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RICINUS COMMUNIS: PHARMACOLOGICAL ACTIONS AND MARKETED MEDICINAL PRODUCTS

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ABSTRACT

Ricinus communis L. family Euphorbiaceae importance has the use of different parts of this plant for the treatment of different diseases. The Preliminary Phytochemical studied of *R. communis* revealed the presence of Steroids, Saponins, Alkaloids, Flavonoids, and Glycosides. Castor beans have been used in traditional Egyptian and Greek medicine. The root of this plant is also useful as an ingredient of various prescriptions for nervous diseases and rheumatic affections such as lumbago, pleurodynia and sciatica 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 as they have been found to be hepatoprotective, laxative and diuretic. The antifertility activity of 50% ethanolic extract of *R. communis* has also been reported. Roots and aerial parts are useful in the treatment of diabetes.50% of ethanolic extract of the root, stem and leaves of this plant showed hypoglycemic activity.

KEYWORD: castor beans, *Ricinus communis,* Pharmacological activity.

1. INTRODUCTION

Castor plant (*Ricinus communis* L.) belongs to perennial shrub family of Euphorbiaceae. It is popularly known as Castor oil plant in English; Arandi or Erandi in Hindi; Mexico weed, Palma Christi in English, German, Portuguese; Ricin commun in French; Ritsin in Russian; Rizinus in Danish, German; Rikinusu and Rishin in Japanese; etc.[1, 2] Castor is known locally in Nigeria as Era ogi in Bini; Kpamfini gulu in Nupe; Laraa in Yoruba; Jongo in Tiv; Ogilisi

in Igbo; Zurman in Hausa.[3] For a comprehensive list of Castor plant names in other languages see.[1] The botanical name *Ricinus communis* was derived by Swedish naturalist Carlous Linnaeus in the eighteenth century. Ricinus is the Latin word for Mediterranean sheep tick (Ixodes ricinus) which the Castor plant seed has total resemblance to, and communis literally means common.[4] Castor plant has been cultivated as far back as 6,000 years ago. It is usually a small soft wooded tree that grows up to 6 meters with varying stem pigmentation; the leaves which is usually 30 – 60 cm in diameter may be green or reddish in colour made of about 5-12 coarsely toothed lobes; the fruits which is usually a three-celled thorny capsule covered with soft spins encloses the seeds.[1, 5] Castor plant extracts have been used by numerous communities in different regions of the world for treatment and/or alleviation varieties of sicknesses. The extracts have been shown to possess essential and beneficial biological properties such as antioxidant, antimicrobial, antihelmintic, insecticidal, diuretic, anti-inflammatory, laxative; in the treatments of hypoglycemia, edema, rheumatism, headache, asthma, dermatitis, ringworm, warts, dandruff; external application on breast of nursing mothers shown to increase flow of milk and the oil shown to relieve labour pain and aid delivery.[1, 5, 6, 7, 8, 9, 10] The activity of the Castor plant seeds was studied on the male and female reproductive systems. The seed extracts were shown to possess high anti-fertility activities by causing decrease in serum levels of testosterone, weight of the reproductive organs, sperm functions, disruption of somniferous tubules and erosion of the germinal epithelium in male rats[7, 11]; and in reduction of progesterone levels, altering the oestrogen/progesterone balance, and abortifacient effect on the uterus and fallopian tube.[7, 12]

2. TAXONOMICAL CLASSIFICATION

Kingdom : Plantae
Order : Malpighiales
Family : Euphorbiaceae
Sub Family : Acalyphoideae
Tribe : Acalypheae
Sub Tribe : Ricininae
Genus : Ricinus
Species : R.Communis

Whole plant of *Ricinus communis* (33)

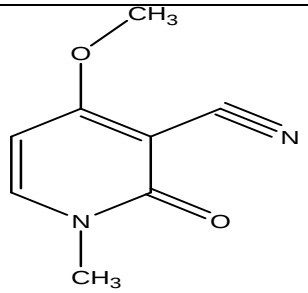
3. GEOGRAPHICAL DISTRIBUTION

Probably native to Africa, castor beans been introduced and is cultivated in many tropical and subtropical areas of the world, commonly appearing spontaneously. It is found through India, cultivated and found wild up to 2400 meters. Castor bean is originally resident to north eastern Africa and the middle east. It has escaped cultivation and become naturalized as weed almost everywhere in the world that has a tropical or subtropical climate.[13-14]

4. PHYTOCHEMICAL CONSTITUENTS

The Preliminary Phytochemical study of *R.communis* revealed the presence of Steroids, Saponins, Alkaloids, Flavonoids, and glycosides.[15-18]

Table No.1

Chemical compounds	Active constituents	Structure
Alkaloids	Ricinine	 Ricinine

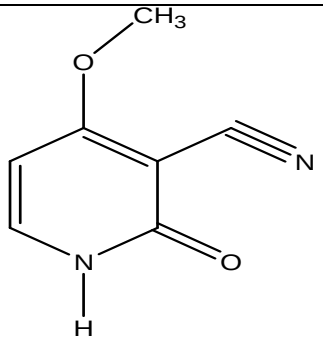
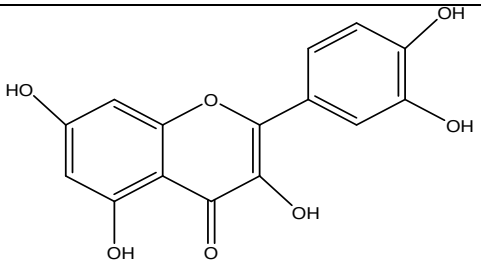
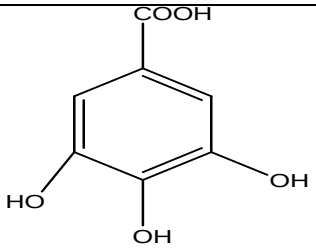
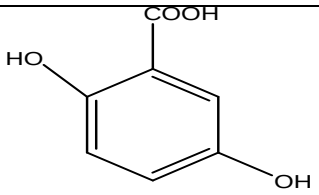
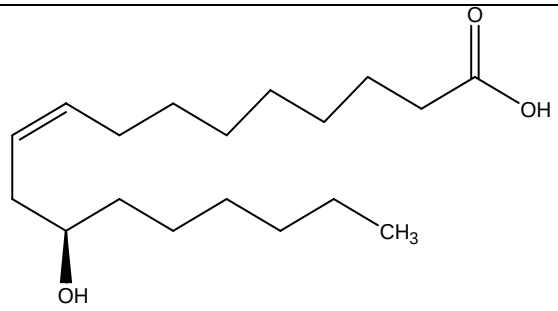
	N-demethylricinine	 N-demethylricinine
Flavones glycosides	kaempferol-3-O -β-D-xylopyranoside, kaempferol-3-O-β-D-glucopyranoside, quercetin-3-O-β-D-xylopyranoside, quercetin-3-O-β-D-glucopyranoside, kaempferol-3-O-β-rutinoside and quercetin-3-O-β- rutinoside	 Quercetin
Monoterpenoids	1, 8-cineole, camphor and α-pinene	
Sesquiterpenoid	(β-caryophyllene), gallic acid, quercetin, , rutin, epicatechin and ellagic acid	 Gallic acid
	/gentisic acid	 Gentisic acid
Fixed oil	ricinoleic, isoricinoleic, stearic and dihydroxystearic acids and also lipases and a crystalline alkaloid, ricinine	 Ricinolic acid

Table 2: PHARMACOLOGICAL ACTIVITY

R.communis **Plant (part of Use)**	**Tested Animal /Dose (rats/mice)**	**Responsible Chemical Constituent /bacterial strain /cell /part of animal organ**	**Methods/test/model**	**Activity**	**References**
extract,Leave and stem	_	Methyl recinoleate, Ricinolic acid,12-octadecadieonic acid ,and methylester, Flavonoids	Lipid per oxidation by ferric thiocyanate	Antioxidant activity	Oloyede Ganiyat K. 2012.[19]
Methanolic extract	Mice	Saponins, steroids and alkaloids	Writhing test	Antinociceptive activity	Dnyaneshwar J Taur et. al., 2011.[20]
Leaves and root extract	Wistar albino rats (250 and 500 mg/kg dose)	Flavonoids	Acute and chronic inflammatory	Anti-inflammatory activity	Ilavarasan R, Mallika et.al., 2006.[21]
Castor oil seed	Different conc.(5 % w/w and 10% w/w)	Cb Castor oil	Reducing the scar area (epithelization time in excision wound	Wound healing activity	Prasad M. K., rachhadiya R. M., et al, 2010.[22]
Ethanolic root extract	_	Saponins has mast cell stabilizing effect and the flavonoids	Muscle relaxant and bronchodilator	Antiasthmatic activity	Dnyaneshwar J Taur e.t al.,2011.[23]
seed	_	Steroids	Anti-fertility effect	Antifertility activity	Sandhyakumary, K., Bobby, R. et. al., 2003.[24]
Ethanol extract root	Mice (100,125,and 150 mg/kg i.p.)	Induces catalepsy in mice	_	Antihistaminic Activity	Dnyaneshwar J.2011.[25]
Leaves ethanolic extract	250/500 mg kg b.wt dose	Flavonoids	Lipid per oxidation protein, glycogen and the activities of acid and alkaline phosphatase in	Hepatoprotective activity	Visen, P. K. S. 1992.[26]

			liver induced by carbon tetrachloride (CCL4).		
Petroleum ether and acetone extracts	200 mg/ml	Bacterial strain	Diffusion	Antimicrobial activity	Islam T, Bakshi H et.al.,2010.[27]
Ethanolic extract of roots	Effective dose (500 mg/kg b.w.)	Diabetics rats	Bioassay	Antidiabetic activity	Shokeen P, Anan D P.et.al., 2010.[28]
Ricin from *R. communis*	–	Lipase	Membrane-like	Lipolytic activity	Lombard,M.E.Helmy G.et al., 2001.[29]
Castor oil seed	Rats (500 and 1000 mg/kg dose but more potent dose 1000 mg/kg)	Gastric mucosa	–	Antiulcer activity	Rachhadiya R. M et.al., 2011.[30]

6. PRECAUTION

Castor oil use as a laxative should be avoided as it causes secondary constipation, that is, repetition of the condition after cure. Persons suffering from kidney infections should take castor oil as purgative. It should not be used when there is abdominal pain or intestinal infections such as appendicitis, enteritis or inflammation of the small intestine and peritonitis. High doses of castor oil during the early months of pregnancy may cause abortion.

7. TOXICITY

The seed contains 2.8-3% toxic substances, 2.5-20 seed killing a man, 4 rabbit, 5 sheep's, 6oxes, 6 horses, 7pig, 11 dogs, but 80 for cocks and ducks. The principle toxin is the albumin, ricin, However, it produces antigenic or immunizing activity producing in small doses an antitoxin analogous to that produced against bacteria. The seeds from *R.communis* linn. Are poisonous to people, animals and insects. One of the main toxic proteins is "ricin" named by still mark in 1988 when he tested the beans extract on red blood cells. If the seed is swallowed without chewing and pass harmlessly through the digestive tract. However, if it is chewed or broken and then swallowed, the ricin toxic will be absorbed by the intestines. It is said that just one seed can kill a child, children are more sensitive than adults to fluid loss due to vomiting and diarrhea, and can quickly become severely dehydrated and die. Perhaps just one milligram of ricin can kill an adult. The symptoms of human poisoning begin within a few hours of ingestion and key are abdominal pain, vomiting, diarrhea, sometimes bloody. Within several days' severe dehydration, a decrease in urine and a decrease in blood pressure occur.[31]

8. INFORMATION ON MEDICINAL PRODUCTS MARKETED IN THE EU/EEA[32]

Table 3.

Active substance	Indication	Pharmaceutical form Strength
Castor oil	Functional constipation not corrected by diet.	Oral liquid. For internal use: for children 1 to 5 years old: 5 ml once a day, for children 5 to 12 years old: 10 ml once a day, for adolescents, adults, in elderly: 15-30 ml once a day. The use in children under 1 year of age is not recommended. Duration of use: maximum 3 days
Castor oil, refined	Short-term use in cases of constipation.	Capsule, 1000 mg >12 years: 1-10 capsules 1 time daily in the morning no longer than 2 weeks
Castor oil, virgin	Short-term use in cases of constipation.	Capsule, 500 mg >12 years: 2-20 capsules, soft 1 time daily in the morning no longer than 2 weeks
Castor oil	In constipations due to various reasons.	Oral liquid 100% children in the age of 12 y 1-2 teaspoons (4-8 g). adults 1-2 spoons (12-24 g) designed for temporary use

Castor oil	Functional constipation. Clearing of bowels before radiological examination, surgery, labour.	Oral liquid. posology: children 1-5 years old: 1 teaspoon (5 g) children: 5-12 years old: 1 desert spoon (10 g) adults and elderly: 1-2 spoon (15-30 g)
Castor oil BP 100%	Laxative	Oral liquid. posology: children up to one year: ten drops 1-12 years: ten drops to two (5 ml) spoonfuls according to age. adults and elderly: one to four (5 ml) spoonfuls to be taken in Milk or lemon juice one hour before breakfast or on an empty stomach.
Castor oil	Traditionally used as a purgative	Oral liquid adolescents and adults: Single dose: 30 ml, in the morning

9. CONCLUSION

Ricinus communis is a widely traditionally used and potent medicinal plant between all the thousands of medicinal plants. The pharmacological activities reported in the present review confirm that the therapeutic value of *Ricinus communis* is much more. It is an important source of compounds with theirs chemical structures as well as pharmacological properties. The presence of phytochemical constituents and pharmacological activities proved that the plant has a leading capacity for the development of new good efficacy drugs in future.

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