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EXTRACTION, IDENTIFICATION AND BIOLOGICAL ACTIVITIES OF PHYTO CONSTITUENTS FROM SANSEVIERIA CYLINDRICA

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ABSTRACT
Plants are known for its rich source of bionutrients. Historically several plants have been used to cure several chronic diseases including cancer, diabetes and coronary diseases. The aim of the study was to find out the presence of phytochemicals and the antimicrobial activity of the ethyl acetate extract of *Sansevieria cylindrica* root (SCEA-R). A qualitative phytochemical analysis was performed for the detection of steroids, flavanoids, terpenoids, tannins, saponins and phenolic acids. Knowledge about the phytochemicals present in various varieties of plants brings about a revolution in the age of synthetic medicines. The tested plant extract showed inactivity against the tested human pathogens and may be the higher concentration of the extract inhibits the microbial growth. The FTIR study revealed the presence of possible functional groups in the plant extract.

KEYWORDS: Bionutrients, antimicrobial activity, tannins, terpenoids, phenolic acids.

1. INTRODUCTION

The plants are basically made up of primary metabolite like chlorophyll, amino acids, nucleotides, simple carbohydrates or membrane lipids that play vital roles in photosynthesis, respiration, solute transport, translocation, nutrient assimilation and differentiation[1] and secondary metabolites that are synthesized by the plants as a part of their defense system.[2] The concentration of such phytochemicals are distributed unevenly throughout the plant body and such nutrients may or may not have the therapeutic properties.[3] *Sansevieria cylindrica* is filled with bionutrients and is one of the most recommended plants for improving air quality. It is able to absorb 107 types of toxins, including air pollution, cigarette smoke (nicotine).[4] The phytochemical screening and pharmacological activity of various plant extracts are reported by researchers.[5-10]

2. Experimental

2.1. Materials

Fresh root of *Sansevieria cylindrica* was powdered and soaked in 500 ml of ethyl acetate for 3 days. After the immersion period the solution was filtered and stored. The filtrate was used as a stock solution for further screening and pharmacological studies.

2.2. Methods

2.2.1. Phytochemical Screening

The extract was examined for the presence of the following phytochemicals: alkaloids, tannins, saponin, steroid, terpenes, flavonoids, and cardiac glycosides etc, using standard procedures[13] as follows:

Test for Saponins

The extract, with 5mL of water was vigorously shaken and heated to boil. Frothing that persisted for 30 minutes shows the presence of saponin.

Test for Tannins

The extract was dissolved in 5mL of distilled water, then boiled gently and cooled. To 1mL of the solution, 3 drops of Ferric Chloride solution was added. A deep greenish-black colouration shows a positive test for tannins.

Test for flavones

The formation of red color shows the presence of flavones by adding a few magnesium turnings and 1-2 drops of conc. HCl to the extract.

Test for quinones

Appearance of red colour on addition of concentrated sulphuric acid to 1ml of the extract indicates the presence of quinons.

Test for Alkaloids

The extract was dissolved in 5mL of 1% HCl and 5 drops of Drangendoff's reagent were added. The orange precipitate indicates the presence of alkaloids.

Test for terpenoids
To 1 ml of extract, tin (one bit) and thionyl chloride were added. Appearance of pink color indicates the presence of triterpenoids.

Test for coumarins
10% sodium hydroxide was added to the extract. Coumarins is confirmed by the formation of yellow color.

Test for steroids
Glacial acetic acid and 1mL of acetic anhydride and two drops of concentrated sulphuric acid were added to the extract. Bluish green formation indicates the presence of steroids.

Test for tannins
2ml of the extract was mixed with 2ml of $FeCl_3$. A blue or greenish black precipitate indicated the presence of tannins.

Test for saponins
Extract was diluted with distilled water to 5ml and this was shaken in a conical flask for 15 minutes. Formation of foam indicates the presence of saponin.

Test for flavones
To the extract, a few magnesium turnings and 1-2 drops of conc. HCl were added; formation of red color shows the presence of flavones.

Test for quinones
Concentrated sulphuric acid is added to the extract. The red color formation shows the presence of quinones.

Test for phenols
10% aqueous ferric chloride is added to the extract. Green color confirms the presence of phenols.

Test for proteins
40% sodium hydroxide solution and two drops of one percent copper sulphate solution is added to the extract. Violet colour confirms the presence of proteins.

Test for carbohydrates
Alpha-naphthol solution, and concentrated sulphuric are added to the extract. Reddish violet colour at the junction of the two liquids confirms the presence of carbohydrates.

Test for glycosides
A small amount of extract was dissolved in 1ml water and then aqueous sodium hydroxide was added. Yellow colour indicates the presence of glycosides.

Test for glycosides
5mL of extract was treated with 2mL of glacial acetic acid, containing one drop of ferric chloride solution and 1 ml of concentrated sulphuric acid. A browning of the interface indicates a deoxysugar characteristic of 'cardiac glycosides' (cardenolides). In the acetic acid layer, a greenish ring is observed.

Test for amino acids
Ninhydrin solution is added to the extract, purple color formation indicates the presence of amino acids.

Detection of carotenoids
The ethyl acetate extract is mixed with conc. sulphuric acid. Blue colour formation indicates the presence of carotenoids.

2.2.2. Antibacterial activity
The test microorganisms used for antimicrobial sensitivity testing included *Staphylococcus aureus*, *Escherichia coli.* Antibacterial assay was carried out on Muller Hinton agar. The extract fractions were diluted in the respective solvent used for its extraction. The extract fractions were diluted and used at concentrations of 20, 60 and 80µL concentration. The assay is established by the measurable zones of inhibition after 24 h of incubation at 37°C. Ciproflaxacin is used as standard control.

2.2.3. Antifungal activity
The test microorganisms used for antimicrobial sensitivity testing included Aspergillus niger, Candida albicans. Antifungal assay was carried out on Czapek-Dox Agar. The extract fractions were serially diluted in the respective solvent used for its extraction. The extract fractions were diluted and used at concentrations of 20, 60 and 80µL concentration. The assay is established by the measurable zones of inhibition after 96 h of incubation at 27°C.

2.2.4. FTIR analysis
The crude SCEA-R extract was employed for FTIR analysis using a Shimadzu spectrometer in the spectral region between 4000 and 500 cm^{-1}.

3. RESULTS AND DISCUSSION

3.1. Phytochemical screening

The presences of medicinally important metabolites are reported by screening study. The phytochemical constituents of the plant extract is shown in Table 1 The screening shows the presence of alkaloids, saponins, quinones and carbohydrates in the plant extract.

Table 1: Phytochemical analysis of SCEA-R.

S.NO	Phyto Constituents	SCEA-R
1.	Alkaloids	+
2.	Terpenoids	-
3.	Coumarins	-
4.	Steroids	-
5.	Tannins	-
6.	Saponins	+
7.	Flavonoids	-
8.	Quinones	+
9.	Phenols	-
10	Proteins	-
11.	Carbohydrates	+
12	Glycosides	-
13	Amino acids	-
14	Carotenids	-

Presence-(+) Absence-(-)

3.2. Anti Microbial activity

The antibacterial and antifungal activities of the crude SCEA-R extract with different concentration ranges showed that no zone of inhibition by the plant extract due to the thickness of the cell wall of the microorganisms and may be the higher concentration of the plant extract inhibits the growth of the pathogens. The antimicrobial assays are shown in Figure 1 and Figure 2.

E.coli [SCEA-R] **S.aureus[SCEA-R]**

Fig. 1: Antibacterial Testing of Scea-R.

A.niger[SCEA-R] **C.albicans[SCEA-R]**

Fig. 2: Antifungal Testing of Scea-R.

3.3. FTIR Analysis of SCEA-R

The FTIR peak values and corresponding spectrum of SCEA-R is shown in Table 2 and Fig 3The peak at 3649cm^{-1} indicates the presence of alcohols and phenols, 2985.81 cm^{-1} shows the presence of alkyl, 1739 .79 cm^{-1} indicates the presence of ketone or esters, 1647.21 cm^{-1}

indicates the presence of aromatic compounds, 1372.32 cm^{-1} indicates the presence of nitrogen containing compounds. 1242.16 cm^{-1} indicates the presence of aromatic ethers, 1054.42 cm^{-1} indicates the presence of amine group, 933.55 cm^{-1} indicates the presence of cyclic compounds, 848.68 cm^{-1} indicates the presence of para substituted aromatic compounds. The above results indicate the presence of various functional groups in the plant extract.

Table 2: FTIR peak values for SCEA-R.

FTIR peak values cm^{-1}	
SCEA-R	**POSSIBILE GROUPS**
3649	OH-Alcohols & Phenols
2985.81	$-CH_3$
1739.79	C=O in esters or lactones
1647.21	C=C in benzene
1372.32	N-O in nitro compound
1242.16	C-O in aromatic ethers
1054.42	-NH in Primary amines
933.55	-C-H in benzene
848.68	-C-H in para di substituted benzene

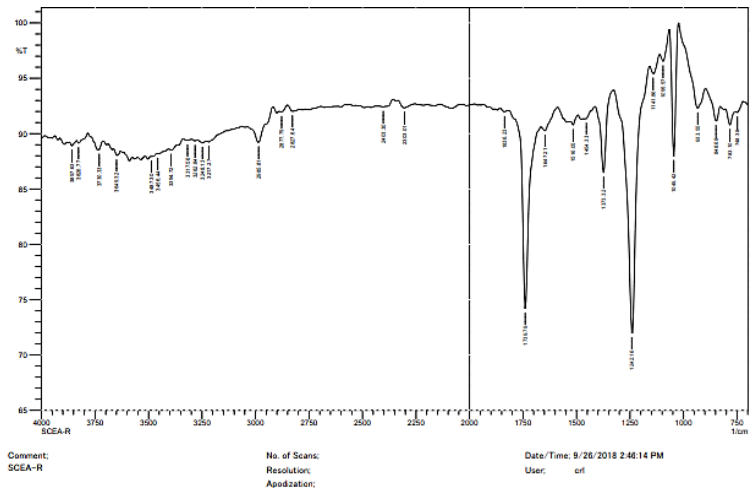

Fig. 3: FITR Spectrum of SCEA-R.

CONCLUSION

- The preliminary qualitative phytochemical screening of root extract of *Sansevieria cylindrica* shows the presence of alkaloids, carbohydrates, saponin and quinones. It indicates that ethyl acetate root extract contains bioactive constituents.
- The ethyl acetate extract showed no inhibition against pathogenic bacterial and fungal species due to the micro liter concentrations of the extract which was indicated by anti-bacterial susceptibility assay and may be the higher concentration of the extract exhibits the anti microbial activity.
- FTIR study shows the presence of of different functional groups like –OH,-NH,-C-H.-C=O,C=C, N-O etc. in the plant extract.

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