



Study of effects leaf extract of *Ricinus communis* in skin disease

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ABSTRACT

People use plants as a method of alternative medicine because they are safe and free from chemicals, cheap and easy to obtain from nature. Castor is one of the medicinal plants that has a wide range of medical properties to remedy many diseases such as asthma, diabetes and hair loss. It is a laxative, anti-inflammatory, anti-cancer, anti- bacterial and fungi. It has properties to wound healing and furuncles. *Ricinus communis* used in many industries such as the soap and cosmetics also It is used in printer inks and lubricants. The aim of this article is to investigate the roles of *Ricinus communis* in wound healing.

Keyword: *Ricinus communis*, healthy effects, skin disease, wound healing

INTRODUCTION

Ricinus communis "Castor plant" is a member or part of Euphorbiaceae¹.

Its distributed in different area of worldwide. India, Ethiopia, Egypt. Now it has other names such as "wonder tree" or "Palma Christi"². Because it contains a wide range of phytoconstituents, including terpenoids, flavonoids, alkaloids, anthraquinones, tannins, saponins, polyuronides, glycosides, steroids, and reducing sugars, so, it has the curative effects for Many common diseases^{3,4}. The *R. cummunis* is belongs to the Euphorbiaceae, is a large family also called euphorbias of flowering plants.⁵ Some species of the family have economic value, such as castor oil plant (*Ricinus communis*)⁶. The castor plant was cultivated 6,000 years ago. The botanical name of *R. communis* was coined by Swedish naturalist Carlos Linnaeus in the 18th century⁷. seed of castor plant contains ricin, extremely potent toxin.⁸ All parts of *R. Cumminus* are used for remedy the pathogens such as root, stem, leaves, flowers, seed and seed oil. Leaves of *R. cumminus* are used to relieve stomach pain and treat jaundice and have anti-fungal activity while seeds were used for resistance against *Tribalium castaneum*

9,10 Numerous studied were showed to biological activities of *R. cumminus* plant as antimicrobial, antifungal, antioxidant, anticancer, anti-inflammatory, antidiabetic and antiparasites¹¹.

Herbal medicines are derived from plants and are used as alternative medicine compared to chemical medicines.¹² They do not has side effects and can be obtained easily with suitable prices¹³

Plant Classification

Kingdom: Planta

Phylum : Spermatophyta Subphylum: Angiospermea Class: Dicotyledonae

Order: Euphorbiales Family: Euphorbiaceae Genus: *Ricinus* Species: *Communis*

Morphology of plant

Ricinus communis is a perennial soft-wooded shrub that can attain a height of about (1-5 m) and has remarkable lateral roots and sturdy tap roots. Leaves of the shrub are spirally arranged, green in color or acquire dark green color when getting older, (1-3cm) long united stipules to a sheathing bud that are deciduous. *Ricinus communis* is characterized by adaptation depending on the cultivar, so it has different colors, sizes, shapes and seed colors, growth conditions, and climate 14. The castor plant is a glabrous, soft-woody shrub or small tree, up to 7 (-10) m high, grown as an annual in temperate zones and as a perennial in the tropics. It is strongly tap-rooted with prominent lateral roots. The stem and branches have conspicuous nodes and ring-like scars and glands often present at nodes. The shoots are usually glaucous, green, or red in color. The leaves are spirally arranged, borne on 3.5- 50 cm long petioles. The leaf blade is large (up to 50 (-70) cm in diameter), palmately compound with 5-12 acuminate lobes, median one up to 8(-20) cm long. The leaf margins bear glandular teeth. The inflorescence is an up to 40 cm long. *R. communis* also known as a castor plant, is a small tree implanted in moderate regions, Seeds is oily that contains several toxic substance and is widely used in the pharmaceutical industry. The leaf margins bear glandular teeth. The inflorescence is an up to 40 cm long, erect terminal panicle becoming lateral as the plant develops new branches (due to indeterminate growth habit). The flowers are unisexual, regular, and 1–1.5 cm in diameter; the male flowers are borne towards the base of the inflorescence, with many stamens in branched bundles, and the female ones, towards the top of the inflorescence, with early caducous sepals, red or green in color. The fruits are spiny or smooth ellipsoid to globose, slightly 3-lobed capsules, 1.5-2.5 cm long, brown in color. Ripening of fruits within an infructescence is uneven, with the lower fruits maturing before the upper ones. At maturity, the fruit is dehiscent in 3 cocci each opening by a valve and 1 seed. The seeds are ellipsoid, 9–17 mm long, compressed, with a brittle, mottled, shining seedcoat and with a distinct caruncle at the base 15.

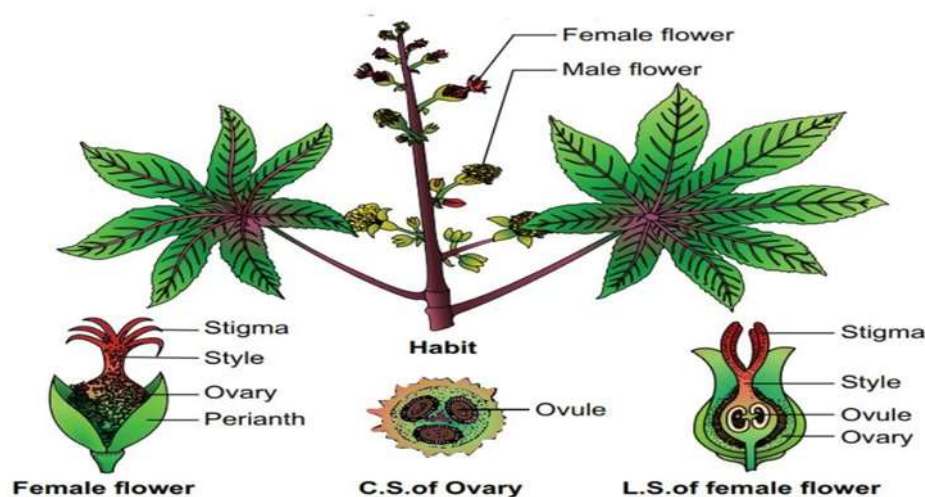


Figure 1: botanical description of *R. cummunis*.

The chemical components of methanol extract

According to the study performed by 16. showed that ricinine is a poisonous alkaloid derived from the leaves and seeds of the castor. It can cause vomiting and various other toxic reactions. Therefore, in the present work, ricinine might be the compound that inhibited *A. Niger*, moreover, 17 stated that the castor leaves ethanolic extract consisted of n-hexadecanoic acid, octadecanoic acid, 1-hexadecanoic acid, 2,4a.7 trihydroxy-1-methyl-8methylene, 1,4- α -lactone-10 -methyl, L-valine,

ethyl ester, hexadecamethyl, tetradecamethyl, octadecamethyl, butanadioic acids, hydroxyl and diethyl ester. Another research by 18 reported that the GC-MS analysis of the castor leaves methanol extract produced eight compounds that exhibited antimicrobial activity against *Klebsiella pneumonia* and *Pseudomonas aeruginosa*.

METHODS

This research presented electronic database, Medline, PubMed, web of science, an additional manual search using research word including:

Bioactive compound on *R. Communis*.

The precursory research of *R. communis* indicated to presence of different component such as alkaloids, glycosides, saponins, steroids and flavonids. Two of alkaloids, Ndemethylricinine (0.016%) and ricinine (0.55%). moreover six types of flavones including: glycosides kaempferol-3-O- β -D-Xylopyranoside, kaempferol-3-O- β -D-glucopyranoside, quercetin-3-O- β -D-glucopyranoside, quercetin-3-O- β -D-xylopyranoside, quercetin-3-O- β -rutinoside²⁰ and kaempferol-3-O- β -rutinoside, gentisic acid, quercetin, gallic acid, ellagic acid and epicatechin are the major phenolic compounds isolated from *R. communis* leaves. Roots of *R. communis* contains Indole-3-acetic acid while seeds and fruits have 45% of fixed oil be composed from isoricinoleic, stearic, dihydroxystearic acids, ricinoleic, of glycosides, in addition crystalline alkaloid, a ricinine and lipases^{19,20} The analyses of Gas Liquid Chromatography technique of *R. communis* essential oil indicated to the ester form of palmitic availability in the rate of (1.2%), arachdic (0.3%), stearic (0.7%), hexadecenoic (0.2%), linoleic (3.4%), oleic (3.2%), linolenic (0.25%), ricinoleic (89.4%) and dihydroxy stearic acids, moreover the technique of capillary columns that used for evaluation *R. communis* essential oil showed the presence substances such as camphor (12.92%), camphene (7.48%), α -thujone (31.71%), α -pinene (16.88%), and 1, 8- cineole (30.98%). These studied demonstrated that camphene (7.48%) and 1, 8- cineole (30.98%) might be responsible for the different antimicrobial activity.²¹

RESULTS AND DISCUSSION

Medicinal effects of *Ricinus communis* Cutaneous disease.

A parasitic disease found in different parts of area such tropical, subtropical and southern Europe owing to infection by sand flies that carries a parasites called leishmania²². Leishmaniasis is known as white leprosy or black fever.²³ protozoan parasites are the most common parasites in the tropics and subtropics countries^{24,25} The World Health Organization has considered Leishmaniasis among the most dangerous parasites to health²⁶.

Leishmaniasis caused different infection ranging between cutaneous forms to visceral infection that threatening life.²⁷ Therefore, the efforts of scientists were to search for plant extracts or drugs taken orally, injected, or topically to treat leishmaniasis. Gupta RS, *et al*; 2004 found that 'Alcoholic extract of the *Ricinus communis* leaf has been shown to be hepatoprotective in rats²⁸, furthermore Oyewole *et al*; and Lomash; 2010 demonstrated that *R. Communis* Methanolic extracts of the leaves have antimicrobial, anti-inflammatory and antihistamine properties^{29,30}



Clinical presentation of cutaneous leishmaniasis. (a) A nodule on the cheek and a crusted sore in the angle of the lips of the patient before treatment, both arrowed. (b) The same view of the patient's skin after treatment

Antibacterial activity

Medicinal plants have potent biologically active compounds; moreover it is a sign which makes the plants a wealthy origin of a variety of drug.³¹

The active compound of the plant extracts were used in the treatment of bacterial infections, as they showed important therapeutic properties throughout the world^{32,33}

The usage of this plant for medicinal purpose has been demonstrated by several investigators,³⁴. were showed to efficient effects of antibacterial activity of ethanol, methanol also aqueous extract of *R. communis* leaves exhibited the antibacterial activity against four isolates of bacteria, in this study

The antibacterial activities of methanolic, ethanolic and aqueous extracts compared favorably with that standard antibiotic (penicillin).

In this regard, another study had been performed by Al-kuraishy et.al showed the role of the *R. communis* alcoholic extract as an antibacterial against Gram-positive and Gram-negative bacteria.

The results proven that *R. communis* produce significant antibacterial activity against negative gram and less for a gram of positive bacteria³⁵.

Table 1: The MIC of alcoholic extract of *R. communis*.

bacteria	2mg/ml	4 mg/ml	8 mg/ml	16 mg/ml	32 mg/ml
<i>E. fecalis</i>	+	+	-	-	-
<i>S. aureus</i>	+	+	-	-	-
<i>P. aeruginosa</i>	+	+	+	+	-
<i>E. coli</i>	+	+	-	-	-

Table 2: The MIC of aqueous extract of *R. communis*.

Bacteria	2mg/ml	4 mg/ml	8 mg/ml	16 mg/ml	32 mg/ml
<i>E. fecalis</i>	+	+	+	-	-
<i>S. aureus</i>	+	+	+	+	-
<i>P. aeruginosa</i>	+	+	-	-	-
<i>E. coli</i>	+	+	+	-	-

MIC (Determination of minimal inhibitory concentration)

The essential oil of *R. communis* has potent effects as antimicrobial and antiproliferative because possess mixture of different compounds with antimicrobial and cytotoxic effects these results was confirmed by³⁶. who demonstrated the antimicrobial activity of the oil was investigated in order to evaluate its efficacy against twelve bacteria and four fungi species, using disc diffusion and minimum inhibitory concentration methods. The essential oil showed strong antimicrobial activity against all microorganisms tested with higher sensitivity for *Bacillus subtilis*, *Staphylococcus aureus* and *Enterobacter cloacae*. A Previous study by³⁷ who indicate to the positive roles of *R. communis* against bacterial activity, He explained this mechanism of resistance due to containing flavonoids and ricin compound. In 2004, another study conducted in by Burt S, about castor essential oil indicate to the inhibitory effect of *R. communis* for bacterial and fungal due to highly permeable through the cell wall and cell membrane³⁸. Furthermore, (Edris, 2007; Oussalah et al., 2006) confirmed that cell membrane constitute of bacterial cells such as phospholipid, fatty acid and polysaccharide which interaction with essential castor oil leads to membrane breakdown causes cellular content leakage and cell death³⁹ In the study of M. Abdulla Al-Mamun, et al, 2016, researches showed that the concentration of total crude protein extracted from the seed of six castor varieties range between 21–35 mg/ml by spectrophotometric analysis, this study demonstrated the potent role of antibacterial is due to the action of lectin protein such as ricin in the seed of castor

bean.⁴⁰

Antifungal activity of *R. communis*

In 2012, Naz and Bano,*et al* indicated to the antifunguil activity of methanolic and water extract of *R. cumminus* in reduction of *Aspergillus niger* isolated from stored groundnuts⁴¹.listed in table below:

Table 3: Antifungal activity of methanol and aqueous extract from tissue of *R.communis*.

Test fungi	Linear growth (mm)		Percentage inhibition (%)	
	Methanol	Water	Methanol	Water
<i>A. fumigatus</i>	3.96	4.56	59.50	55.70
Control	9.80	10.30	–	–
<i>A. flavus</i>	4.33	4.96	56.30	51.30
Control	9.90	10.20	–	–

Methanolic extract of castor leaves showed antifungal activity. This was indicated by the biomass reduction of *A. niger* isolated from stored groundnuts. At 0.05%, the extract showed 71.46% inhibition. GCMS analysis showed the presence of ricinine which could be responsible in *A. niger* inhibition⁴². Crude extract of *R. cumminus* was tested to recognize the source of the curative effects, this result was demonstrated the potent role of these plants in fungus activities by^{43,44} Furthermore *C. forskohlii* indicate to the powerful antimicrobial role against *Candida albicans*, this result was in agreement with another previous study in vitro which showed that *C. albicans* was sentient to *coleus* species extracts⁴⁵.

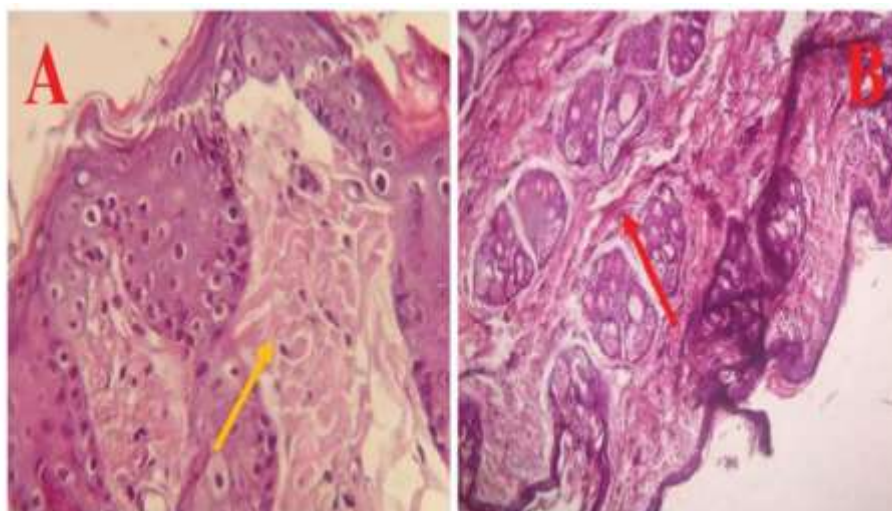
Anti-inflammatory activity

Ilavarasan et al.,2006 reported the anti-inflammatory activity of the leaves and root extract of *R. communis* in rats. The 250 and 500 mg/kg dose of *R. communis* methanol leaves extract to possess a protective effect in the prevention of cellular events during edema formation and in all the stages of acute inflammation. The antiinflammatory potential of the *R. communis* methanolic extract was due to the presence of flavonoids against carragennan-induced paw edema in rats⁴⁶. In order to stop the prevalence of bacterial pathogens must be treated the inflammatory action that may be caused gangrene in the injury part. different extracts of *Ricinus communis*, methanolic, ethanolic, or hexane are usually used to test the anti- inflammatory action⁴⁷. The *R. cumminus* is considered as medicinal plant and widely usage to treatment variousdiseaes due to has several pharmacological action - anti-inflammatory , antioxidant , anagesic ,ant- ashmatic , antibacterial , antitumor and anti-diabetic by usage several parts of this plant instead the chemical drugs for the treatment of different infections.

Wound healing activity

The wound is an incision in the skin and epithelial tissue or a physical injury of the body, wound healing is a biological process that leads to stopping bleeding by several processes including vascular constriction platelet aggregation, degranulation, and fibrin formation (thrombus). Wound healing is dependent on the type of skin wound and oftendetermines the amount of tissue damage⁴⁸. The *R. communis* possess wound-healing activity due to the active constituent of castoroil, 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 ofscar areas, and epithelization in the excision wound model. Due to the astringent and antimicrobial properties the tannins, flavonoids, triterpenoids, and sesquiterpenes present in the castor oil, promote the wound healing process, which is responsible for wound contraction and increased rate of epithelialization. The study resulted that

the castor oil showed wound healing activity by reducing the scar area and also the epithelialization time in the excision wound model⁴⁹. In a histological study of the College of Veterinary Medicine, Karbala, Iraq, The research team concluded that the castor plant possesses therapeutic properties to heal wounds in the treated group with castor leaf when compared with non-treated wounds, In the treated group with castor leaf extract, there was a growth of blood vessels (angiogenesis) in the damaged area where the control group was present only a few vessels. Based on this result, the extract of castor leaves has a strong therapeutic effect in wound healing displays that time of wound healing in the group was treated with this extract shorter than non-treated group and accelerated epithelial migration so, accelerating wound healing^{50,51,52}



Fig(4) histological cross section 21th day wound healing show:(A) increase of vascular density and collagen bundle () (B) through rich neovascularization wounds contained abundant fibroblasts and collagen bundles, () (H &E stain) 40X.

A: control group, B: castor leaf extract treated groups (B)

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