The Journal of Phytopharmacology 2021; 10(1): 22-25
Online at: www.phytopharmajournal.com

Research Article

ISSN 2320-480X
JPHYTO 2021; 10(1): 22-25
January- February
Received: 13-12-2020
Accepted: 29-01-2021

doi: 10.31254/phyto.2021.10106

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Comparative Phytochemical Screening of Karela (*Momordica Charantia*) and Jambul (*Syzygium Cumini*) Claimed for Treatment of Diabetes Mellitus

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ABSTRACT

Phytochemicals from herbal medicine are helpful for human health as well as crucial for the existence. The aim of present study was to investigate phytochemicals present in two medicinal plants *Momordica charantia* and *Syzygium cumini* to prove their traditional uses for the treatment of diabetes mellitus. Successive extraction was done with selected solvents *viz*., ethanol, methanol and water using maceration. Standard methods were used for the identification of phytochemicals like alkaloids test, phenols test, saponins test, carbohydrates test, proteins test, amino acids test, flavonoids test, diterpenes test. In conclusion, our findings showed that the methanol extract of both the plant contain most of the phytoconstituents when compare with other solvent extracts such as ethanol and water. Methanol extract of *Syzygium cumini* showed positive test with numerous phytoconstituents compare to *Momordica charantia*.

Keywords: Phytochemicals, *Momordica charantia*, *Syzygium cumini*, Successive extraction.

INTRODUCTION

The prevalence of diabetes mellitus is increasing from recent years and therapies commonly offered in present time for diabetes mellitus comprises insulin and various oral anti-diabetic agents for example biguanides, glinides and sulfonylureas etc. Many of used antidiabetic agents have a numerous adverse effects thus various researches are going on to search antidiabetic medicine to treat this disease [1]. Different countries used plants components as a medicine and also used as a source of powerful and effective herbal drugs [2]. Natural products from herbal medicine are helpful for human health as well as crucial for the existence [3]. *Momordica charantia* (Karela) is economically important medicinal plant commonly known as Karela, bitter gourd, and Karavelli belonging to Cucurbitaceae family. It has many synonyms such as *M. chinesis, M. sinensis, M. indica, M. elegans, M. operculata, S. fauriei*. The Karela is originated in the tropics of the old world and cultivated as a food and medicine in several parts of Indian subcontinents *viz.*, Southeast Asia, Africa, China, the Caribbean and South America. Traditionally, fruit juice to dried fruit bits of *M. charantia* have been employed particularly for blood-sugar lowering effects [4, 5]. Fruit extract of *M. charantia* showed antidiabetic activity in normal and diabetic animal model [6]. The fruits have an antidiabetic principle, but the seed showed no activity [7]. *M. charantia* showed excellent anti-diabetic activities and used for prophylaxis or treatment also reduced level of serum glucose and increased level of serum insulin also showed histopathological changes of the pancreas of type 2 diabetic rats [8].

Scientific Classification

Kingdom	*Plantae*
Divison	*Magnoliophyta*
Class	*Magnoliopsida*
Order	*Cucurbitales*
Family	*Cucurbitaceae*
Genus	*Momordica*
Species	*Charantia*

Syzygium cumini

Syzygium cumini Skeels (*E. jambolana, M. cumini, S. jambolana, S. jambolanum, E. djouant, C. jambolana,*

E. cumini, and *E. caryophyllifolia*) belongs to the family of Myrstaceae is widely found in subcontinent of Asia and other tropical country. It is commonly known as Indian blackberry, Jamun or Jambul by the Indian. Since several years ago, it is commercially utilized as antidiabetic plant [9]. *Syzygium cumini* is an underutilized fruit which is available plenty in India [10]. Various constituents reported in seeds such as alkaloids, jambosine, antimellin and glycoside jambosine, which stops conversion of starch into sugar [11]. The plant has a wide range of medicinal activities such as anti-diabetic, anti-inflammatory, antioxidant [12, 13, 14] antibacterial activity [15, 16] antitumor activities. The fruit extract of *E. jambolana* reduced level of blood sugar in normal, fasting and diabetic rat, rabbit also in dogs [17]. Considering the vast potentiality of plants as sources of herbal drugs, the present study aimed to carry out phytochemical investigation of two antidiabetic plants namely *M. charantia* and *S. cumini*.

Scientific Classification

Sub kingdom	*Plantae*
Divison	*Tracheophyta*
Subdivison	*Spermatophytina*
Class	*Magnliopsida*
Superorder	*Rosanae*
Order	*Myrtales*
Family	*Myrtaceae*
Genus	*Syzygium*
Species	*Cumini*

MATERIAL AND METHODS

Plant material

The *S. cumini* (seed) and *M. charantia* (fruits) powder were obtained from local market of Satna, Madhya Pradesh, India.

Preparation of sample extract

Initially, powdered plant sample (50g) was defatted with (100ml) petroleum ether by maceration. Subsequently, successive extraction was done with selected solvents *viz*., ethanol, methanol and water. The concentrated extracts were evaporated to dryness and the extracts obtained with each solvent were weighed and their percentages yield were calculated in terms of initial plant material. Extract obtained after maceration extraction were further stored at 4 degree Celsius for further analysis.

Qualitative screening procedure for phytochemicals

The crude extracts obtained were analysed for the presence of various phytoconstituents by procedure given in Indian Pharmacopoeia by using standard phytochemical tests. Chemical tests were carried out on the ethanolic extract, methanolic extract and water extract to identify the phytoconstituents using standard procedure like Alkaloids test, phenols test, saponins test, carbohydrates test, proteins test, amino acids test, flavonoids test, diterpenes test [18, 19].

RESULTS AND DISCUSSION

Table no. I shows the percentage yield of different extract of *Momordica charantia* and *Syzygium cumini*. Ethanol extract of *Momordica charantia* exhibited higher yield 5.6% followed by methanol extract (4.7%) and water extract (1.6%) respectively. Ethanolic extract and methanolic extract of *Momordica charantia* exhibited higher yield when compare with ethanolic extract and methanolic extract of *Syzygium cumini*. A cursory look at table no. I shows that water extract of *Syzygium cumini* gave greater percentage yield 4.15% followed by methanol (2.75%), ethanol (2.57%) petroleum ether extract (2.18%).

The ethanol and methanol extract of *M. charantia* fruits showed the presence of alkaloids, amino acids and saponins. Ethanol and methanol extracts had shown negative results for phenol and proteins (table II, fig I). Another study of Daniel *et al.*,2014, Adi and Reddy 2017, Ingle and Kapgatte 2018 also showed presence of phytochemicals such as saponins, flavonoids, coumarins, emodins, terpenoids, alkaloids, cardiac glycosides, proteins, steroids, anthocyanins and anthraquinones etc. [20, 21, 22].

Phytochemical analysis for *Syzygium cumini* is depicted in table III. From the results obtained, it was clear that carbohydrates and saponins were present in all extract of *Syzygium cumini*. Flavonoids and saponins were absent in only methanol and ethanol extract. Methanol extract of *Momordica charantia* and *Syzygium cumini* exhibited presence of most of the phytochemicals when compare with ethanol and water extract. Similar results have been reported in phytochemical extraction of *Syzygium cumini* [23, 24]. The petroleum ether extract of both the plant revealed that they were negative for alkaloids, carbohydrates, saponins, phenols, flavonoids, amino acids, proteins and diterpenes. The presence of various bioactive compounds in both the plants depicts its protective role against various diseases.

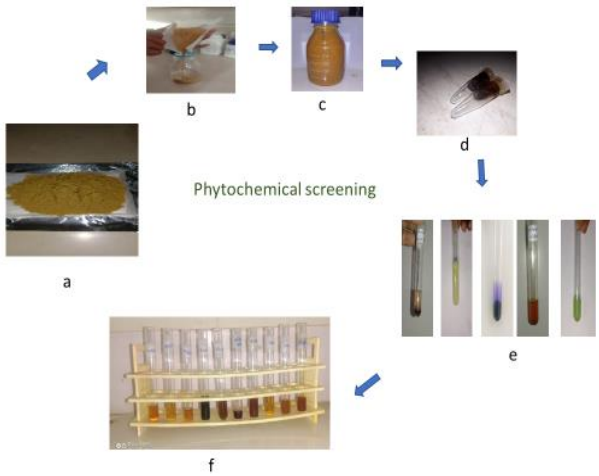

Figure 1: Phytochemical screening of plant. Frame a, b, c and d shows different steps of Phytochemical extraction and frame e and f shows results of different phytochemical test.

Table 1: Results of percentage yields of various solvent extract of *S. cumini* and *M. charantia*

S.no.	sample	petroleum ether	ethanol	methanol	Water
1.	***S. cumini***	2.18	2.57	2.75	4.15
2.	***M. charantia***	0.0%	5.6%	4.7%	1.6%

Table 2: Results of phytochemical screening of various solvent extracts of *M. charantia*

Phytochemicals	Test /reagent	Observation	Petroleum ether	Ethanol	Methanol	Water
Alkaloids	Wagner's test	Red brown ppt	-ve	+ve	+ve	-ve
	Dragendroff's	Red brown ppt	-ve	-ve	+ve	-ve
Carbohydrates	Fehling test	Brick red ppt	-ve	-ve	+ve	+ve
	Molisch test	Violet rings	-ve	+ve	-ve	-ve
Saponins	Foam test	Foam present	-ve	+ve	+ve	+ve
Phenols	Ferric test		-ve	-ve	-ve	-ve
Flavonoids	Lead acetate test	Yellow ppt	-ve	-ve	+ve	-ve
	Alkaline test	Yellow Colour	-ve	-ve	+ve	-ve
Proteins	Xanthoprotein test	Yellow colour	-ve	-ve	-ve	+ve
Amino acid	Ninhydrin test	Bluish black colour	-ve	+ve	+ve	+ve
Diterpenes	Copper acetate test	Light green colour	-ve	+ve	+ve	+ve

+ve: Indicates the presence of phytochemicals, -ve: Indicates the absence of phytochemicals

Table 3: Results of Phytochemical screening of various solvent extracts of *S. cumini*

Phytochemicals	Test /reagent	Observation	Petroleum ether	Ethanol	Methanol	Water
Alkaloids	Wagner's test	Red brown ppt	-ve	-ve	+ve	-ve
	Dragendroff's	Red brown ppt	-ve	-ve	+ve	-ve
Carbohydrates	Fehling test	Brick red ppt	-ve	+ve	+ve	+ve
	Molisch test	Violet rings	-ve	+ve	+ve	+ve
Saponins	Foam test	Foam present	-ve	+ve	+ve	+ve
Phenols	Ferric test		-ve	-ve	+ve	+ve
Flavonoids	Lead acetate test	Yellow ppt	-ve	+ve	+ve	-ve
	Alkaline test	Yellow Colour	-ve	+ve	+ve	-ve
Proteins	Xanthoprotein test	Yellow colour	-ve	+ve	+ve	-ve
Amino acid	Ninhydrin test	Bluish black colour	-ve	+ve	+ve	-ve
Diterpenes	Copper acetate test	Light green colour	-ve	-ve	-ve	-ve

+ve: Indicates the presence of phytochemicals, -ve: Indicates the absence of phytochemicals

CONCLUSION

From this study, it may be concluded that many phytochemicals present in various solvent extracts of both the plants. The presence of various bioactive constituents depicts its protective role against various diseases. In conclusion, our findings showed that the methanol extract of both the plants contain most of the phytoconstituents when compare with other solvent extracts. Methanol extract of *S. cumini* showed positive test with numerous phytoconstituents compare to *M. charantia*. Further research is required to search and isolate antidiabetic principle from these plants and also need to study pharmacological potential of other parts of the plants.

Acknowledgement

The authors are grateful to Mr. Anant Soni, Pro-Chancellor, AKS University, Satna and Dr. Kamlesh Choure, Head, Department of Biotechnology, AKS University, Satna, India for providing the necessary laboratory facilities and for his valuable guidance.

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HOW TO CITE THIS ARTICLE

Nigam R, Sen P, Singh R, Garg P. Comparative Phytochemical Screening of Karela (*Momordica Charantia*) and Jambul (*Syzygium Cumini*) Claimed for Treatment of Diabetes Mellitus. J Phytopharmacol 2021; 10(1):22-25.