

## Phytochemical investigations of *Momordica charantia* (L). and *Momordica dioica* (Roxb).root extracts

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**Abstract**— The phytochemical studies in root extract in *M. charantia* and *M. dioica* which belongs to the Cucurbitaceae family is a valuable herb gifted by mother nature. *M.charantia* commonly known as kakara(karela),cultivated plant.*M.dioica* commonly known as Bodakakara(jangle karela),spiny gourd,wild plant.Both plants roots also used for diabetes cure. The qualitative phytochemical analysis showed the presence of pytochemicals such as Phenols, Saponins, Alkaloids, Flavonoids, Anthraquinones, Cardiac glycosides, Tannins, Carbohydrates, Terpenoids and Steroids in Methanol, Ethanol, Chloroform, Petroleum ether and water extracts of *M. charantia* and *M. dioica* root. Analysis revealed the presence of similar kind of Phytochemicals in both root extracts. The present study confirms the wild relationship of *Momordica dioica* with *Momordica charantia* which can be explored to the comparative biological activity for further

confirmation. This is valuable information for preparation of drugs in pharmaceutical industry and stress the need for more intensive research since they play a great role in healthcare and it can also help the pharmaceutical industry.

**Key words:** *Momordica charantia* and *Momordicadioica*, Root extract, Phytochemical analysis, Qualitative analysis.

### I. Introduction

Medicinal plants constitute the main source of new pharmaceuticals and healthcare products (Ivanova *et al.*, 2005). The history of plants being used for medicinal purpose is probably as old as the history of mankind. The use of medicinal plants in industrialized societies has been traced to the extraction and development of several drugs from these plants as well as from traditionally used folk medicine (Sreekumar and Ravi, 2007). Extraction and characterization of several active

phytochemicals from these green plants have given birth to some high activity profile drugs (Mandal *et al.*, 2007). The use of traditional medicine is wide spread in India (Jayachandran and Mahesh, 2007). Plant secondary metabolites play a critical role in human health and may be nutritionally important. Herbal medicine has become popular in the treatment of many diseases due to the belief that plant derived medicine is safe, easily available and have lesser side effects. Due to this, the market and public demand has been so great that many medicinal plants today face either extinction or loss of genetic diversity (Misra, 2009).

India is one of the twelve mega biodiversity countries in the world. Among 25 hot spots in the world, the Eastern Himalayas and the Western Ghats are the two major hot spots of India. In India around 20,000 medicinal plant species have been recorded recently but more than 500 traditional communities use about 800 plant species for curing different diseases (Rath *et al.*, 2005). India has one of the richest plant medicinal traditions in the world. The use of herbal medicine is becoming popular because of toxicity and side effects of allopathic medicines. This led to sudden increase in the number of herbal drug manufactures. India ranks second to China in export of medicinal plants. Among ancient civilizations, India has been known to be rich repository of medicinal plants. The forest in India is the principal repository of large number of medicinal and aromatic plants, which are largely

collected as raw materials for manufacture of drugs and perfumery products. About 8,000 herbal remedies have been codified in AYUSH systems in INDIA. Ayurveda, Unani, Siddha and Folk (tribal) medicines are the major systems of indigenous medicines. Among these systems, Ayurveda and Unani Medicine are most developed as traditional medicine and widely practiced in India.

Treatment with medicinal plants is considered very safe as there is no or minimal side effects. These remedies are in sync with nature, which is the biggest advantage. The golden fact is that, use of herbal treatments is independent of any age groups and the sexes. The ancient scholars only believed that herbs are only solutions to cure a number of health related problems and diseases. They conducted thorough study about the same, experimented to arrive at accurate conclusions about the efficacy of different herbs that have medicinal value. Most of the drugs, thus formulated, are free of side effects or reactions. This is the reason why herbal treatment is growing in popularity across the globe. These herbs that have medicinal quality provide rational means for the treatment of many internal chronic diseases, which are otherwise considered difficult to cure.

*Momordica charantia* L. Belongs to Cucurbitaceae family is a valuable herb gifted by mother nature. *M. charantia* known as kakara, bittermelon, bittergourd and bitter squash. It is one

of the healthiest vegetables known to man. A part from being eaten mainly as a vegetable. Bittergourd has also been used as a traditional medicine for several other ailments including dysentery, colic, fever, burns, painful menstruation, scabies and other skin problems. (Beloin *et al.*, 2005).

*Momordica dioica* Roxb. Belongs to the family Cucurbitaceae under the genus *Momordica* a genus of annual or perennial climbers. *Momordica dioica* a climber plant commonly known as Bodakakara, Spinygourd, or small bitter gourd is a relatively small oval to ovoid vegetable. It is also called as jangle karela. This genus is essentially a native of tropical regions of Asia with extensive distribution in China, Japan, South East Asia, besides tropical Africa and South America. Many of the species of this genus have been found to grow wild in India, Bangladesh, Sri Lanka, Myanmar and Malaya. The fruits of these plants are used as vegetable and have medicinal properties.

## II Material and Methods

**Plant material:** *M. charantia* and *M. dioica* roots were collected from Adilabad dist, Telangana state

### **Phytochemical analysis:**

The use of plants for medicinal purpose is very old. The use of medicinal plants in the human kind has been traced to the extraction and development of several drugs from these plants as well as from traditionally used folk medicine (Shrikumar and

Ravi, 2007). The secondary metabolites present in the plants play important role in human health and nutrition (Hertong *et al.* 1993). The crude extracts of medicinal plants are more biologically active than isolated compounds due to their synergistic effects (Jana Shekhawat, 2010).

In the present study, qualitative phytochemical analysis was carried out for the root extracts of *M. charantia* and *M. dioica*.

### **Preparation of extracts:**

The roots of *M. charantia* and *M. dioica* collected plant material was washed thoroughly in tap water, shade dried in open air separately. Powder of the fruit is obtained by grinding them mechanically. About 100 gm of each dried powder of the plant were soaked separately in 100 ml of different solvents like methanol, ethanol, chloroform, pet ether and hot water in conical flasks and then subjected to agitation on a rotary magnetic shaker for about 72 hours. After three days the plant extracts were subjected to filtration, filtered with No 42 whatman filter paper separately. Concentrated extract was preserved in sterilized air tight labeled bottles and preserved in refrigerator at 4°C until required for further use. The extract was filtered under reduced pressure using rotary flash evaporator and subjected for further preliminary phytochemical tests. Different tests conducted for the identification of phytochemicals is adopted by

using the methods described by (Mohan *et al.*, 2015; Edeogal *et al.*, 2005) (Figs 1&4).

***M. charantia* roots extraction studies.**

**Fig-1-2: Roots and roots powder of *M. charantia*.**

***M. dioica* roots used for extraction studies.**

**Fig-3-4: Roots and roots powder of *M. dioica*.**



**Fig:-5. Root extracts of *M. charantia*.**



**Fif:- 6. Root extracts of *M.dioica*.**

**Qualitative phytochemical tests:** This crude extracts were used for the phytochemical investigation of secondary metabolites studies the tests were carried out in triplicate.

**Test for identification of Alkaloids:** About 0.5 gm of extract was taken in a test tube and was diluted

and homogenized with 10 ml distilled water, dissolved in 20 ml dilute HCl solution and clarified by filtration. The filtrate was tested with Drangendroff's and Mayer's reagent. The treated solution was observed for precipitation of white or creamy colour.

**Test for identification of Flavonoids:** About 0.5 gm of extract was introduced into 10 ml of ethyl acetate in a test tube and heated in boiling water for 1 min. The mixture was then filtered. About 4 ml of the filtrate was shaken with 1 ml 1% aluminum chloride solution and incubated for 10 min. Formation of yellow colour in the presence of 1 ml dilute ammonia solution indicated the presence of flavonoids.

**Test for identification of Phenols:** About 0.5 gm of extract was taken in a test tube, mixed with 100ml distilled water and heated gently. To this, 2 ml of ferric chloride solution was added and observed for the formation of green or blue colour positive for phenols

**Test for identification of Saponins:** About 0.5 gm of extract was taken in a test tube and 5 ml distilled water was added to it. The solution was shaken vigorously and observed for persistent froth. The frothing was mixed with 3 drops of olive oil and

shaken vigorously after which it was observed for the formation of an emulsion indicating saponins

**Test for identification of Steroids:** About 0.5 gm of extract was taken in a test tube and 2 ml of acetic anhydride was added to it and 2 ml of sulphuric acid was added by the sides of the test tube and observed for the colour change to violet or blue green for the presence of steroids.

**Test for identification of Tannins:** Five grams of the ground powder was extracted with 10 ml ammoniacal chloroform and 5 ml chloroform. The mixture was filtered and the filtrate was shaken with 10 drops of 0.5 M sulphuric acid. Creamish white precipitate was observed for the presence of tannins.

**Test for identification of Terpenoids:** 5 ml of the extract was mixed with 2 ml of chloroform and 2ml concentrated sulphuric acid to form a layer. A reddish brown coloration of the interface showed the presence of Terpenoids.

**Test for identification of Cardiac glycosides:** To 1ml of extract glacial acetic acid, few drops of ferric chloride and then finally concentrated sulphuric acid were added from the walls of the test tube. Appearance of the reddish brown at the junction of two layers and the bluish green colour in the upper layer indicates the presence of cardiac glycosides.

**Test for identification of Anthraquinones:** 5ml extract was boiled with 10ml of sulphuric acid and filtered while hot. The filtrate was shaken with 5ml of chloroform the chloroform layer was pipetted out into another test tube then 1ml of dilute ammonia is

added. The resulting solution was observed for colour changes. The change in colour indicates the presence of anthraquinones.

**Test for identification of carbohydrates:** A few drops molischs solution was added to 2 mL of aqueous solution of the extract, there after a small volume of concentrated sulphuric acid was allowed to run down the side of the test tube to form a layer without shaking. The interface was observed for a purple colour as indicative of positive for carbohydrates.

### III Results

#### Qualitative phytochemical analysis:

Qualitative phytochemical analysis was carried out. Following the methods of (Edeogal *et al.*, 2005) reveals the present study information of Phytochemicals in root extracts (methanol, ethanol, chloroform, petether and water) of *M. charantia* and *M. dioica* used is a variety of ethnic medicinal uses. The present of Phytochemicals such as Phenols, Saponins, Alkaloids, Flavonoids, Anthraquinones, Cardiac glycosides, Tannins, Carbohydrates, Terpenoids and Steroids were present in *M. charantia* and *M. dioica* have shown the present of phytochemicals (Table-1 to 4, Fig- 7 to 8).

#### Phytochemicals of *Momordica charantia* root extracts:

Tannins are present in methanol and pet ether absent in ethanol, chloroform and water extract of *M. charantia* root. Phenols are present in methanol, chloroform, pet ether, water and absent in ethanol

extract of root. Saponins are present in methanol, ethanol, chloroform and water except in pet ether extracts of root. Alkalioids, Carbohydrates, Terpenoids and steroids are present in all extract of root. Flavonioids are present in methanol, ethanol, chloroform and absent in pet ether, water extract. Anthraquinones are absent in all extract like methanol, ethanol, chloroform, pet ether and water. Cardiac glycosides are present in methanol, ethanol, chloroform, pet ether and absent in water extract (Table-1, Fig- 7).

#### Phytochemicals of *Momordica dioica* root extracts:

Tannins are present in only methanol and pet ether absent in ethanol, chloroform and water extract of *M. dioica* root. Phenols, Alkaloids, Carbohydrates, Terpenoids and steroids are present in all extract like methanol, chloroform, pet ether water and absent in ethanol extract of root. Saponins are present in methanol, ethanol, chloroform and water extract absent in pet ether extract of root. Flavanoids are present in methanol, ethanol, chloroform and absent in pet ether, water extract. Anthraquinones are absent in all extract like methanol, ethanol, chloroform, pet ether, water extract. Cardiac glycosides are present in methanol, ethanol, chloroform, pet ether and absent in water extract (Table-2, Fig-8).

With the result of phytochemical analysis of root extracts of *M. dioica* and *M. charantia* the

comparative analysis was done to know the differences between both the plant extracts. The roots of both plants were extracted separately with methanol, ethanol, water, petroleum ether and chloroform and screened for their phytochemical constituents. The present study contributes information of qualitative phytochemicals in *M. dioica* and *M. charantia*. Qualitative analysis of plant extracts were carried out for Alkaloids, Flavonoids, Saponins, Phenols, Tannins, Steroids, Terpenoids and Glycosides. The phytochemicals like Alkaloids, flavonoids, Phenols, Tannins, Terpenoids and Glycosides were present in *M. dioica* and *M. charantia* except for Anthraquinones and Tannins.

**Table:- 1. Phytocheicals of *Momordica charantia* root extracts:**

S.NO	Phytochemicals	Methano l	Ethanol	Chloroform	Pet Ether
1	Tannins	+	-	-	+
2	Phenols	+	-	+	+
3	Saponins	+	+	+	-
4	Alkaloids	+	+	+	+
5	Flavonoids	+	+	+	-
6	Anthraquinones	-	-	-	-
7	Cardiac glycosides	+	+	+	+
8	Carbohydrates	+	+	+	+
9	Terpenoids	+	+	+	+
10	Steroids	+	+	+	+

+ Present of the phytochemicals

- Absent of the phytochemicals.

**Table:- 2. Phytochemicals of *Momordica dioica* root extracts:**

Phytochemicals	Methanol	Ethanol	Chloroform	Pet Ether	Water metabolites including
Tannins	+	-	-	+	alkaloids, phenols, tannins, flavonoids, - sterols, glycosides and saponins,
Phenols	+	+	+	+	terpenoids etc. Phytochemicals of plants play an
Saponins	+	+	+	-	important role in defense mechanism against
Alkaloids	+	+	+	+	predation by many microorganisms, insects and
Flavonoids	+	+	+	-	herbivores (Cowan, 1999).
Anthraquinones	-	-	-	-	The qualitative analysis of Methanol, Ethanol,
Cardiac glycosides	+	+	+	+	Chloroform, Petroleum ether and Water extracts
Carbohydrates	+	+	+	+	showed the presence of Phytochemicals such as
Terpenoids	+	+	+	+	Phenols, Saponins, Alkaloids, Flavonoids,
Steroids	+	+	+	+	Anthraquinones, Cardiac glycosides, Tannins,
					Carbohydrates, Terpenoids and Steroids in <i>M. charantia</i> and <i>M. dioica</i> root in the form of

+ Present of the phytochemicals.

- Absent of the phytochemicals.

Phytochemical analysis tests of root extracts of *M. charantia* and *M. dioica*.

Fig: 7 Root extracts of *M. charantia*

Fig: 8 Root extracts of *M. dioica*.

#### IV Discussion

The Comparative Phytochemical analysis of *Momordica charantia* and *Momordica dioica* root extracts is carried and presented. The present study contributes the information of qualitative Photochemical in root extracts of *M. charantia* and *M. dioica* plants with a variety of ethnic medicinal uses. The different tests conducted for the identification of phytochemicals are adopted by using the methods described by (Edeogal *et al.*, 2005). Generally plants possess numerous phytochemicals in the form of secondary

presence of phytochemicals. Similar kinds of results are reported from Phytochemical investigation carried out in *Momordica charantia* leaves. Qualitative phytochemical tests were used to detect the presence of alkaloids, tannins, saponins, flavonoids and phenols (Komathi *et al.*, 2013). The results obtained in the present study are in concurrence with phytochemical analysis that revealed the presence of phytochemicals such as steroids, fatty acids in hexane extract and proteins, saponin glycosides and triterpenes in ethyl acetate soluble portion of methanolic extract (Ilango *et al.*, 2012). From the result of phytochemical analysis of root extracts of *M. charantia* and *M. dioica* the comparative analysis is done to know the differences between both. The roots of both plants were extracted separately with methanol, ethanol,

water, petroleum ether and chloroform and screened for their phytochemical constituents. The present study contributes valuable information of phytochemicals in *M. charantia* and *M. dioica*. Qualitative analysis of plant extracts were carried out for Alkaloids, Flavonoids, Saponins, Phenols, Tannins, Steroids, Terpenoids and Glycosides.

### V Conclusion

The qualitative phytochemical analysis showed the presence of phytochemicals such as Phenols, Saponins, Alkaloids, Flavonoids, Anthraquinones, Cardiac glycosides, Tannins, Carbohydrates, Terpenoids and Steroids in Methanol, Ethanol, Chloroform, Petroleum ether and water extracts of *M. charantia* and *M. dioica* root. Analysis revealed the presence of similar kind of Phytochemicals in both plant root extracts. The present study confirms the wild relationship of *Momordica dioica* with *Momordica charantia* which can be explored to the comparative biological activity for further confirmation.

### VI Acknowledgement

The financial support of UGC-NON-NET Fellowship. We express deep thanks to Department of Botany, Osmania University, Hyderabad

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