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PHYTOCHEMICAL ANALYSIS AND ANTIMICROBIAL ACTIVITY OF *CUCUMIS MELO* PEEL EXTRACT

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Abstract

Medicinal plants are the source of natural medicine and impressive number of modern drug have been used to treated various diseases like cancer, diabetics, cardiovascular diseases in all over the world. In the present study the phytochemical analysis and antimicrobial activity of *Cucumis melo* peel extract were assessed. The results of methanol peel extract of *Cucumis melo* revealed the presence of secondary metabolites like alkaloid, carbohydrate, flavonoid, steroid, terpenoid, tannin, quinone, phenol and absence the bioactive compounds namely saponins and glycosides were respectively. The methanol peel extract of *Cucumis melo* showed significantly increased *Pseudomonas fluorescens* when compared to control and against all the microorganisms. It can be concluded that the methanol peel extract of *Cucumis melo* contains broad spectrum of bioactive compounds and also exhibit antimicrobial activity against all the tested microorganisms . It indicates the presence of these biologically active chemical in *Cucumis melo* may justify their wide usage in traditional medicine .

Keywords: *Cucumis melo,* Traditional medicine, Phytochemicals and Antimicrobial Porperties.

1. Introduction

Natural products play an important roles of drug discovery process include provide basic compounds affording less toxic and more effective drug molecules, serve as extremely useful natural drugs, exploration of biologically active prototypes towards newer and better synthetic drugs and modification of inactive natural products by suitable biological or chemical means into potent drugs . Muskmelons are monoecious plants. They do not cross with watermelon, cucumber, pubpkin, or squash but varieties within the species intercross frequently [1]. The genome of *Cucumis melo* L. was first sequenced in 2012. Muskmelons are an excellent source of vitamin A and vitamin C, and a good source of potassium.

In addition to their consumption when fresh, melons are sometimes dried. Other varieties are cooked, or grown for their seeds, which are processed to produce melon oil . The Phytochemical "phyto" means Greek word for plant that nonnutritive plants chemical they have protective or preventive disease human from a host of disease. Phytochemical studies have shown that plants with antimicrobial activity contain bioactive constituents such as tannins, flavonoids, alkaloids and saponins. Alkaloids and flavonoids have been used as antiviral, antibacterial, antimicrobial and anticancer agents. Phenolic and polyphenolic are the other group of secondary metabolites .[2]

An antimicrobial is substance that kills of inhibits the growth of microorganisms such as bacteria fungi or protozoan. Antimicrobial drugs either kill microbes (microbicidal) or prevent the growth of microbes (microbistatic). They did not know at that time that the reason one bacterium failed to grow was that the other bacterium was producing an antibiotic. Technically, antibiotics are only those substances that are produced by one microorganism that kill, or prevent the growth of another microorganism [3]. Hence, the present study entitled Phytochemical analysis and antimicrobial activity of *Cucumis melo* peel extract.

2. Materials and Methods

2.1. Collection and Preparation of fruit material

The fresh *Cucumis melo* will be purchased from a local market in Tirupattur and used for the study. The *Cucumis melo* is washed thoroughly with distilled water and *Cucumis melo* will be peeled off carefully with a skin peeler. The peeled skin will be shading dried and fine powder using electric mixing grinder. Finally, this fine powder is stored in an air tight container and stored away from direct sunlight and in a cold, dry place. To take 5 grams of melon peel powder with 50ml of methanol in conical flask, store it in a dark area for two days. These extracts are filtered into a sterile conical flask after two days.

2.3. Phytochemical Analysis

The methanol extract of *Cucumis melo* solutions were measured for the existence of the phytochemical analysis by using the following standard methods.

Test for Carbohydrate

Taken 0.5ml of extract and 1 ml of water, five to eight drops of Fehling's reagent were added finally observed for brick red precipitate.[4]

Test for Glycoside

Added 2 ml conc. H_2SO_4 with melon extract and reddish-brown color are formed which is indicated the presence of glycoside.

Test for Tannin

Taken 10 ml of bromine water and 0.5ml melon extract added showed the presence of decoloration means presence of tannin.

Test for Saponin

Taken 5.0 ml of distilled water mixed with melon extract in a test tube vigorously the foam appearance showed the presence of saponin.

Tests for Flavonoid

Taken 1 ml of 2 % sodium hydroxide mixed with 1 ml melon extract first yellow color appeared which became colorless then added 2 drops of diluted H_2SO_4 the result showed the presence of flavonoid.

Test for Terpenoid

Taken 2 ml of chloroform with added 5 ml melon extract kept it water path for 5 minutes then added drop by drop 3 ml of conc. H_2SO_4 the grey color appeared indicated means the presence of terpenoid.

Test for Steroid

Taken 2 ml of chloroform with added 2 ml of conc H_2SO_4 were added with 4 ml melon extract. In the lower chloroform layer red color appeared that indicated the presence of steroid.

Test for Alkaloid

Taken 2 ml of melon extract with one ml of dilute hydrochloric acid and filtered. The filtrate was tested for alkaloids. To the filt22rate, a drop of Mayer's reagent was added along the sides of the test tube.

Test for Quinone

Taken 5 ml of the melon extract was boiled with10% HCl for few minutes in a water bath. It was filtered and allowed to cool. Equal volume of Chloroform was added to the filtrate. Few drops of 10% ammonia were added to the mixture and heated. Formation of pink colour indicates the presence of Quinone's.

2.4. Antimicrobial Activity

Principle

The antimicrobials present in the plant extract are allowed to diffuse out into the medium and interact in a plate freshly seeded with the test organisms [5]. The resulting zones of inhibition will be uniformly circular as there will be a confluent lawn of growth . The diameter of zone of inhibition can be measured in millimeters .

Reagents:

Taken 33.9g of Muller Hinton Agar Medium was dissolved in 1000 ml of distilled water to prepare the medium. The dissolved medium was then autoclaved at 15 lbs pressure at 121°C for 15 minutes, and it was poured onto 100 mm petri plates while still molten. Taken 13g of commercially available nutrient medium were dissolved in 1000 ml of distilled water to create one litre of nutrient broth, which was then brought to a boil to completely dissolve the medium. The medium was dispensed as needed and autoclaved for 15 minutes at 15 pounds of pressure (121 degrees Celsius) to sterilise it.

Procedure

The Petriplates containing 20ml of Muller Hinton medium were seeded with 24hr culture of bacterial strains. Wells were cut and 20µl of the melon extracts were added. And then plates were kept it incubated at 37°C for 24 hours. The antibacterial activity was assayed by measuring the diameter of the inhibition zone formed around the well.

3. Results and Discussion

3.1. The Preliminary Phytochemical Analysis of methanol peel extract of *Cucumis melo*

The phytoconsituents of methanol extract of *Cucumis melo* peel showed the incidence of bioactive compounds namely carbohydrate, alkaloid, flavonoid, steroid, terpenoid, tannin, quinone, phenol and absence the bioactive compounds namely saponin and glycoside. The Table 1 shows the Preliminary phytochemical analysis of methanol peel extract of *Cucumis melo* as follows, The Presence of flavonoids, tannins, and alkaloids has been observed to exhibit various biological properties related to antioxidant mechanisms . They are effective hydrogen donors that inhibit the lipid oxidation and chelate metal ions, making them good anti-oxidants . The cardiac glycosides are basically steroids with an inherent ability to afford a very specific and powerful action mainly on the cardiac muscle when administered through injection into man or animal [6].

It has been reported that cardiac glycosides are utilized to treat cardiac arrhythmia and congestive heart failure. Their method of action begins with blocking the Na+/K+ pump, which raises calcium ion levels and makes more Ca2+ available for heart muscle contraction, which

restores cardiac output and lessens heart distension. The primary energy source is carbohydrates. They support the central nervous system, muscles, heart, kidneys, and brain in terms of fuel. Glycosides are substances that, when hydrolyzed by an acid or enzyme, produce glucose, hydrogen cyanide, and aldehyde or ketone. [7] Foods high in endogenous cyanide, or cyanogenic glycosides, are the primary source of dietary exposure to cyanide.

It has been claimed that phenolic chemicals function as antioxidants and offer a broad range of medical benefits, including the ability to treat diabetes, cancer, and inflammation.

Table 1: The Qualitative Phytochemical Analysis

Phytochemical Constituents	**Methanol peel extract of *Cucumis melo***
Carbohydrate	+
Alkaloid	+
Flavonoid	+
Steroid	+
Terpenoid	+
Tannin	+
Quinone	+
Phenol	+
Saponin	-
Glycoside	-

Indicated as: + means Presence, - means Absence

Phenolic compounds such as gallotannins, condensed tannins and flavonoids are known to inhibit some molecular targets of pro-inflammatory mediators in inflammatory responses. The phytochemicals also act as antioxidants by scavenging free radicals and thereby attenuate the inflammatory process [8] . According to tannins are what give tea its taste and make it useful for treating skin eruptions. The astringent qualities of tannins aid in the management of intestinal disorders. Dietary anti-nutrients called tannins give food and beverages an astringent flavour; for this reason, they are helpful in the food processing and wine-making sectors.

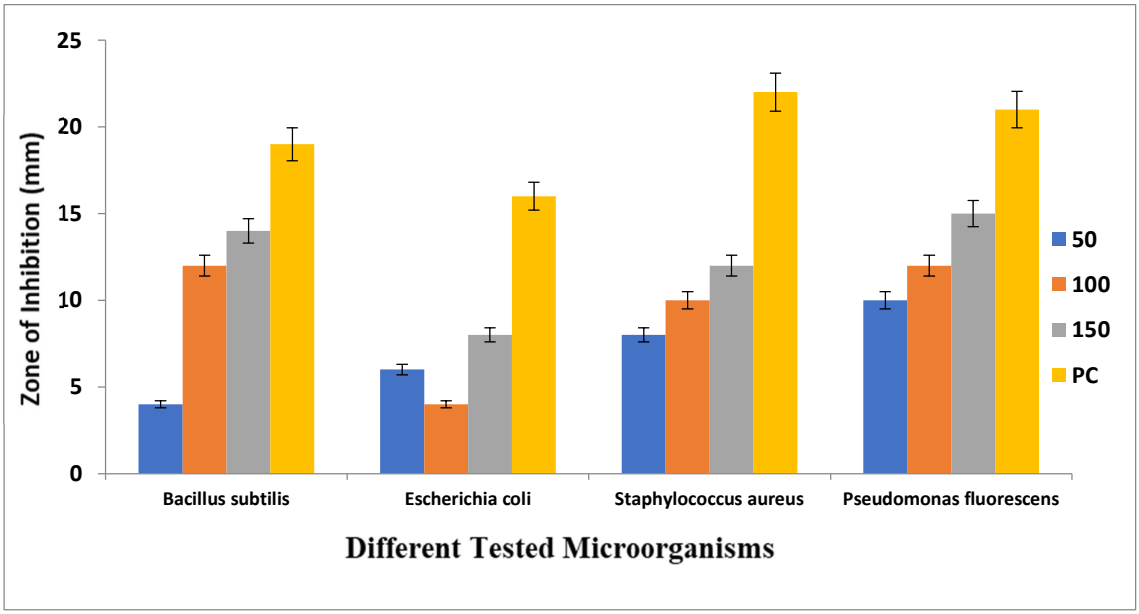
The treatment of sore throat, haemorrhage and wound healing has also been linked to tannins. But if ingested in excessive quantities, tannins inhibit the absorption of minerals such as iron and calcium which may lead to aneamia or osteoporosis if prolonged. Flavonoids are good antioxidants and free radical scavengers which help in inhibiting cancer cell activity. They can lower the risk of arthritis, osteoporosis, allergies and viral disease caused by herpes simplex virus, parainfluenza virus and adenovirus. Plants terpenoids are used extensively for their aromatic qualities and play a role in traditional herbal remedies as they are used as flavour enhancer. Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities [9].

3.2. Antimicrobial activity of methanol peel extract of *Cucumis melo*

The antimicrobial activity of methanol peel extract of *Cucumis melo* against both Gram positive and Gram negative bacteria such as *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas fluorescens* tested by disc diffusion method .

The methanol peel extract of *Cucumis melo* showed significantly increased activity against all the tested microorganisms when compared to Gentamicin (Positive control) and Dimethyl sulfoxide (DMSO, Negative control) was respectively . The methanol peel extract of *Cucumis melo* showed maximum zone of inhibition namely *Pseudomonas fluorescens* (15mm and 12mm), *Bacillus subtilis* (14mm and 12mm), *Staphylococcus* (12mm and10mm) followed by *Escherichia coli,* (8mm and 4mm). When compared to positive control ranges between *Staphylococcus* (22mm), *Pseudomonas fluorescens* (21mm), *Bacillus subtilis* (19mm) and *Escherichia coli* (16mm) and No zone of inhibition for negative control in all the microorganisms.

Antimicrobial agents have a fundamental role in mitigating the worldwide impact of infectious illnesses. The advent and spread of multidrug resistant (MDR) strains of pathogenic bacteria pose a serious threat to public health due to the limited availability of effective antimicrobial medicines for treating pathogenic bacterial infections . Thus, in the light of the evidence of the rapid global spread of resistant clinical isolates, the need to find new antimicrobial agents is of paramount importance. However, the past record of rapid, widespread emergence of resistance to newly introduced antimicrobial agents indicates that even new families of antimicrobial agents will have a short life expectancy.



The issue of antibiotic resistance still poses a significant threat to the global healthcare system in both industrialised and developing nations. The current antibacterial therapy has been significantly threatened by the emergence and spread of multidrug resistant pathogens. This has made it necessary to look for other sources of antimicrobial materials, such plants, which generate a wide range of bioactive chemicals with established medical uses. The purpose of this study was to assess the antibacterial activity of several extracts from medicinal plants against two reference strains of human diseases". Although some extracts exhibited a good antibacterial activity towards different tested bacterial isolates, many plant extracts exhibited a limited antibacterial activity against the test bacterial isolates as judged by their MIC values [10] .

4. Conclusion

It can be concluded that the phytochemical screening of methanol peel extract of *Cucumis melo* showed the presence of bioactive compounds namely carbohydrate, alkaloid, flavonoid, steroid, terpenoid, tannin, quinone, phenol and absence of saponin and glycoside. The methanol peel extract of *Cucumis melo* showed significantly increased activity against *Pseudomonas fluorescens* followed by other microorganisms when compared to positive control and negative control was respectively. Fruit peel is a common waste among household as well as industries. It can lead to the problem of pollution if not utilized or disposed-off properly. The investigation has opened up the possibility to use these *Cucumis melo* peel in future drug development for the treatment of various pathogenic and resistant microbes. Thus, these are best natural and economic sources of antimicrobial agents and can be used to cure various microbial diseases.

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Conflict of Interest: Nil

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