World Journal of Science and Research. 1(1): 9-12 (2015)

ISSN: 2455 2208

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World Journal of Science and Research

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Research Article

Biochemistry

PHYTOCHEMICAL AND ANTIMICROBIAL ACTIVITY OF *Asparagus racemosus* ROOT EXTRACT

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ABSTRACT

Medicinal plants are the nature's gift to human being to make disease free healthy life. It plays a vital role to preserve our health. India is one of the most medico-culturally diverse countries in the world where the medicinal plant sector is part of a time-honored tradition that is respected even today. In the present study, to investigate phytochemical and antimicrobial activity of *Asparagus racemosus* root extract. The preliminary phytochemical analysis of *Asparagus racemosus* root extract revealed the presence of flavonoids, phenolics, steroids, tannin, saponins, glycosides, terpenoids and phlobatannins. Phlobatannins and anthroquinones were absent. The phytochemicals further confirmed by histochemical studies The fluorescence behavior of plant powder were observed Overall, the *Asparagus racemosus* root is a source of phytochemicals that can be important in health prevention.

***Citation*:** K. Kalaiarasan and S. Nethaji (2015) Phytochemical and animicrobial activity of *Asparagus racemosus* root extract. World Journal of Science and Research. 1(1): 9-12.

Article Info:

Received on 08 April 2015

Accepted on 11 May 2015

Keywords:

Phytochemical, Antimicrobial, *Asparagus racemosus*

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INTRODUCTION

Many of today's synthetic drugs originated from the plant kingdom but, historically, medicinal herbalism went into decline when pharmacology established itself as a leading and effective branch of medical therapeutics. In much of the English-speaking world, herbalism virtually vanished from the therapeutic map of medicine during the last part of the 19th and early part of the 20th century. However, in many third world countries various forms of ethnic herbalism prevail to the present day (e.g., Ayurvedic medicine in India, Kampo medicine in Japan, and Chinese herbalism in China). In some developed countries, (e.g., Germany and France), medical herbalism continues to co-exist with modern pharmacology, albeit on an increasingly lower key.

Medicinal plants are the nature's gift to human being to make disease free healthy life. It plays a vital role to preserve our health. India is one of the most medico-culturally diverse countries in the world where the medicinal plant sector is part of a time-honored tradition that is respected even today. Traditional medicines derive their scientific heritage from rich experiences of ancient civilization. Hence, it is not surprising that traditional medicines claim comes for several "difficult to cure" diseases (Satyavati, 1982). India is well known for its rich traditional systems of medicine. i.e. Siddha, Ayurveda, Unani and Amchi (Tibetan) besides a vast reservoir of living traditions of ethnomedicine. The earliest mention of the use of plants in medicine is found in the Rigveda, which was written between 4500 and 1600 BC. During British period due to Western culture, our traditional art of natural healing is disappeared. Now it is reappearing due to realization of its importance in curing diseases without any side effects.

Mainstream medicine is increasingly receptive to the use of antimicrobial and other drugs derived from

plants, as traditional antibiotics (products of microorganisms or their synthesized derivatives) become ineffective and as new, particularly viral, diseases remain intractable to this type of drug. Another driving factor for the renewed interest in plant antimicrobials in the past 20 years has been the rapid rate of (plant) species extinction. There is a feeling among natural-products chemists and microbiologists alike that the multitude of potentially useful phytochemical structures which could be synthesized chemically is at risk of being lost irretrievably. There is a scientific discipline known as ethnobotany (or ethnopharmacology), whose goal is to utilize the impressive array of knowledge assembled by indigenous peoples about the plant and animal products they have used to maintain health (Lewis *et al*., 1995).

There is, therefore, an urgent need to investigate the biological properties of additional medicinal plants in order to develop new drugs. This prompted us to evaluate plants as a source of potential chemotherapeutic agents for antimicrobial activity based on their ethnomedical use. In the present study to investigate the phytochemical and antimicrobial activity of *Asparagus racemosus* root extract against bacteria and fungi.

MATERIALS AND METHODS

Phytochemical screening

Plant materials:

The fully mature *Asparagus racemosus* roots were purchased in March 2015 from Traditional medical shop, Thanjavur, Thanjavur district, Tamil Nadu, India.

Preparation of alcoholic extract:

. The powder was extracted with 70% methanol for 1 hours. A semi solid extract was obtained after complete elimination of alcohol under reduced pressure. The extract was stored in refrigerator until used.

Phytochemical screening

Chemical tests were carried out on the alcoholic extract and on the powdered specimens using standard procedures to identify the constituents as described by Sofowara (1993), Trease and Evans (1989) and Harborne (1973, 1984).

Determination of Fluorescence behavior of plant powder (Rao *et al*., 2011)

Fluorescence analysis of entire root of *Asparagus racemosus* has been carried out in daylight and under U.V light. Florescence analysis of root powder of *Asparagus racemosus* was carried out by the treatment of different chemical reagents such as methanol, H_2SO_4, HCl, HNO_3, NaOH, acetone, hexane, chloroform and distilled water. The powders were observed in normal daylight and under short (245nm) and long U.V. light (365 nm).

Histochemical tests

The powders of Asparagus racemosus root were treated with specific chemicals and reagents. The treated plant powder further analysed in light microscope. The *Asparagus racemosus* root powder treated with phloroglucinol and diluted HCl gave red colour indicates lignin, treated with diluted ammonia and H_2SO_4 gave yellow colour indicates flavonoids and treated with Mayers reagent gave reddish brown colour indicates alkaloids.

Antibacterial activity

Antibiogram was done by disc diffusion method (NCCLS, 1993; Awoyinka *et al*., 2007) using plant extracts. Petri plates were prepared by pouring 30 ml of NA medium for bacteria. The test organism was inoculated on solidified agar plate with the help of micropipette and spread and allowed to dry for 10 mints. The surfaces of media were inoculated with bacteria from a broth culture. A sterile cotton swab is dipped into a standardized bacterial test suspension and used to evenly inoculate the entire surface of the Nutrient agar plate. Briefly, inoculums containing *Escherichia coli* specie, *Staphylococcus auerus* specie, was spread on Nutrient agar plates for bacteria. Using sterile forceps, the sterile filter papers (6 mm diameter) containing the crude extracts (50µl, 100 µl and 150 µl) were laid down on the surface of inoculated agar plate. The plates were incubated at 37°C for 24 h for the bacteria. Each sample was tested in triplicate.

RESULTS AND DISCUSSION

Medicinal plants are assumes greater importance in the primary health care of individuals and communities in many developing countries. There has been an increase of demand in international trade because of very effective, cheaply available, supposedly have no side effects and used as alternative to allopathic medicines. Medicinal plants are believed to be much safer and proved elixir in the treatment of various ailments. Plants synthesize an array of chemical compounds that are not involved in their primary metabolism. These 'secondary compounds' instead serve a variety of ecological functions, ultimately to enhance the plants survival during stress. In addition these compounds may be responsible for the beneficial effects of fruits and vegetables on an array of health related measures (Liu, 2003).

Table 1: Phytochemical screening of *Asparagus racemosus* root

S.No	Phytochemical analysis	Result
1	Tannin	+
2	Phlobatannins	--
3	Saponin	+
4	Flavonoids	+
5	Steroids	+
6	Terepenoids	+
7	Triterpenoids	+
8	Alkaloids	+
9	Carbohydrate	+
10	Protein	+
11	Anthroquinone	--
12	Polyphenol	+
13	Glycoside	+

(+) Presence (-) Absence

In the present study was carried out on the plant sample revealed the presence of medicinally active constituents. The phytochemical characters of the *Asparagus racemosus* root investigated and summarized in Table-1. The phytochemical screening

Asparagus racemosus root showed that the presence of flavonoids, phenolics, steroids, tannin, saponins, glycosides, terpenoids and phlobatannins. Phlobatannins and anthroquinones were absent

Fluorescence behavior

Fluorescence is the phenomenon exhibited by various chemical constituents present in the organo gel. Some constituents show fluorescence in the visible range in daylight. The ultra violet light produces fluorescence in many products, which do not visibly fluoresce in daylight. If the substances themselves are not fluorescent, they may often be converted into fluorescent derivatives or decomposition products by applying different reagents. Hence, some drugs are often assessed qualitatively in this way and it is an important parameter of pharmacognostical evaluation (Kokashi *et al*., 1957). Table 2 represents Fluorescence behavior of *Asparagus racemosus* root powder

Table 2: Fluorescence behavior of *Asparagus racemosus* root powder

S.No	Tests	Visible Light	Short UV	Long UV
1	Plant powder	Yellow	Brown	Pale Green
2	Plant powder treated with distilled water	Yellowish Brown	Brown	Light Green
3	Plant powder treated with hexane	Pale Brown	Pale Green	Brown
4	Plant powder treated with chloroform	Yellowish Brown	Greenish Brown	Yellowish Brown
5	Plant powder treated with methanol	Brown	Greenish Yellow	Brown
6	Plant powder treated with acetone	Light Brown	Light Green	Dark Blue
7	Plant powder treated with 1N sodium hydroxide in water	Pale Yellow	Pale Green	Dark Brown
8	Plant powder treated with 1N hydrochloric acid	Light Brown	Pale Green	Brown
9	Plant powder treated with sulphuric acid with an equal volume of water	Brown	Green	Dark Brown
10	Plant powder treated with nitric acid diluted with an equal volume of water	Brown	Green	Dark Brown

Histochemical studies

Histochemistry is the branch of histology dealing with the identification of chemical components of cells and tissues, it is a powerful tool for localization of trace quantities of substances present in biological tissues (Krishnamurthy, 1998) . Histochemical techniques have been employed to characterize structure and development, and to study time course of deposition and distribution of major storage compounds such as proteins, lipids, starch, phytin and minerals like calcium, potassium and iron (Krishnan *et al*., 2001). The importance of histochemistry in solving critical biosystematic problems is as popular as the use of other markers. According to botanical literatures, the use of histochemical characters in taxonomic conclusions is now a common practice. Table 3 represents Histochemical studies of *Asparagus racemosus* root powder .

Table 3: Histochemical studies of *Asparagus racemosus* root powder

S.No	Charecterisation	Colour	Result
1	Lignin	Red/Pink	Present
2	Flavonoids	Yellow	Present
3	Alkaloids	Reddish brown	Present
4	Tannin	Dark blue	Present
5	Starch Grain	Blue	Present
6	Steroids	Violet blue	Present
7	Poly Phenol	Bluish green	Present

Antibacterial activity

The *in vitro* antimicrobial activity of the *Asparagus racemosus* extract against these bacteria were qualitatively assessed by the presence of inhibition zones represented in the photographic Fig 1**.** The inhibitory activities in culture media of the *Asparagus racemosus* reported in Table 4 were comparable with standard antimicrobiotic viz. chloromphenical.

The *E.coli, and Staphylococcus aureu*, which already known to be multi-resistant to antibiotics, were resistant to tested plant extract. The mean inhibition zone of *Asparagus racemosus* extract was 3 ± 0.21 mm for 50 µl, 7 ± 0.49 mm for 100 µl, 9 ± 0.63 mm for 150 µl for *E.coli*. The mean inhibition zone of *Asparagus racemosus*

extract was 2 ± 0.14 mm for 50 µl, 5 ± 0.35 mm for 100 µl, 7 ± 0.42 mm for 150 µl for *Staphylococcus aureu*. The mean inhibition zone for standard is 12 ± 0.84, 11 ± 0.77 mm *E.coli, and Staphylococcus aureu.*

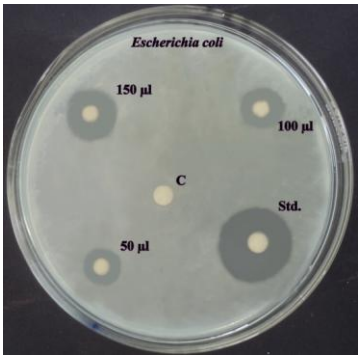
Table 4: Antibacterial activity of *Asparagus racemosus* root

Sample	50 µl	100 µl	150 µl	Control	Standard (Chloromphenical for bacteria)
E.coli (mm)	3 ± 0.21	7 ± 0.49	9 ± 0.63	0	12 ± 0.84
S.aureu (mm)	2 ± 0.14	5 ± 0.35	7 ± 0.42	0	11 ± 0.77

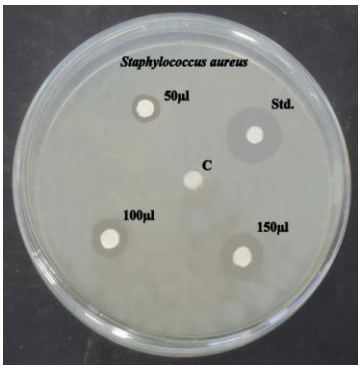
Values were expressed as Mean ± SD.

Fig 1: Antibacterial activity of *Asparagus racemosus* root

Escherichia coli



Staphylococcus aureu



CONCLUSION

The study demonstated that the preliminary phytochemical analysis of *Asparagus racemosus* root extract revealed the presence of flavonoids, phenolics, steroids, tannin, saponins, glycosides, terpenoids and phlobatannins. Phlobatannins and anthroquinones were absent. The phytochemicals further confirmed by histochemical studies The fluorescence behavior of plant powder were observed Overall, the *Asparagus racemosus* root is a source of phytochemicals and possesses antimicrobial activity that can be important in health prevention.

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