



Research Article

EVALUATION OF ANTIMICROBIAL ACTIVITY OF *GYMNEMA SYLVESTRE*

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ABSTRACT

In this paper the antimicrobial activity of the Water extract of *Gymnema sylvestre* fruit and root were studied. Antimicrobial studies showed that the extract has considerable activities against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella aerogenes* and *Aspergillus niger*.

Keywords: *Gymnema sylvestre*, Root and Fruit, antimicrobial activity.

INTRODUCTION

According to World Health Organization (WHO) medicinal plants would be the best source to obtain a variety of drugs¹. The information on medicinal plants from Ayurveda, Unani, Homeopathy and Siddha gives idea that the medicinal plants contain a wide range of ingredients. The medicinal value of plants is due to ingredient like alkaloids, flavonoids, tannins and phenolics². They can be used to treat chronic as well as infectious diseases. Medicinal plants are the main source of pharmaceuticals and healthcare products³. Medicinal plants products are used as home remedies to treat specific conditions as well as complex preparations to treat life threatening diseases⁴. The antimicrobial properties of medicinal plants have been investigated by a number of researchers' worldwide. Recent research review shows that, medicinal plants are screened for biological activities for finding potential new compounds for therapeutic use^{5,6,7}. The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments⁸. Hence, more studies pertaining to the use of plants as therapeutic agents should be emphasized.

G. sylvestre (Asclepiadaceae), a vulnerable species is a slow growing, perennial, medicinal woody climber found in central and peninsular India. The plant is considered to be a good source of a large number of bioactive substances. *G. sylvestre* leaves contains large number of phytochemicals like triperpenoids, saponins, gymnemic acids, gymnemasaponins. The antidiabetic activity of *G. Sylvestre* is due group of closely related gymnemic acids^{9, 10}. The essential oil obtained from *G. sylvestre* leaves shows Antioxidant & Antimicrobial activity¹¹. The aqueous, methanolic and ethanolic extract of *G. sylvestre*

leaves possess antimicrobial activity¹². The present study reports antimicrobial activity of root and fruit water extract of *G. Sylvestre*.

MATERIALS AND METHODS

Plant Material

The plants of *G. sylvestre* were collected from 'Pune' Maharashtra, India. The plant was authenticated by Botanical Survey of India, Pune (BSI). The material has been deposited at AHMA herbarium at BSI (Voucher No.SVS-1/783).

Preparation of extract

Dried and powdered root and fruit (100 g) of *G. sylvestre* were subjected to cold extraction with n-hexane (1.5 lit) at room temperature. The dried powder was then extracted with distilled water (1.5 lit) at room temperature (3 x 6 h). The combined water extract was concentrated under reduced pressure at 60°C.

Procurement of cultures

For Antimicrobial activity studies following microbial cultural were used. *Bacillus subtilis* (Gram +ve, ATCC 2239), *Escherichia coli* (Gram -ve, ATCC 25744), *Staphylococcus aureus* (Gram +ve, ATCC 2178), *Klebsiella aerogenes* (Gram -ve, ATCC 2239), *Aspergillus niger* (ATCC 504) and *Penicillium chrysogenum* (ATCC 709). The microbial cultures were procured from National Collection of Industrial Microorganisms (NCIM), National Chemical Laboratory (NCL), Pune.

Antimicrobial Activity

Antimicrobial activity was carried out by agar well-diffusion method^{13,14} using microorganism: Pure cultures of *Bacillus subtilis* (Gram +ve, ATCC 2239), *Staphylococcus aureus* (Gram +ve, ATCC 2178), *Escherichia coli* (Gram -ve, ATCC 25744), *Klebsiella aerogenes* (Gram -ve, ATCC 2239), The cultures of fungus *Aspergillus niger* (ATCC 504) and *Penicillium chrysogenum* (ATCC 709) were obtained National Collection of Industrial Microorganisms (NCIM), National Chemical Laboratory (NCL), Pune. The mother cultures of each micro-organism were allowed to stand for 24 h in order to reach the stationary phase of growth before the assays. Petri dishes containing the mother cultures with proper sterile Muller- Hinton agar medium was used for bacteria. The media were inoculated to obtain the micro-organism concentration of 130×10^7 colony forming units per ml (cfu / ml). A sterile filter

paper disc was loaded with 40 μ l sample (50 mg / ml). The disc was placed near the edge of the agar surface of the inoculated plate. All the plates were kept at 5°C for half an hour for diffusion. The plates were then incubated for 24 h at 37°C and the diameters of growth inhibition zones were measured using Distilled water as a blank. Each assay was performed in triplicates on three independent experimental runs. The minimum inhibitory concentration (MIC) of extracts indicating clear inhibition was determined by agar diffusion method¹⁵. Chloramphenicol (10 μ g/ml) was used as standard for the antimicrobial activity.

Statistical Analysis

Statistical analysis was done by using Student's t test on the values of diameters of zones of inhibitions.

Table 1: Antimicrobial activity of fruit and root extract of *G. sylvestre* against various microbial strains

Plant extract	Gram Positive bacteria		Gram Negative bacteria		Fungal Species	
	<i>B.subtilis</i>	<i>K.aerogenus</i>	<i>S.aureus</i>	<i>E.coli</i>	<i>A.niger</i>	<i>P.chrysogenum</i>
<i>Gymnema Sylvestre</i> Fruit Extract	11.66	12	8.7	13	10.75	-
<i>Gymnema Sylvestre</i> Root Extract	10.66	11.33	11.5	15.5	10	-
Standard	10	10	10	10	10	10

- indicates no zone of inhibition, Zone of Inhibition are in mm

Table 2: Minimum inhibitory concentration (mic) of *G. sylvestre* plant extract against various microbial strains

Sample	<i>S.aureus</i>	<i>E.coli</i>	<i>K.aerogenus</i>	<i>A.niger</i>	<i>B.subtilis</i>	<i>P.chrysogenum</i>
<i>G. Sylvestre</i> Fruit Extract	12.5	12.5	12.5	10.5	12.5	-
<i>G. Sylvestre</i> root Extract	11.5	12.5	10.0	12.5	12.5	-

RESULT AND DISCUSSION

As compared with synthetic drugs, naturally derived drugs are therapeutically active and commercially available¹⁶. The antimicrobial activity exhibited by plant extracts are shown in Table 1. The minimum inhibitory concentrations of the extracts, which range between 10.00mg/ml to 100 mg/ml, is shown in 2. In the antimicrobial studies (Table 1 and 2) Fruit and Root extracts of *G. Sylvestre* exhibited zones of inhibition at 100 mg/ml concentration. *G.sylvestre* fruit extract shows inhibition zone for bacterial species like *Bacillus subtilis* (11.66mm), *Staphylococcus aureus* (8.7mm), *Escherichia coli* (13mm), *Klebsiella aerogenes* (12mm) as well as fungal species like *Aspergillus niger*(10.75mm).The root extract of *G.sylvestre* shows inhibition zone for *Bacillus subtilis* (10.66mm), *Staphylococcus aureus*(11.5mm), *Escherichia coli* (15.5mm), *Klebsiella aerogenes* (mm) as well as fungal species like *Aspergillus niger*(11.33mm). The plant extracts does show any inhibition zone against *P.chrysogenum*. These extracts were active against tested organisms. The present results therefore offer a scientific basis for traditional use of water extracts of plant *G. sylvestre*. The antioxidant and antimicrobial activity of *G. sylvestre* leaf and stem were reported earlier¹⁷.The antimicrobial activity of *G.*

sylvestre might be due to presence of bioactive phytochemicals. The anti-microbial activities could be enhanced if active compounds from extracts are purified.

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