SCREENING OF ANTIBACTERIAL EFFECTS OF *GYMNEMA SYLVESTRE* (L.) R. Br., - A MEDICINAL PLANT

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Summary

This study describes the antibacterial effects of *Gymnema sylvestre* (L.) R.Br. Extracts of this plant were studied on seven bacteria *Bacillus subtilis, Escherichia coli, Klebsiella pneumoniae, Proteus vulgaris, Pseudomonas aeruginosa, Salmonella typhi* and *Staphylococcus aureus.* Methanol, Chloroform and Ethyl acetate extracts were used for antibacterial assay. Growth inhibitions were evaluated by the disc diffusion method. Methanol and Chloroform extracts are more active against *Proteus vulgaris* and *Escherichia coli* respectively. *Pseudomonas aeruginosa, Klebsiella pneumoniae* and *Staphylococcus aureus were* showed moderate activity in Ethyl acetate extract. All extracts showed no activity against *Bacillus subtilis* and *Salmonella typhi.*

Key words*: Antibacterial, Gymnema sylvestre, medicinal, endangered*

Introduction

In many developing countries 80% of available medicines are obtained from medicinal plants, while in the western developed countries, the plants mainly constitute raw materials for industrial processing or preparation of the pure chemical derivatives [1]. Several studies on antibacterial substances from plants have been conducted by a number of investigators [2-4]. This use of medicinal plants in antibacterial activities may be attributed to the presence of antibacterial compounds like alkaloids, terpenes, steroids, saponins, tannins, phenols, quinines, essential oils and flavonoids [5-7].

Gymnema sylvestre (L.) R. Br., belongs to the family Asclepiadaceae which is an Indian herb used in Ayurveda, the ancient Hindi medicine system of India. It is a woody climbing plant that grows in the tropical forests of central and Southern India. The leaves are used in herbal medicine preparations which, when chewed, interfere with the ability to taste sweetness, which explains the Hindi name gurmar - "*destroyer of sugar*" [8]. The hypoglycemic (blood sugar lowering) action of *Gymnema sylvestre* (L.) R.Br. was first documented in 1920 [9]. This action is attributed to members of a family of substances called *gymnemic acids* [10-11]. The present study was carried out due to the lack of adequate information on antibacterial effects of *Gymneman sylvestre* (L.) R. Br.

Materials and Methods

Preparation of Extracts

Selected plant material was dried in shade and ground. 10gm of powder was used for extraction. Extracts were prepared separately and successively using Soxhlet apparatus with different solvents namely Methanol, Chloroform and Ethyl acetate. The extracts were concentrated to dryness and the residue was dissolved in 10ml of respective solvents and used for the assay of antibacterial activity.

Test organisms

Both gram positive and gram negative microorganisms were used for the test. The gram positive organisms include *Staphylococcus aureus* and *Bacillus subtilis*. The gram negative organisms include *Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi and Klebsiella pneumoniae* and *Proteus vulgaris.* All the bacterial strains were maintained on freshly prepared Muller Hinton agar (Hi-media) slant and stored at 0°C. The bacterial strains were procured from Sea Horse Hospital, Trichy, Tamil Nadu.

Screening of antibacterial Effects

Antibacterial effect was determined by disc diffusion method [12]. Muller Hinton agar were inoculated with 0.2ml bacterial suspension of over night culture of each bacterium and uniformly spread out. Then the disc was placed on the upper layer of the seeded agar plates. Triplicates were maintained. The plates were incubated at 37°C for 24 hours. The inhibition zones were measured and recorded.

Positive control was used by standard antibiotic Gentamycin (0.2ml/ml) and negative controls were maintained by the respective solvents.

Results and Discussion

In the present study, antibacterial effects of *Gymnema sylvestre* (L.) R. Br., against seven microbial species was recorded. Effect of plant extracts on different organisms was shown in Table – 1. Positive control (Gentamycin) produced inhibitory zone against all the chosen bacteria and negative control was also maintained using respective solvent alone.

Ethanol extract showed maximum inhibition against *Proteus vulgaris* (10mm) and followed by moderate effect against *Escherichia coli* (3mm), *Pseudomonas aeruginosa* (2mm) and *Staphylococcus aureus* (2mm). There was no effect on *Bacillus subtilis, Klebsiella pneumoniae* and *Salmonella typhi*. Chloroform extract highly affected the activity of *Escherichia coli* (10mm), and followed by moderate activity on *Pseudomonas aeruginosa* (4mm), *Proteus vulgaris* (2mm) and *Staphylococcus aureus* (2mm). There was no effect on *Bacillus subtilis, Klebsiella pneumoniae* and *Salmonella typhi*.

Ethyl acetate extract showed maximum inhibition against *Staphylococcus aureus* (8mm) and *Klebsiella pneumoniae* (7mm). The moderate inhibition zone was observed on *Escherichia coli* (6 mm), *Pseudomonas aeruginosa* (4mm) and *Proteus vulgaris* (2mm). There is no antibacterial effect against *Bacillus subtilis* and *Salmonella typhi*.

Antibacterial activity of some medicinal plants were screened against *Bacillus subtilis, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa*, *Proteus vulgaris* and *Klebsiella pnemoniae.* Among these bacteria, *Escherichia coli, Proteus vulgaris* and *Staphylococcus aureus* were shown high inhibition zone [13]. More or less similar results were found in the present study.

Table - 1
Antibacterial effects of Ethanol, Chloroform and Ethyl acetate extracts of the aerial parts of *Gymnema sylvestre* (L.) R.Br., by Disc Diffusion Method

S.No	Tested organisms	Positive control (mm)	Negative control (mm)	Extraction	Inhibition zones (mm)
1	*Bacillus subtilis*	13	0.5	Ethanol	-
			0.1	**Chloroform**	**-**
			0.1	Ethyl acetate	-
2	*Escherichia coli*	15	0.4	Ethanol	3± 0.02
			-	**Chloroform**	**10 ± 0.02**
			0.4	Ethyl acetate	6 ± 0.02
3	*Proteus vulgaris*	11	0.5	**Ethanol**	**10 ± 0.03**
			-	Chloroform	2 ± 0.04
			0.2	Ethyl acetate	2 ± 0.01
4	*Pseudomonas aeruginosa*	11	0.5	Ethanol	2 ± 0.04
			0.3	**Chloroform**	**4 ± 0.04**
			-	Ethyl acetate	4 ± 0.01
5	*Staphylococcus aureus*	12	0.5	Ethanol	2 ± 0.01
			0.1	Chloroform	2 ± 0.03
			-	**Ethyl acetate**	**8± 0.05**
6	*Klebsiella pnemoniae*	10	0.5	Ethanol	-
			-	Chloroform	-
			0.1	**Ethyl acetate**	**7 ± 0.01**
7	*Salmonella typhi*	8	0.4	Ethanol	1 ± 0.02
			-	Chloroform	-
			-	Ethyl acetate	-

Conclusion

The present study confirms that there are antibacterial properties in *Gymnema sylvestre* (L.) R.Br. These properties may be due to the secondary metabolites present in the plant. These chemicals may give the medicinal property to the particular plant and they arrest the activity of *Proteus vulgaris* and *Escherichia coli* highly followed by *Pseudomonas aeroginosa, Klebsella pneumoniae* and *Staphylococcus aureus* moderately. And there is no effect on *Bacillus subtilis* and *Salmonella typhi*.

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