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Research Article

Pharmacognostic, Physicochemical, Phytochemical Evaluation and Thin Layer Chromatography of *Momordica charantia* Linn. Fruits

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Abstract

Momordica charantia Linn, well known as bitter gourd belongs to Family Cucurbitaceae. The aim of the present study is to obtained detailed pharmacognostic, physicochemical characters and phytochemical screening of the fruits. The various pharmacognostic parameters were determined viz macroscopic, microscopic including transverse section of the fruit, powder microscopic characteristics, fluorescence analysis, physicochemical properties (Total Ash 7.3 ± 0.11 , acid-insoluble ash 1.40 ± 0.05, water soluble ash 3.16 ± 0.35,alcohol soluble extractive value 8.90 ± 0.11, water soluble extractive value 25.93 ± 0.2, moisture content 17.93 ± 0.08) and phytochemical screening of fruits ethanolic extracts reveals the presence of alkaloids, terpenoids, flavonoids, saponins, tannins & reducing sugars. Rf value was found to be 0.20, 0.27, 0.32, 0.48, 0.54, 0.59, 0.72, 0.85 & 0.93. The current study reveals the standardised parameters for pharmacognostics, physicochemical parameters, phytochemical characteristics, and chromatographic studies of the fruits of *Mordica charantia.*

Keywords: Fluorescence analysis, Physicochemical, Thin layer chromatography

INTRODUCTION

Momordica charantia Linn. Known as bitter gourd, bitter melon or karela belongs to the family Cucurbitaceae. It is a climbers & growing in tropical areas of Asia, east Africa & Carribbean[1]. The fruit is oblong or spindle with warts of the surface[2]. It is used for the treatment of dysmenorrheal, piles, rheumatism, pneumonia, gout, jaundice, eczema & psoriasis[3, 4, 5]. The plant used against several diseases as digestive, laxative, anthelmintics, diabetes & many others. *Momordica charantia* may cause hypoglycemic coma in children, abortion & death in laboratory animals[2]. This work aims to high light the pharmacognostics, physicochemical, phytochemicals & thin layer chromatographic features of the fruit of the plant.

MATERIALS AND METHODS

Plant collection: Fresh fruits of *Momordica charantia* L were collected from local area of Prayagraj, U.P., India. The plant material identified and authenticated by Botanical Survey of India (BSI), Prayagraj, Authentication No.2023-24/ 100.

Macroscopic studies: Morphological studies were performed by organoleptic features viz. colour, odour, taste, texture, shape and sizes were observed and evaluated botanically[14, 15].

Microscopic studies: [6, 7, 8]

Microscopic studies were carried out by cutting transversely thin sections of fruit. The sections were mounted in glycerine water solution for further observations and specific microscopic diagnostic characteristics were point out. The powder characteristics & fluorescence analysis of poder were also carried out.

Physicochemical parameters [9, 10]

The dried fruit of *Momordica charantia* was powdered and various physicochemical analysis viz., foreign matter, moisture content, extractive value, ash value were carried out and values are recorded.

Phytochemical screening [11, 12, 13]

100g powdered *Momordica charantia* Fruits drug powder was defatted with Pet. ether and then extracted with 95% ethanol in a soxhlet extractor. The liquid extract was concentrated & various qualitative chemical analyses were carried out and recorded.

Thin layer chromatography [13, 14]

Alcoholic extract of *Momordica charantia* fruit were evaluated for TLC by using activated Silica gel G plate as stationary phase and Butanol : acetic acid: water (4:1: 2) as mobile phase & Iodine solution or chamber were used as detecting reagents.

RESULTS AND DISCUSSION

Macroscopic study: The organoleptic & macroscopic characters of the fruits as colour,odour,taste,shape, size, & surface were evaluated botanically.

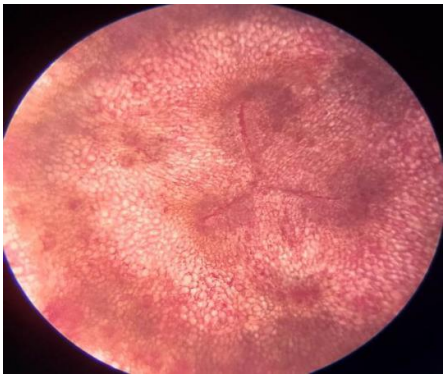
Figure 1: *Momordica charantia* Linn fruits & plant

Table I: Macroscopic study of *Momordica charantia* Linn. fruit

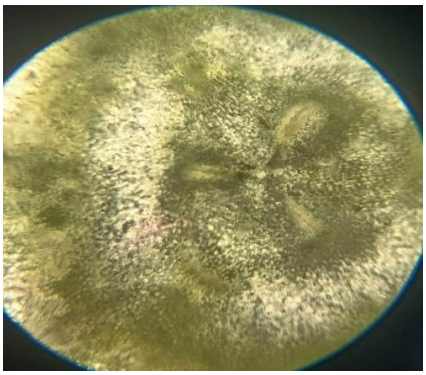
Characters	Observation
Colour	Green (unripe) reddish-orange (ripend)
Odour	Characteristic
Taste	Bitter
Size	4-15 cm long, 1.5- 3.5 cm in diameter
Shape	Beaked, ovoid, pendulous
Extra features	Surface havelongitudinal ridges & warts

Microscopic study:

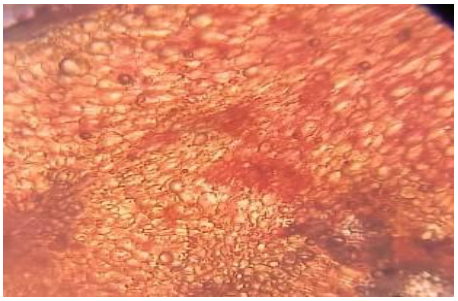
Transverse section of *Momordica charantia* fruits shows epicarp cells consisting isodiametric cells with thick cuticles. 5-7 layers of mesocarp with large isodiametric elongated cells. Vascular bundles were present in the middle of the mesocarp & endocarp consists of small thin walled elongated cells.



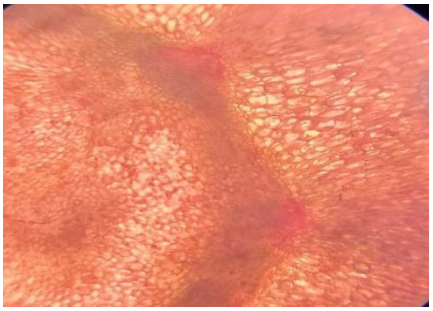
a) T.S. *Momordica charantia* fruits



b) Mesocarp & Vascular bundle



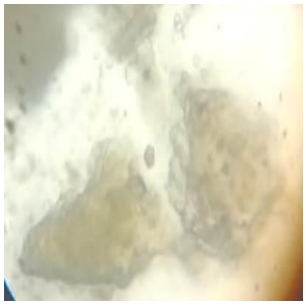
c) Exocarp



d) Endocarp

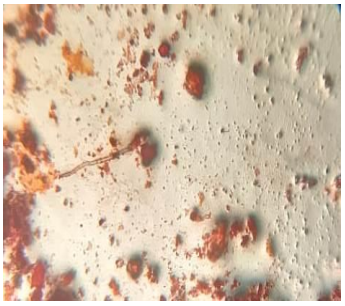
Figure 2: Transverse Section of *Momordica charantia* fruits

Powder microscopy: It is yellowish fine powder with bitter taste. The powder microscopic study reveals the presence of trichomes, parenchymal cells, calcium oxalate crystal & starch.



A) parencymal cells

B) prismatic calcium oxalate crystal



C) Multicellular trichomes

Figure 3: Powder Characteristics of *Momordica charantia* Linn

Table II: Fluorescence analysis of *Momordica charantia* Linn fruit powder

Treatment	Visible	Short U.V. 254 nm	Long U.V. 365 nm
Powder	Yellow	Green	Yellowish
Powder + water	Whitish -yellow	Greenish	Light green
Powder + NaOH	Brownish	Greenish	Light yellow
Powder + $FeCl_3$	Reddish -brown	Green	Black
Powder + dil. H_2SO_4	Pale yellow	Greenish	Light green
Powder + dil. HCl	Pale yellow	Green	Light green
Powder + dil. HNO_3	Yellowish	Greenish	Dark
Powder + Ethanol	Yellowish	Pale green	Golden yellowish
Powder + KOH	Light brown	Greenish	Slightly yellowish

Table III: Physicochemical data of *Momordica charantia* Linn fruit

S.N.	Physicochemical Parameter	Values (% w/w)
1.	Foreign matter	Nil
2.	Moisture Content	7.93 ± 0.08
3.	Total Ash	7.30 ± 0.11
4.	Acid- Insoluble ash	1.40 ± 0.05
5.	Water soluble ash	3.16 ± 0.03
6.	Alcohol soluble extractive	8.90 ± 0.11
7.	Water soluble extractive	25.93 ± 0.20

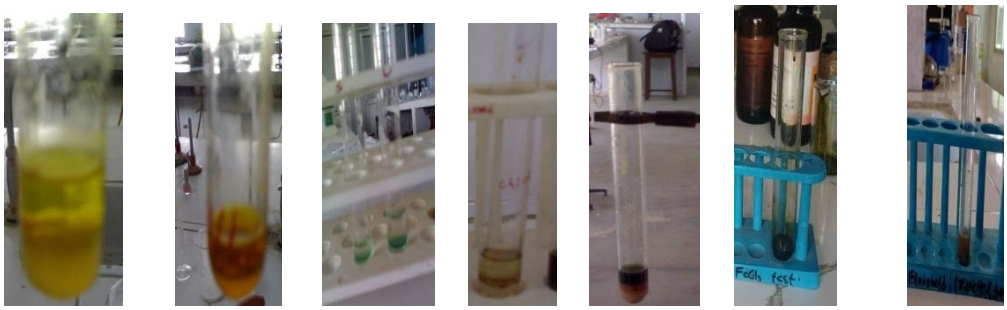
Qualitative phytochemical screening

Phytochemical screening of ethanolic extract of *Momordica charantia* fruit shows the presence of several secondary metaboilites. Hager's and Wagner's reagent tests shows the presence for alkaloids while triterpenoids & flavonoids present in more amount. Reducing sugars, terpens, saponins, tannins, steroids & cardiac glycosides were also present.

Table IV: Qualitative Phytochemical screening of Ethanolic extract of *Momordica charantia* fruit

	Phytochemical test	**Ethanolic extract of *Momordica charantia* Linn. fruit**
1.	Carbohydrates	
	i) Molisch	+
	ii) Fehling Reagent	++
2.	Alkaloids	
	i) Dragondroff's reagent	-
	ii) Mayer's reagent	-
	iii) Wagner reagent	+
	iv) Hager reagent	+
3.	Tannins	
	i) Lead acetate	+
	ii) FeCl3	+
4.	Flavonoids	
	i) Shinoda test	++
	ii) Zinc- HCl reduction test	++
	iii) Alkaline reagent test	++
5.	Saponins	
	i) Foam test	+
6.	Steroids	
	i) Libermann – Burchard test	++
7.	Cardiac glycosides	
	Keller-Kiliani	+
8.	Triterpens	
	Salkowaski's test	+++

+++ More amount, ++ moderate amount, + less amount, - absent



Alkaloids terpenoids carbohydrates Tannins Flavonoids

Figure 4: Chemical tests of ethanoilc extract of *Momordica charantia* fruit

Table V: TLC Profile: Thin layer chromatography of alcoholic extract of *Momordica charantia* Linn fruit.

Solvent system	Solvent front in cm	Distance travelled by solute in cm	Rf value	
Butanol: Acetic acid:Water (4:1:2) Spraying agent : Iodine solution	7.4	1.50 2.0 2.40 4.0 4.4 5.4 6.3 6.9	0.20 0.27 0.32 0.54 0.59 0.72 0.85 0.93	

DISCUSSION:

T.S. of *Momordica charantia* fruit shows isodiametric epicarp with thin cuticle, mesocarp have 5-7 layers of large parencymatous elongated cells with statch grains, vascular bundles are present in the mesocarp. Powder microscopy reveals the presence of parenchymal cells, trichomes, & calcium oxalate crystals. Qualitative phytochemical screening indicates presence of alkaloids, tannins, tritepenes, steroids and flavonoids, carbohydrates, thin layer chromatography of Ethanolic extracts indicates presence of many compounds.

CONCLUSION:

The plant *Momordica charantia* Linn is a common species that has been used traditionally. The above pharmacognostic, physicochemical, phytochemical & chromatographic studies will give approaches for identification, safety & quality parameters as well as new incentive to natural system of medicine in the research & in the treatment of other diseases.

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