

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES ANTIBACTERIAL INVESTIGATION OF *SOLANUM XANTHOCARPUM*

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ABSTRACT

In Ayurveda *Solanum xanthocarpum* (Family : *Solanaceae*) is known as Kantkari. For the human health care this plant is totally medicinally contributed. In Ayurvedic text *Solanum xanthocarpum* is found very active and beneficial medicinal plant as antifertility, antipyretic, anticancer, antiallergic, anti-inflammatory, antihistemic, hypoglycemic, antibacterial, antioxidant properties. The present work study revealed and signified the antibacterial investigations of the crude extract obtained from the roots of *Solanum xanthocarpum* using the different solvents i.e. ethanol, chloroform, water and acetone and the effect of the different extracts were tested on Gram positive bacteria i.e. *staphylococcus aureus*, *Bacillus subtilis* and Gram negative bacteria e.g. *Pseudomonas aeruginosa*, *E. coli* by the agar well diffusion method. Although several points like antiinflammatory, antianaphylactic, immunomodulation, antiallergic and antitumor effects of the roots are still remained to be validated scientifically, yet for the vivid bacterial infections the present study work supports scientifically the usage of the roots of the plant as a very eminent remedy.

Key words: *Solanum xanthocarpum*, *Solanaceae*, Antibacterial, Antioxidant.

I. INTRODUCTION

The Solanaceae family is widely distributed in different regions of the world. It is composed of approximately 84 genera and 3000 species¹. *Solanum xanthocarpum* (Family: Solanaceae) commonly known as the Indian night shade or Yellow berried night shade (English) and kantakari (Sanskrit). *Solanum xanthocarpum* has held a place of some importance in the Hindu Materia Medica, primarily as an expectorant and antipyretic. It is one of the members of the dashamula (ten roots) of the Ayurveda. It occurs throughout India, in dry situations as a weed along the roadsides and wastelands. It is naturally propagated by seed in waste lands. A very prickly diffuse bright green perennial herb, somewhat woody at the base; stem is somewhat zigzag; branches are numerous. Various medicinal properties are attributed to it, particularly in the treatment of asthma, chronic cough and catarrhal fever²⁻⁷. In ancients Ayurveda, plant is described as pungent, bitter, digestive, alternative astringent. Stems, flowers, fruits are bitter, carminative. Root decoction used as febrifuge, effective diuretic and expectorant . Charaka and Sushruta used the extract of entire plant and fruits in internal prescription for bronchial asthma, tympanitis, misperistalsis, piles and dysuria and for rejuvenation. *Kantkari Ghrita* of *Charaka* is specific for cough and asthma. The whole plant is used traditionally for curing various ailments. Decoction of the plant is used in gonorrhoea; paste of leaves is applied to relieve pains; seeds act as expectorant in cough and asthma; roots are expectorant and diuretic, useful in the treatment of catarrhal fever, coughs, asthma and chest pain⁸. All the parts of *Solanum xanthocarpum* are used as traditional Ayurvedic medicinal herb in India. It is used for treating TB, fever, asthma, lung diseases and kidney disorders. The species contain steroids, alkaloids, solasonine and solamargine. Solasonin serves as an important intermediate in the synthesis of steroidal hormones⁹ and is a potential alternative to diosgenins as a precursor in synthesis of steroidal hormones¹⁰. Chemical and physical investigation of methanolic extract of roots of *Solanum xanthocarpum* was carried out. By phytochemical screening the presence of alkaloid, triterpenoid, phenols, tannins, flavanoids, carbohydrates, phytosterols, fats and fixed oil were confirmed¹¹.

II. MATERIAL AND METHOD

In the month of February and March from Green House Nursery, Khandwa Road Indore M.P., India the roots of the *Solanum xanthocarpum* (Family : *Solanaceae*) were collected, and identified with the herbarium specimen of the Department of Botany, P.M.B. Gujarati Science College Indore which was deposited there for future references. The

roots were washed under the running water of the tap to wash and clean it's dirt and soil and to clean them. After cleaning the roots they were cut into pieces and dried under the shade at the room temperature for about 20 days and then the roots were grinded to the powder with the help of the pestle mortar.

III. EXTRACTION PROCEDURE

The above mentioned and obtained powder was processed to get extract from the following procedure-

1. Ethanol Extract :

In the soxhlet apparatus the root powder was macerated repeatedly with 95% ethanol, and the combined filtrate was evaporated for drying under reduced pressure at about 50⁰ C and the found crude Ethanol extract was stored at 15⁰C.

2. Chloroform Extract :

The root powder was subjected to extract with chloroform. For the three days the extract was allowed to stand and after every 24 hours with the sterile glass rod the extract was stirred. And then with the whatman filter paper no.1. The filtrate was concentrated with a rotary evaporator under vacuum at 30-35⁰ C and then utilized.

3. Aqueous Extract :

A small amount of powder was mixed in aqueous solution in a flat bottom flask of 500 ml and was processed cold for 7 days and was shaken occasionally. And then the clear filtrate was obtained which was further concentrated by vacuum distillation.

4. Acetone Extract :

With acetone the small amount of the powder was macerated and then the extract was filtered and with the rotary evaporator the solvent was removed, then over the desiccator the extract was dried.

IV. TEST ORGANISMS

Gram positive bacteria i.e. *Bacillus subtilis*, *staphylococcus aureus* and Gram negative bacteria i.e. *Escherichia coli* and *Pseudomonas aeruginosa* organisms were procured from the Department of Biotechnology, P.M.B. Gujarati Science College, Indore M.P. India.

Antibacterial Activity of Agar Well Diffusion Assay

As per the instruction of the manufacturers the Nutrient Agar (Hi media) for bacteria was prepared. With the Agar well diffusion method the antibacterial activities of the root extract was determined. With the test microorganisms nutrient agar slants was inoculated after solidification. With the sterile cork borer about 5mm diameter wells were punched in the agar medium. As the positive controls the antibiotics were used in the test system and for the next 24 hours on the body temperature (37⁰C) the plates were incubated. To know the sterile conditions the negative control was added without any cultures. For the respective plant extract and antibiotic. The antibacterial activity was accessed by measuring the diameter of the zone of inhibition.

V. RESULT AND DISCUSSION

In the higher plants the presence of antibacterial substances is well established as the inspirational novel drug compound as the plant derived medicines. It's significant contribution towards the remedy of diseases done in the Ayurveda system of medicines. Majority of phytochemical components are known to produce the therapeutic activity like antibacterial, antifungal and antioxidant etc.¹². These finding are in accordance with the work carried out by Salie¹³ and Kannabiran¹⁴.

The antibacterial investigation was carried out of the obtained extract of the roots using the different solvents like Ethanol, Chloroform, Acetone and water were subjected to antibacterial activity against *Escherichia coli*, *Bacillus*

subtilis, *Pseudomonas aeruginosa*, *Staphylococcus aureus*. The following table shows it's result. Against the Gram positive and Gram negative bacteria the different extract of *Solanum xanthocarpum* roots have potent antimicrobial activity in the study and found equally affected by the root extract of *Solanum xanthocarpum* shows the presence of broad spectrum antibacterial substance in the plant.

Extract	Concentration mg/ml	Bacillus subtilis	staphylococcus aureus	E coli	Pseudomonas aeruginosa
Ethanol	25	11	11	14	14
	50	13	12	15	16
	100	14	14	17	17
	Control	0	0	0	0
Water	25	10	9	10	9
	50	11	10	11	13
	100	10	11	11	9
	Control	0	0	0	0
Chloroform	25	9	9	13	9
	50	10	11	15	11
	100	11	13	17	13
	Control	0	0	0	0
Acetone	25	12	9	11	12
	50	11	11	14	13
	100	9	13	15	13
	Control	0	0	0	0
Standard	antibiotics	16	19	23	13

VI. CONCLUSION

In present study, The importance of the root extract of the *Solanum xanthocarpum* Plant has been showed Inhibitory action against all the selected bacteria. It is concluded that the methanolic extract of *Solanum xanthocarpum* is effective curing the bacterial disease.

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