrhoea. In milk is given twice a day for 2-3 days. In case of epilepsy, plant paste with sugar candy is given. The plant paste with honey is given twice a day for the treatment of leucorrhoea. Plants are soaked overnight in a glass of water and taken orally in morning for control of blood pressure and tuberculosis. Plants are dried and one teaspoonful powder is taken orally, once a day for four days in the case of cough. The paste of 5-6 leaves mixed with fresh cow milk (nearly 200ml) is taken for a week or so, to overcome irregularly in menstrual period. The ash (approx. 2-3 g) of the plant mixed with fresh cow milk (200

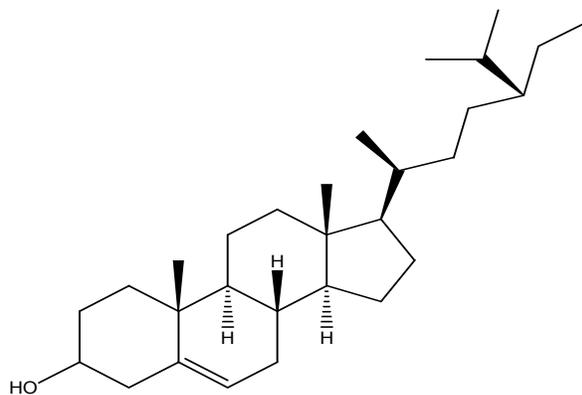
ml) is given to a lady for fortnight after menses for conception. On the other hand the paste of 8-10 leaves mixed with thin curd (nearly 250 ml) is given for birth control. Decoction of leaves is also used in tuberculosis.

EXTRACTION METHODS: ^{10, 11}

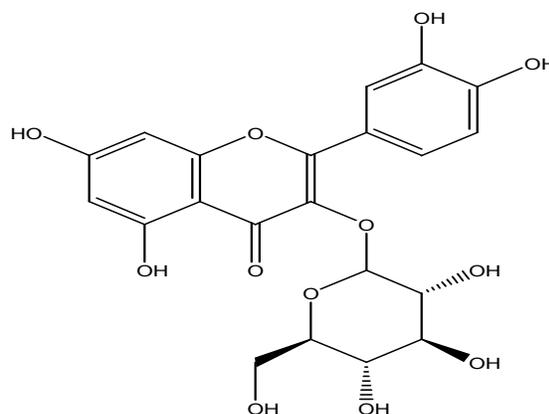
The phytochemical constituents of *Actiniopteris radiata* were extracted by using different solvents such as n-hexane, chloroform, ethyl acetate and ethanol. The Whole plant were collected and washed with the tap water followed by dried in the sun shade at 30-40°C. Then it is grounded to get coarse powder by cutter mill for extraction. The essential constituents are extracted in Soxhlet extraction apparatus by using ethanol as a solvent.

Phytochemical Constituents: ^{13, 14}

The main bioactive components of this plant are known to be Hentriacontane, Hentriacontanol, β -sitosterol, Quercetin-3-rutinoside (Rutin), β -sitosterol palmitate, β -sitosterol-D-glucoside, glucose, fructose alkaloids, glycosides, Flavanoids, tannins, phenols.



β - Sitosterol



Quercetin-3-rutinoside

PHARMACOLOGICAL ACTIVITIES:

However some of the pharmacological investigations have been carried out based on the chemical constituents present in this plant but a lot more can be explored and

utilized in a therapeutic manner. A summary of the findings of some of these activities is described below.

Invitro Antihistaminic and Anti cholinergic activity:⁹

The ethanolic extract of whole plant of *Actinopteris radiata* (Sw.) Link was tested to evaluate the spasmolytic effect on isolated rat ileum. The crude extract at a dose of 2, 4,

10 mg/ml dose dependently relaxed the rat ileum which was contracted. And maybe due the presence of agonist like histamine and acetylcholine.

Analgesic activity:¹⁰

The ethanolic and aqueous extract of *Actinopteris radiata* was investigated in mice to evaluate the analgesic activity by using Acetic acid induced writhing and Tail flick method.. Administration of *Actinopteris radiata* extracts shown potent analgesic activity in the Acetic acid induced Writhing method, where as both extracts shown non-significant analgesic activity in

Tail flick method. Hence it is indicated that both plant extracts possesses only potent peripheral mediated analgesic activity and inhibits predominantly peripheral pain mechanism. The extracts were found to produce marked analgesic effect due to the presence of alkaloids, tannins, flavonoids and phenolic acid.

Antimicrobial activity: ^{11, 12}

Anti-bacterial activity

Extracts of the *Actinopteris radiata* and *caralluma adscendens* was studied by cup plate method. All the extracts at the concentration of 150 mg/ml and 300 mg/ml were tested against Gram (+) bacteria such *Escherichia coli*, *Shigella*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Bacillus subtilis*, *Kebsiella pnemoniae*, *Proteus vulgaris* and *Staphylococcus aureus*. The plates were incubated at 37⁰C for 48 hrs. The diameter of zone of inhibition was calculated after incubation .An average of three independent determinations was recorded.

Antifungal Activity

Plant extract of *Actinopteris radiata* and *Caralluma adscendens* was evaluated against *Candida Albicans*, *Aspergillus niger* and *Mucor* by Cup-plate method at the concentration of 150 mg/ml and 300mg/ml using Griseofulvin as standard drug. Diameters of the zones of inhibition were determined as an indication of activity after incubating the plates at 25⁰ C for 72 hrs. An average of three independent determinations was recorded. The anti-microbial activity has shown appreciable results due to the presence of tannins, flavonoids and sterols.

Wound healing activity: ¹³

The ethanolic extract of the *Actinopteris radiata* evaluated for its wound healing activity in rats. Wound healing activity was studied using Excision, Incision and Dead space wound models in rats following topical application and compared with a standard 5% w/w Povidone-iodine ointment. 10% w/w *Actinopteris radiata* ointment was prepared for topical application and 5% w/w Povidone-iodine ointment was used as a standard. On excision and incision wound models the alcoholic extract of *Actinopteris radiata* produces good wound healing activity and comparable with that of 5% w/w Povidone-iodine ointment. The alcoholic extract of *Actinopteris radiata* produced dose dependent effect on granulation tissue and hydroxyproline content. The results clearly indicated good wound healing activity.

CONCLUSION

In the recent years, the pharmaceutical industries are mainly focused towards design and development of new innovative/indigenous plant based drugs through investigation of leads from traditional system of medicine.¹⁵ *Actinopteris radiata* is an important traditional plant contains β - sitosterol,

Quercetin-3-rutinoside (Rutin) which is often used for the treatment of skin disease and also possesses anti-microbial activity. This review is an effort to compile all

information on its botanical, phytochemical, ethno medical uses and pharmacological activities of the plant published till now.

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