



ANTIBACTERIAL ACTIVITY OF *PSORALEA CORYLIFOLIA* ROOT EXTRACTS: A BRIEF STUDY

Biological Science

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ABSTRACT

Medicinal plants have been used for its therapeutic value since ancient time. Medicinal plants represent a rich source of antimicrobial agents and herbal medicines are one of the most important fields of traditional medicine all over the world.

Psoralea corylifolia is an annual herb found all over the world, it is known for its tremendous medicinal value. All plant parts have various medicinal properties and used in almost all medicinal systems. Antimicrobial activity of *Psoralea corylifolia* root extracts was carried out by disc diffusion method against selected bacterial and fungal strains. Ethanol and methanol extracts showed significant activity against various bacterial strains as well as fungal strains while aqueous extracts were found to be less active.

KEYWORDS

Psoralea corylifolia, Antimicrobial activity, Root extracts, Ethanol extract, Methanol extract, Aqueous extract, Significant activity

INTRODUCTION:

Various developing countries of Africa and Asia commonly choose herbal medicines as traditional healers.¹ majority of people in these countries depend solely upon plant medicines for common health problems.² Since ancient times, different parts of medicinal plants have been used to cure many diseases. Nearly 70% of villagers in developing countries like India follow indigenous system of medicine i.e. ayurveda, siddha and unani which exist for thousands of years.³

Psoralea corylifolia is an endangered herb species belonging to family fabaceae⁴. its therapeutic importance is described in Chinese, British and American Pharmacopoeias; Indian pharmaceutical codex and also in various conventional medicinal systems such as ayurveda, unani, siddha. *Psoralea* species are native of America, mostly found in the south and Alleghenies in the west⁵. It is found as wild weed in Himalayas, also found in maharashtra, west Bengal, Uttar Pradesh, Rajasthan, and other states of India⁶.

In India *Psoralea corylifolia* is known by various vernacular names i.e. Bakuchi, Suparnika, Krisnaphal, Kalamasi, Putiphala, Shashilekha, Somaraji, Avalguja, Kushtanashini, Malay, svitragni^[7,8,9]. In Korea, it is known as 'Boh-Gol-Zhee' and used in the treatment of enuresis, pollakiuria and waist and knee psychoalgia. *Psoralea corylifolia* contains coumarins, flavonoids, and meroterpenes such as psoralen, isopsoralen, neobavaisfoavone, bovachin,

bavaisfoavone, bavachromene, psoralidin, corylifolinin, bavachinin, bavachalcone. Psoralen and isopsoralen have been reported to be used for the treatment of skin diseases such as psoriasis and

vitiligo¹⁰. The plant has also been used as cardiac tonic, vasodilator, pigmentor in ayurvedic medicine system^[11,12]. We studied antimicrobial activity of root extracts of *Psoralea corylifolia* against some bacteria and fungi. Ethanol and methanol root extracts have been found to be effective against most of the bacteria and fungi under evaluation while aqueous root extracts were not effective.

AIM: Aim of this study was to assess antibacterial activity of *Psoralea corylifolia* root extracts.

MATERIALS AND METHODS:

COLLECTION OF PLANT MATERIAL:

Psoralea corylifolia plants were collected from the road sides on the outskirts of Latur city (Maharashtra state, India). Roots were removed, despoiled and washed under running tap water. water was drained and poured completely and dried in shadow for 2 weeks. Dried roots were cut in to small pieces and ground in a clean disinfected (with 95% ethanol) and dry grinder mixer to get fine powder. The root powder was then sifted through a fine muslin cloth, fine powder was used for preparation of aqueous, ethanol and methanol extracts.

PREPARATION OF ROOT EXTRACTS:

5g of root powder each was taken in three separate 250 ml conical flasks labeled as aqueous, ethanol and methanol. 100 ml of respective

solvent was taken in the flasks labeled accordingly. For aqueous extract mixture was boiled for 20 minutes at 100°C in a boiling water bath. For ethanol and methanol extracts, flasks were kept on rotary shaker for overnight. Whole plant extracts were collected in pre-weighed flasks by filtration through Whatman filter paper No.1 Himedia (Cat No 1001090)¹³. After collection of the complete extracts, the solvents were evaporated in water bath at 80°C. After complete evaporation of solvents, the amount of extracts were measured by subtracting the weights of empty flasks from weights of flasks with extracts¹⁴.

TEST ORGANISMS:

Pure cultures of Gram positive bacteria, *Bacillus subtilis* NCIM 2063, *Bacillus megaterium* NCIM 2326, *Bacillus cereus* NCIM 2185 and *Staph aureus* NCIM 5021. Gram negative bacteria i.e. *Escherichia coli* NCIM 2574, *Salmonella typhimurium* NCIM 2501, *Proteus vulgaris* NCIM 2813, *Shigella boydii*. NCIM 5288, *Pseudomonas aeruginosa*. All these bacterial strains were activated by streaking on to nutrient agar (M001) slants and incubating at 37°C for 24 hours.

ANTIBACTERIAL ACTIVITY OF ROOT EXTRACTS.

Antibacterial activity of *P corylifolia* root extracts was carried out by disc diffusion method¹⁵ as per CLSI guidelines¹⁶. Active bacterial cultures were suspended in sterile saline and adjusted to approximately 1×10^8 cfu/ml by using 0.5 McFarland equivalent (Himedia R092). these suspensions were spread over the plate containing Mueller-Hintin agar (Himedia M391) using a sterile cotton swab in order to get a uniform growth on both control and test plates.. The extracts were dissolved in dimethylsulfoxide (DMSO from Fisher Scientific prod No.23125) under aseptic conditions, empty sterilized discs (Himedia SD 067) were impregnated with 30 µl leaf extracts of *P corylifolia*, these discs were dried and placed onto the agar Petri plates with bacterial cultures. Paper disc moistened with 30 µl DMSO was placed onto the agar Petri plate with culture as negative control. Standard discs for bacteria, (Methicillin 30 mcg SD137, Ciprofloxacin 5 mcg SD060 from Himedia) were used as positive control. The plates were kept for 30 minutes at 4°C to allow the diffusion of extracts, then they were incubated at 37°C for 24 h. After incubation, the zones of inhibition were measured with vernier calliper¹⁷.

OBSERVATIONS

Table 1: Preparation Of *Psoralea corylifolia* Root extracts:

S.N	Solvent used for extraction	Weight of empty 150 ml flask- W1 Grams	Weight of 150 ml flask with dried extract- W2 Grams	Weight of dry extract W2-W1 Grams	DMSO added - ml	Conc Of extract - per ml
1	Water	74.1	74.7	0.6	6	100
2	Ethanol	76.3	77.1	0.8	8	100
3	Methanol	76.8	77.1	0.3	3	100

N.B: N.B. 5g dried leaf powder was dissolved in respective solvent and processed as mentioned in the method., filtered with whatman filter paper no 1 and dried at 80°C in water bath.

DMSO: Dimethyl sulfoxide

Table 2 : Zones of Inhibition of Psoralea corylifolia Root extracts

S.N	Organism	Average Zones Of Inhibition in mm				
		A	E	M	+	NZ
1	<i>B subtilis</i>	NZ	16.0	11.0	32.0	NZ
2	<i>B megaterium</i>	NZ	12.0	11.0	42.0	NZ
3	<i>B cereus</i>	NZ	19.0	15.0	34.0	NZ
4	<i>Staph aureus</i>	NZ	13.0	9.0	26.0	NZ
5	<i>S.boydii</i>	NZ	NZ	NZ	30.3	NZ
6	<i>P aeruginosa</i>	NZ	NZ	NZ	35.0	NZ
7	<i>E coli</i>	9.0	11.0	13.0	30.0	NZ
8	<i>S typhi</i>	NZ	NZ	NZ	30.0	NZ
9	<i>P vulgaris</i>	NZ	11.0	12.0	32.0	NZ

N.B.:- A= Aqueous extract, E= Ethanol extract, M= methanol, + = Positive control, = Negative control, NZ= No Zone

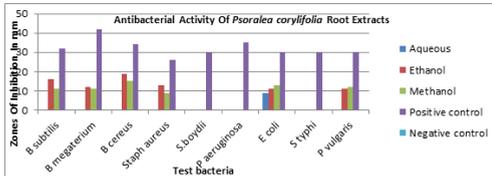


Figure 1: Chart showing zones Of Inhibition of Psoralea corylifolia Root extracts

1. Bacillus subtilis



Test

Control

2. Bacillus megaterium



Test

Control

3. B cereus



Test

Control

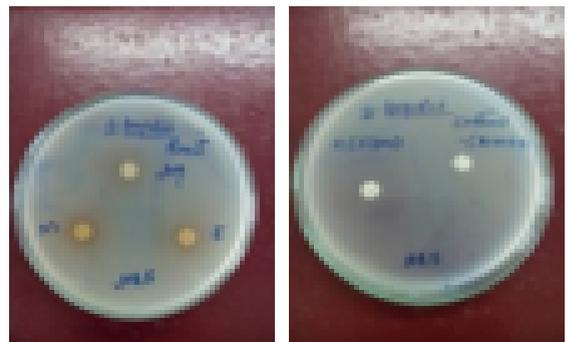
4. Staph. aureus



Test

Control

5. S boydii



Test

Control

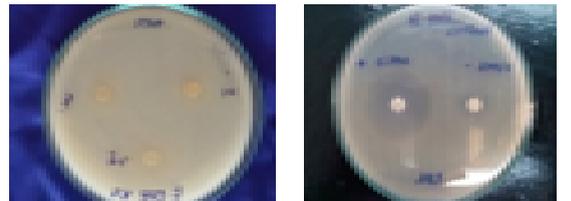
6. Paeruginosa



Test

Control

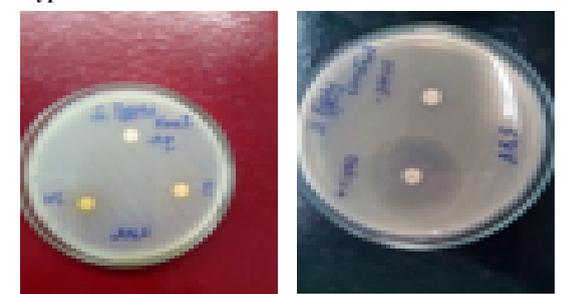
7. E coli



Test

Control

8. S typhi



Test

Control

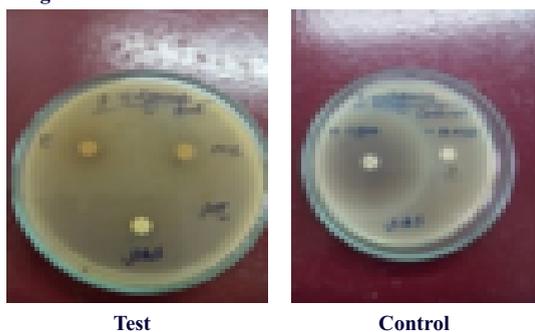
9. *P.vulgaris*

Figure: Photoplates showing zones of inhibition of *Psoralea corylifolia* root extracts

RESULTS AND DISCUSSION:

We obtained following results of our study, Table 1 shows amount of extracts obtained from 5g *Psoralea corylifolia* root powder, ethanol extracts yields maximum extract i.e. 0.8 g. followed by aqueous extract 0.6 g. and methanol extract 0.3g. we used simplest method for extraction¹⁴

Table 2. shows mean diameter of zones of inhibition of root extracts against Gram positive and Gram negative bacteria, Figure 1 shows the graph of zones of inhibition in mm and figure 2 shows the photographs of Petri plate showing zones of inhibition. Highest zone of inhibition was obtained with ethanol extract against gram positive bacteria *Bacillus cereus* followed by *Bacillus subtilis*, *Staphylococcus aureus*, and *Bacillus megaterium* with zones of inhibition 19 mm, 16 mm, 13 mm, 12 mm respectively. Methanol extract also gave zone highest zone of inhibition against *Bacillus cereus* (15mm), *Bacillus subtilis* (11 mm), *Bacillus megaterium* (11mm) and *Staphylococcus aureus* (9 mm) while Gram negative bacteria *Pseudomonas aeruginosa*, *Shigella boydii*, *Salmonella typhi* showed no zones of inhibition with both ethanol and methanol extracts. *Escherichia coli* and *Proteus vulgaris* showed 11 mm zones with ethanol extract while larger zones obtained with methanol extracts viz 13 mm and 12 mm respectively. No zones of inhibition were obtained with aqueous extracts against most of the bacteria under study except *Escherichia coli* i.e. 9 mm Ciprofloxacin 5 mcg was used as positive control/standard for bacteria except for *Staphylococcus aureus*. Methicillin 30 mcg was used for *Staphylococcus aureus*. Both antibiotics showed zones of inhibitions comparable as indicated in standard records and all bacteria are sensitive Dimethyl sulfoxide was used as negative control and showed no zones of inhibition against any bacteria under study.

CONCLUSION:

In our in vitro study, we conclude that the crude ethanol and methanol extracts of *Psoralea corylifolia* root are have considerable antibacterial activity. Ethanol extracts are the effective against Gram positive bacteria under study while methanol extracts are effective against Gram positive as well as some Gram negative bacteria under study. aqueous extracts have no antibacterial activity against the test bacteria. Hence it is concluded that *Psoralea corylifolia* roots have potential antibacterial activity.

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