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PHYTOCHEMICAL ANALYSIS OF DIFFERENT SOLVENT PEEL EXTRACT OF *TRICHOSANTHES CUCUMERINA*

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Abstract

Trichosanthes cucumerina, commonly known as snake gourd, is a tropical and subtropical vegetable crop traditionally used in herbal medicine due to its diverse therapeutic properties. While its fruit and seeds have been extensively studied, the peel typically discarded as waste has received limited scientific attention despite its potential as a source of bioactive compounds. This study aims to evaluate the phytochemical constituents present in the peel of *Trichosanthes cucumerina* using different solvent extracts, namely methanol, diethyl ether and water. Dried and powdered peel samples were subjected to solvent extraction through Soxhlet methods. Each extract was analyzed qualitatively for the presence of major phytochemical groups such as alkaloids, flavonoids, tannins, saponins, glycosides, phenols, and terpenoids using standard protocols. The results revealed that methanol extract contained the highest variety of phytochemicals, indicating their efficiency in extracting both polar and semi-polar compounds followed by diethyl ether and water. These findings suggest that the polarity of the solvent plays a crucial role in the extraction efficiency of phytochemicals. The presence of these bioactive compounds in the peel highlights the potential of *Trichosanthes cucumerina* as a valuable source for pharmaceutical and nutraceutical applications. Utilizing the peel could also contribute to waste reduction in agricultural processing.

Keywords: Trichosanthes cucumerina, Phytochemicals, Pharmaceutical and nutraceutical applications.

1. Introduction

Plants and plant-derived products have been used as medicine since the dawn of human civilization. The most abundant bioresource of pharmaceutical intermediates, lead chemicals in synthetic drugs, nutraceuticals, food supplements, folk medicines, and medications used in modern and traditional medicine is found in medicinal plants [1]. Phytochemicals are more complex and particular non-nutritive plant compounds that function by mimicking endogenous metabolites. The plant's leaves, flowers, roots, fruits, seeds, bark, and other parts can all provide these natural components. Since synthetic medications have adverse effects, antimicrobials originating from plants are used nowadays because they have the potential to treat infectious disorders [2].

Trichosanthes cucumerina is an aromatic, dioecious annual creeper that is a member of the *cucurbitaceae* family [3]. It is indigenous to Australia and Southeast Asia and is grown

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extensively worldwide for its snake-like, twisted, irregularly shaped fruits [4]. Its odd shape, which resembles an eel and measures 30 to 180 cm by 5 to 10 cm, has earned it the nickname "snake gourd." During the summer, snake gourd is a popular vegetable. Its roots are tuberous and white. Fruits ripen from September to October, while flowers are delicate, lace-like, white, and blossom in the evening [5]. The flowering season lasts from July to September. In addition to providing basic nourishment, *Trichosanthes cucumerina* is rich in functional elements such carotenoids, phenolic compounds, flavonoids, and vital minerals, which makes the plant pharmacologically and therapeutically active [6].It can function as an antioxidant and is abundant in proteins, minerals, carbs, and vitamins E and A. The plants' seeds, roots, leaves, and fruits all have therapeutic qualities. Many illnesses have historically been treated using the plant. Fruits boost hunger, act as stomachic and atonic, and cure biliousness, while seeds are used to treat fever, bronchitis, diarrhea, and diabetes [14].Snake gourd helps follicles resist hair loss and promotes the growth of new hair since it is rich in vitamins, minerals, and carotenes [7].

2. EXPERIMENTAL DESIGN

2.1. Collection of Plant material

Fresh peel of *Trichosanthes cucumerina* collected from Tirupattur, dried and converted into a powder using an electric blender. The dried powders were used for further analysis. Take 5 grams of *Trichosanthes cucumerina* peel powder + 50 ml of distilled water, 5 g of *Trichosanthes cucumerina* peel powder + 50 ml of diethyl ether and 5 g of *Trichosanthes cucumerina* peel powder + 50 ml of methanol was placed in a thimble and extracted for 8 cycles in a Soxhlet apparatus separately. After 8 cycles, extract was filtered by whatman no.1 filter paper. The Fig. 1 shows the *Trichosanthes cucumerina* and its extraction are below,

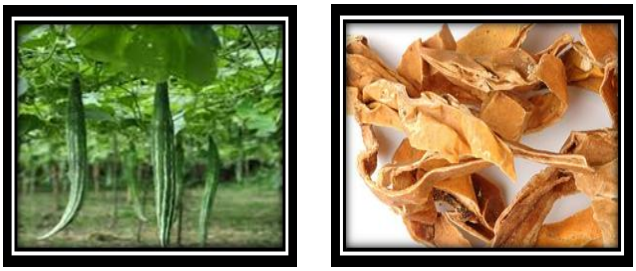

Fig.1. *Trichosanthes cucumerina* and its Peel

2.2. Phytochemical Analysis

The plant extract solutions were assessed for the existence of the phytochemical analysis by using the following standard methods. [8]

Test for Anthraquinone

10 ml of benzene was added in 6 g of the Ephedra powder sample in a conical flask and soaked for 10 minutes and then filtered. Further 10 ml of 10% ammonia solution was added to the filtrate and shaken vigorously for 30 seconds and pink, violet, or red color indicated the presence of anthraquinones in the ammonia phase.

Test for Tannin

10 ml of bromine water was added to the 0.5 g plant extracts. Decoloration of bromine water showed the presence of tannins.

Test for Saponin

5.0 ml of distilled water was mixed with plant extracts in a

test tube and it was mixed vigorously. The frothing was mixed with few drops of olive oil and mixed vigorously and the foam appearance showed the presence of saponins.

Tests for Flavonoid

Shinoda Test

Pieces of magnesium ribbon and HCL concentrated were mixed with aqueous plant extract after few minutes and pink color showed the presence of flavonoid.

Alkaline Reagent Test

2 ml of 2.0% NaOH mixture was mixed with plant extracts; concentrated yellow color was produced, which became colorless when we added 2 drops of diluted acid to mixture. This result showed the presence of flavonoids.

Tests for Glycoside

Liebermann's Test

Added 2.0 ml of acetic acid and 2 ml of chloroform with whole plant extracts. The mixture was then cooled and we added H_2SO_4 concentrated. Green color showed the entity of glycine, steroidal part of glycosides.

Keller-Kiliani Test

A solution of glacial acetic acid (4.0 ml) with 1 drop of 2.0% $FeCl_3$ mixture was mixed with the 10 ml plant extracts and 1 ml H_2SO_4 concentrated. A brown ring formed between the layers which showed the entity of cardiac steroidal glycosides [7].

Salkowski's Test

Added 2 ml H_2SO_4 concentrated to the whole plant extracts. A reddish brown color formed which indicated the presence of steroidal a glycone part of the glycoside.

Test for Terpenoid

Added 2.0 ml of chloroform was added with the 5 ml plant extracts and evaporated on the water path and then boiled with 3 ml of H_2SO_4 concentrated. A grey color formed which showed the entity of terpenoids.

Test for Steroid

Added 2 ml of chloroform and concentrated H_2SO_4 were added with the 5 ml plant extracts. In the lower chloroform layer red color appeared that indicated the presence of steroids.

Alkaloid

The solvent free extract (50mg) was stirred with one ml of dilute hydrochloric acid and filtered. The filtrate was tested for alkaloids. Mayer's Test: To the filtrate, a drop of Mayer's reagent was added along the sides of the test tube. A white precipitate indicates the test as positive.

Carbohydrate

To 0.5ml of the extract of the plant sample, 1ml of water and 5-8 drops of Fehling's solution was added at hot and observed for brick red precipitate.

3. RESULTS AND DISCUSSION

Phytochemicals are the naturally occurring chemical substances found in plants. They provide the plant with color and organoleptic qualities. Although they are easily accessible as dietary supplements in many locations, phytochemicals' dormant health benefits can only be accessed by using the entire plant. In addition to providing "immunity against many diseases," phytochemicals are helpful in enhancing immunological responses. Certain phytochemicals, such as phenols, tannins, flavonoids,

saponins, carbohydrates, alkaloids, and phytosterols, have been shown to exhibit physiological and therapeutic properties [9].

3.1. The Preliminary Phytochemical Analysis of different solvent extract of *Trichosanthes cucumerina peel*

The presence of important phytochemical groups, including alkaloids, flavonoids, tannins, saponins, glycosides, phenols, and terpenoids, was qualitatively assessed in each extract using established procedures. Following diethyl ether and water, the results showed that methanol extract had the greatest range of phytochemicals, demonstrating its effectiveness in extracting both polar and semi-polar molecules.

Phytochemicals, commonly referred to as secondary metabolites, are bioactive substances that are typically derived from plants. Plants create two different kinds of metabolites: primary metabolites and secondary metabolites. The regular metabolism of plants, including growth and development, depends on primary metabolites[10].

The Table 1 shows the Preliminary phytochemical analysis of different solvent extract of *Trichosanthes cucumerina peel as* follows,

There may not be much use for the secondary metabolites that plants produce. Bioactive chemicals such as tannins, alkaloids, carbohydrates, terpenoids, steroids, and flavonoids are among the organic compounds found in medicinal plants that have a specific physiological effect on humans. The primary or rather secondary metabolism of living things produces these chemicals [11].

Secondary metabolites are incredibly diverse substances with unknown functions in terms of both chemistry and taxonomy. Large-scale pharmacological and biological activities, including antioxidant constituents (hydrolyzable tannins, phenolic acid and flavonoids) of plant materials, give phytochemicals the potential to protect against cancer, heart disease, and other diseases as well as have anti-carcinogenic and anti-mutagenic properties [12].

Table 1: The Preliminary Phytochemical Analysis

Phytochemical Constituents	*Trichosanthes cucumerina Peel*		
	Aqueous	**Diethyl ether**	**Methanol**
Carbohydrates	+	+	+
Alkaloids	-	-	+
Flavonoids	+	+	+
Steroids	-	-	+
Terpenoids	+	-	+
Tannins	+	+	+
Quinones	+	-	+
Phenols	+	+	+
Saponins	-	+	-
Glycosides	-	-	-

Indicated as: + means Presence, - means Absence

Analysis of the phytochemicals found in the plant extracts showed the presence of components known to have both physiological and therapeutic effects. Protein, carbs, phenols, steroids, alkaloids, flavonoids, and tannins were

among the phytochemicals found in the plant extracts, according to analysis [13].

4. CONCLUSION

The phytochemical analysis of different solvent peel extracts of *Trichosanthes cucumerina* revealed the presence of a wide range of bioactive compounds such as alkaloids, flavonoids, tannins, saponins, glycosides, terpenoids, and phenolic compounds, with variations depending on the solvent polarity. These findings highlight the significant medicinal potential of the peel, which is often discarded as waste, suggesting its role as a valuable source of natural antioxidants and therapeutic agents. The study emphasizes that solvent selection plays a crucial role in the qualitative and quantitative extraction of phytoconstituents, and further in-depth investigations including quantitative assays and bioactivity studies are necessary to validate the pharmacological importance of these compounds for drug development and nutraceutical applications.

Conflict of Interest: Nil

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