

MOMORDICA DIOICA ROXB: A REVIEW ON DIOECIOUS PLANT WITH POTENT PHARMACOLOGICAL PROPERTIES

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ABSTRACT

Momordica dioica Roxb., also known as spine gourd, is a nutritionally valuable dioecious plant with a wide range of pharmacological properties. It is rich in beta-carotene, proteins, calcium, phosphorus, and iron, making it a nutritious vegetable widely consumed in India. It exhibits antioxidant, hepatoprotective, anticancer, anti-ulcer, anti-inflammatory, antiallergic, nephroprotective, antimalarial, antidiabetic, and antibacterial activities due to its bioactive compounds. This underutilized plant holds promise for further research and development in natural medicine. There are lot many review articles already have been published in many different national and international journals. Although not much regarding its pharmacological activity in numerous disease has been discussed and explained smoothly. Therefore, a small attempt in this review article has been made to explain various pharmacological activity of Momordica dioica Roxb or spine gourd.

KEYWORDS: Momordica dioica Roxb., dioecious plant, Pharmacological actions.

INTRODUCTION

The Momordica dioica Roxb. (spine gourd), often referred as the bristly balsam pear, teasle gourd, or spiny gourd, is a type of flowering plant that is a perennial dioecious plant with chromosome number 2n = 28. It is a member of the Cucurbitaceae family (the gourd family). In India and certain other regions, it is commonly consumed as a vegetable.<sup>[1]</sup> The fruit of the spine gourd plant has characteristic spines that resemble small prickles. When the fruits reached maturity, they changed from being little, green, and elongated to yellow. Due to its dioecious nature, which means it has separate male and female plants, and its vegetative form of production,

this vegetable is underutilized and underexplored.<sup>[2]</sup> It is a rainy season crops bear blossoms in July and August and fruiting in September to November. The solitary flower bud on both male and female vines emerged in each axil. While female flower buds needed approximately 15 days to fully bloom, male flower buds took 18–20 days from observable initiation to full bloom.<sup>[3]</sup> Its parts are eaten in many ways; young leaves and petals are also eaten, and immature green fruits are prepared like vegetables. Fruits have the highest concentration of beta-carotene and the highest concentrations of proteins, calcium, phosphorus, and iron.<sup>[4]</sup>

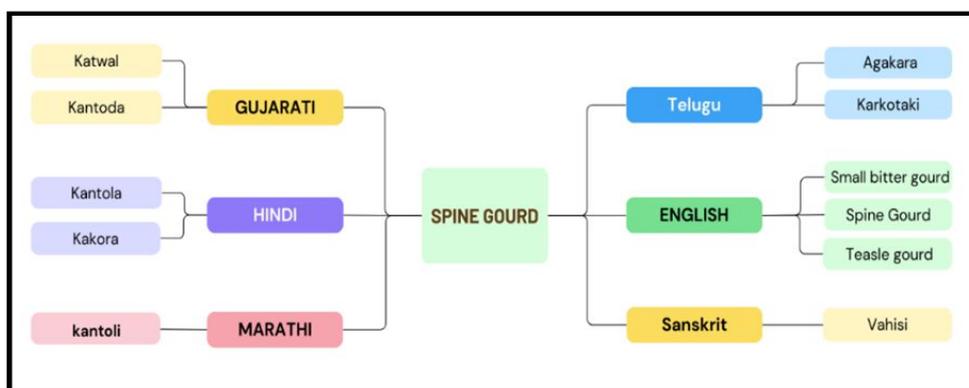


Fig. 1: Vernacular name.<sup>[5]</sup>

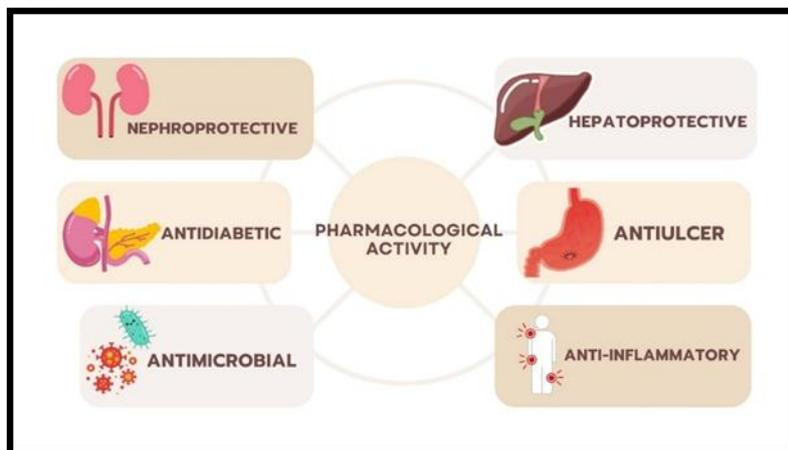
Table 1: Taxonomical classification.<sup>[6]</sup>

Sr. No.	Taxonomical classification	
1.	Kingdom	Plantae
2.	Subkingdom	Tracheobionata
3.	Super division	Spermatophyta
4.	Division	Magnoliophyta
5.	Class	Magnoliopsida
6.	Subclass	Dilleniidae
7.	Order	Violales
8.	Family	Cucurbitaceae
9.	Genus	Momordica
10.	Species	Dioica

PLANT PARTS	PHYTOCONSTITUENTS	USES
FRUITS	Protein, Niacin, Carbohydrate, Thiamin, Carotene, Ascorbic acid, Total phenolic compounds, Alkaloids, Flavonoid, Steroids, Saponins, Triterpenoids, Phytic acid	Hypertension, Diabetes, Pimple and acne protectant, Hepatoprotective agent, Antihypertensive, Anti-inflammatory agent, Antipyretic, Antivenomous agent, Antiasthmatic agent, Antidepressant, Antileprosy agent, Neuroprotective, Nephroprotective, Anti-allergic, Anticancer
LEAVES	Flavonoids	Analgesic, Antihelminthic, Antibronchitic, Antihemorrhoidal, Skin disease reducer, Antimicrobial
ROOTS	Alkaloid [Momordicafoetida], Stearic acid, Steroid [alphaspinasterol octadecanonate, alphaspinasterol-3-O-beta-D-glucopyranoside], Triterpenoid [3-O-beta-D-glucuronopyranosyl gypsogenin, 3-O-beta-D-glucopyranosyl gypsogenin and 3-O-beta-D-glucopyranosyl hederagenin, Oleanolic acid, Gypsogenin, Hederagenin]	Diabetes, Anti-inflammatory agent, Stimulant, Antiseptic, Antiulcerant, Antitoxic agent, Antipyretic, Antiperspirant, Antihemorrhoidal agent, Bowel infection reducer, Anticancer activity
SEEDS	Alkaloid [Momordicin], Lectin	Eczema protectant

Fig. 2: Phytoconstituents and their medicinal uses.<sup>[7,8]</sup>

## Pharmacological Activities

Fig. 3: Some pharmacological activities.<sup>[9]</sup>

### 1) Antioxidant Activity

Momordica dioica has several potent antioxidant substances that can prevent the production of oxygen-derived free radicals and shield cells.<sup>[10]</sup> Phenolic substances such as flavonoids, steroids, alkaloids, and amino acids were detected when the antioxidant activity of methanol and aqueous extract of fruit was examined. It has also been noted that the fruit of the spiny gourd fruit has strong antioxidant properties because of the presence of flavonoids.<sup>[11]</sup>

### 2) Hepatoprotective Activity

The hepatoprotective effect of the flavonoidal fraction obtained from the ethanolic extract of Momordica dioica

fruits was evaluated against hepatic damage induced by carbon tetrachloride as shown in figure 4. In treated rats compared to control, the flavonoid fraction decreases the serum levels of alkaline phosphatase, total bilirubin, serum glutamate pyruvate transaminase (SGPT), and serum glutamate oxaloacetate transaminase (SGOT). The flavonoidal fraction derived from Momordica dioica fruits could offer an effective defense against hepatocellular damage<sup>[12]</sup>, which is mostly brought on by toxic substances (such as carbon tetrachloride and some antibiotics) and excessive alcohol intake.<sup>[13]</sup>

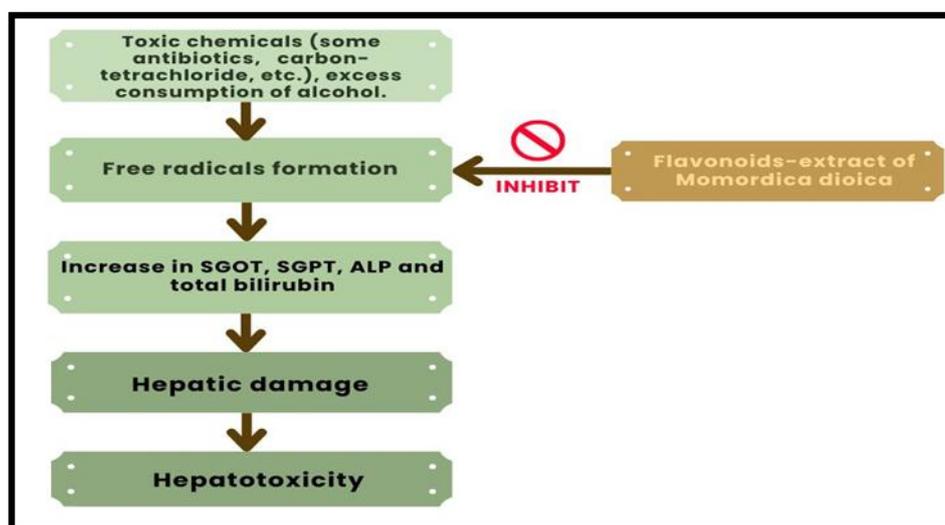


Fig. 4: Hepatoprotective action of momordica dioica.<sup>[12,13]</sup>

### 3) Anticancer Activity

Momordica dioica's aqueous fruit extract showed anticancer activity on ovarian carcinoma of PA-I cell

lines and human cervical cancer of Hela cell line as shown in figure 5.<sup>[14]</sup>

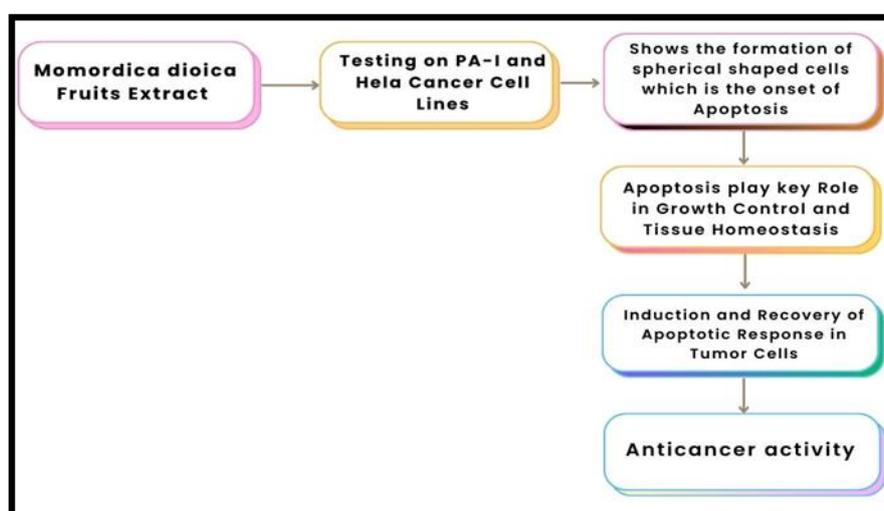
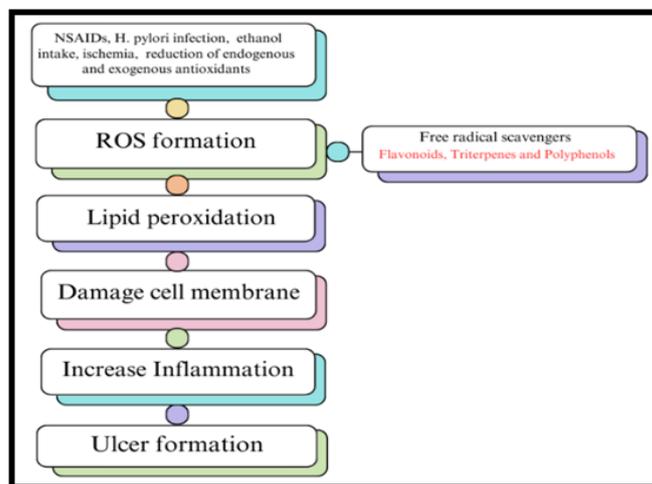


Fig. 5: Anticancer action of Momordica dioica.<sup>[14]</sup>

**4) Anti-ulcer Activity**

The fruit of *Momordica dioica*'s ethanolic extract has an antiulcer effect as shown in Figure 6. Its extract has an antiulcerogenic effect on a rat ulcer model produced by ethanol. Reduced H<sup>+</sup>-K<sup>+</sup>ATPase level, gastric juice volume, and acid output. Gastric wall mucus, pH, and catalase enzyme levels were significantly increased. Superoxide dismutase an antioxidant enzyme levels have

been found to be decreased.<sup>[15]</sup> Its gastroprotective and ulcer healing properties have also been found.<sup>[16]</sup> *Momordica Dioica*'s anti-ulcer properties comes from the presence of flavonoids and triterpenes. Triterpenes are known as an anti-ulcer agent. its effect is to activate cellular proteins, reduce mucosal prostaglandin metabolism, and have cytoprotective activities. Flavonoids have been found to scavenge free radicals.<sup>[17]</sup>



**Fig. 6: Anti-ulcer action of momordica dioica.**<sup>[17,18]</sup>

**5) Anti-inflammatory Activity**

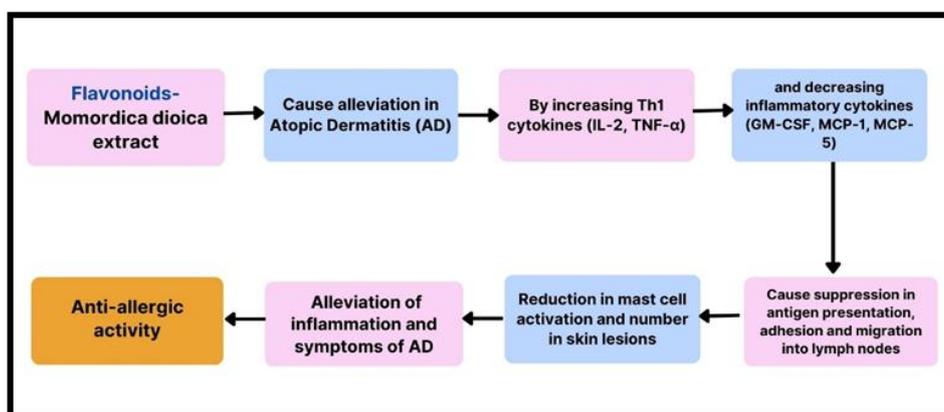
The alcoholic extract taken orally considerably lessened the paw edema caused by carrageenan. Ibuprofen (200 mg/kg) was compared to the activity.<sup>[19]</sup>

and decreased IgE and inflammatory cytokine levels in the serum. These suggest that the aqueous extract of *momordica dioica* may have therapeutic potential for allergic reactions in vitro and in vivo.

**6) Antiallergic Activity**

An aqueous extract of *momordica dioica* flesh suppressed the development of atopic dermatitis-like lesions in picryl chloride-treated NC/Nga mice. its extract reduced the formation of skin lesions in the ears,

GM-CSF (granulocyte-macrophage colony-stimulating factor), MCP (monocyte chemoattractant protein), IL-2 (Interleukin-2), and d TNF- $\alpha$  (Tumor Necrosis Factor-alpha).<sup>[20]</sup>



**Fig. 7: Antiallergic action of momordica dioica.**<sup>[20,21]</sup>

**7) Nephroprotective Activity**

Fruit ethanol extract showed antioxidant properties in vivo. A phytochemical analysis confirmed the presence of phenolic compounds and flavonoids which have antioxidant properties. So, the nephroprotective and

nephrocurative actions of *Momordica dioica* fruits (200 mg kg<sup>-1</sup>) may be due to antioxidant activity, thus preventing the damage caused by reactive oxygen species created from cisplatin.<sup>[22]</sup>

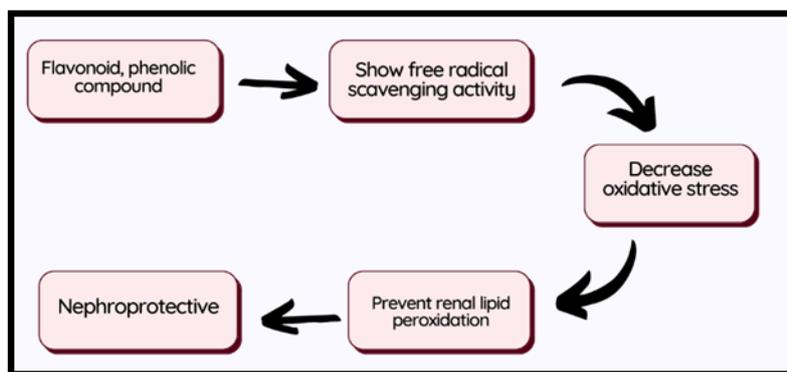


Fig. 8: Nephroprotective action of momordica dioica.<sup>[22]</sup>

**8) Antimalarial Activity**

Momordica dioica alcoholic extracts exhibit antimalarial efficacy against the NK 65 strain of Plasmodium berghei. It was discovered that the plant had schizontocidal activity (50% or higher) in vivo and in vitro at a dose of 1 gm/kg 4 days.<sup>[6]</sup>

**9) Antidiabetic Activity**

Momordica dioica fruit extract has antidiabetic effects by enhancing insulin secretion, high density lipoprotein

(HDL) and reduce fasting blood glucose, post-meal blood glucose, total cholesterol, very low-density lipoprotein (VLDL) and low-density lipoprotein (LDL). This activity may be due to the presence of active flavonoids, phenols, steroids and saponins. These compounds can scavenge free radicals released by alloxan in diabetic rats. By eliminating free radicals, this extract protects against lipid peroxidation and reduces the risk of diabetic complications.<sup>[23]</sup>

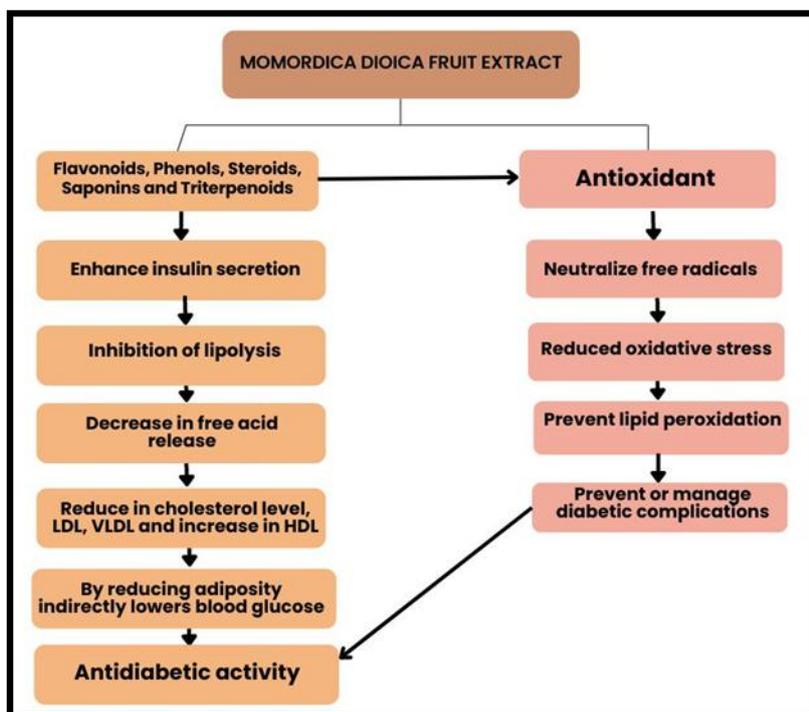


Fig. 9: Antidiabetic action of momordica dioica.<sup>[23]</sup>

**10) Antibacterial Activity**

Momordica dioica fruit pulp contain some secondary metabolites, including steroids, fatty acids, proteins, saponin glycosides and triterpenes. These metabolites were found to be most effective against Salmonella typhi and Shigella dysenteriae at concentrations of 100 to 500µg/ml.<sup>[24]</sup>

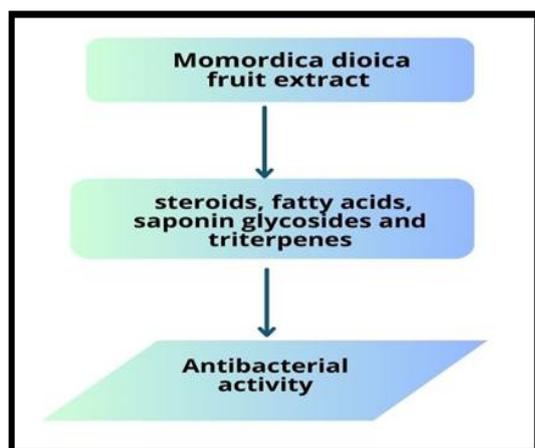


Fig. 10: Antibacterial action of momordica dioica.<sup>[24]</sup>

### CONCLUSION

*Momordica dioica* Roxb., also known as spine gourd, is a nutritionally valuable dioecious plant with a wide range of pharmacological properties. It is rich in beta-carotene, proteins, calcium, phosphorus, and iron, making it a nutritious vegetable widely consumed in India. It exhibits antioxidant, hepatoprotective, anticancer, anti-ulcer, anti-inflammatory, antiallergic, nephroprotective, antimalarial, antidiabetic, and antibacterial activities due to its bioactive compounds. This underutilized plant holds promise for further research and development in natural medicine.

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### Conflict of interest

The author declares no conflicts of interest regarding the publication of this article.

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