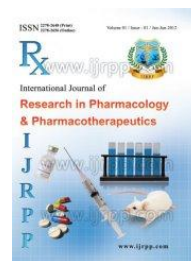




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Review article

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Ricinus Communis (Castor): An overview

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ABSTRACT

Ricinus communis Linn. commonly called as castor belonging to family Euphorbiaceae found throughout India, mostly growing wild on waste land and also cultivated for its oil seeds. Castor is a perennial evergreen shrub. The Sanskrit name erandah describes the property of the drug to dispel diseases. It is native to the Ethiopian region of tropical East Africa. Castor bean has been introduced and is cultivated in many tropical and subtropical areas of the world, frequently appearing spontaneously. The leaves contain isoquercetin 2, 5-dihydroxy benzoic acid and epicatechin. The castor oil consists principally of ricinoleic acid with only small amounts of dihydroxystearic, linoleic, oleic, and stearic acids. It used in treatment of rheumatic arthritis, paralysis; epilepsy; distention of the uterus. Castor-oil is a cathartic and has labor-inducing properties. Ricinoleic acid has served in contraceptive jellies. It is considered as a reputed remedy for all kinds of rheumatic affections. Used regularly as hair oil, it helps for growth of the hair and cure dandruff. This plant is reported to possess antibacterial, anti-inflammatory, analgesic, anticonvulsant, antidiabetic, hepatoprotective, purgative, lubricant, anticancer and antitubercular activities. The leaves (aqueous extract) exhibited 100% ovicidal and larvicidal activity against mosquito larvae. It is also used as a lubricant and for lighting and as an ingredient in fuels for precision engines. The oil is used in coating fabrics and other protective coverings, in the manufacture of high-grade lubricants, transparent typewriter and printing inks. It should also not be used when there is abdominal pain or intestinal infections such as appendicitis, enteritis or inflammation of the small intestine and peritonitis.

Key words: Castor, *Ricinus communis*, Purgative, Antidiabetic.

INTRODUCTION

Ricinus communis Linn. is a tall glabrous and glaucous annual sometimes shrubby or almost small tree, 2-4 m high; found throughout India, mostly

growing wild on waste land and also cultivated for its oil seeds.

Although it is native to the Ethiopian region of tropical east Africa, castor plant has become naturalized in tropical and warm temperate regions

throughout the world, and is becoming an increasingly abundant weed in the southwestern United States. Castor plants are very common along stream banks, river beds, bottom lands, and just about any hot area where the soil is well drained and with sufficient nutrients and moisture to sustain the vigorous growth. Although the seeds or beans are extremely poisonous, they are the source of numerous economically important products and are one of earliest commercial products. Castor beans have been found in ancient Egyptian tombs dating back to 4000 B.C. and the oil was used thousands of years ago in wick lamps for lighting. To many people the castor plant is just an overgrown, undesirable weed, and yet it produces one of nature's finest

natural oils. The seeds from the *Ricinus communis* Linn. are poisonous to people, animals and insects^[1].

TAXONOMICAL CLASSIFICATION

Ricinus communis Linn.

Kingdom: Plantae -Plants

Subkingdom: Tracheobionta - Vascular plants

Superdivision: Spermatophyta - Seed plants

Division: Magnoliophyta - Flowering plants

Class: Magnoliopsida – Dicotyledons

Subclass: Rosidae

Order: Euphorbiales

Family: Euphorbiaceae - Spurge family

Genus: *Ricinus* L. – *Ricinus*

Species: *Ricinus communis* Linn.^[2,3].

SYNONYMS

Table no. 10: Data showing synonyms of *Ricinus communis* Linn. in different languages

Sanskrit.	Gandharva- Hasta, Panchi'gul, Vitiri	Kannad	Harlu
Assam	Erri	Malylam	Ambanakka, Avanakku
Bengali.	Bherenda	Marathi	Erand, Erandee
English	Castor Oil Plant	Orissa	Bheranda
Gujrathi	Erando	Punjabi	Erand
Hindi.	Erand, Rendee, Andu	Tamil	Amanakku
Urdu	Erand	Telgu	Amudanu, Amudmuchetu

DERIVATION OF THE NAME CASTOR

It is interesting to trace the origin of the name "Castor." Castor is the generic name of the North American beaver (*Castor canadensis*) and one of the brightest double stars in the constellation Gemini. In Greek and Roman legend, castor was one of the twin sons of Jupiter and Leda. According to E. A. Weiss, writing in *Castor, Sesame and Sunflower* (1971), the name "castor" has nothing to do with luminous stars, or offspring of Greek and Roman Gods. Castor was apparently coined by English traders who confused it with the oil of another shrub, *Vitex agnus-castus*, which the Spanish and Portuguese in Jamaica called "agno-casto." Although it is commonly known as the castor bean plant, the seed is really not a true bean and it is not related to the bean or legume. There are many other examples of "beans" that are technically not beans, such as Mexican Jumping "beans" and coffee "beans".

The scientific name for the castor plant, *Ricinus communis*, has a much more logical derivation. *Communis* means common in Latin, and castor plants were already commonly naturalized in many parts of the world when the eighteenth century Swedish naturalist Carolus Linnaeus (Karl von Linne) was giving scientific first and last names to plants and animals over 200 years ago. *Ricinus* is the Latin word for tick and is the specific for the Mediterranean sheep tick (*Ixodes ricinus*). Apparently Linnaeus thought the seeds looked like ticks, particularly large ticks engorged with blood^[1,2,5].



Fig no.1: A western wood tick (*Dermacentor occidentalis*)

The mottled body of certain ticks superficially resembles a castor bean seed (especially when the tick is engorged with blood) and the tick's head resembles the caruncle of a castor bean seed.



Fig no. 2. A] *Ricinus communis* plant



B] Castor bean flowers & fruits

GEOGRAPHICAL DISTRIBUTION

Probably native to Africa, Castor bean has been introduced and is cultivated in many tropical and subtropical areas of the world, frequently appearing spontaneously^[6]. It is a native of N. E. tropical Africa. It is found throughout India, cultivated and found wild up to 2400 meters^[7]. Castor Bean is originally native to northeastern Africa and the Middle East. It has escaped cultivation and become naturalized as a weed almost everywhere in the world that has a tropical or subtropical climate^[8].

CULTIVATION

Germplasm

Reported from the African Center of Diversity, castor bean thereof is reported to tolerate bacteria, disease, drought, fungi, high pH, heat, insects, low pH, nematodes, poor soil, salt, slope, virus, weed, wind, and wilt. Many developed; two of the best commercial ones are: 'Conner' and 'Kansas Common', which give from 51.3 to 55.6% oil^[9].

Ecology

Ranging from cool temperate moist to wet through tropical desert to wet forest life zones, castor bean is reported to tolerate annual precipitation of 2.0 to 42.9 dm annual temperature of 7.0 to 27.8°C and pH of 4.5 to 8.3. Grows best where temperatures are rather high throughout the season, but seed may fail to set if it is above 38°C for an extended period. Plant requires 140–180 day growing season and is readily killed by frost. Irrigated crops require 2–3.5 acre-feet of water to produce satisfactory yields. High humidity contributes to the development of diseases. Plants do best on fertile, well-drained soils which are neither alkaline nor saline. Sandy and clay loam being best for cultivation.

Harvesting

Fruits are harvested when fully mature and the leaves are dry, in about 95–180 days. In tropics, harvest is from wild or native plants. Planting and harvesting may be done by hand methods or completely mechanized. Harvesting should begin before rainy

season in tropical regions, but in dry regions it is best to harvest when all fruits are mature. In India fruit is picked in November; unless the capsules are dry, they must be spread out to dry quickly. Castor oil is manufactured by running cleaned seed through the decorticating machines to remove the seed coat from the kernel; the more complete this operation the lighter the oil. Castor seeds cannot be ground or tempered as soybeans. Unbroken or uncrushed seeds should be gotten to the press. Preheating may make heavy viscous oil more mobile. Seed is put in 'cage' press, and number 1 oil is obtained, which needs little refining but has to be bleached. Oil remaining in the press-cake is extracted by solvent methods and is called number III oil, which contains impurities, and cannot be effectively refined. Castor bean oil can be stored 3–4 years without deterioration^[10].

MORPHOLOGY

Description of leaves

Leaves green or reddish-green, broad, palmately lobed, with 5-11 lobes, 30-60 cm. dia., nearly orbicular, lobes oblong linear, acute or acuminate, margin serrate, vary from 4-20 cm in length, 2.5 -7.5 cm in width; petiole 10-20 cm long, cylindrical or slightly flattened towards distal and palmately attached to the blade, solid when young, becomes hollow on maturity smooth, alternate, palmately-divided and 20-60 cm in width. The lobes are oblong and toothed^[11].

PHYSICAL CONSTITUENTS

Table no.2: Physical constituents in 100 g of leaves of *Ricinus communis* Linn.

Total ash	12.4 g	Fat	5.4 g
Fiber	24.8 g	Total carbohydrate	57.4 g
Protein	10.3 g		

PHYTOCHEMISTRY

Per 100 g, the leaves are reported to contain on a zero-moisture basis, 2,670 mg calcium, and 460 mg phosphorous. The leaves contain isoquercetin 2, 5-dihydroxy benzoic acid and epicatechin. They also contain rutin, hyperoside, quercetin, chlorogenic acid, neochlorogenic acid and gallic acid. They contain an

Castor bean flowers & fruits

Flowers occur most of the year in dense terminal clusters (inflorescences), with female flowers just above the male flowers. This species is clearly monoecious, with separate male and female flowers on the same individual. There are no petals and each female flower consists of a little spiny ovary (which develops into the fruit or seed capsule) and a bright red structure with feathery branches (stigma lobes) that receives pollen from male flowers. Each male flower consists of a cluster of many stamens which literally smoke as they shed pollen in a gust of wind.

Castor seeds

The shiny seeds of castor plants are a little larger than pinto beans and have very beautiful and intricate designs. At one end is a small, spongy structure called the caruncle, which aids in the absorption of water, when the seeds are planted. Like human faces, finger prints or the spots on a leopard, no two seeds have exactly the same pattern. They are unquestionably among the most deadly seeds on earth, and it is their irresistible appearance that makes them so dangerous. The many "faces" of castor seeds like the faces and fingerprints of the people. The beautiful designs on castor seeds exhibit infinite genetic variation. The small structure on the end of each seed is a caruncle^[5].

invertase, a glycoprotein activated by macromolecules including proteins and lectins from castor^[10].

The seed contains 5.1–5.6% moisture, 12.0–16.0% protein, 45.0–50.6% oil, and 2.0–2.2% ash. Seeds are high in phosphorus, 90% in the phytic form. The bean coat yielded lupeol and 30-norlupan-3-ol-20-

one. Seed coat contained 62% lipids and higher amounts of phosphatides and non-saponifiable matter than seed kernel. The seeds contain a powerful lipase, employed for commercial hydrolysis of fats, also amylase, invertase, maltase, endotrypsin, glycolic acid, oxidase, ribonuclease, and a fat-soluble zymogen. Sprouting seeds contain catalase, peroxidase and reductase, ricinus lipase, fixed oil, 49-85% ricin, ricinin.

Roots, stems and leaves contain several amino acids. Flowers gave apigenin, chlorogenin, rutin, coumarin and hyperoside. Castor oil is constituted by several fatty acids. The castor oil consists principally of ricinoleic acid with only small amounts of dihydroxystearic, linoleic, oleic, and stearic acids. The unsaponifiable matter contains sitosterol^[12].

Chemistry of plant oils

Plant oils are typically composed of triglyceride molecules (technically called esters) composed of a 3-carbon alcohol (glycerol) plus three 18-carbon (or 16-carbon) fatty acids. Unlike the saturated fatty acids of animal fats which are solid at room temperature, plant fatty acids are typically unsaturated and liquid at room temperature, with one or more double bonds between the carbon atoms (mono-unsaturated and polyunsaturated)^[13].

PARTS UTILISED: Roots, leaves, seeds.

PROPERTIES

The root is sweetish, heating, plain tasting, neutral-natured; leaves and stems-sweet-pungent tasting, neutral natured, slightly toxic. Seeds are exceedingly pungent in taste, warming-natured. Soothes and regulates the gastrointestinal tract.

FOLKLORIC USES

It used in treatment of rheumatic arthritis, paralysis; epilepsy; distention of the uterus, prolapsus drink dried root decoction or poultice Bai-hui pt (GV-20) with pounded seed or leaf material. Used in non-lowering of the fetus (during delivery): poultice Yungchuan Pt (K-1 pt) with pounded fresh leaves. In facial paralysis: poultice with pounded seeds (seed coat removed). If the paralytic side is on the left side of the face, apply poultice on the left. In wound caused by piercing with pointed objects (nails,

bamboo slats, bullet wound): use pounded fresh seed and apply as poultice. In skin ulcers: Boil pounded leaves use as wash. Bark of castor plant also used as dressing for ulcers and sores. Seed oil is laxative and vermicide; also used as ear drops to hardened cerumen and also used for warts. For Milk stimulation: Pound leaves apply over breast as poultice. In hemorrhoids, Roast seed, pound apply to affected area^[14].

It is considered anodyne, antidote, bactericide, cathartic, cyanogenetic, discutient, emetic, emollient, expectorant, insecticide, lactagogue, larvicidal, laxative, poison, purgative, tonic, and vermifuge. Castor or castor oil is a dangerous ingredient in folk remedies for abscess, arthritis, asthma, boils, burns, cancer, carbuncles, catarrh, chancre, cholera, cold, colic, convulsions, corns, deafness, delirium, dermatitis, dogbite, dropsy, epilepsy, fever, flu, gout, guineaworm, headache, inflammation, moles, myalgia, nerves, osteomyelitis, parturition, rash, rheumatism, scrofula, seborrhea, skin, sores, stomachache, swellings, toothaches, tuberculosis, tumors, urethritis, uteritis, venereal disease, warts and wounds. Castor-oil is a cathartic and has labor-inducing properties. Ricinoleic acid has served in contraceptive jellies. Ricin, a toxic protein in the seeds, acts as a blood coagulant. Oil used externally for dermatitis and eye ailments. Seeds, which yield 45-50% of a fixed oil, also contain the alkaloids ricinine and considered purgative, counter-irritant in scorpion-sting and fish poison. Leaves applied to head to relieve headache and as a poultice for boils^[13,14,15].

USES OF CASTOR IN AYURVEDA

Castor is a perennial evergreen shrub. The Sanskrit name erandah describes the property of the drug to dispel diseases. It is considered as a reputed remedy for all kinds of rheumatic affections. They are useful in gastropathy such as gulma, amadosa, constipation, inflammations, fever, ascitis, bronchitis, cough, leprosy, skin diseases, and vitiated conditions of vata, colic and lumbago.

Root

The root is sweetish, heating, carminative; useful in inflammations, pains, ascites, fever, glands, asthma,

eructations, bronchitis, leprosy, diseases of the rectum, and the head.

Leaves

The leaves are useful in “vata” and “kapha”, intestinal worms, night blindness, earache; increases biliousness. Leaves are useful in burns, nyctalopia, strangury and for bathing and fermentation and vitiated conditions of vata, especially in rheumatoid arthritis and arthralgia. Fresh leaves are used by nursing mothers in the Canary Island as an external application to increase the flow of milk.

Flowers

The flowers are useful in glandular tumors, anal troubles, vaginal pain. Flowers are useful in arthralgia.

Fruit

The fruit is heating and an appetizer useful in tumors and pain, “vata”, piles, diseases of the liver and spleen.

Seed

The seed is cathartic and aphrodisiac. The oil is sweetish; cathartic, aphrodisiac, anthelmintic, alternative; useful in tumors, diseases of the heart, slow fevers, inflammations, ascites, typhoid, pain in the back, lumbago, leprosy, elephantiasis, convulsions; increases “kapha” causes biliousness. Seeds are useful in dyspepsia and for preparing a poultice to treat arthralgia.

Castor oil

Castor oil is an excellent solvent of pure alkaloids and as such solutions of atropine, cocaine, etc. are used in ophthalmic surgery. It is also dropped into the eye to remove the after-irritation caused by the removal of foreign bodies. The oil from seeds is a very effective purgative for all ailments caused by vata and kapha. It is also recommended for ascites, intermittent fever, colonitis, lumbago, coxalgia and coxitis. Castor oil is also used for soap making.

USES OF CASTOR IN YUNANI

The root bark is purgative, alternative; good in skin diseases. The leaves are galactagogue; good for

burns, the seeds and the oil from them have a bad taste; purgative; useful in liver troubles, pain in the body, lumbago, boils, piles, ringworm, paralysis, inflammations, ascites, asthma, rheumatism, dropsy and amenorrhea^[6,13].

MEDICINAL USES OF CASTOR SEEDS

A poultice of castor seeds can be applied with gratifying results to gouty and rheumatic swellings. A decoction of the roots of castor plant with carbonate of potash is useful in the treatment of lumbago, rheumatism and sciatica. A paste of the kernel without the embryo, boiled in milk, is also given as a medicine in these conditions. Castor oil is a harmless purgative. It simply passes out after completing its purgative action, making the patient feel a mild irritation in the anus at that time. Administering of castor oil as a purgative is very simple. About 30 to 60 grams of pure odorless castor oil is given orally with 250 to 375 grams of lukewarm milk. It acts just after an hour. Those who find its use nauseating and unpalatable can take it with ginger water or aqua anisi in place of milk. This greatly reduces its unpleasantness, while destroying mucous and promoting healthy appetite.

A poultice of castor leaves is useful as an external application of boils and swellings. Coated with some bland oil such as coconut oil and heated, the hot leaves can be applied over guinea-worm sores to extract the worms. A poultice of castor seeds is also applied to scrofulous sores and boils due to tuberculosis of lymph nodes. Castor oil massaged over the breast after child-birth increases the flow of milk, as it stimulates the mammary glands. The leaves of castor can also be used to foment the breast for the same purpose. Castor oil massaged over the body, before bath, keeps the skin healthy and imparts sound sleep. Such an oil bath may be taken once in a week. Applying castor oil over hand and feet before going to bed keeps them soft and similarly over the eyebrows and eyelashes keeps them well-groomed. Used regularly as hair oil, it helps for growth of the hair and cure dandruff^[16].

PHARMACOLOGICAL ACTIVITY

Anti-inflammatory activity

The effect of petroleum ether extract of root of **Ricinus Communis** (150 mg/kg p.o) has been

investigated against Carrageenan, 5-Hydroxytryptamin, Dextran, Bradykinin and Prostaglandin E, induced rat's hind paw oedema. The extract exhibited significant anti-inflammatory activity against all the phlogestic agents except PGE. Mean changes in the paw volumes revealed, the efficacy of extract against the phlogestic agents in the following order: Carrageenan>Bradykinin>5-HT>Dextran. 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^[17].

Antidiabetic activity

Administration of the effective dose of *Ricinus communis* to the diabetic rats for 20 days showed favorable effects not only on fasting blood glucose, but also on total lipid profile and liver and kidney functions on 10th and 20th day. *Ricinus 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 10 g/kg body weight. Thus *Ricinus communis* seems to have a promising value for the development of a potent phytomedicine for the diabetes^[18].

Anti-inflammatory and free radical scavenging activity

Anti-inflammatory and free radical scavenging activities of the methanolic extract of *Ricinus communis* Linn. root was studied in wistar albino rats. The methanolic extract at doses 250 and 500 mg/kg p.o. exhibited significant anti-inflammatory activity in carrageenan-induced hind paw edema model. The extract at the dose of 500 mg/kg p.o. also exhibited significant ($P < 0.001$) anti-inflammatory activity in cotton pellet granuloma model. The methanolic extract showed significant free radical scavenging activity by inhibiting lipid peroxidation initiated by carbon tetrachloride and ferrous sulphate in rat liver and kidney homogenates. The extract enhanced free radical scavenging activity of stable radical 2,2-diphenyl-1-picryl-hydrazyl

(DPPH radical hot), nitric oxide and hydroxyl radical in vitro assay methods. The methanolic extract of *Ricinus communis* Linn. root possess significant anti-inflammatory activity in acute and chronic inflammatory models in rats^[19].

Gastric Ulcer and Secretion activity

Gastric ulcer and secretion studies in Pylorus ligated rats was conducted in albino rats of either sex by administering *Ricinus communis*. The gastric juice was estimated for its volume, acid output and peptic activity. Ulcer index was calculated by adding the number of ulcers/erosions (in glandular portions of the stomach) with severity in pluses (+) scored as 1-4 per stomach after histological confirmation^[19].

Anticancer activity (Ricin)

Although it is 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^[20].

Hepatoprotective activity

Fresh leaves protected against liver injury induced by carbon tetra chloride in rats while cold aqueous extract provided partial protection.

Purgative activity

Castor oil was one of the old-fashioned remedies for everything from constipation to heartburn widely used for over 2,000 years and is still used to this day; is the most valuable laxative in medicines. 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. The mode of its action is unknown. 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.

Lubricant activity

Castor oil is also used as lubricant. It is sometimes applied externally as a soothing emollient for dry skin, dermatitis, other skin diseases, sunburn, open sores and it is the primary ingredient of several brand name medications. Several additional little-known uses for castor oil include hair tonics, ointments, cosmetics and contraception creams and jellies^[4].

Antitubercular activity

Proportion method, NRA and BacT/ALERT 3D system used for evaluation of anti-tubercular activity. *M. tuberculosis* H37RV is sensitive to 150 µg/ml ethanol extract of *Ricinus communis* Linn. The ethanolic extract of *Ricinus communis* Linn. possess significant anti-tubercular activity. Results with the BacT/ALERT 3D system agreed 100% with those obtained by the NRA and conventional proportion methods. The susceptibility test results were obtained in average 10 days by NRA and BacT/ALERT 3D system and 42 days by conventional proportion method^[21].

BIOLOGICAL ACTIVITY

The leaves (aqueous extract) exhibited 100% ovicidal and larvicidal activity against mosquito larvae but have no effect on adult mosquitoes, thus used as larvicidal agents in an integrated vector control. Castor leaves are used in preparing long acting biocide compounds which are safe and stable and can completely control pests such as mosquitoes, flies, cockroaches, ants, fleas and lice in 24 hours. The leaves have insecticidal properties.

OTHER USES

The seed contains 35 - 55% of a drying oil. As well as being used in cooking, it is an ingredient of soaps, polishes, flypapers, paints and varnishes. It is also used as a lubricant and for lighting and as an ingredient in fuels for precision engines. The oil is used in coating fabrics and other protective coverings, in the manufacture of high-grade lubricants, transparent typewriter and printing inks. In textile dyeing (when converted into sulfonated castor oil or turkey-red oil, for dyeing cotton fabrics

with alizarine) and in the production of 'Rilson', a polyamide nylon-type fiber. The dehydrated oil is an excellent drying agent which compares favorably with tung oil and is used in paints and varnishes. The hydrogenated oil is utilized in the manufacture of waxes, polishes, carbon paper, candles and crayons. A fiber for making ropes is obtained from the stems. Cellulose from the stems is used for making cardboard, paper etc. The growing plant is said to repel flies and mosquitoes. When grown in the garden it is said to rid it of moles and nibbling insects. The leaves have insecticidal properties^[11]. Polyoxyethylene hydrogenated castor oil is used for preparing stable vitamin A and E solubilised eye drops and oral nitroglycerine sprays. Polyoxyethylated castor oil is used as a surfactant for transdermal delivery of anti-inflammatory drugs. Polyoxyethylated hydrogenated castor oil used to give finish to synthetic fiber to provide high strength and low shrinkage^[10].

TOXICITY

The seeds contain 2.8–3% toxic substances, 2.5–20 seed killing a man, 4 rabbits, 5 sheep, 6 oxes, 6 horses, 7 pigs, 11 dogs, but 80 for cocks and ducks. The principal 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 the *Ricinus communis* Linn. are poisonous to people, animals and insects. One of the main toxic proteins is "ricin", named by Stillmark in 1888 when he tested the beans extract on red blood cells. If the seed is swallowed without chewing and there is no damage to the seed coat, it will most likely pass harmlessly through the digestive tract. However, if it is chewed or broken and then swallowed, the ricin toxin 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 they are abdominal pain, vomiting, diarrhea, sometimes bloody. Within several days severe dehydration, a decrease in urine and a decrease in blood pressure occurs^[2].

PRECAUTIONS

Repeated use of castor oil as a laxative should be avoided as it causes secondary constipation, that is, recurrence of the condition after cure. Persons suffering from kidney infections should not take castor oil as a purgative. It should also not be used when there is abdominal pain or intestinal infections such as appendicitis, enteritis or inflammation of the small intestine and peritonitis. Large doses of castor oil during the early months of pregnancy may cause abortion^[17].

CONCLUSION

Numerous Phytochemical and pharmacological studies have been carried out On different parts of *Ricinus communis* Linn. The present literature supports the potential of *Ricinus communis* Linn. as a medicinal tree. Further more research can be done to investigate the unexplored and unexploited potential uses of this plant.

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