

CHAPTER 7

Phytochemical screening of *Cucumis melo* L., fruits (Cucurbitaceae)

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Abstract

Cucumis melo L., a species of the Cucurbitaceae family, has been traditionally used in medicine for its various health benefits. This study aimed to investigate the available phytochemical in fruits of *C. melo*. Phytochemical analysis revealed the presence of bioactive compounds, including saponin, tannin, phenolic compounds, and terpenoids. The results of this study provide valuable insights into the medicinal properties of *C. melo* and contribute to the understanding of its medicinal potential. The findings of this study can be used to develop new pharmaceuticals and functional foods, and to promote the conservation of this valuable plant species.

Keywords: Bioactive compounds, cucurbitaceae, nutraceutical, pharmacological

Introduction

Plants have been an integral part of human civilization (Kumar, 2015; Das et al., 2022), serving not only as a source of food and shelter but also as a reservoir of medicinal agents (Dimri et al., 2024). For centuries, plants have been used in traditional medicine to treat various health problems (Das et al., 2020; Mishra et al., 2023), and their importance as a source of therapeutic agents (Kumar and Jena, 2014; Sethi et al., 2024). The World Health Organization (WHO) estimates that

approximately 80% of the world's population relies on traditional medicine, which is largely based on plant-derived remedies (Kumar et al., 2013). The Cucurbitaceae family, commonly known as the gourd family, is one of the largest and most diverse families of flowering plants (Saradar et al., 2023; Saradar and Jena, 2023; Saradar et al., 2024). Many of plants of this family have been used in traditional medicine for their medicinal properties (Tripathy et al., 2014). Some of the most well-known species of the Cucurbitaceae family include *Cucumis sativus* (cucumber), *Citrullus lanatus* (watermelon), and *Lagenaria siceraria* (bottle gourd). *Cucumis melo* L., is a species of the Cucurbitaceae family that has been cultivated for thousands of years and grows in wild. In addition to its culinary uses, wild *C. melo* has been used in traditional medicine to treat various ailments, including fever, rheumatism, and digestive disorders (Manjula et al., 2023).



Figure 1: Fruit of *C. melo* in wild

Bioactive compounds are the chemical constituents of plants that are responsible for their medicinal properties (Vimala, 2024). These compounds can be used to prevent or treat various diseases, and their importance in modern medicine continues to grow (Sharma et al., 2024). The search for new bioactive compounds

from plants is an active area of research, with many scientists and researchers exploring the medicinal properties of various plant species (Mety et al., 2023). *C. melo* might be a rich source of bioactive compounds as per its uses. These compounds have been shown to possess various biological activities, including antioxidant, anti-inflammatory, and antimicrobial properties (Dimri et al., 2023). However, the phytochemical composition of *C. melo* is not yet fully understood, and further research is needed to explore its medicinal potential. Therefore, an attempt has been made to document the available bioactive compounds in the fruits of *C. melo* (Figure 1). The results of this study will contribute to our understanding of the medicinal properties of *C. melo* and provide a basis for further research into its potential health benefits.

Materials and methods

The fruits of *C. melo* were collected (Figure 2) from the bank of Mahanadi river areas, Cuttack, in November 2024 (Kumar et al., 2021). Authors have identified the plant specimen. Aqueous, ethanol and methanol extracts of fruits were obtained and nine different bioactive compounds (Aradhana et al., 2022) were detected using standard methods (Devi et al., 2023; Marndi et al., 2024; Devi et al., 2024).

Qualitative phytochemical analysis for secondary metabolites

Test for tannin

2-5 drops of 0.1 % lead acetate solution were added to 1 ml of the filtrate of the fruits extract. The white gelatinous precipitate provided a positive result for the presence of tannins.

Test for saponin

1 ml of distilled water was added to 1 ml of the filtrate of the fruits extract and shaken vigorously. The persistent froth formation after shaking indicated the presence of saponin.

Test for flavonoids

2 ml of 2 % NaOH solution and 3 drops of dilute HCl were added to 1 ml of the filtrate of the fruits extract. The colour of the filtrate initially turned to an intense yellow

colour with NaOH solution and later turned colourless. This colour change confirmed the presence of flavonoids.

Test for terpenoids

1 ml of the filtrate of fruits extract was added with 6 drops of chloroform and placed in the water bath for a few minutes. Then 6 drops of concentrated H_2SO_4 were added. The reddish-brown interface confirmed the positive result for the presence of terpenoids.



Figure 2: Collection of fruits for experimental works

Test for phenolic compounds

1 ml of the filtrate of fruits extract was taken and a few drops of 5 % Ferric chloride solution were added. The bluish-black colour provided the positive result of the phenolic compounds.

Test for reducing sugars

1 ml of the filtrate of fruits extract was taken and 2 drops of Fehling's solution A followed by Fehling's solution B were added and kept in the water bath for a few minutes. The presence of red-orange precipitate confirmed the presence of reducing sugars.

Test for steroids

1 ml of the filtrate of the fruits extract was added with 1 ml of chloroform and 1 ml of concentrated H_2SO_4 were added to it. The appearance of upper red and lower yellow with green fluorescence provided the positive result of the test for steroids.

Test for alkaloids

1 ml of the filtrate of the fruits extract was taken and 3-4 drops of Dragendroff's reagent was added to it. The formation of a reddish-brown precipitate confirmed the presence of alkaloids.

Test for carbonyl compounds

1 ml of the filtrate of the fruits extract was taken and 3-4 drops of 2,4-Dinitrophenylhydrazine reagent was added to it. The formation of yellow crystals confirmed the presence of carbonyl compounds.

Results and discussion

The phytochemical analysis of *C. melo* fruits revealed the presence of several bioactive compounds (Table 1). Tannins and saponins were detected in all three extracts (aqueous, ethanol, and methanol), indicating their widespread presence in the fruit. Reducing sugars were also found in all three extracts, suggesting that the fruit contains significant amounts of carbohydrates (Table 1). In contrast, flavonoids, steroids, alkaloids, and carbonyl compounds were not detected in any of the

extracts. This suggests that these bioactive compounds may not be present in significant amounts in *C. melo* fruits or may require more specific extraction methods to be detected. Interestingly, terpenoids were only detected in the methanol extract, suggesting that this solvent may be more effective at extracting these compounds. Overall, the results of this study provide a preliminary understanding of the phytochemical composition of *C. melo* fruits and highlight the potential for further research into their bioactive properties. Future studies on *C. melo* fruits could focus on isolating and characterizing the specific bioactive compounds present, such as tannins, saponins, and terpenoids, to explore their potential medicinal and therapeutic applications. Additionally, investigations into the fruit's antioxidant, anti-inflammatory, and antimicrobial properties could provide valuable insights into its potential health benefits. Furthermore, exploring the effects of different extraction methods, solvents, and processing conditions on the phytochemical composition of *C. melo* fruits could optimize their bioactive potential, paving the way for the development of novel functional foods, dietary supplements, and pharmaceuticals.

Table 1: Phytochemical analysis of *C. melo* fruits

Bioactive compounds	Aqueous	Ethanol	Methanol
Tannin	+ve	+ve	+ve
Saponin	+ve	+ve	+ve
Flavonoids	-ve	-ve	-ve
Terpenoids	-ve	-ve	+ve
Reducing sugar	+ve	+ve	+ve
Phenolic compounds	+ve	-ve	-ve
Steroids	-ve	-ve	-ve
Alkaloids	-ve	-ve	-ve
Carbonyl compounds	-ve	-ve	-ve

(+ve: present; -ve: absent)

Conclusion

he phytochemical analysis of *C. melo* fruits has unequivocally demonstrated the presence of a repertoire of bioactive compounds, including tannins, saponins, and

terpenoids, which confer upon the fruit a profound potential for medicinal and therapeutic applications. The findings of this study underscore the importance of exploring the uncharted realm of phytochemicals in *C. melo* fruits, which may hold the key to unlocking novel strategies for the prevention and treatment of various diseases. Ultimately, this study serves as a testament to the vast and untapped potential of natural products in promoting human health and well-being.

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