

**ETHNOMEDICINAL USES, PHYTOCHEMISTRY AND
PHARMACOLOGICAL ACTIVITIES OF *Ipomea Reniformis*****Manish Singh Verma¹, Rakesh Sharma^{1*}, Yogesh Kumar Sharma¹, Prashant Dhakad¹,
Mamata Sharma¹**¹Department of Pharmacology, Jaipur College of Pharmacy, Jaipur, Rajasthan, India**ABSTRACT**

This study provides a comprehensive overview of *Ipomoea reniformis*, a plant belonging to the Convolvulaceae family with extensive traditional uses in the Indigenous system of Medicine. Despite its prevalence in India, there has been limited research on the chemical composition of this plant. The morphological features, traditional uses, and phytochemical composition, including the presence of resin, glycosides, reducing sugars, and starch, are discussed. The reported pharmacological activities of *Ipomoea reniformis*, such as its anticancer, antiepileptic, antioxidant, antiulcer, antimicrobial, and nephroprotective properties, are highlighted based on recent scientific investigations. Notably, the study emphasizes the scarcity of research on the chemical examination of *Ipomoea reniformis*, despite its significant medicinal properties and widespread use in traditional medicine. The reported pharmacological activities align with the plant's traditional uses, supporting its potential therapeutic benefits. This research contributes to the growing global interest in herbal medicines, emphasizing their favorable characteristics such as minimal adverse reactions, diverse biological activities, and cost-effectiveness. Further exploration of the chemical constituents and pharmacological potential of *Ipomoea reniformis* could unveil new avenues for its utilization in healthcare practices.

Keywords: *Ipomoea reniformis*, Pharmacology, Phytochemistry, Ethnomedicinal Uses, etc.

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INTRODUCTION

Herbal medicines, derived from various plant parts such as leaves, roots, bark, seeds, and flowers, are recognized for their medicinal, aromatic, or savory qualities, offering remedies for a diverse range of conditions from depression to common colds and flu [1]. The World Health Organization (WHO) categorizes herbal medicines as labeled medicinal products containing active ingredients sourced from aerial or underground plant parts, or other plant material combinations. Current estimates suggest that a substantial 80% of the global population utilizes herbal medicine for primary healthcare treatments [2].

Ipomoea reniformis, belonging to the Convolvulaceae family, is a perennial, extensively branched herb found distributed across India, particularly in damp regions of the upper Gangetic plain, Gujarat, Bihar, West Bengal, the Western Ghats, Goa, Karnataka, Ceylon, and Tropical Africa [3]. Also referred to as *Merremia emarginata* Hallier f., this plant is known by various names in different regions of India. Despite its prevalence, there has been limited research on the chemical composition of *Ipomoea reniformis*.

Reported to have significant medicinal properties, *Ipomoea reniformis* has been traditionally used in the Indigenous system of Medicine for various purposes. It has been claimed to be beneficial for conditions such as cough, headache, neuralgia, rheumatism, diuretic purposes, inflammation, nose troubles, fever due to liver enlargement, and kidney diseases. Different plant parts, including leaves (used as snuff during epileptic seizures), juice (acting as a purgative), and the root (with diuretic and laxative properties, applied in eye and gum diseases), contribute to its diverse medicinal uses [3].

While *Ipomoea reniformis* is widespread in India, there remains a scarcity of research on its chemical examination. Recently, there has been a growing global interest in herbal medicines due to their favorable tolerance, minimal adverse drug reactions, diverse biological activities, higher safety margins, and cost-effectiveness. Herbal medicines, being the oldest form of healthcare known to mankind, continue to attract attention for their potential therapeutic benefits [3].

Scientific classification:

Kingdom:	Plantae
Division:	Tracheobionta
Class:	Magnoliopsida
Order:	Solanales
Family:	Convolvulaceae
Genus:	<i>Ipomoea</i>

Species: *reniformis*

Common Name:

Gujarati: Undarakani, **Urdu:** Chukakani, **Hindi:** Musakani, Chuhakanni **Malayalam:** Elichhevi, **Tamil:** Elikatu keerayi, **Telugu:** Ellika jemudu **Marathi:** Undirkani , **Bengali:** Indurakani

Morphological Characters

The plant is a perennial herb. The plant has leaves which are shaped like human kidney and also appear like the mouse ear. Flowers of the plant are very small in size. The plant has seeds which have a smooth appearance and their colour is dark brown to black.



Figure 1. Morphological features of *Ipomea reniformis*

Traditional Uses

Traditionally the plant is used for various ailments like fever, inflammation, kidney problems, etc. It is also used in gout, ulcer and epilepsy. It is also used for eyes and gum problems and has diuretic and laxative properties [4].

Phytochemistry

The exploration of the phytochemical composition of the plant has been relatively limited. Shah et al. conducted a study revealing the presence of resin, glycosides, reducing sugars, and starch, with the absence of alkaloids [3,4]. Furthermore, the petroleum ether extract was found to contain fats and fixed oil, while the aqueous extract was reported to include amino acids, tannins (including condensed tannins and pseudo tannins), and starch. In the chemical investigation of *Ipomea reniformis*, seeds were identified to contain caffeic, p-coumaric, ferulic, and sinapic acid esters.

Reported Pharmacological Activities

Bharti D. et al. (2023) conducted a study on various extract fractions of *Ipomea reniformis*, examining their impact on cancer cells. The ethyl acetate fraction of the whole plant exhibited cytotoxic effects on human cervical cancer and human breast carcinoma MCF cell lines. The

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IC50 values for HeLa cell lines and MCF-7 cell lines were 51.57 g/ml and 39.6 g/ml, respectively. These findings support the traditional use of the plant in the medical system. Additionally, the study isolated the well-known Coumarin derivative Scopoletin and the iridoids gardenoside from *Ipomoea reniformis* [5].

Thakare CV. et al. (2022) investigated a herbal composition, including *Ipomoea reniformis*, *Madhuca longifolia* var *Latifolia*, *Albizia lebbbeck* (L) Benth, and *Artocarpus heterophyllus*, for its antiepileptic activity. The study concluded that the plant composition exhibited significant antiepileptic activity against various epileptic models [6].

Zhang Z. et al. (2019) conducted a study on the efficacy of ACE inhibitors and calcium channel blockers through randomized trials. The results suggested that both ACE inhibitors and calcium channel blockers similarly improved blood pressure, urinary albumin excretion rates (UAER), 24-h urine protein (24-UP), and glomerular filtration rate (GFR) [7].

Raghuvanshi A. et al. (2017) evaluated the phytochemical and antioxidant properties of various extracts of *Ipomoea reniformis*. The study revealed that ethanolic extracts of *Ipomoea reniformis* demonstrated significant antioxidant activity, attributed to the presence of phenols and flavonoids [8].

Lakshmi Devi S. et al. (2017) investigated the ethanolic leaf extract of *Ipomoea reniformis* for its antiulcer activity using a pyloric ligated ulcer model. The extract exhibited significant protection against stress-induced free radical damage and reduced ulcer index, indicating antiulcer activity attributed to its antisecretory or antioxidant properties [9].

Raghuvanshi A. et al. (2017) reported that the ethyl acetate extract of *Ipomoea reniformis* showed the highest antimicrobial activity. The extract exhibited activity against both Gram-positive and Gram-negative bacteria, while the aqueous extracts demonstrated antimicrobial activity against *Staphylococcus aureus* [10].

Neelima S. et al. (2017) studied the efficacy of the methanolic extract of *Ipomoea reniformis* (MEIP) in protecting against paracetamol-induced liver damage. The results suggested that MEIP provided dose-dependent protection against alcohol-induced liver damage, improving liver biochemical parameters [11].

Asokan BR. et al. (2017) investigated the effect of the ethanolic extract of *Ipomoea reniformis* leaves in ethylene glycol-induced kidney stones. The extract demonstrated a significant protective effect against the formation of kidney stones [12].

Bothara SB. et al. (2016) evaluated the hypoglycemic and antioxidant activity of *Ipomoea reniformis* alcoholic and aqueous extracts in alloxan-induced diabetes. The alcoholic extract exhibited better hypoglycemic and antioxidant activity than the aqueous extract [13].

Thakare S. et al. (2016) studied the anticonvulsant potential of *Ipomoea reniformis* in maximal electroshock (MES), pentylenetetrazol (PTZ), and lithium pilocarpine-induced convulsions.

The aqueous extract showed significant activity in MES and lithium pilocarpine models [14].

Chitra KK. et al. (2014) investigated the methanolic extract of *Ipomoea reniformis* for its anti-epileptic and anti-psychotic activities in rodent models. The extract exhibited anti-epileptic and anti-psychotic activities, possibly by enhancing the GABAergic system [15].

Qaiser J. et al. (2013) explored the hypotensive, diuretic, and angiotensin-converting enzyme (ACE) inhibitory activities of the aqueous-methanol crude extract of *Ipomoea reniformis*. The study concluded that the crude extract had hypotensive, ACE inhibitory, and diuretic activities [16].

Naik SR. et al. (2013) investigated the antidiabetic activity of the phytoconstituent embelin from *Ipomoea reniformis*. Treatment with embelin demonstrated a significant reduction in plasma glucose and glycosylated hemoglobin levels, along with improvement in lipid profile and oxidative stress parameters [17].

Gandhi R. et al. (2012) studied the antidiabetic property of *Ipomoea reniformis* in streptozotocin-induced diabetic rats. The plant extract exhibited potent antidiabetic activity, including the regeneration of pancreatic cells [18].

Purushoth PT. et al. (2012) explored the anticancer activity of *Ipomoea reniformis* against human cervical and breast carcinoma. The ethyl acetate fraction of the plant demonstrated cytotoxic effects on cancer cells [19].

Purushoth PT. et al. (2012) investigated the effect of ethanolic and ethyl acetate extracts of *Ipomoea reniformis* on Freund's adjuvant-induced arthritis. The alcoholic extract exhibited more potency in chronic phases compared to the ethyl acetate extract [20].

Purushoth PT. et al. (2012) screened the anti-inflammatory, antiarthritic, and analgesic activity of the ethanolic extract of the whole plant of *Ipomoea reniformis*. The extract possessed anti-inflammatory, antiarthritic, and analgesic activities [21].

Bhatt MK. et al. (2011) conducted a study on the isolation and structure elucidation of Scopoletin from *Ipomoea reniformis*. Scopoletin was isolated from the methanolic extract of the plant [22].

Sudhavani V. et al. (2010) studied the nephroprotective and antioxidant activity of *Ipomoea reniformis* against cisplatin-induced nephrotoxicity. The ethanolic extract showed significant protection against cisplatin-induced nephrotoxicity and oxidative stress [23].

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Babu AV. et al. (2009) investigated the biological activities of different solvent extracts of *Ipomoea reniformis*. Methanol extract exhibited better antioxidant effects, while methanol and hexane extracts showed α -amylase inhibitory activity [24].

Poul BN. et al. (2009) explored the phytochemical composition of *Ipomoea reniformis*, revealing the presence of amino acids, tannins (including condensed tannins and pseudo tannins), starch, fats, and fixed oils [25].

Raghuvanshi A. et al. (2008) conducted a study on the antioxidant activity of various extracts of *Ipomoea reniformis*. The plant was found to possess significantly antioxidant activity due to the presence of phenolics and flavonoids [26].

CONCLUSION

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