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## TO STUDY THE PHARMACOGNOSTIC OF ACTIVE COMPONENTS OF EXTRACTS FROM ERANDA MOOLA (RICINUS COMMUNIS) – A REVIEW ARTICLE

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### ABSTRACT

Eranda (*Ricinus communis* Linn.) is one of the most important drug used in Ayurveda therapeutics. It is used widely in different formulations in medical practice. The standardization regarding phytochemical and histological evaluation of *Ricinus communis* leaves was not at all mentioned in Ayurveda Pharmacopoeia of India (API). In the present article we are discussing regarding the pharmacognostic properties of active components extracted from eranda moola.

**Keywords:** Pharmacognostic properties, eranda moola, extracts



## INTRODUCTION

*Ricinus communis* Linn (Euphorbiaceae) commonly known as *Eranda* in Ayurveda is a soft-wooded small tree wide spread throughout tropics and warm temperate regions of the world. In the Indian system of medicine, the leaf, root, and seed oil of this plant have been used for the treatment of inflammation and liver disorders.[1] In Ayurveda, the roots of *Eranda* are used in the treatment of *Amavata* (rheumatism), *Sotha* (inflammation), *Katisula* (backache), *Udararoga* (disease s of abdomen), *Jwara* (fever), etc.[2] Its roots have also been highlighted for its *Vrishya* (aphrodisiac) and *Vatahara* actions by Acharya Charaka.[3] This plant also possesses hepatoprotective,[4,5] anti-diabetic,[6] laxative,[7] anti-fertility,[8] anti-inflammatory and free radical scavenging activities.[9] Castor bean is an evergreen herbaceous or semi-woody, large shrub or small tree that reaches 5 meters tall. This is a fast growing plant that tends to grow straight up at first, and then develops branches later. The leaves are palmate, with 5-11 deeply incised lobes. They are glossy, green to purplish or reddish-green and 30 to 75 cm across, with long petioles. Stem is green to reddish-purple in color and have hollow internodes. The inflorescence (not particularly showy) has greenish yellow flowers that are borne in spikes up to 30 cm long near the tops of the stems. Female flowers are on the top half of the spike and have conspicuous red stigmas.

The male flowers on the lower half of the spike have showy yellow anthers. Pollinated female flowers are followed by reddish brown, egg-shaped capsules, about 2.5 cm long, thickly covered with soft flexible spines. Each capsule contains three seeds that look like fat, swollen dog ticks and are deadly poisonous<sup>15</sup>. This plant has numerous medicinal uses that are potential for the prevention of diseases, leaving no baleful effects on the health if the dose is maintained properly (below the toxic level). The present review article provides the comprehensive information on phytochemical and pharmacological aspects of *R. communis*.

Due to high demand, roots of the cultivated variety are mainly used instead of wild. But, a comparative phytochemical profile of both varieties is not available till date. Hence, to ensure quality of both varieties, phytochemical evaluations of both the varieties was undertaken.

*Eranda* (*Ricinus communis* Linn.), of Euphorbiaceae family is an important drug mentioned in Ayurveda classics from Vedic period itself. It is used very commonly in rheumatic conditions, wounds, hydrocele etc.<sup>1-3</sup>. The plant considered probably a native of Africa, is found throughout the hotter parts of India and tolerates a wide range of climatic conditions<sup>4</sup>. While describing *agryadravyas*, Charaka considered *Erandamoola* as *vrshya* and *vatahara*<sup>5</sup>. *Susrutha* mentioned *Erandataila* as best among oil purgatives<sup>6</sup>. The root and oil obtained from seeds are widely used in

different formulations, but the leaves are used rarely. But the use of tender leaves and old leaves are mentioned in texts like Bhavaprakasa for some conditions like yakruthvikaras and medovridhi<sup>7</sup>. But the phytochemical and microscopical evaluation of *Ricinus communis* leaves was not at all mentioned in API. So there is a need of standardized data for the establishment of a unique identification data. Nowadays Ayurveda gets more acceptance and popularity among the public due to its holistic approach. The drugs should be standardized by establishing quality parameters for the safe and effective use in clinical practice. Pharmacognosy is an objective study of crude drugs from natural sources treated scientifically and it encompasses the knowledge of the history, distribution, cultivation, collection, processing for market and preservation, the study of sensory, physical, chemical and structural characters and uses of crude drugs<sup>8</sup>. It includes macroscopic, microscopic, phytochemical and pharmacological evaluation. Macroscopic evaluation refers to evaluation of drugs by size, shape, nature of outer and inner surfaces, type of fracture and organoleptic characteristics like colour, odour, taste, and consistency etc.<sup>9</sup>. Preliminary physicochemical evaluation is a step towards the genuinity and purity of the drug.

#### Pharmacological properties:

**Antifertility activity** Methanol extract of *R. communis* seed revealed the presence of steroids and alkaloids. The sex hormone

being steroidal compound's (phytosterols) and the presence of steroids in the methanol extract of *R. communis* seed may be produced antifertility effects. One of the study reported antifertility effects of ethanol extracts of *R. communis* in male rats. The sperm count reduced, the motility, mode of movement and morphology of the sperms were found during the study. Reductions in the fructose and testosterone levels were suggestive of reduced reproductive performance<sup>24</sup>.  
**Antiimplantation activity**

The ether soluble portion of the methanol extract of *R. communis* var. minor possesses antiimplantation, anticonceptive and estrogenic activity in adult female rats and rabbits when administered subcutaneously at a dose upto 1.2 g/kg body weight and 600 mg/kg body weight, in divided doses, respectively.

**Wound healing activity** The *R. communis* possess wound healing activity due to the active constituent of castor oil, which produces antioxidant activity by inhibiting lipid peroxidation. The study of wound healing activity of castor oil was in terms of the scar area, percentage closure of scar areas and epithelization in the excision wound model. Due to the astringent and antimicrobial property the tannins, flavonoids, triterpenoids and sesquiterpenes present in the castor oil, promote the wound healing process, which are responsible for wound contraction and increased rate of epithelialisation. The study resulted that the castor oil showed wound healing

activity by reducing the scar area and also the epithelialisation time in the excision wound mode . Future Perspectives *R. communis* is a very useful medicinal plant having no adverse effects on the body. Now a day, people are becoming more and more dependent on the herbal products rather than the chemical ones due to their residual effects on the long run<sup>46</sup> . The multidisciplinary use of the active constituents of the castor bean reveals that it will be possible to find out new herbal products in the field of medical science/ethno-botanical science for the better health of the human being. The contraceptive effect of the chemical constituent of the castor bean has also added a new dimension in the field of birth control might be useful in the densely populated countries even having no baleful effects on the body as the chemical birth control pills .

**Antinociceptive activity** Methanol leaves extract of *R. communis* possesses significant antinociceptive activity against acetic acid induced writhing test, formalin induced paw licking and tail immersion methods in mice. The antinociceptive activity showed due to the presence preliminary phytoconstituents like saponins, steroids and alkaloids .

**Anti inflammatory activity:** Anti inflammatory effect of the leaves and root extract were studied in wistar albino rats and paw oedema formation due to sub plantar administration of carragennan, characterizing the cellular

events of acute inflammation. The 250 and 500mg/kg dose of methanolic leaves extract possess protective effect in prevention of cellular events during oedema formation and in all the stages of acute inflammation. The anti inflammatory activity of methanolic extract was due to the presence of flavonoids. The effect of petroleum ether extract of root of *R. Communis* (150 mg/kg p.o) has been investigated against Carrageenan, 5-Hydroxy tryptamin, Dextran, Bradykinin and Prostaglandin E, induced rat's hind paw oedema. The extract exhibited significant antiinflammatory activity against all the phlogestic agents except PGE. The anti-inflammatory activity was compared with standard drugs such as Phenylbutazone and Betamethasone, both in acute and chronic experimental models of inflammation in albino rats [9,10].

**Analgesic activity:** Aqueous extract of plant showed, presence of secondary metabolites such as alkaloid, flavonoid, saponin, terpenoid, tannin, carbohydrate and glycoside in root of both cultivated and wild varieties [11]. Alkaloids have been found to be responsible for both analgesic and anti-inflammatory actions in some natural products. Flavonoids are known to target prostaglandins which are involved in the late phase of acute inflammation and pain perception. Saponin and terpenoid have also been reported to inhibit histamine release in vitro. To evaluate the analgesic property of aqueous root extract of wild and cultivated varieties of *R. communis* using the tail flick method of rats by oral pre-

treatment with wild variety of plant caused a profound significant analgesia in the treated rats and cultivated variety of *R. communis* caused a moderate analgesia in the treated rats. Above procedure consists of behavioural methods that have been developed to study nociception in animals. Animal response in these tests is usually integrated at the lower levels in the central nervous system, thus, giving information about the pain threshold.

**Antioxidant activity:** The methanolic extract showed significant free radical scavenging activity by inhibiting lipid peroxidation initiated by carbon tetrachloride and ferrous sulphate in wistar albino rats liver and kidney homogenates. The extract enhanced free radical scavenging activity of stable radical 2,2-diphenyl-1-picryl-hydrazyl (DPPH radical), nitric oxide and hydroxyl radical in vitro assay methods. *R. communis* seed extracts produced the antioxidant activity by using lipid peroxidation by ferric thiocyanate method and free radical scavenging effect on 2,2-diphenyl-1-picrylhydrazyl radical (DPPH) and hydroxyl radical generated from hydrogen peroxide. The high antioxidant activity of the seed which produce antioxidant activity are methyl ricinoleate, ricinoleic acid, 12-octadecadienoic acid and methyl ester and stem and leaves extracts also produce antioxidant activity due to the presence of flavonoids in their extract [12].

**Antitumor activity:**

It has a very potent poison ricin, has been shown to possess antitumor qualities and has been used in cancer research and chemotherapy during recent years. One of the most promising uses of ricin is in the production of immunotoxins, where the protein ricin is joined to monoclonal antibodies. The antibodies are produced in a test tube (in vitro) and have protein receptor sites that recognize the specific target cells of a tumor. The resulting ricin-antibody conjugate is called an immunotoxin. By arming these antibodies with ricin, the deadly toxin can be carried directly to the site of the tumor in a cancer patient. Thus, ricin can destroy the tumor cells, without damaging other cells in the patient [13]

**Antidiabetic activity:** Administration of the effective dose of *R. communis* to the diabetic rats for 20 days showed favorable effects not only on fasting blood glucose, but also on total lipid profile. *R. communis* seemed to have a high margin of safety as no mortality and no statistically significant difference in alkaline phosphatase, serum bilirubin, creatinine, serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase and total protein was observed even after the administration of the extract at a dose of 10g/kg body weight. Thus, *Ricinus communis* seems to have a promising value for the development of a potent phytomedicine for the diabetes [14].

**Purgative activity:** Castor oil was one of the old-fashioned remedies for everything from constipation to heartburn widely used since ancient time and is still used to



this day; is the most valuable laxative in Ayurveda. It is considered to be fast, safe and gentle, prompting a bowel movement in 3 -5 hours, affecting the entire length of the bowel, but not increasing the flow of bile, except in very large doses. It is recommended for both the very young and the aged. It is also used to clear the digestive tract in cases of poisoning. It should not be used in cases of chronic constipation [15].

## CONCLUSION

R. communis or castor plant is a natural plant of India. Medicinal effect of R. communis plant occupied a distinct place in the life right from the primitive period to till date and provided information on the use of plants or plant products as medicine. It has various pharmacological actions, some of them are reviewed here, but still this plant has much novel potential which is yet to explore. The pharmacological activities reported in the present review confirm that the therapeutic value of R. communis is very high having a leading capacity for the development of a new, safe, effective and cheaper drug in future. But it needs more elaborative study, pharmacological investigations, clinical trials, more exploration and public awareness for the best utilization of its medicinal properties. Overall, all these phytochemical constituents and pharmacological activities exhibited by the R. communis have great potential and significance in the field of medicinal plant research. Hence, the industrial entrepreneurs also should come forward

with new concepts and steps towards the best use of this potential medicinal plant.

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