WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 11, 1073-1080. Research Article ISSN 2277–7105

EXTRACTION OF PHYTOCONSTITUENTS FROM CASTOR LEAVES AND EVALUATION OF ITS ANTIBACTERIAL ACTIVITY

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Article Received on
12 April 2024,

Revised on 02 May 2024,
Accepted on 22 May 2024

DOI: 10.20959/wjpr202411-32417

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ABSTRACT

Castor leaf is botanically named as Ricinus communis Linn. belongs to family "Euphorbiaceae". It is also known as 'Eranda' in Sanskrit. The castor plant, or Ricinus communis L., is a significant drought-resistant shrub that is widely distributed in the wild and the plant originated from East Africa, and is reasonably priced. Around the world, castor is found in a variety of climate zones, including warm-temperate, tropical, and subtropical climates. The decoction of leaves is a purgative, emmenagogue (an agent that promotes the menstrual discharge). A poultice of the leaves is applied to boils and swellings. The hot leaves are applied over the abdomen of children to relieve flatulence. In women the leaves promote menstrual flow. Extraction of phytoconstituents from castor leaf by using soxhlet apparatus in which methanol is used as a solvent has been done. Evaluation and identification of phytoconstituents by using various test (Alkaloid, glycoside etc) have been performed in laboratory. To investigate the *in vitro* antibacterial activities of the leaf extract in solvents *viz.*, methanol, extracts of the selected plant *Ricinus communis*, agar well diffusion method and agar tube dilution method were carried out. Methanol leaf extracts were found to be more active against bacterial strain. Methanolic extracts of *Ricinus communis* were effective in inhibiting the fungal growthas well. The efficient antibacterial activity of *Ricinus communis* from the present investigation revealed

that the methanol leaf extracts of the selected plant have significant potential to inhibit the growth of pathogenic bacterial strains.

KEYWORDS: Ricinus communis Linn, Phytoconstituents, Emmenagogue, Antibacterial, purgative.

1. INTRODUCTION

Castor leaf is botanically named as Ricinus communis Linn. belongs to family "Euphorbiaceae". It is also known as 'Eranda' in Sanskrit. The castor plant, or Ricinus communis L., is a significant drought-resistant shrub that is widely distributed in the wild and The plant originated from East Africa, and is reasonably priced.[1] Around the world, castor is found in a variety of climate zones, including warm-temperate, tropical, and subtropical climates.[2] It contains plants that can grow to a maximum size of 5–12 m, both annual and perennial. East Africa remains home to wild progenitors of castor, especially in Kenya and Ethiopia. The process most likely took place in a region halfway between east Africa and west Asia around 3200 years ago (YBP).[3] The process of domestication involves choosing key characteristics of the plants, like their height and diameter.[4]

Fig. 1: Description of castor plant.

Castor leaves are palmate, 15–45 cm long. It has been noted that leaves have different colors; juvenile leaves are often reddish to golden in color, and as they grow, they turn dark green. At the end of the main and subsidiary branches, there is a 40 cm long, circular panicle inflorescence that bears the blooms. Flowers have a short pedicel and are unisexual, about 1-3 cm in diameter. The plant is extensively cultivated for its oil bearing seeds. It has become naturalized in many parts of India. The castor oil and its uses are well known to all. The leaf juice is given as an emetic in narcotic poisoning. The decoction of leaves is a purgative, emmenagogue (An agent that promotes the menstrual discharge).A poultice of the leaves is

applied to boils and swellings. The hot leaves are applied over the Abdomen of children to relieve flatulence. In women the leaves promote menstrual flow.[5]

1.1. Chemical constituents

- Castor oil consists of glyceride of ricinoleic acid, isoricinoleic, stearic, and dihydroxy stearic acids. Ricinoleic acid is responsible for laxative property. Castor oil also contains vitamin F. 90% of the fatty acid content is ricinoleic acid.[6]
- The castor leaf extract composition was reported to include alkaloids, terpenoids, tannins, cardiac glycosides, steroids, saponins, and phenols.[7]
- Castor is one of the medicinal plants that have 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.[8]

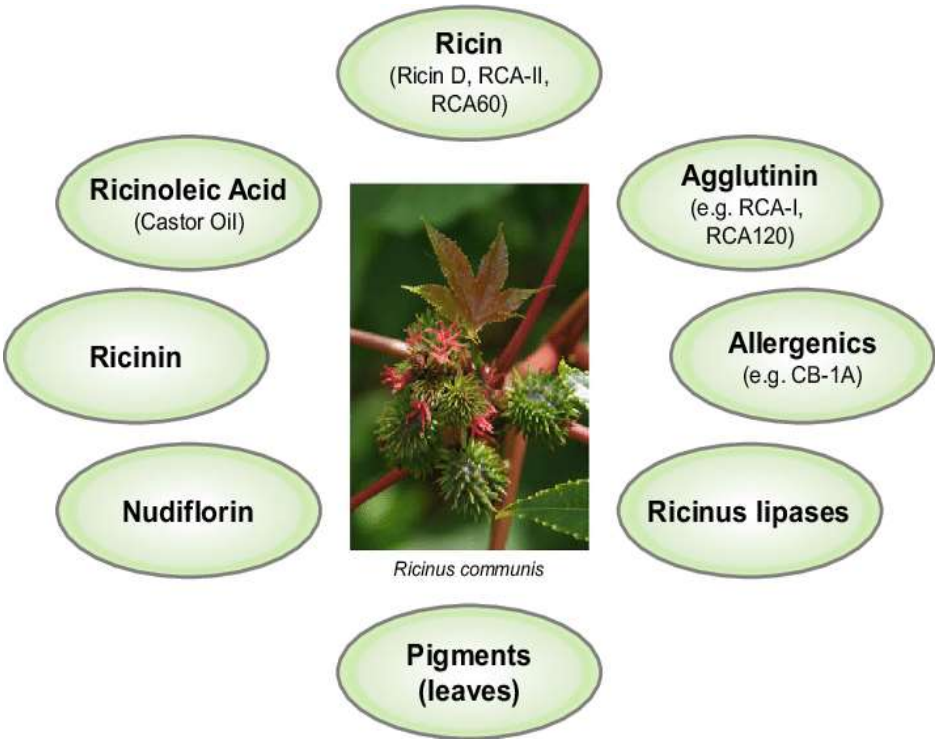

Fig. 2: Chemical constituents contained in the plant.

2. MATERIAL AND METHODS (Experimental work)

Plant materials

Fresh leaves of castor were collected from Distt. Mandi (HP) dried in shade and powdered to get a coarse powder.

Processing of the leaf extract

Methanol used as an extraction solvent.

Equipment:-Beakers, Glass rod, Funnel, Tripod stand, Soxhlet apparatus etc.

Plant material preparation

Fresh leaves of R. communis L. were collected from Distt. mandi (HP), dried in shade and powdered to get a coarse powder.[9]

3. Method used for plant extraction

Soxhlet extraction method: 10 grams of crushed castor leaves were inserted into a soxhlet extractor connected to a 1000 mL flask containing 250 mL of methanol. The extraction was conducted at the boiling temperature of methanol for 6 h. After extraction, the solvent was evaporated at its boiling point until a complete removal of methanol was ascertained for determining the extract weight. The same procedure was repeated in duplicate for petroleum ether as extraction solvents as well.[10]

Fig. 3: Castor extract obtained after the extraction process.

4. Phytoconstituent analysis

Preliminary analysis of extracts was carried out to identify the presence of various phytoconstituents by employing standard protocols. The results were summarized in Table 1 after conducting the following chemical tests.

1. **Tests for alkaloids**

(a) Dragendorff's test: By adding 1 ml of Dragendorff"s reagent to 2 mL of extract, an orange red precipitate was formed, indicating the presence of alkaloid.

(b) Wagner test: Acidify 1 ml of alcoholic extract of the drug 1.5% v/v of HCl and few drops of wagner reagents, a yellow or brown ppt is formed.[11]

2. **Test for triterpenoids**

Horizon test:-.Two milliliters of trichloroacetic acid were added to 1 mL of extract. The presence of terpenoids was confirmed by the formation of a red precipitate.[12]

3. **Tests for glycosides**

Keller Killiani test: A solution of 0.5 mL, containing glacial acetic acid and 2-3 drops of ferric chloride, was mixed with 2 mL of extract. Later, 1 ml of concentrated H_2SO_4, was added along the walls of the test tube. The appearance of deep blue colour at the junction of two liquids indicated the presence of cardiac glycosides.[13]

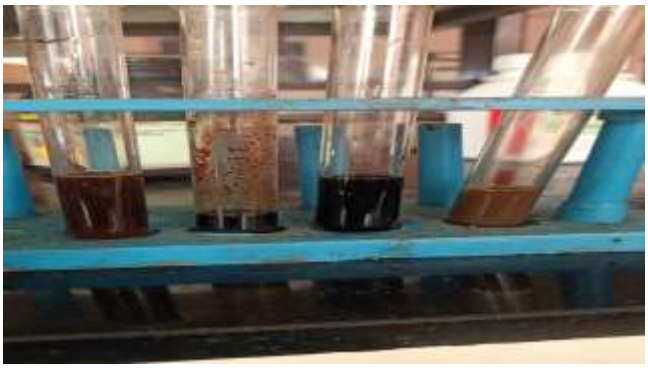

Fig. 4: Various test of castor extraction.

Table 1: Laboratory screening tests done using the castor leaf extract.

S. No.	Phytochemicals	Test	Observation	Inference
1.	Alkaloids	Dragendroff's test	Orange red ppt.	+VE
		Wagner's test	Red brown ppt.	+VE
2.	Triterpenoids	Horizon test	Red PPT.	+VE
3.	Glycosides	killer killani test	Deep blue colour.	+VE

Table No. 2: Culture media composition.

S. No	Name of composition	Amounts (g/ml)
1.	Beef extract	3.0g
2.	Peptone	5.0g
3.	Agar	20.0g
4.	Distilled water	1000ml
5.	pH	7.0-7.2

Antibacterial activity of the methanol extract of the castor plant extracts were determined by using the agar-well diffusion method.[14] The bacterial strains were first cultured in a nutrient broth for 18 h prior to use and standardized to 0.5 McFarland standards (106 cfu/mL). Nutrient agar medium was prepared by adding nutrient agar 2.3 g in 100 mL of distilled water; adjusted to pH 7.0, autoclaved and allowed to cool up to 45 °C. Petri plates were prepared by pouring 75 mL of seeded nutrient agar and allowed to solidify. Wells were bored into agar using a sterile 6 mm diameter cork borer. Approximately 100 µL of the crude extract at 12 mg/mL were added into the wells, allowed to stand at room temperature for about 2 h and incubated at 37 °C. Controls were set in parallel in which case the respective solvents were used to fill the well. The plates were examined after 24 h for zones of inhibition. The treatment effects were compared with those of penicillin at concentration of 1 mg/mL.[15]

Fig. 5: Assessment of antimicrobial activity (zone of inhibition)

5. RESULT AND DISCUSSION

The phytochemical testing of the extract of castor leaf extract showed the presence of various chemical compounds in methanolic extract of the plant. This extract consists of alkaloids, triterpenoids, and glycosides within it. Assesment of antibacterial activity of extract by using penicillin as an standard drug and methanolic extract as an test substance in which extract has shown more zone of inhibition than that of standard drug.

6. CONCLUSION

The present study demonstrates that the methanol leaf extracts of Ricinus communis exhibit remarkable antibacterial properties, indicating their efficacy in inhibiting the growth of pathogenic bacteria. More studies can be done in order to make its applicability in future.

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