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Preliminary Pharmacognostical and phytochemical analysis of fruits of *Momordica charantia* var. *muricata*

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Abstract

Momordica species are vegetable crops, belonging to the family of Cucurbitaceae.

Momordica charantia var. *muricata* small fruited variety mentioned in Horthus Malabaricus as Pavel or Pandipavel. They are reported to cultivated extensively in the past. Now its cultivation restricted to a few home gardens due to the entering of large fruited variety. The whole plant possesses a significant therapeutic value in the traditional system of medicine. The present study aimed to conduct preliminary pharmacognostic and phytochemical screening. The pytochemicals are those chemicals that are not established as a food nutrients but acts as a healing agent for different diseases in human beings. Pharmacognosy is the study of medicines derived from natural sources, mainly from plants. Basically deals with standardization, authentication and study of natural drugs.

Key Words: *Momordica charantia* var.*muricata* ,Pandi pavel, Phytochemicals,

Pharmacognosy

1. Introduction

Vegetables are considered to be protective foods and highly beneficial for the maintenance of good health and prevention of diseases. They are sources for nutrients such as carbohydrates, proteins, vitamins, fiber and minerals required for human health. *Momordica* charantia L. commonly known as bitter gourd is an economically important medicinal plant belonging to the family Cucurbitaceae. Plants of this family have medicinal and nutritional benefits . Increasing population of the world has doubled the food demands and inundated the available land resources. Along side other food alternatives, vegetables are considered cheap source of energy(Alertor *et al*.,2002 ; Hussain *et al.,* 2009). Bitter gourd fruit contain bioactive components with many important medicinal

properties(Horax *et al*. 2005).Momordica species are well-known for the bitter taste due to the presence of phytochemicals and have a wide range of medicinal values. The *Momordica* species have been used in indigenous medical systems in various countries in Asia and Africa. Based on the indigenous knowledge, wild plant foods play a vital role in the complex cultural system of tribal people for reducing various disorders.

Interspecific variability in *Momordica charantia* is included under two taxonomic varieties. *Momordica charantia* var. *charantia* representing the large fruited cultivated type and *Momordica charantia* var. *muricata* representing the small fruited, wild or semi domesticate type. According to Chakravarthy unless a mature fruit is obtained it is very difficult to distinguish the two varieties. Morphologically, they do not vary much from the true cultivated bitter gourd except for miniature size of fruits and seeds, and other plant parts. The 16th century publication Horthus Malabaricus (Rheede ,1688) the first authentic document on the Flora of Malabar, provides illustrations and descriptions of four Momordica entities, of which ‘‘Pavel’’ and ‘‘Pandi-pavel’’ refer to small-fruited *Momordica charantia* L. (Roxburgh,1832) has reported the small-fruited forms (var. muricata) as ‘‘cultivated by the natives of India, even more extensively than charantia and the fruit, though much smaller, being more esteemed”. Plants belonging to variety *muricata* produced more number of fruits per vine. Traditionally, wild bitter gourd (M. charantia var. abbreviate) leaves are crushed to obtain the juice for applying on the skin for treating insect bites, bee stings,burns,contact rashes, and wounds. Decoction of its leaves and fruits is drunk as preventive or treatment for stomachache, toothache,liver diseases,diabetes,hypertension, and cancer(Chiu and Chang 1995).

Now a days people interested in the health benefits of food and have begun to look beyond the basic nutritional benefits of food to the disease prevention and health enhancing compounds contained in many foods. Nutritional deficiency is one of the serious problem. Vegetables are the rich source of various types of nutrients. That is chiefly available in our locality. Due to bitter taste most of the people avoid bitter gourd especially children. But they contain various types of mineral constituents needed for the growth and vitamins especially the vitamin C. That prevent scurvy and provide antioxidant capacity. The iron is also one of the essential element required for the body. Its deficiency causes anemia. Antioxidant important secondary metabolites like flavanoids, phenolic acids, terpenoids, alkaloids, carotenoids, sterols are present. So the conservation of these plants (both cultivated and wild) and also give an awareness to the people about its traditional knowledge is very important. The large-fruited commercial types of bittergourd, by virtue of their large and heavy fruits, have higher yield potential and the small-fruited semi domesticates have practically escaped the attention of growers and breeders alike.

Phytochemical screening is of paramount importance in identifying new source of compound having medicinal significance, to make the best and judicious use of available natural wealth (Sharma et al., 2013). *Momordica* plant parts are characterized by a wide diversity of bioactive compounds such as phenolic acids, flavonoids, carotenoids cucurbitane triterpenoids, and phytosterols. The potential health benefits of phytochemicals found in *Momordica* species have received ample attention in the recent literature, focusing especially on compounds with high antidiabetic, antitumour and antioxidant properties. According to Ali et al 2008 bitter gourd has important role as

a source of Carbohydrate, proteins, vitamins,minerals and other nutrients in human diet, which are necessaryfor maintaining proper health. The presence of secondary metabolites such as alkaloids, saponins, tannins, glycosides , terpenoids may contribute to its medicinal value.

Pharmacognosy is the study of medicines derived from natural sources, mainly from plants. Basically deals with standardization, authentication and study of natural drugs. Now a days the impotance of pharmacognosy was wldely elaborated. Pharmacognostic study gives the scientific information regarding the purity and quality of the plant drug. Pharmacognostical study is the preliminary step in the standardization of crude drugs.. Pharmacognosy includes both the study of botanical dietary supplements,including herbal remedies (Tyler.1999; Cardellina,2002), as well as the search for single compound drug leads that may proceed through further development in to Food and Drug Administration(FDA) approved medicines. According to Dave et al.,2006 the detailed pharmacognostical evaluation gives valuable information regarding the morphology, microscopical and physical characteristics of crude drug. Drug discovery from medicinal plants has played an important role in the treatment of cancer and, indeed, most new clinical applications of plant secondary metabolites and their derivatives over the last half century have been applied towards combating cancer(Newman et al.,2000,2003;Butler 2004).

The present study aimed to conduct preliminary pharmacognostic and phytochemical anlysis of fruits of *Momordica charantia* var. *muricata*.

2.Materials and Methods

2.1 Plant selected for the study

Momordica charantia* var. *muricata

Annual, slender climber, 2–4 m high, scarcely to densely pubescent (tender parts wooly), monoecious. Flowers solitary in the axils, pubescent; petals yellow. Male flowers: solitary, stalks slender with bract midway or towards base ; peduncles2-4 cm long, glabrous ; bract reniform, 5-10 mm diameter, green, mu Pharmacognostic

cronate at apex , margins entire ; pedicel 2-5 cm long ; Receptacle tube cup shaped ,2-4 mm long and 2-3 mm wide ; sepals ovate –elliptic, 4-6X2-3 mm, pale green – touching each other and protecting the corolla tube; petals obovate, 10-20X 7-15 mm, mucronate at apex, scales 2; filaments 1.5 - 2 mm long , inserted in the throat of the receptacle tube ; anthers coherent ; disc shortly cup shaped 1.5 mm diameter .Female flowers ; peduncle 1-6 mm long ; bract 1-9 mm diameter ; pedicel 1-8 cm long ; sepals narrow , oblong – lanceolate, 2-5 mm long ; petals smaller than or equal to that in male ,7-10 mm long ; stamens modes ovary fusiform , narrowly

rostrate , 5-11 X 2-3 mm, muricate, tuberculate or longitudinally ridged ; style. 2mm long. Fruits small 3-9 cm, weighing 5- 35 g, tapering at both ends, seeds small to medium, flat, sub tridentate, brown, black, senescence late, wild rarely cultivated.

Habit of *Momordica charantia* var. *muricata*

Momordica charantia var.*muricata* (Willd.) Chakrav.

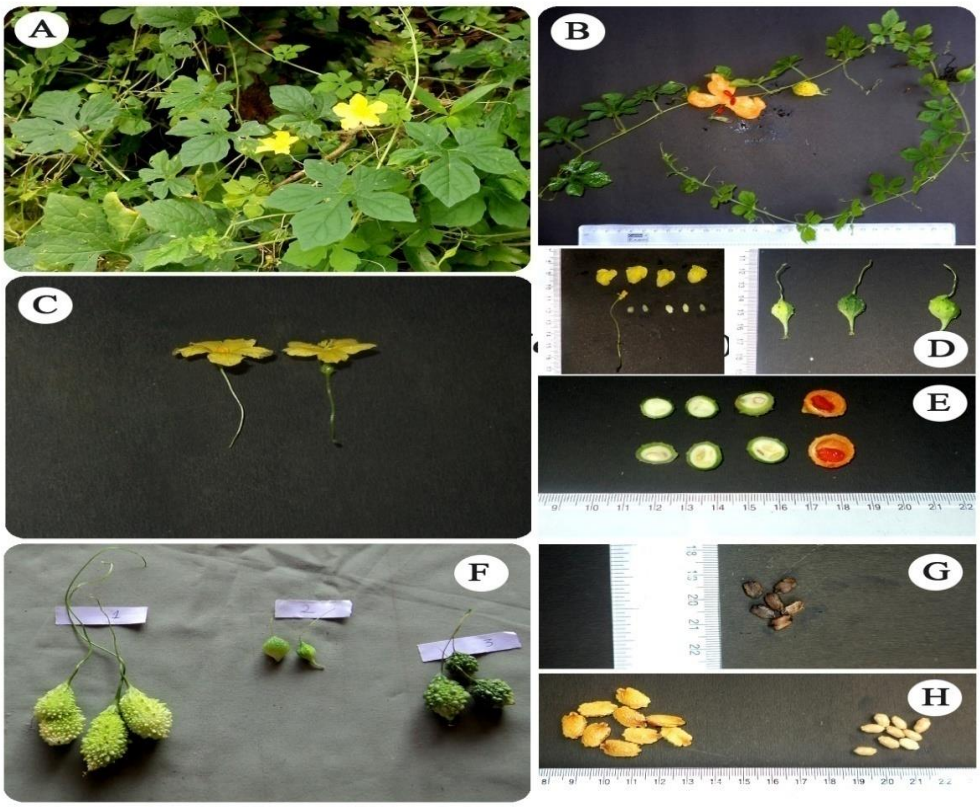

Fig. 4 *Momordica charantia* var.*muricata* (Willd.) Chakrav.

A- Habit, B- Twig with Fruits, C- Male & Female flower, D- Fruits, E- Cross section fruit, F- Different types of fruits, G- Seeds, H- seeds of Momordica charantia Linn. var.charantia & *Momordica charantia* var.*muricata* (Willd.) Chakrav.

2.2 Collection and Authentication

The fruits of *Momordica charantia* var. *muricata* were collected from different localities and are authenticated from the Regional Herbarium of S.B. College (RHK), Changanacherry, Kerala. The voucher specimens of the plant sample were deposited in the Herbarium of S.B.College Changanacherry. Collected fruits were manually washed with distilled water and residual matter evaporated at room temperature.

2.2.1 .Preliminary Pharmacognostic study

2.2.1.2.Macromorphological characters(Trease & Evans 2009)

Colour: The untreated part of the fruit was taken and colour of the fruit was examined under sunlight.

Odour and Taste:

A small portion of the fruit was taken slowly and repeatedly inhaled the air over the material and examined the odour and taste, a small portion of fruit was taken on the tongue and find out the taste of the fruit.

Shape and size

Width and length of fruit was measured with the help of scale, Shape of fruit was confirmed by compairing with literature.

2.2 Determination of Physical Parameters

The powdered fruits were subjected to check various parameters like moisture content, total ash value, water soluble ash, petroleum ether, methanol, alcohol and watersoluble exactives, etc.(Trease and Evans 2002).

2.3. Preliminary Phytochemical analysis

The extract was studied for the presence of phytochemicals such as carbohydrates, aminoacids, Carboxylic acids ,tannins,Coumarins, Phenolic acids, flavanoids, alkaloids, terpenoids, fats and lipids etc., using standard procedure , Harbone (1998), Sofowora (1993), Trease and Evans (2002)

3. Result and Discussion

3.1 Preliminary Pharmocognostic study

3.1.2.Morphological evaluation of Fruit of *Momordica charantia* var. *muricata*

Fruit a pepo, fusiform, longitudinally grooved, ridged and warty , whitish yellow 3-9 cm long 2-4.5 cm in diameter , pulp pithy , splitting in to 3 compartments, seeds small, less in number, they enclosed whitish aril which becomes bright red on maturity : seeds pale brown up to 1 cm long ,flattened, elliptic with markings . Odour characteristics, taste bitter.

Sl. No	Physiochemical parameters	Obtained values in % w/w
1	Total ash	6%
2	Water soluble ash	2%
3	Acid insoluble ash	0.4%
4	Water soluble extractive value	25%
5	Alcohol soluble extractive value	17%
6	Petroleum ether extractive value	13%
7	Methanol soluble extractive value	15%
8	Moisturecontent(%)	90%

Table 1. shows the percentage of Physiochemical parameters

Ash value is very useful in determining authenticity and purity of sample and also these values are important qualitative standards (Kokate & Purohit 2006).The total ash is particularly important in the evaluation of purity of drugs, i.e. the presence or absence of foreign inorganic matter such as metallic salts or silica. Samples with high percentages of ash content are expected to have high concentrations of various elements, which are expected to speed up metabolic processes and improve growth and development (Bello et al., 2008).

Estimation of extractive values determine the amount of the active constituenets in a given amount of plant material when extracted with a particular solvent yield a solution. The extraction of any crude drug with a particular solvent yield a solution containing different phytoconstituents. The composition of these phytoconstituents depend upon the nature of the drug and solvent used. From this study high exactive value obtained in water soluble extracts .

Moisture content is among the most vital and mostly used measurement in the processing , preservation and storage of food(Onwuka, 2005).Moisture content indicates that they can all be preserved for a reasonable period of time without the risk of microbial deterioration and spoilage. Moisture is one of the major factor responsible for the deterioration of the drugs and formulations. Low moisture content is always desirable for higher stability of drugs .

SL.No	**Phytochemicals**	***Momordica charantia* var *muricata***
1	**Carbohydrates**	**+**
2	**Amino acids**	**+**
3	**Lipids and Fatty acids**	**+**
4	**Carboxylic acids**	**+**
5	**Flavanoids**	**+**
6	**Steroids**	**+**
7	**Coumarins**	**+**
8	**alkaloids**	**+**
9	**terpenoids**	**+**
10	**Phenolic acids**	**+**

Table 2. shows preliminary phytochemical analysis of fruits of *Momordica charantia* var. *muricata*

Plants contain potential source of phytoconstituents with varied pharmacological activities. Identification of such plants of po tential use in medicine is of significance. So phytochemical screening is very important. Phytochemical analysis carried out on extracts of fruits revealed the presence of different types of biologically active phytoconstituents. Table 2. Shows the presence of phytochemicals present in the fruits .The presence of

secondary metabolites such as alkaloids, flavanoids, saponins, glycosides in the vegetables may contribute to their medicinal value.(Schneider and Wolfing,2004). Cucurbitaceae crops are known to reservoir of several essential nutrients, minerals, vitamins, dietary fibres and a number of nutraceuticals and phytomedicinal compounds(Nath Prem *et al.*, 2008, Rubatzky & Yamaguchi 1997) .The main constituents of bitter melon which are responsible for the antidiabetic effects are triterpene, steroid, alkaloid, inorganic lipid and phenolic compounds (Saeed etal, 2010,Budrat & Shotipruk 2008). Bitter melon contains biologically active chemicals that include crude fat, crude protein, soluble dietary fiber, minerals, essential oil, flavanoids ,phenolic acids,glycosides,triterpenes. The immature fruits are a good source of vitamin C and also provide vitamin A (Xie *et al* ., 1998; Braca *et al* 2008: Zhongguo *et al*., 2009).Secondary metabolites have various type of biological activities. In which antioxidants give more important. Various types of diseases especially diabetes, atherosclerosis, cancer, aging, and inflammations are caused due to oxidative damage that reduced by the action of antioxidants. In this scenario the role of vegetable containing these anti-oxidants are very important. Majorly the phenolics provide the anti-oxidant capacity

M. charantia var. *muricata* faces a medium level of threat across its geographic range. Habitat loss and fragmentation brought about by population pressure and developmental activities, poor distribution and low population density of Momordica species coupled with inadaquate in situ conservation efforts, and acculturation of the forest dwelling communities are the major factors attributed to their heightened threat status affecting their long-term survival in the wild (Joseph and Antony 2007).

4. Conclusion

Cucurbitaceous vegetables are well known for their medicinal and nutritional properties. Traditional knowledge leads to the development of new therapeutics. So the identification of chemical compounds are very essential. For this purposes pharmacognostic study is detrimental.

The importance of pharmacognosy has been widely felt in recent times. Unlike taxonomic identification, pharmacognostic study includes parameters which help in identifying adulteration in dry powder form also. This is again necessary because once the plant is dried and made into powder form, it loses its morphological identity and easily prone to adulteration. Pharmacognostic studies ensures plant identity, lays down standardization parameters which will help and prevents adulterations. Such studies will help in authentication of the plants and ensures reproducible quality of herbal products which will lead to safety and efficacy of natural products. Due to bitter taste and itrs small size most of the people avoid the fruits of momordica charantia var muricata. But they contain various types of biological activities due to its phytoconstituents So the conservation of these plants very essential ..In our homested garden we can easily cultivate these nutraceutically important vegetables.

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