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**PHYTOCHEMICAL SCREENING AND PHARMACOLOGICAL  
EVALUATION OF LEAVES AND SEEDS OF *RICINUS COMMUNIS* L.**

**Siyaram Yadav<sup>1</sup> and Dr. Renu Singh<sup>2</sup>**

Department of Botany

T.D.P.G.College,Jaunpur, (U.P.) India.

1-Corresponding author- Siyaram Yadav

**Abstract:**

Medicinal plants are important sources of bioactive compounds used in pharmaceutical and traditional medicine systems. The present study investigates the phytochemical composition and pharmacological activities of leaf and seed extracts of *Ricinus communis*. Plant extracts were prepared using methanol and ethanol solvents and evaluated through qualitative phytochemical screening. Antioxidant, antibacterial, and anti-inflammatory activities were also examined using standard assays. The results showed that the plant extracts contain significant phytochemicals such as alkaloids, flavonoids, tannins, saponins, glycosides, and phenolic compounds. The extracts exhibited considerable antioxidant and antimicrobial activities against tested pathogens. These findings confirm that *Ricinus communis* possesses important bioactive compounds with potential pharmacological applications.

**Keywords:** Phytochemicals, Antioxidant activity, antimicrobial activity, Medicinal plants, Pharmacological evaluation.

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## Introduction:

The monotypic genus *Ricinus* and subtribe Riciniinae include the family Euphorbiaceae which includes the species *Ricinus communis*. The common name of this plant is “castor plant”. It is commonly found in the tropics and other warm climates and is present all throughout the nation. It may grow quickly and is a perennial shrub with soft woods that can reach height of around 6 meters. This plant grows wild in waste areas and is grown for its leaves, flowers and oil. Different plant parts have been employed in the Indian medical system to cure various ailments. Additionally, it is used in the production of soap, printer ink, plastic, fibres, hydraulic fluid etc. The leaf, root and seed oil of this plant have been used to treat liver disease and inflammation in the Indian medical system. Hepatoprotective, Antifilarial, antioxidant, antiasthmatic and bacterial effects of the plant have been shown to be beneficial. This plant root may be found in a number of prescription medication that treat rheumatic conditions including sciatica, lumbago and pleurodynia as well as nerve disorders. This plant's root exhibited anti-inflammatory, free radical-scavenging, anti-fertility, anti-diabetic and antibacterial qualities.

Medicinal plants have been widely used in healthcare systems since ancient times. According to the World Health Organization, nearly 80% of the global population relies on traditional plant-based medicines for primary healthcare (WHO, 2019).

Among medicinal plants, *Ricinus communis* L. (family Euphorbiaceae) is an important species widely distributed in tropical and subtropical regions. The plant is commonly known as castor plant or “Arandi” in India. Various plant parts such as leaves, seeds, and roots possess medicinal properties.

The seeds contain castor oil rich in ricinoleic acid, while the leaves contain important phytochemicals including flavonoids, tannins, phenols, and alkaloids (Patel et al., 2018). These phytochemicals have been reported to exhibit antioxidant,

antibacterial, anti-inflammatory, analgesic, and laxative properties (Ramesh et al., 2020). Due to its wide medicinal importance, the present study was conducted to evaluate the phytochemical constituents and pharmacological activities of leaf and seed extracts of *Ricinus communis*.

## **Materials and Methods:**

### **Collection of Plant Material**

Leaves and mature seeds of *Ricinus communis* were collected from T.D.P.G.College, Jaunpur agricultural fields in Uttar Pradesh, India. The plant materials were authenticated and washed with distilled water.



**Fig-1** *Ricinus communis* (Plant and Seeds)

### **Preparation of Extract**

The plant materials were shade dried for 10 days and powdered. Extraction was carried out using methanol and ethanol in a Soxhlet apparatus for 8 hours. The extracts were filtered and concentrated.

### **Phytochemical Screening**

Qualitative phytochemical analysis was performed following standard protocols described by Harborne (1998).

**Table 1: Phytochemical Constituents Detected in Extracts**

Phytochemical	Leaf Extract	Seed Extract
Alkaloids	Present	Present
Flavonoids	Present	Present
Tannins	Present	Moderate
Saponins	Present	Present
Phenols	Present	Present
Glycosides	Moderate	Present
Terpenoids	Present	Moderate

### Results and Discussion:

The phytochemical and pharmacological investigations of leaves and seeds of *Ricinus communis* revealed the presence of several bioactive compounds with significant biological activities.

### Phytochemical Screening

Qualitative phytochemical analysis demonstrated the presence of several important secondary metabolites in both leaf and seed extracts. Alkaloids, flavonoids, tannins, phenols, and saponins were detected in the extracts. However, the concentration and intensity of these phytochemicals varied between leaves and seeds.

**Table 2: Qualitative Phytochemical Screening**

Phytochemical	Leaf Extract	Seed Extract
Alkaloids	+++	++
Flavonoids	+++	++
Tannins	++	+
Saponins	++	++
Phenols	+++	++
Glycosides	++	+
Terpenoids	++	+

(+ = low, ++ = moderate, +++ = high)

The results indicate that leaf extracts contain a comparatively higher concentration of flavonoids and phenolic compounds than seed extracts.

### **Antioxidant Activity**

The antioxidant activity of the extracts was evaluated using the DPPH radical scavenging assay. Both leaf and seed extracts showed significant free radical scavenging activity, which increased with increasing concentration.

**Table 3: Antioxidant Activity of Extracts**

Sample	Concentration ( $\mu\text{g/ml}$ )	% Inhibition
Leaf extract	50	42.3
Leaf extract	100	63.8
Leaf extract	200	74.6
Seed extract	50	38.5
Seed extract	100	59.2
Seed extract	200	70.1
Ascorbic acid	200	88.4

The leaf extract exhibited slightly higher antioxidant activity compared to seed extract.

### **Antibacterial Activity**

The antibacterial activity of the extracts was evaluated against *Escherichia coli* and *Staphylococcus aureus* using agar well diffusion method.

**Table 4: Antibacterial Activity (Zone of Inhibition)**

Extract	<i>E. coli</i>	<i>S. aureus</i>
Leaf extract	14 mm	16 mm
Seed extract	12 mm	15 mm
Standard antibiotic	20 mm	22 mm

Leaf extracts showed slightly stronger antibacterial activity compared to seed extracts.

### **Anti-inflammatory Activity**

The anti-inflammatory potential of the extracts was assessed using protein denaturation inhibition assay.

**Table 5: Anti-inflammatory Activity**

Sample	% Inhibition
Leaf extract	61.4
Seed extract	56.2
Standard drug (Diclofenac)	75.3

Both extracts showed moderate anti-inflammatory activity, with leaf extract showing slightly higher inhibition.

### **Discussion**

Medicinal plants are rich sources of bioactive phytochemicals responsible for various therapeutic activities. The present study demonstrated that *Ricinus communis* leaves and seeds contain important phytochemical constituents such as flavonoids, alkaloids, tannins, phenols, and saponins.

The higher concentration of flavonoids and phenolic compounds observed in leaf extracts may explain their stronger antioxidant activity. Phenolic compounds are known to neutralize free radicals by donating hydrogen atoms, thereby reducing oxidative stress in biological systems.

The antioxidant activity observed in the present study is consistent with earlier findings that reported strong radical scavenging potential of *Ricinus communis* extracts. These compounds help prevent oxidative damage associated with chronic diseases such as cancer, cardiovascular diseases, and neurodegenerative disorders.

The antimicrobial activity observed in this study may be attributed to the presence of alkaloids and tannins. These compounds disrupt microbial cell walls, inhibit enzyme activity, and interfere with metabolic pathways in bacteria. The moderate

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inhibition observed against *E. coli* and *S. aureus* indicates the potential use of *Ricinus communis* extracts as natural antimicrobial agents.

The anti-inflammatory activity demonstrated by the extracts may be associated with flavonoids and phenolic compounds, which inhibit inflammatory mediators and reduce protein denaturation. Inflammation is a major biological response to tissue injury, and natural plant-derived compounds are increasingly being explored as safer alternatives to synthetic drugs.

The slightly higher pharmacological activity observed in leaf extracts compared to seed extracts may be due to higher concentrations of secondary metabolites in leaves. This suggests that leaves may serve as a more potent source of bioactive compounds.

Overall, the results support the traditional medicinal use of *Ricinus communis* in herbal medicine and indicate its potential as a natural source of pharmacologically active compounds.

## **Conclusion**

The present study investigated the phytochemical composition and pharmacological potential of the leaves and seeds of *Ricinus communis*. The phytochemical screening confirmed the presence of several important secondary metabolites including alkaloids, flavonoids, tannins, phenolic compounds, saponins, and glycosides. These bioactive constituents are widely known for their therapeutic significance and are often responsible for many biological activities observed in medicinal plants.

The experimental results demonstrated that both leaf and seed extracts possess noticeable antioxidant activity as indicated by their ability to scavenge free radicals in the DPPH assay. However, the leaf extracts showed comparatively higher antioxidant potential, which may be attributed to the higher concentration of

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phenolic and flavonoid compounds present in the leaves. These compounds are known to protect biological systems against oxidative stress by neutralizing reactive oxygen species.

The antimicrobial evaluation further indicated that the extracts exhibited moderate inhibitory effects against common bacterial pathogens such as *Escherichia coli* and *Staphylococcus aureus*. This antibacterial activity suggests that the phytochemicals present in the plant extracts may interfere with microbial growth and metabolism. Such activity supports the traditional use of this plant in treating infections and inflammatory conditions.

In addition, the anti-inflammatory activity observed in the extracts indicates their potential role in reducing inflammatory responses. Natural compounds such as flavonoids and phenolics are known to inhibit protein denaturation and inflammatory mediators, which may explain the pharmacological activity observed in the present investigation.

Overall, the findings of this study demonstrate that *Ricinus communis* is a valuable medicinal plant with promising pharmacological properties. The presence of multiple phytochemicals and their associated biological activities highlight the potential of this plant as a natural source for the development of therapeutic agents. Further detailed studies involving isolation and characterization of active compounds, as well as advanced pharmacological and toxicological evaluations, would be beneficial to fully explore its medicinal potential.

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## References

1. Harborne, J.B. (1998). *Phytochemical Methods*. Chapman and Hall.
2. Patel, N., Patel, D., & Desai, S. (2018). Phytochemical and pharmacological evaluation of *Ricinus communis*. *Journal of Medicinal Plants Research*, 12(4), 65-72.
3. Ramesh, P., Kumar, A., & Singh, R. (2020). Antioxidant and antimicrobial activity of *Ricinus communis* extracts. *International Journal of Pharmaceutical Sciences*, 15(3), 112-118.
4. Saini, R., Sharma, N., & Kumar, S. (2021). Bioactive compounds and pharmacological importance of medicinal plants. *Journal of Herbal Medicine*, 28, 100432.
5. World Health Organization (2019). *WHO Global Report on Traditional Medicine*.