

Evaluation of Antimicrobial Activity of *Hemidesmus indicus* Root Extracts

¹Mohd. Ishrar, ^{1*}Sanjay Gaur and ²Z. Mehmood

¹Department of Pharmacology, Govt. Doon Medical College, Dehradun,
Uttarakhand

²Himalaya Wellness Company Dehradun, Uttarakhand

*Email- sarul.choudhary10@gmail.com

DOI 10.51129/ujpah-2025-38-1(5)

Received - June 11, 2025

Revised - June 13, 2025

Accepted - June 17, 2025

Published - June 28, 2025

Abstract-This study investigates the antimicrobial potential of various solvent extracts of *Hemidesmus indicus* (Indian sarsaparilla) roots. Extracts were prepared using methanol, hexane, and distilled water. The antibacterial and antifungal efficacy of these extracts was assessed against *Salmonella typhi*, *Staphylococcus aureus*, and *Candida albicans* using the agar well diffusion method. Results showed that methanolic extracts exhibited the highest antimicrobial activity. These findings support traditional medicinal uses of *H. indicus* and point to its potential in developing plant-based antimicrobial agents.

Introduction

Medicinal plants have played a vital role in traditional healing systems and continue to offer promising leads in pharmaceutical research. *Hemidesmus indicus* (family: Asclepiadaceae), commonly referred to as Indian sarsaparilla or "Nannari," is a perennial climber found throughout India and neighbouring countries. Its roots are aromatic, woody, and have long been used in Ayurveda for treating a range of disorders including venereal diseases, skin infections, and urinary tract infections¹. The plant is rich in bioactive compounds such as tylophorine (an alkaloid with anti-inflammatory properties), coumarins, essential oils, starch, tannic acid,

and triterpenoid saponins. Modern pharmacological studies have suggested that extracts from *H. indicus* roots possess antimicrobial, anti-inflammatory, anti-spasmodic, and antioxidant properties².

H. indicus serves as an alternative tonic, demulcent, diaphoretic and traditionally been used to treat venereal diseases, skin diseases, urinary infections, negative emotions and impotence. It also prevents abdominal distention, arthritis, rheumatism, gout and epilepsy. According to practitioners of traditional Indian medicine, Ayurveda, this root can be administered in the fourth and ninth month of pregnancy to prevent mis-carriage. They also claim its efficacy in treating ulcers, fever, loss of appetite, Gastritis, Anorexia nervosa cough, excessive thirst Menorrhagia, Diarrhea and Diabetes. It is also believed that the extracts from this root help in increasing semen count, purifies blood, neutralizes poisons, works as a diuretic and emetic, and has anti-inflammatory properties. Some experimental studies have displayed the beneficial effect of the extract of this root. The alkaloid content present in it is Tylophorine and is anti-inflammatory, antispasmodic and anti-anaphylactic in nature. The other compounds present in it are coumarin, essential oil, starch, tannic acid and triterpenoid saponins. The roots and

leaves of the plant possess medicinal properties³.

Given its widespread ethnopharmacological use and growing interest in herbal medicine, this study aims to evaluate the antimicrobial activity of different solvent extracts of *H. indicus* roots against selected bacterial and fungal strains.

Material and Methods

Chemicals and Reagents

Conical flasks, beakers, spatula, glass funnels, measuring cylinders, autoclave, top-loading Mettler balance, mortar and pestle, test tube holder, analytical balance, capillary tubes, and filter paper were used. All solvents (methanol, hexane, distilled water) were of analytical grade.

- a. Hexane S wt – 50g
Hexane = 200ml
Wt.-15ml(10.4217gm)
- b. Methanol S wt -50g
Methanol = 200ml
Wt.-15ml(14.8150gm)
- b. Aqueous S wt -50gm
Purified water = 200ml
Wt.-20ml(22.0985gm)



Procurement of Plant Material

Root samples of *H. indicus* were procured from Himalaya Wellness Company, Dehradun. The specimen was authenticated by Dr. Maya Ram Uniyal (Specification No. SPEC/HD/202/03). The roots were washed, air-dried, shade-dried for seven days, and ground to a 60-mesh powder. Some whole roots were preserved for morphological examination.

Preparation of Extracts^{8&9}

Fifty grams of powdered root material were extracted sequentially with hexane, methanol, and distilled water using a Soxhlet apparatus for 6-8 hours each. Extracts were filtered, concentrated using a rotary evaporator, and stored at 4°C.

Antimicrobial Assay¹⁰

The agar well diffusion method was used to assess antimicrobial activity against *Salmonella typhi*, *Staphylococcus aureus*, and *Candida albicans*. Muller-Hinton Agar and Sabouraud Dextrose Agar were used for bacterial and fungal cultures, respectively. Extracts (100 µL at 100 mg/mL) were loaded into wells. Oxacillin (200 mg) served as a positive control. Solvents were used as negative controls. Details of cultures procured is given in Table-1.

Table-1 References of Microbial cultures details-2025-26



HIMALAYA WELLNESS COMPANY

DEHRADUN UNIT

MICROBIOLOGY DEPARTMENT (QA/QC DEPT.)

Reference Microbial cultures detail-2025-26

S.NO.	ATCC Ref.No9.	Name of culture	Expiration date
1	ATCC 8739	<i>Escherichia coli</i>	30.04.2026
2	ATCC 6538	<i>Staphylococcus aureus</i>	31.10.2025
3	ATCC 9027	<i>Pseudomonas aeruginosa</i>	28.02.2026
4	NCTC 6017	<i>Salmonella spp.</i>	31.03.2026
5	ATCC 10231	<i>Candida albicans</i>	31.03.2026

Results and Discussion

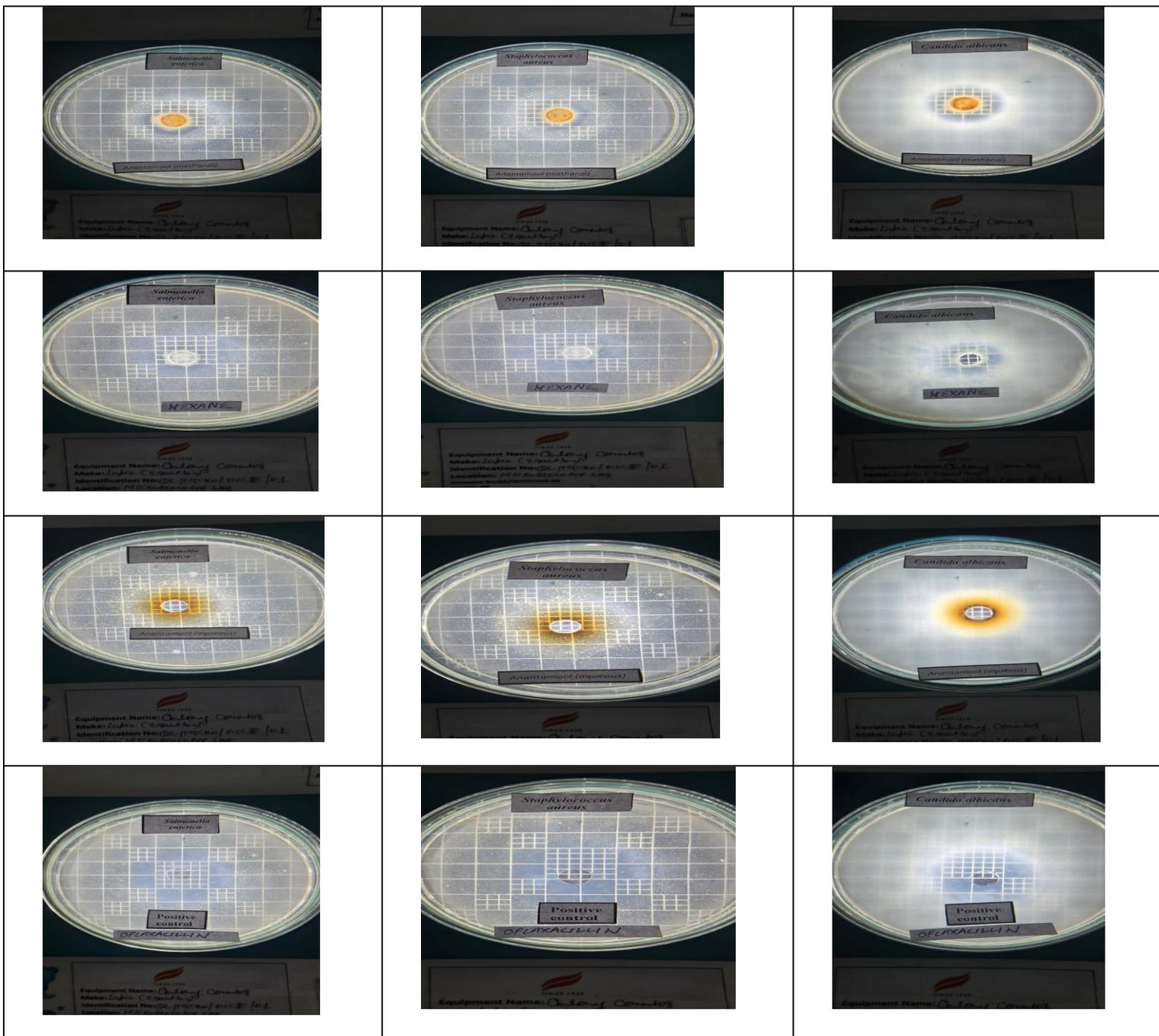
The methanol extract showed the strongest antimicrobial activity. Zones of

inhibition were measured and are summarized in the Table-2.

Table-2 Zones of inhibition were measured

Extract/Solvent	<i>Salmonella typhi</i>	<i>Staphylococcus aureus</i>	<i>Candida albicans</i>
Methanol Extract	20 mm	21 mm	25 mm
Hexane Extract	14 mm	15 mm	19 mm
Aqueous Extract	ND	11 mm	12 mm
Positive Control	35 mm	36 mm	29 mm
Negative Control	ND	ND	ND

ND = No detectable inhibition zone



The results confirm that the methanolic extract of *H. indicus* roots has significant antimicrobial activity, particularly against *Candida albicans* and gram-positive *Staphylococcus aureus*. This suggests that active constituents responsible for antimicrobial effects are more efficiently extracted in methanol. Hexane extracts showed moderate activity, while aqueous extracts demonstrated minimal efficacy⁽⁴⁻⁶⁾.

These findings align with traditional uses of *H. indicus* and reinforce previous studies reporting antimicrobial potential. The absence of activity in negative controls confirms that the effects are due to plant-derived compounds, not solvents.

Conclusion

Hemidesmus indicus root extracts, especially those prepared in methanol, exhibit notable

antimicrobial activity. These results support its traditional applications in treating infections and indicate potential for development into plant-based antimicrobial formulations. Future research should focus on phytochemical isolation and in vivo testing to validate efficacy and safety.

Acknowledgement

We write to acknowledge adequate environment and facilities for the studies undertaken.

Disclaimer Statement

Authors declare that no competing interest exists. The products used for this research are commonly used products in research. There is no conflict of interest between authors and producers of the product.

References

1. WHO. *Traditional Medicine Strategy*; 2014–2023.
2. Kirtikar, K. R. and Basu, B. D. *Indian Medicinal Plants*; 1935.
3. Nadkarni, K. M. *Indian Materia Medica.*; 1976.
4. Chopra, R.N., Nayar, S.L., and Chopra, I.C. *Glossary of Indian Medicinal Plants*; 1956.
5. Rajeswari, R. *Pharmacognostical Studies of Hemidesmus indicus*; 2002.
6. Dash, V. *Materia Medica of Ayurveda*; 2001.
7. Maiti, B.C., et al. *Studies on Antimicrobial Properties of Medicinal Plants*; 2004.
8. Kokate, C.K. *Practical Pharmacognosy*; 2005.
9. Harborne, J.B. *Phytochemical Methods*; 1998.
10. Cowan, M.M. *Plant Products as Antimicrobial Agents. Clin. Microbiol. Rev.*; 1999.