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Phytochemical Screening & Antibacterial activity of *Scindapsus officinalis* fruit extract against Human Pathogens: An Ethnomedicinal plant

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Abstract: Scindapsus officinalis *used in skin diseases, asthma ulcers, leprosy, nocturnal emissions, diabetes, throat troubles, ophthalmia, tumors and dysentery. Hydro-alcoholic extract of fruits of* Scindapsus officinalis *were evaluated on the basis of Phytochemical, Physiochemical screening and antibacterial activity against human pathogen bacteria such as Bacillus subtilis, Bacillus cereus, Escherichia coli and Klebsiella pneumonia at various concentrations (10%, 20%, 40%, 60%, 80 %). Findings of work revealed that fruit extracts of* Scindapsus officinalis *have promising antibacterial properties can be of great significance in therapeutic treatments.*

Keywords*:* Scindapsus officinalis, *Phytochemical Screening, Physiochemical Screening, Antibacterial activity*

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I. Introduction

Antibacterial drugs have caused a dramatic change not only of the treatment of infectious diseases but of a fate of mankind. Antimicrobial chemotherapy made remarkable advances, result in the overly optimistic view that infectious diseases would be conquered in the near future [1]. However, in reality, emerging and re-emerging infectious diseases have left us facing a counter charge from infections [2]. Infections with drug resistant organisms remain an important problem in clinical practice that is difficult to solve. If an improper antibacterial agent happens to be chosen for the treatment of infection with drug-resistant microorganisms, the therapy may not achieve beneficial effect, and more over, may lead to a worse prognosis. In addition, in a situation where multidrug-resistant organisms have spread widely, there may be quite a limited choice of agents for antibacterial therapy[3]. Considering this situation together with the increasing awareness of drug safety, we are now facing a situation of severely limited options among antimicrobial agents [4].

Plant-derived natural products such as flavonoids, terpenes, alkaloids, etc., have received considerable attention in recent years due to their diverse pharmacological properties including anti-bacterial activity [5]. Only few of them were scientifically explored. *Scindapsus officinalis* is a medicinal plant used against diseases such as skin diseases and asthma; it causes flatulence, is good for curing ulcers, leprosy, nocturnal emissions, diabetes, throat troubles, ophthalmia, tumors, dysentery[6]. It is alexetric, anthelmintic, and astringent. Hence, the antimicrobial evaluation of *S. officinalis* fruits is an attempt to investigate the antimicrobial activity against human pathogenic bacterial strains [7].

II. Material and method

2.1 Plant material. S. officinalis fruits were collected from Chennai, Tamil Nadu, and India. They were identified and authenticated from Botanical survey of India, Allahabad (U.P). The voucher specimen has been deposited at the Botanical survey of India, Allahabad (U.P) fruits were dried under shade and coarsely powdered. (figure no.1)

Figure 1: *S. officinalis* fruits

2.2 Preparation of extract. The powdered dried fruits were extracted with 70% ethanol using cold maceration method for 48 hrs. The extract was filtered and concentrated by a Rotary evaporator under reduced vacuum.
2.3. Identification test. Physicochemical studies: Physico-chemical parameters of S. officcinalis fruit powder were determined and reported as Total ash, Acid insoluble ash, water soluble ash, water soluble extractive values, alcohol soluble extractives, loss on drying (LOD), crude fiber content, foaming index.
2.4 Phytochemical studies. Extracts of dried fruits of *S. officinalis* were subjected for the identification of various active constituents, such as carbohydrates, glycosides. alkaloids, fixed oils and fats, proteins and free amino acids, saponins, phenolic compounds and tannins, gums and mucilages, flavonoids, and phytosterol. The extracts were subjected to qualitative preliminary phytochemical screening for identification of phytochemical constituents.
2.5 Evaluation of Anti-bacterial activity
2.5.1 Procurement of micro-organism. Gram-positive bacteria (*Staphylococcus aureus, Bacillus subtilis*) and Gram-Negative bacteria (*Escherichia coli*) were obtained and confirmed at the research laboratory of the School of Life science, ITM University, Gwalior (M.P) India.
2.5.2 Preparation of Culture media. 28 grams of nutrient agar were mixed in a 1000 ml (1L) with distilled water. After this, the solution was put on hot plate for short periods. Then it was kept in an autoclave for nearly 45 minutes. Media was finally poured into the petri plates.
2.5.3 Preparation of Samples. Antibacterial activity of *S. officinalis* at different concentrations of 80, 60, 40, 20, 10 mg/ml of each extract were used for the screening. (NCCLS, 2000)
2.5.4 Experimental Protocol. The in-vitro antimicrobial activity was screened by using Mueller Hinton Agar. The culture plates were prepared by pouring 25 ml of media into sterile petriplates. The plates were allowed to solidify for 5 min and 0.1 % inoculum suspension of different bacterial strains were swabbed uniformly and the inoculum was allowed to dry for 5 minutes and incubated at 37°C for about 30 min. The different concentrations of extracts (80, 60, 40, 20, 10 mg/disc) were loaded on 5 mm sterile individual discs. The loaded discs were placed on the surface of medium and the compound was allowed to diffuse for 5 min and the plates were kept for incubation at 37°C for 24 hrs. Negative control was prepared using respective solvent. Ciproflaxacin (Standard drug) (20 µg/disc) was used as positive control. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimeter.

III. Result

3.1 Physiochemical and Phytochemical screening. The ash value was found 6.15 % of total ash, 1.34% of acid insoluble ash, 2.0% of water soluble ash, water soluble extractive values were found to be 8.9%, alcohol soluble extractives value 9.46%, Loss on drying (LOD) was found 3.232%, crude fibre content was 6.651%, foaming index was found to be 109.32.
In Phytochemical screening total flavonoids and tannin content were also determined. Physio-chemical and Phytochemical parameters screening mentioned in table no. 1and 2.

Table 1: Physicochemical Values

S.No	Parameters	Values (%w/w)
i	Ash Values *Total ash* *Acid insoluble ash* *Water soluble ash* *Chloroform soluble ash*	 6.15 ± 0.30 1.34 ± 0.22 2.0 ± 0.24 4.12 ± 0.20
ii	Water soluble extractive value Alcohol soluble extractives	8.99 ± 1.01 9.46 ± 1.02
iii	Loss on drying	3.232 ± 0.389
iv	Crude fiber content	6.651 ± 0.211
v	Foaming index	109.32

Table 2: Phytochemical Values

S.No	Chemical Test	Result
i	*Alkaloids Test*	+
ii	*Carbohydrates Test*	-
iii	*Glycosides Test*	-
iv	*Amino acids Test*	-

v	*Saponins Test*	+
vi	*Flavonoid Test*	+
vii	*Phenolic compounds Test*	+
viii	*Tannins Test*	+
ix	*Terpenoids Test*	-
x	*Steroids Test*	-

3.2 Evaluation of Antimicrobial activity. The antimicrobial activity of hydro-alcoholic extracts of *S. officinalis* fruits using disc diffusion method. At different concentration range between 80 µg/ml to 10 µg/ml are showed maximum zone of inhibition (24 mm) against *Staphylococcus aureus*, *Bacillus subtilis* (24 mm), *Bacillus cereus*. (31 mm), *Escherichia coli* (32 mm) and *Klebsiella pneumonia (34 mm)* are shown in Table 3. The Minimum Inhibitory Concentrations of most active fruit extract of *S. officinalis* 40 µg/ml for *Staphylococcus aureus*, 60 µg/ml for *Bacillus subtilis*, 40 µg/ml for *Bacillus cereus*, 40 µg/ml for *Escherichia coli and* 60 µg/ml for *Klebsiella pneumonia* compared with the Minimum Inhibitory Concentrations of Ciproflaxacin at 20 µg/ml shown in table no. 3 and 4.

Table 3: Antimicrobial Activities of *S. officinalis extract* against Gram (+) and Gram (-) bacterial strains

S.No	**Organisms**	**Zone of Inhibition (mm)**					
		10 µg/ml (Extract)	20µg/ml (Extract)	40 µg/ml (Extract)	60 µg/ml (Extract)	80 µg/ml (Extract)	Ciproflaxacin 20 µg/ml (Standard)
i.	*Staphylococcus aureus*	8	16	24	21	23	21
i.	*Bacillus subtilis*	12	14	18	24	20	24
i.	*Bacillus cereus*	16	15	31	31	30	28
v.	*Escherichia coli*	10	18	32	30	31	31
v.	*Klebsiella pneumoniae*	11	22	30	34	34	34

Table 4: Minimum Inhibitory Concentrations (M.I.C) of the *S. officinalis extract* (µg/ml)

S.No	**Organisms**	**M.I.C of the *S. officinalis extract* (µg/ml)**	
		Concentration	**Ciproflaxacin**
i.	*Staphylococcus aureus*	40 µg/ml	20 µg/ml
i.	*Bacillus subtilis*	60 µg/ml	20 µg/ml
i.	*Bacillus cereus*	40 µg/ml	20 µg/ml
v.	*Escherichia coli*	40 µg/ml	20 µg/ml
v.	*Klebsiella pneumoniae*	60 µg/ml	20 µg/ml

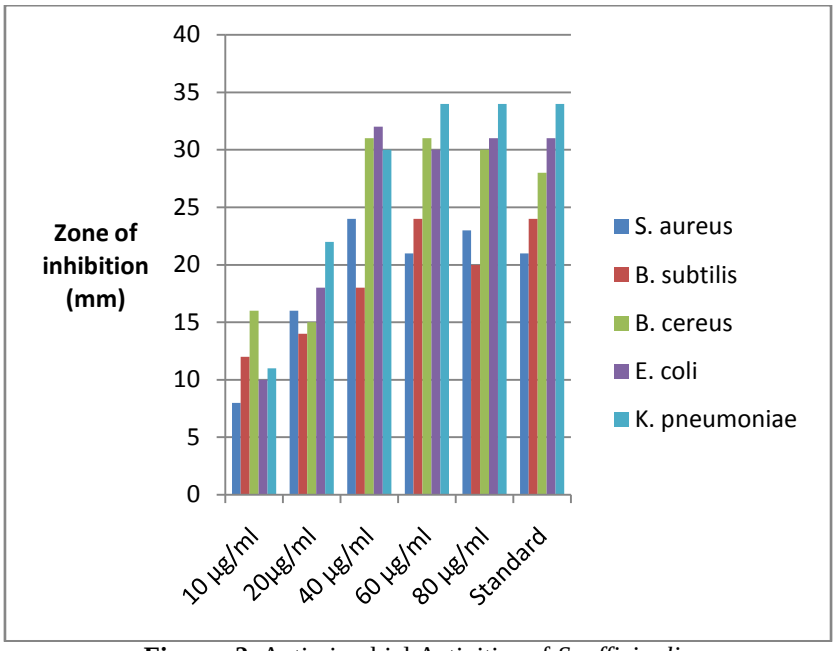

Figure :2 Antimicrobial Activities of *S. officinalis*

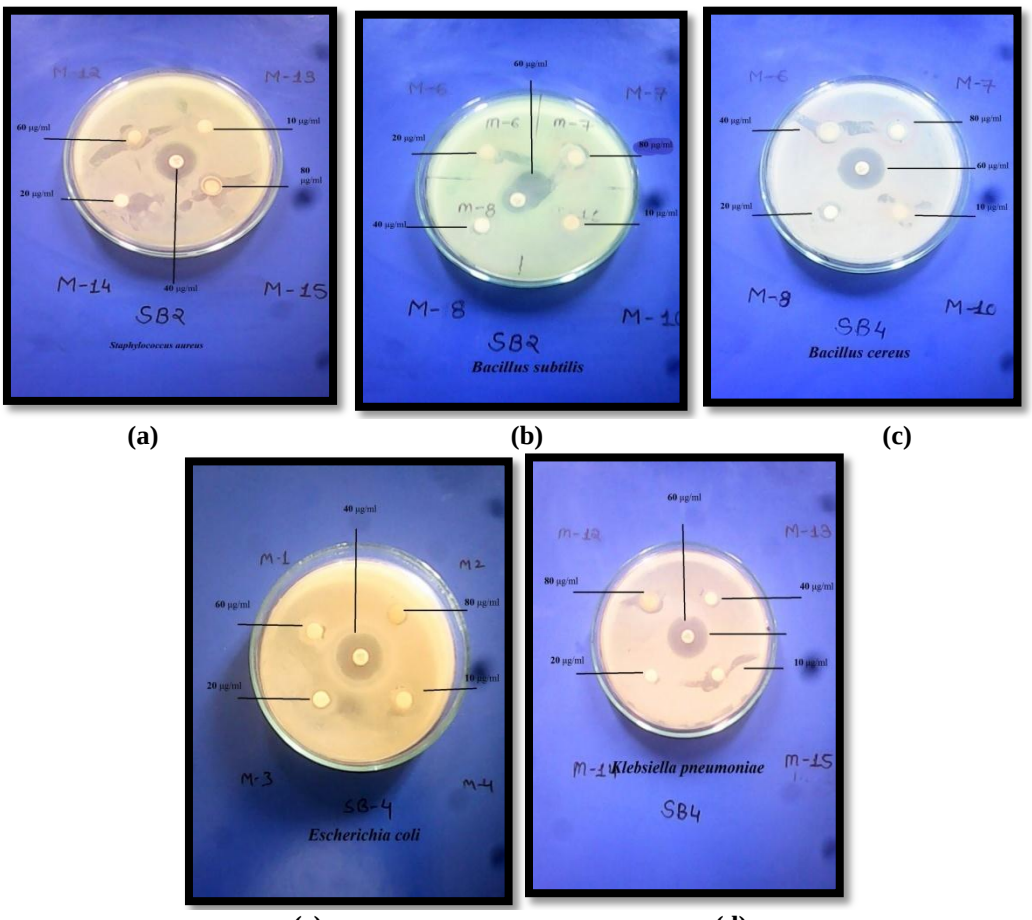

Figure 3: Antimicrobial activity of *S. officinalis* plant extract on gram (+) and gram (-) bacterial strain

IV. Discussion

Objective to investigate antibacterial activity. It was found fruit of *S. officinalis* that exhibited moderate to significant *in vitro* antibacterial activity, preliminary screening showed, that the hydro-alcoholic (80%) extract of *S. officinalis* exhibited Minimum Inhibitory Concentrations of most active fruit extract of *S. officinalis*

at 40 µg/ml for *Staphylococcus aureus*, 60 µg/ml for *Bacillus subtilis*, 40 µg/ml for *Bacillus cereus*, 40 µg/ml for *Escherichia coli and* 60 µg/ml for *Klebsiella pneumonia* compared where as Ciproflaxacin (20 µg/ml) used as the Positive control .Results obtained from this study, indicated that, the plant extracts showed the strongest antimicrobial activity than the commercially available antibiotic.

V. Conclusion

Results obtained in this study have considerable value with respect to Physiochemical, Phytochemical Screening and antibacterial activity of plant. These results suggest hydro-alcoholic extract of *S. officinalis* develop as a potential drugs as antimicrobial agent which active against human pathogens.

Conflicts of interests

The author(s) confirm that this article content has no conflict of interest.

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