Phyto-constituents and GCMS analysis of hydroalchoholic *Momordica tuberosa* extract

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Abstract

Herbal treatments are the most often utilized kind of medicine in the majority of underdeveloped nations. Herbs that are used for medicine are widely available and have been utilized for centuries. The ethno-therapeutic plant Momordica tuberosa is grown in India, and its medicinal properties are linked to the presence of certain dietary and bioactive constituents. In this work, the nutrient and phytochemical makeup of the methanol extract of Momordica tuberosa stem is assessed. Standard methods were used for phytochemical screening and proximate analysis, and GC-MS analysis was carried out to profile small and volatile compounds. The nutritional value and phytochemical composition of Momordica tuberosa's leaves and fruits has been the subject of several studies. According to the early results, the plant's methanolic stem extract has nutritive and bioactive components.

Keywords

Momordica tuberosa; Medicinal herb; phytochemicals; Proximate compounds; methanplic stem extract.

DOI Number: 10.14704/nq.2022.20.8.NQ44000 **Neuro Quantology 2022; 20(8):1-8**

Introduction

Medicinal plants include a wide range of chemical components that could be turned into therapeutics with a few chosen compounds, in addition to being utilized as a source of medicinal agents (Atanasov et al., 2021). They are collections of beneficial chemical compounds that can be used as a guide and proof in the development of current drugs (Dzobo, 2021). Phytochemicals found in medicinal plants' leaves, fruits, seeds, barks, and roots have a natural preventive and resistance mechanism against a variety of diseases (Ahad et al., 2021). Primary and secondary compounds are found in phytochemicals. Primary components include chlorophyll, proteins, and simple sugars, whereas secondary compounds include terpenoids, alkaloids, flavonoids, saponins, and phenolic compounds. Terpenoids have been shown to have potent anti-inflammatory, anti-cancer, anti-malaria, anti-viral, and anti-bacterial properties. Alkaloids, which are mostly found in medicinal plants, are anaesthetics, microorganism inhibitors, antihypertensive medicines, and have antimalarial properties (Rajput et al., 2021;Vijayaram et al., 2016).

Momordica species are vegetable crops that belong to the Cucurbitaceae family (often known as cucumber, gourd, melon, or pumpkin family) and are medium-sized plants that survive in warm climates(Chinthan et al., 2021). *Momordicatuberosa* is a thin, scandent, branched, striate annual or perennial herb with a slender, scandent, branching, striate stem. The leaves have an orbicular-reniform shape, are deeply cordate at the base, and are obtusely lobed with 5–7 lobes. The fruits are 20 - 25 mm long, pyriform with 8 strong ridges, 24 mm x 15 mm attenuated at the apex, and with the base narrowed into the fleshy, dark green, and plundered peduncle(Gopu et al., 2021). It is classified as an underused vegetable crop because it is not economically grown due to a shortage of planting supplies (Meghwal et al., 2021). It's high in vitamin C, fibre, and beta carotene, as well as iron and calcium. It has antidiarrhoeal, hepatoprotective, anti-diabetic, anti-nephroprotective, anti-allergic, antimicrobial, and other therapeutic qualities. *Momordica tuberosa* and *Momordica charantia* have a reputation for treating a variety of diseases and it has passed multiple animal tests, and clinical trials have been underway for several years. All parts of the plant, not just the fruits, have medicinal benefits (Balaraman et al., 2020).

The *Momordica tuberosa* has been used in traditional knowledge, and wild plant foods play an important role in tribal people's complex cultural system for treating a variety of disorders. Many edible wild plants have been found to be high in phytochemicals, which may have health-promoting properties, according to research. Considering its extensive action, several researchers have been paying attention to this plant and its medicinal value in recent days (Muronga et al., 2021). The reason and primary goal of this work is to identify the phytochemical elements found in the stem of the plant extracted under standard conditions.

Materials and Methods

The plant "*Momordica tuberosa*" was collected in Peraiyur, Madurai, Tamilnadu, India (9.72°N 77.8°E). Plant taxonomist P.V. Anto PhD, Department of Botany, Thomas College, Thrissur, India,

*e*ISSN 1303-5150

identified the plant samples in the field based on morphology and taxonomy. Plant materials were cleaned and dried in the shade for ten days at room temperature (37 °C). The dried plant components were powdered, and the sample was extracted using petroleum ether, chloroform, ethyl acetate, and methanol in order. The extracts were filtered through Whatman filter paper with a pore size of 1 m, and only pure refined extracts were used in this investigation. The chemicals and reagents of AR grade purchased from Spectrum, Merck, Nice and HiMedia were used for the present study.

Phytochemical screening

Standard phytochemical analysis was used to check for the presence and absence of secondary metabolites in plant extracts (Evans, 2002).The presence of phytoconstituents such as alkaloids, cardiac glycosides, anthraquinones, steroids, triterpenes, and reducing sugars was determined using a methanolic extract of the Momordica *tuberosa* plant's stem. Other phytochemical tests were performed on several classes of phytoconstituents, including the shinoda test for flavonoids, the froath test for saponins, the alkaloids test for alkaloids, and the legal's test for glycosides.

Proximate analysis

The proximate composition of the plant sample was determined using the Association of Official Analytical Chemists' official technique of analysis. The weight difference method was used to determine the moisture and ash content of the plant Components (AOAC, 2011). The weight loss on igniting of dried residue following digestion of fat-free samples was used to quantify crude fibre in the extracts. The crude fat content of the samples was measured using a soxhlet extractor and petroleum ether. The percentages were used to report all of the proximate values.

Analysis by gas chromatography and mass spectrometry (GCMS)

The GC-MS apparatus (Shimadzu GC-MS; Model Number: QP2010S) was used to identify the Tetramethyl heptadecan derivatives. The GC system employed an HP-5 MS capillary column. At a flow rate of 1 mL/min, helium was used as the carrier gas. The injection was 2 litres in volume. The mass spectroscopy detector used an ionisation energy EI of 70 eV. GCMS Solutions Libraries operated the GC-MS apparatus (NIST 11 & WILEY 8software package). The injector and detector were both set to 250°C. Compound identification was accomplished using standard procedures.

Results

Phytochemical analysis

Phytochemical study of methanolic extract of *Momordica tuberosa* stem was performed to determine the presence and absence of carbohydrates, alkaloids, flavonoids, phenols, tannins, saponins, and terpenoids (Table 1).The presence of carbohydrates at a higher level and the absence of saponins in the stem has been observed from the table. Tannins, terpenoids, cardiac glycosides, falvonoids, and phytosterols are found in moderate amounts in the stems of the plants, whereas proteins, alkaloids, and anthraquinones are found in lesser amounts. The fact that isolated chemicals could be employed for important biological activities is supported by these findings. The literature examines the significance of each chemical in biological action (Altemimi et al., 2017).

Table 1. Phytochemical screening of methanolic extract of *Momordica tuberosa's* stem.

S. No	Phytochemical Compounds	Method	Momordica *Tuberosa* Stem-Methanolic
1	Tannins	Ferric Chloride Test	++
2	Saponins	Froth's Test	-
3	Terpenoids	Salkowsky's Test	++
4	Cardiac Glycosides	Keller-Killani Test	++
5	Flavonoids	Shinoda Test	++
		Lead acetate Test	++
		Alkaline Reagent Test	++
6	Carbohydrates	Fehling 's Test	+++
		Molisch Test	++
		Benedict's Test	++
7	Phytosterols	Liebermann Burchad Test	++
8	Proteins	Millon's Test	+
9	Alkaloids	Dragendorff's Test	+
		Mayer's Test	+
		Hager's Test	++
		Wagner's Test	++
10	Anthraquinones		+

+++ Highly present ++ Medium + Low - Nil

Proximate analysis

Proximate analysis is a useful metric for determining a food's nutritional content. The nutritional and mineral contents of *Momordica tuberosa* are shown in Table 2. Extractive yield (23.52%), water soluble extractive (20.1%), and water soluble extractive (14.25%) are the most prevalent components, according to our findings; however, acid insoluble ash (1.24%) content is rather low. The estimation of ash content can aid to understand the inorganic content of the stem. They are also intended to aid metabolic processes, growth, and development, while the moisture content provides further information on storage/shelving life and microbial viability.

Table 2. Proximate compounds screening of methanolic extract of *Momordica tuberosa's* stem.

S. No	Proximate Compounds	*Momordica tuberosa* (Shade dried stem)
1	Extractive Yield	23.52%
2	Moisture content	8.90%
3	Total Ash	6.25%
4	Water Soluble Ash	1.82%
5	Acid Insoluble Ash	1.24%
6	Water Soluble Extractive	20.1%
7	Alcohol Soluble Extractive	14.25%

Gas chromatography and mass spectrometry (GCMS)

The results of GC-MS analysis of methanolic extract of *Momordica tuberosa*'s stem are tabulated in Table 3 and allowed to the elucidation of a single compound (3,7,11,15-Tetramethyl-2-hexadecen-1-ol) as a main constituent which present about 60.28 % of the total area, followed by Pregn-9(11)-en-20-ol-3-on-19-oic acid lactone (21.6%), Hexahydrofarnesyl acetone (10.39%), 4,8,12,16-Tetramethylheptadecan-4-olide (4.78%), and Methylpalmitate occurring in small quantities (2.95%).Unsaturated fatty acids (oleic acid), for example, are known to have favourable health effects and can help avoid cardiovascular disorders.

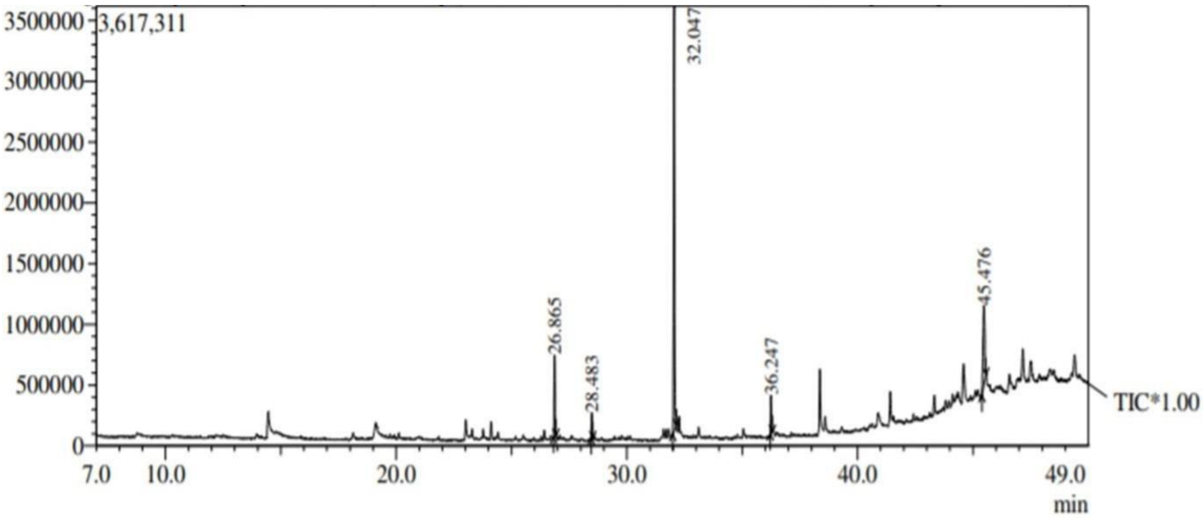

Figure 1. GCMS analysis of methanolic extract of *Momordica tuberosa*'s stem

Discussion

Herbal therapies are less expensive and more convenient than pharmaceuticals. Traditional medicinal plant uses has a long history of importance and were primarily used by ancient peoples, as well as our forefathers, to recuperate from disease. However, the recent trend of avoiding natural rather than artificial sources of disease prevention is discouraging. Because there have been numerous reports of antibiotic resistance and synthetic drug side effects all across the world. As a result, finding a better alternative to synthetic drugs has become a significant need. In this regard, we focused on a therapeutic herb that has traditionally been used as a vegetable in south India. Our findings show that the stem of *Momordica tuberosa* has a better nutritional value as a source of carbohydrate, ash, and moisture in this study. Despite the fact that there are several reports demonstrating the medicinal effects of Momordica *tuberosa* (leaves and fruits), we give a foundation for further research into the nutritional value of Momordica *tuberosa*, particularly the stem region.

Conclusion

The presence of certain phytochemicals justifies the *Momordica tuberosa*'s usage in health-promoting characteristics, according to this research. The therapeutic activity of the plant could be due to the presence of particular phytochemicals including flavonoids and tannins respectively. Furthermore, the research demonstrates that the plant in question is a strong source of carbohydrates, making it a nutritious vegetable.

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*e*ISSN 1303-5150