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Research Article

Preliminary Evaluation of Antioxidant and Antimicrobial Activity of *Solanum khasianum* Berries

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ABSTRACT

The present investigation was carried out for the evaluation of antioxidant and antimicrobial activities of methanolic extract of berries of *Solanum khasianum* Clarke. Antioxidant activity by nitric oxide and DPPH methods reveals that methanolic extract of *Solanum khasianum* shows maximum percentage of inhibition when compared to the standard drug, Ascorbic acid. Antibacterial activity by Agar well diffusion method reveals that methanolic extract of berries of *Solanum khasianum* shows maximum zone of inhibition when compared to the standard drug.

Key Words: Antioxidant activity, Antibacterial activity, *Solanum khasianum,* DPPH method, agar well diffusion method.

INTRODUCTION

The past studies have shown medicinal plants, many of which exhibit antioxidant and antimicrobial properties which can protect the human body against both cellular oxidation reactions and pathogens. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural resources. Antioxidants help to neutralize free radicals, which are unstable molecules that are linked to the development of a number of degenerative diseases such as cancer, cardiovascular disease, cognitive impairment immune dysfunction, cataract and macular degeneration. [1, 2, 3, 4]

Solanum khasianum Clarke synonym of *Solanum aculeatissimum* Jacq., *Solanum* viarum Dunal commonly called as Dutch egg plant belongs to the Family: Solanaceae is generally distributed throughout the North-east parts of India.[5,6,7,8,9,10] It is a stout, branched, woody shrub attaining a height of 0.75 to 1.5 m. The stem has spines, the leaves are ovate to lobed with spines on both the surfaces, the flowers are hermophrodite, borne on axillary clusters, white; the berries are yellowish when ripe or greenish; the seeds are small, brown in colour and abundant, embedded in a sticky mucilage. The steroid-bearing solanum holds an important place due to its quick growth and low initial investment in its commercial cultivation. It yields a glyco-alkaloid, solasodine, a nitrogen analogue of diosgenine. Solasodine[11] through 16-dehydro-pregnenolone (16 DPA) is converted to a group of compounds like testosterone and methyl testosterone and corticosteroids like prednisolone and hydrocortisone. These steroidal compounds have anti-inflammatory, anabolic and antifertility properties, due to which they find large-scale use in health and family planning programmes all over the world.[12] The past studies revealed that the ethanol extract of berries of *Solanum khasianum* Clarke possess anti-inflammatory and anthelmintic activities. [13]

MATERIALS AND METHODS

Collection of Plant Material: The plant was collected from the surroundings of Karimnagar in Andhra Pradesh. It was authenticated by the taxonomist Prof. Naqui from Karimnagar, Andhra Pradesh, India.

Preparation of the extract-

Alcoholic extract of *Solanum khasianum* Clarke: About 1kg fresh berries were extracted first with 2 litres of 95% ethanol by cold maceration method. After completion of extraction it was filtered and concentrated to dry mass by vaccum distillation. A dark yellowish-green colour residue was obtained. The extract was then stored in a dessicator.

Method of Evaluation-

Nitric oxide scavenging activity- Briefly, 5mM sodium nitroprusside was prepared in phosphate buffered saline and mixed with different concentrations of extracts (50,100 and 150 µg/ml) followed by incubation at 25ºC for 30 min. A control without the extracts but with equivalent amounts of solvents was taken. After 30 min, 1.5 ml of incubated solution was pipette out and diluted with 1.5 ml of Griess reagent (sulphanilic acid reagent (0.33%i in 20% glacial acetic acid) and will be allowed to stand for 5 min for completing diazotization. The absorbance of the chromophore formed during diazotization of the nitrite with sulphanilamide and subsequent coupling with N-1-napthyl ethylene diamine dihydrochloride was measured at 546 nm and percentage scavenging activity was measured with reference standard.[14]

% scavenged = [(Absorbance of control–Absorbance of test sample)/ (Absorbance of control)] × 100

%inhibition = $(1-A_1/A_0) \times 100$

A_1 control is the absorbance of the control reaction mixture. A_0 test is the absorbance of sample of the extracts

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Nitric oxide method

Type of extract	Concentration, (ug/ml)	absorbance	% Inhibition	IC50 (ug/ml)
Alcohol extract	100	1.0234	40.68	
	200	0.9823	49.89	
	300	0.8971	53.88	286
	400	0.8836	61.23	
	500	0.6894	69.98	
Ascorbic acid	100	0.9983	44.89	
	200	0.9144	52.21	
	300	0.8567	58.93	243
	400	0.8121	69.90	
	500	0.6234	76.45	

DPPH method

Type of extract	Concentration, (ug/ml)	absorbance	% Inhibition	IC50 (ug/ml)
Alcohol extract	100	0.8234	34.81	
	200	0.8113	39.90	311
	300	0.7781	45.22	
	400	0.6214	51.45	
	500	0.5521	59.21	
Ascorbic acid	100	0.8113	37.94	
	200	0.7214	45.82	
	300	0.6756	59.13	274
	400	0.5821	62.12	
	500	0.5340	69.15	

Antimicrobial activity of *Solanum khasianum* Clarke by Agar well diffusion method against S. *aureus* and E. *coli*

Sl.no	Name of the extract	Name of the organism used	Concentration (µg/ml)	Zone of inhibition (mm)
1	Alcohol	S.aureus	100	10
2	Alcohol	E.coli	100	12
3	Standard (Streptomycin)		100	24

at different concentrations.

DPPH (1, 1-diphenyl-2-picryl-hydrazyl) radical scavenging activity: DPPH radical scavenging activity was done by serial dilution by taking diluted methanol (1:20) as standard. 10ml of various diluted extracts of various concentrations (50,100 and 150µg/ml) were added to 1 ml DPPH solution (0.004%) and incubated for 10 min at room temperature. Absorbance of test and reference standard, ascorbic acid was measured at 517 nm. The amount of DPPH scavenging was calculated by using the following formula: [14, 15]

% DPPH radical scavenging = [(Absorbance of control – Absorbance of test sample)/ (Absorbance of control)] × 100

Antimicrobial Activity: Fresh alcoholic extract of *Solanum khasianum* Clarke was used for the determination of antimicrobial activity

Microorganisms used: Staphylococcus *aureus,* Escherichia *coli*,

Method-

Agar well diffusion method: The antimicrobial activity of the extracts was carried out by Agar well diffusion method.[16] By using the organisms, inoculums were prepared by inoculating the organisms in 10 ml of nutrient broth and incubated at 37ºC for 18 hrs. Nutrient agar medium was poured in to each sterilized petridish and organism was inoculated. Wells were made in to the medium by using sterile cork borer and each sample of the extracts (100µl) was filled in to the wells of agar plates directly by using a micropipette. Then the plates were incubated at 37ºC for 24 hrs. After incubation, the zone of inhibition was observed and measured in mm.[17]

RESULTS AND DISCUSSIONS

Antioxidant activity by nitric oxide method and DPPH method states that methanolic extract of *Solanum khasianum* Clarke shows good antioxidant activity. As concentration increases, percentage of scavenging activity also increases for methanolic extract of *Solanum khasianum* Clarke. Antimicrobial activity by agar well diffusion method by using microorganisms Staphylococcus *aureus,* Escherichia *coli*, states that methanolic extract of *Solanum khasianum* Clarke shows maximum zone of inhibition i.e., antimicrobial effect against the microorganism when compared to the standard drug.

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