



## 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 drugs<sup>1</sup>. 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 phenolics<sup>2</sup>. They can be used to treat chronic as well as infectious diseases. Medicinal plants are the main source of pharmaceuticals and healthcare products<sup>3</sup>. Medicinal plants products are used as home remedies to treat specific conditions as well as complex preparations to treat life threatening diseases<sup>4</sup>. 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<sup>5,6,7</sup>. The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments<sup>8</sup>. 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<sup>9, 10</sup>. The essential oil obtained from *G. sylvestre* leavesshows Antioxidant & Antimicrobial activity<sup>11</sup>. The aqueous, methanolic and ethanolic extract of *G. sylvestre*

leaves possess antimicrobial activity<sup>12</sup>. 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<sup>13,14</sup> 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  $130 \times 10^7$  colony forming units per ml (cfu / ml). A sterile filter

paper disc was loaded with 40 µl 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 method<sup>15</sup>. Chloramphenicol (10 µg/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 available<sup>16</sup>. 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 earlier<sup>17</sup>.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.

### REFERENCES

- Selvamohan T and Ramadas V, Shibila S, Selva Kishore. Antimicrobial activity of selected medicinal plants against some selected human pathogenic bacteria, *Advances in Applied Science Research*, 2012; 3(5):3374-338.
- Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituents of some Nigerian medicinal plants. *African Journal of Biotechnology*, 2005; 4(7):685-688.
- Ammara H, Salma R, Farah D and Shahid M. Antimicrobial activity of some plant extracts having hepatoprotective effects. *Journal of Medicinal Plants Research*, 2009; 3(1):20-23.
- Cano JH, Volpato G. Herbal mixtures in the traditional medicine of eastern Cuba. *Journal of Ethnopharmacology*, 2004; 90(2-3):293-316.
- Vashist H, Jindal A, Antimicrobial Activities of Medicinal Plants-Review. *International Journal of Research in Pharmaceutical and Biomedical Sciences*, 2012;3(1).222-230.

6. Moghadamtousi SZ, Kadir HA, Hassandarvish P, Tajik S, Abubakar S and Zandi S, A Review on Antibacterial, Antiviral, and Antifungal Activity of Curcumin. *BioMed Research International* 2014(2014):1-12.
7. Silva NCC, Fernandes JA, Biological properties of medicinal plants: a review of their antimicrobial activity, *The Journal of Venomous animals and Venom Toxins including Tropical Diseases*. 2010;16(3):402-413.
8. Nascimento GGF, Locatelli J, Freitas PC and Silva GL, Antibacterial Activity of Plant Extracts and Phytochemicals on Antibiotic –resistant Bacteria. *Brazilian Journal of Microbiology*, 2000;31:247-256.
9. Khare AK, Tondon RN, and Tewari JP, Hypoglycemic activity of an indigenous drug (*Gymnema sylvestire* Gurmar) in normal and diabetic persons. *Indian Journal of Physiology and Pharmacology*, 1983;27, 257-261,.
10. Maeda M, Iwashita T, Kurihara Y, Studies on taste modifiers II: Purification and structure determination of gymnemic acids, antisweet active principle from *Gymnema sylvestire* leaves. *Tetrahedron Letters*, 1989;30:1547–1550.
11. Naik DG, Dandge CN and Rupanar SV, Chemical Examination and Evaluation of Antioxidant and Antimicrobial Activities of Essential Oil from *Gymnema sylvestire* R. Br. Leaves, 2011;23(12):11-19.
12. Beverely CD, Sudarsanam G, Antimicrobial activity of *Gymnema sylvestire* (Asclepiadaceae). *Journal of Acute Disease*, 2013; 2(3):222-225.
13. Aneja KR, Experiments in Microbiology, Plant Pathology and Biotechnology, 4<sup>th</sup> edition, New Age International (New Delhi) 2003; 390 – 391.
14. Vlietink J, Van Hoof L, Lasure A, Vanden Berghe D, Rwangabo PC. Screening of a hundred Rwandese medicinal plants for antibacterial and antiviral properties. *Journal of Ethnopharmacology*, 1995;46(1):31–47.
15. Mokbel MS, Hashinaga F. Antibacterial and antioxidant activities of Banana (*Musa, AAA cv. Cavendish*) Fruits Peel, *American Journal of Biochemistry & Biotechnology*, 2005;1(3):125-131.
16. Bhuvra RM, Dixit YM, Comparative Antimicrobial activities of Neem and Curry Leaf extracts and their synergistic effect against selected pathogenic Bacteria and Fungus. *International Research Journal of Pharmacy*. 2015; 6 (11):755-759.
17. Rupanar SV, Pingale SS, Dandge CN, Kshirsagar D, Phytochemical Screening and In *Vitro* evaluation of Antioxidant & Antimicrobial activity of *G. Sylvestire*. *International Journal of Current Research*, 2016;8(11).

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