

# Antimicrobial Activity of *Asparagus Racemosus* Willd From Leaf Extracts – a Medicinal Plant

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**Abstract-** *Asparagus racemosus* Willd. (Family Asparagaceae; Liliaceae), is commonly known as Satavari. It is Medicinal plant contribute in human health care system. *Asparagus racemosus* is recommended in Ayurvedic texts for prevention and treatment of gastric ulcers, dyspepsia and as a galactagogue. It is also used successfully for nervous disorders, inflammation, liver diseases and certain infectious diseases. In the present study, we evaluated the antibacterial and antifungal investigations were carried out of the crude extracts obtained from the leaf of *Asparagus racemosus* Willd. using different solvents like Petroleum ether, Methanol, Chloroform, Acetone, Ethyl acetate and Water. The effect of different extracts were tested on Gram positive bacteria like *Bacillus subtilis*, *Staphylococcus aureus* and Gram negative bacteria *E. coli*, *Pseudomonas* and the yeast *Candida utilis*. by in vitro agar well diffusion method. This study scientifically supports the usage of whole plant as a remedy for various superficial bacterial and fungal infections in traditional medicine. The results were discussed.

**Index Terms-** Antimicrobial activity, *Asparagus racemosus* willd., Solvent extraction

## I. INTRODUCTION

Medicinal plants are the nature's gift to human being to make disease free healthy life. Herbal medicine is still the mainstay of about 75-80% of the whole population, mainly in developing countries, for primary health care because, better compatibility with the human body and fewer side effects (Barnet, 1992). In India thousands of species are known to have medicinal values and the use of different parts of several medicinal plants to cure specific ailments has been in vogue since ancient times (Parekh *et al.*, 2005). From over 3, 00,000 species of higher plants to occur in nature, only about 2 percent have been screened so far. Extract of plants from 157 families have been reported to be active against microorganisms (Lakshmanan, 1990 and Ravishankar, 1990).

*Asparagus racemosus* Willd. is a member of Liliaceae plant family (Madhavan *et al.*, 2010). It is an important monocot medicinal plant of tropical and subtropical countries like India (Gomase *et al.*, 2010). This is a woody climber growing to 1-2 m in height. The leaves are linear with a stout conical spiny spur, straight or slightly curved and pine-needles, small and uniform (Vichien, 2003).

In recent years, a large number of plant products have been investigated for their antimicrobial properties against bacteria and fungi. The study will also confirm if there is a biological

basis to the claim that the ethnomedicinal plant has useful medicinal purposes (Cowan, 1999).

In the worldwide as well as in the developing countries, the most human died due to infectious bacterial diseases (Nathan, 2004). The bacterial organisms including Gram positive and Gram negative like different species of *Bacillus*, *Staphylococcus*, *Salmonella* and *Pseudomonas* are the main source to cause severe infections in humans. Because these organisms have the ability to survive in harsh condition due to their multiple environmental habitats (Ahameethunisa and Hoper, 2010).

We have collected medicinally important medicinal plant *Asparagus racemosus* Will. for antimicrobial studies.

## II. MATERIALS AND METHOD

**Collection of plant:** The Leaves of the plant *Asparagus racemosus* Willd. was collected in the month of April 2011 from Patan district, Gujarat, India. Plant leaves of *Asparagus racemosus* Willd. were washed thoroughly with running tap water followed by rinsing with distilled water and then leaves were separated and cut into small pieces. The leaves were shade dried at room temperature then pulverized into powder. Powdered were stored in an air tight container till further use.

**Authentication of Plant:** The plant material was identified and authenticated by a taxonomist Dr. R.S. Patel, Assistant professor, Biology Department, K.K.Shah Jarodwala Maninagar Science College, Ahmedabad (Gujarat).

**Preparation of extracts:** The dried powder of sample was successively extracted with Petroleum ether, Acetone, Chloroform, Methanol, Ethyl acetate and Water in Soxhlet apparatus. The extract was stored at 4 °C and used for antibacterial activity.

**Test Organisms:** Gram positive & Gram negative bacteria and fungus were used as test organism for this study. Gram positive bacteria such as *Bacillus subtilis*, *Staphylococcus aureus*, Gram negative bacteria such as *Escherichia coli* and *Pseudomonas aeruginosa* and fungus like *Candida utilis*. The organisms were sub cultured on to nutrient agar in order to determine their viability. The identity of each test organism was confirmed by using standard culture, morphological and biochemical techniques. Stock cultures were maintained on nutrient agar slants at 4 °C and then sub-cultured in nutrient broth at 37 °C prior to each antimicrobial test.

### ANTIMICROBIAL ACTIVITY BY AGAR WELL DIFFUSION ASSAY:

Antimicrobial susceptibility testing was done using the well diffusion method to detect the presence of anti bacterial and anti-fungal activities of the plant samples (Perez *et al.*, 1990). Nutrient Agar (Hi-media) for bacteria and Sabouraud's Agar (Hi-media) for fungus were prepared according to the manufacturer's instructions. The antibacterial activity of leaf extracts was determined by agar well diffusion method. Nutrient agar slants after solidification was inoculated with the test microorganisms, by spreading the bacterial inoculums under aseptic conditions. Wells of 5mm diameter were punched in the agar medium with sterile cork borer and filled with plant extract. The antibiotics were used in the test system as positive controls. The plates were incubated at 37<sup>0</sup> c for 24 hrs. The negative control was added without adding the cultures to know the sterile conditions. The antibacterial activity was assessed by measuring the diameter of the zone of inhibition for the respective plant extract and antibiotic.

### III. RESULTS AND DISCUSSION

The presence of antifungal and antimicrobial substances in the higher plants is well established as they have provided a source of inspiration for novel drug compound as plant derived medicines have made significant contribution towards human the treatment of diseases as is done in cases of Unani and Ayurvedic system of medicines.

In the present study, we evaluated the antibacterial and antifungal investigations were carried out of the crude extracts obtained from the leaf of *Asparagus racemosus* Willd. using different solvents like Petroleum ether, Methanol, Chloroform, Acetone, Ethyl acetate and Water were subjected to antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *candida utilis*. The results are showed in Table1. In this study, different extract of *Asparagus racemosus* leaves have potent antimicrobial activity against Gram positive and Gram negative bacteria were equally affected by the leaf extract of *A.racemosus* indicating the presence of broad spectrum antibacterial substance in the plant.

**Table –1 Antimicrobial activity of *Asparagus racemosus* leaf**

Zone of Inhibition (mm)						
Extract	Concentration( µg/ml)	Bacillus subtilis	Staphylococcus aureus	Escherichia coli	Pseudomonas aeruginosa	candida utilis
Methanol	25	10	10	13	13	-
	50	12	11	14	15	-
	100	13	13	16	16	-
	control	0	0	0	0	0
Chloroform	25	8	8	12	8	-
	50	9	10	14	10	-
	100	10	12	16	12	-
	control	0	0	0	0	0
Water	25	9	8	9	8	8
	50	10	9	10	12	9
	100	9	10	10	8	9
	control	0	0	0	0	0
Ethyl Acetate	25	9	10	8	9	-
	50	8	11	9	10	-
	100	8	13	9	11	-
	control	0	0	0	0	0
Petroleum ether	25	10	9	8	10	-
	50	8	10	9	10	-
	100	5	12	10	12	-
	control	0	0	0	0	0
Acetone	25	11	8	10	11	9
	50	10	12	13	12	10
	100	8	10	14	12	12
	control	0	0	0	0	0
<b>Standard Antibiotic</b>		15	18	22	12	20

Value are mean of three replicates.  
Standard Antibiotic Streptomycin 5 µg/ml for Bacterial Strain.  
Standard Antibiotic Fluconazole 5 µg/ml for Fungi.

#### IV. CONCLUSION

The plant extractive studied could be an answer to the people seeking for better therapeutic agents from natural sources which is believed to be more efficient with little or no side effects when compared to the commonly used synthetic chemotherapeutic agents.

In present study, methanolic extract leaves of *Asparagus racemosus* Willd. significant inhibitory action against all the selected bacteria, it is concluded that Methanolic extract of the *Asparagus racemosus* Willd., can be effectively used for curing the bacterial diseases. Hence in the present study show the methanolic extract of the leaves of *Asparagus racemosus* Willd. Possess should be screened further for active constituents.

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#### REFERENCES

[1] Madhavan, V., Tijare, R.D., Mythreyi, R., Gurudeva, M.R. and Yoganarasimhan, S.N.(2010). Pharmacognostical studies on the root tubars

of *Asparagus gonoclados* Baker- Alternate source for the Ayurvedic drug satavari. Indian. J. nature. Resour., 1(1): 57-62.

- [2] Gomase, V.S and Sherkhane, A.S.(2010). Isolation, structure elucidation and biotransformation studies on secondary metabolites from *Asparagus racemosus*. Inter. J. Microbio., 2:7-9.
- [3] <http://www.pharm.chula.ac.th/vichien/2003/crude-45/cardiac/asparg.htm>.
- [4] Cowan, M.M. (1999). Plant products as antimicrobial agents. Clin Microbiol Rev., 12:564-582.
- [5] Nathan, C. (2004). Antibiotics at the crossroads. Nature,431:899-902.
- [6] Ahameethunisa, A.R. and Hoper, W. (2010). Antibacterial activity of *Artemisia nilagirica* leaf extract against clinical and phytopathogenic bacteria. BMC Complementry and Alternative Medicines,10:6.
- [7] Perez, C. (1990). An antibiotic assay by agar-well diffusion method. Acta Biol. Med. Exp., 15:113-115.
- [8] Ravishankar, T. (1990). Ethanobotanical studies in Adilabad and Karimnagar Disrict of Andrapradesh, India. Ph.D. Thesis, Bharathiar University, Coimbatore,Tamilnadu.
- [9] Barmet, H. (1992). The natural pharmacy: An encyclopedic illustrated guide to medicine from nature. Mirriampolunin and Christopher Robins, Great Britain.
- [10] Lakshmanan, K.K. and Sankaranarayanan, A.S. (1990). Antifertility herbs used by the tribals in Anaikatty hills, Coimbatore District, Tamilnadu. J. Econ. Jax. Bot., 14(1): 171-173.
- [11] Parekh, J., Darshana, J. and Sumitra, C. (2005). Efficacy of aqueous and methanol extracts of some medicinal plants for potential antibacterial activity. J. Biolo, 29: 203-210.

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