

Antimicrobial activity of *Asparagus racemosus* L.**¹Nagpurne V.S. , ²Joshi R. D. ³Devarshe A. M. and ⁴Allapure R.B.**

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Abstract

The aim of this study was to appraise the antimicrobial activity of *Asparagus racemosus*. The aqueous root extract of *Asparagus racemosus* (family- Asparagaceae) was investigated for antifungal activity by Agar Well Diffusion method against four distinct groups of fungi viz, *Aspergillus flavus*, *Fusarium oxysporum*, *Alternaria solani* and human pathogenic fungi *Candida albicans*. Preliminary phytochemical screening of the root extracts revealed the presence of some secondary metabolites like steroid, saponins, alkaloid, tannin and amino acids. The presence of these bioactive constituents is associated with the antifungal activity of plant. The present study accomplished that methanolic extracts of *Asparagus racemosus* can be effectively used for curing the fungal diseases in both plants and humans. The Antifungal activity of *Asparagus racemosus* performed, in that the root extracts showed the highest zone of inhibition on *Aspergillus flavus* and least zone of inhibition on *Alternaria solani*.

Keywords: - *Asparagus racemosus*, extract, Antifungal, Agar Well Diffusion, secondary metabolites, methanol, acetone.

Introduction:

Medicinal plants have been providing a tremendous source of natural medicines since ancient time. Traditionally *Asparagus racemosus* is a medicinal plant, and In India it has an intrinsic position in cultural and spiritual. *Asparagus racemosus* is also written in medicinal books like Charak Sanhita and Ashtanga Hridayam. *Asparagus racemosus* belongs to family Asparagaceae. It possesses much more important biological properties such as immunostimulants, anti-inflammatory, anti-hepatotoxic, antimicrobial and reproductive agents. (Hayes et al, 2006). The plant extract is also used to treat various disorders like stomach ulcer, lung abscess, menopause, herpes and chronic fever. The root extract of plant used in nervous disorders, dyspepsia, diarrhea, tumors, neuropathy and infectious diseases. (Sharma et al, 2000). It also possesses anthelmintic and antiseptic properties. (Sinha et al, 2011). Medicinal properties of this plant have been described in traditional medicine, such as the Ayurveda, Siddha and Unani system of medicine. (Verma et al, 2014).

They are also used in hypertension and in treatment of epilepsy. (Shastri et al, 2015). The extract is also used in nervous disorders, dyspepsia, tumors, inflammation, neuropathy, cough, bronchitis, hyperactivity and certain infectious diseases. (Chawla et al, 2011). This plant also contains vitamins A, B₁, B₂, C, E, Mg, P, Ca, Fe, polysaccharides, mucilage and folic acid. The ethanolic extract of *A. racemosus* is rich in bioactive secondary metabolites (Sanker et al 2011). Other primary chemical constituents of *Asparagus racemosus* are essential oils, asparagine's, arginine, tyrosine, flavonoids, resin and tannin. (Mandal et al, 2000). The aim of the present work was to evaluate the antifungal activity of its crude root extract on different group of fungi *Aspergillus flavus*, *Fusarium oxysporum*, *Candida albicans* and *Alternaria solani*.

Materials and methods:**Plant material**

The whole plant of *Asparagus racemosus* were collected from botanical garden of Maharashtra Udayagiri Mahavidyalaya, Udgir. The collected plant was identified and authenticated by Department of Botany, M. U. M. Udgir.

Preparation of plant root extract

The collected roots were thoroughly washed; shade dried for 6-8 days and powdered using a mortar and pestle. The powder kept in air tight container for further study.

Growth and maintenance of test microorganism for Antifungal studies

The four fungal cultures of *Aspergillus flavus*, *Fusarium oxysporum*, *Candida albicans* and *Alternaria solani* were produced by department of botany M. U. M. Udgir. They were identified on the basis of morphological characters and spores of fungi. The collected fungi were maintained on PDA for further studies.

Antifungal activity

The antifungal activities of root extracts were determined by using Agar Well Diffusion method to determine the zone of inhibition.

Phytochemical Screening Tests

The different extracts were subjected to phytochemical tests for plant secondary metabolites, tannins, saponins, flavonoids, terpenoids, alkaloids, cardiac glycosides and carbohydrates in accordance with Njoku and Obi, Abba et al, and Edeoga et al, with some modification.

Test for sterols

In different extracts, few drops of concentrated sulphuric acid (H₂SO₄) was added, shaken and allowed to stand, instead of aqueous extract, in all extract appearance of red colour indicates the presence of sterols.

Test for saponins

The saponins content in root extract were determined by adding small amount of 2N HCl, shake extract with little quantity of water and finally add few drops of Mayer’s reagent. If foam produced persists for 10 minutes; it indicates the presence of saponins.

Test for Alkaloids

For alkaloid test, heat 2ml of root extracts by adding 10% NaOH solution. The white precipitate was taken as positive test for alkaloid.

Test for Tannins

For tannins, heat 2 ml of root extract by adding concentrated HNO₃ along with excess ammonia. The formation of white precipitate indicates presence of tannins.

Test for carbohydrates

The root extract was treated with Molisch reagent and concentrated sulphuric acid was added from the sides of the test tube to form a layer. A reddish violet ring shows the presence of carbohydrates.

Test for flavonoids

To alcoholic solution added few drops of sodium hydroxide solution. Intense yellow colour which disappeared after adding dilute HCl indicates the presence of flavonoids.

Test for Amino acids

About 3 ml of extract and 3 drops of Ninhydrin solution in boiling water bath for 10 minutes. If purple colour appear that shows the presence of amino acids.

Result and discussion

Antifungal activity by agar well diffusion method

Antimicrobial susceptibility testing was done using the Agar Well Diffusion method to detect the presence of antifungal activities of plant samples. (Perez et al, 1990). Sabouraud’s agar was prepared according to the standard method. The antibacterial activity of root extracts was determined by Agar Well Diffusion method. Well of 5 mm diameter were punched in the agar medium with sterile cork borer and filled with root extract. The standard antifungal antibiotics were used in the test system as positive controls. The plates were incubated at 37^o C for 24-48 hrs. The negative control like sterile water was added without adding the cultures to know the sterile conditions. The antifungal activity was assessed by measuring the diameter of zone of inhibition for respective plant extract and antibiotic.

Table -1 Antifungal activity of *Asparagus racemosus* root (zone of inhibition in mm)

Sr	Test microorganism	Methanol	Petroleum ether	Acetone
1.	<i>Aspergillus flavus</i>	17	13	12
2.	<i>Fusarium oxysporum</i>	16	12	10
3.	<i>Candida albicans</i>	18	16	14
4.	<i>Alternaria solani</i>	15	13	12

The results obtain in the present investigation are summarized in table 1. The phytochemical analysis of root extract of *Asparagus racemosus* reveals the presence of important bioactive secondary metabolites such as steroid, saponins, alkaloid, tannin and amino acids. In present investigation the steroid, saponins, tannin, carbohydrate, flavonoids and amino acids were observed in ethanol extract. The root extract of *Asparagus racemosus* was studied for antifungal activity. Microbes used were *Aspergillus flavus*, *Fusarium oxysporum*, *Candida albicans* and *Alternaria solani*. The zone of inhibition recorded for various organisms was found *Aspergillus flavus* (17mm), *Fusarium oxysporum* (16mm), *Candida albicans* (18mm), *Alternaria solani* (15mm).

The ethanolic extract of *A. racemosus* is rich in bioactive secondary metabolites. The flavonoids content was fairly present in acetone extract and it is comparable to that of standard drug Fluconazole. From present study it indicates that root extracts from *Asparagus racemosus* exhibited antimicrobial properties. Thus, justifying scientifically their traditional use as medicinal plant.

Conclusion:

It is revealed that herbal drugs are relatively safe and exhibit a remarkable efficacy in the treatment. In present study, methanolic root extract of *Asparagus racemosus* shows significant inhibitory action against all the selected fungi. It is concluded that methanolic extracts of *Asparagus racemosus* can be effectively used for curing the fungal diseases not only in plants but also in humans. Hence the present study shows the methanolic extract of the root extract of *Asparagus racemosus* possess the active compound associated with antifungal activity, which help to produce friendly fungicide and new drug in future.

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