



*Original Contribution*

**ANTIBACTERIAL ACTIVITY OF BERBERIS LYCIUM ROOT EXTRACT**

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**ABSTRACT**

*In vitro* study was carried out to determine the antibacterial activity of root extracts of *Berberis lycium* by using various solvents for extraction. The methanolic root extract showed higher inhibitory effect as compared to the other solvent extracts, against the mixed culture of human pathogenic bacteria viz., *Pseudomonas* sp., *Escherchia coli*, *Streptococcus* sp. and *Staphylococcus* sp. However, methanolic extract when used separately were less effective compared to Gentamycin and Amoxicillin showing inhibition zone of 10, 11 and 12 against *Staphylococcus*, *Pseudomonas* sp. and *E. coli* respectively.

**Key words:** Antimicrobial activity; Bacteria; *Berberis lycium*

**INTRODUCTION**

Since the time of early Neanderthal man, medicinal plants are the only source of health care management (1). Even as modes of medicines changed throughout the centuries; plants continue to play a vital role in the health care system.

*Berberis lycium* belongs to family Berberidaceae. The genus *Berberis* comprises of as many as 500 species. Out of which 77 species are native to India. *Berberis lycium* is an erect shrub which grows to a height of 3 meter, with a thick woody shoot and covered with a thin brittle bark (2). The flowers from this plant are hermaphrodite (has both male and female organs) and they are pollinated by Insects, self. It is distributed in the temperate and sub tropical parts of Asia, Europe and America. Several species are grown in gardens for their ornamental leaves and bunches of the succulent, acidic, edible berries.

*Berberis lycium* roots form a reputed drug in the Ayurvedic medicines. The root contain a number

of alkaloids out of which the most prominent one is berberine, which is universally present in the rhizomes of *Berberis* species, and find its application in the preparation of drugs for cholera, diarrhoea, dysentery and eye troubles (3). In the Unani system of medicine, it is used for the treatment of leprosy (4).

Since it is not appreciably absorbed by the body, it is used orally in the treatment of various bacterial infections, especially bacterial dysentery. It should not be used with *Glycyrrhiza* species (Liquorice) because this nullifies the effects of the berberine.

**MATERIALS AND METHODS**

**Extract preparation** – The collected roots were washed thoroughly with running tap water and finally with sterile distilled water. The completely shade dried root material was coarsely powdered and allowed to Soxhlet for successive extraction with distilled water, ethanol, isopropanol and methanol. The obtained liquid extracts were subjected to Rotary evaporator and subsequently concentrated under reduced pressure (in vaccum at 40°C). The residues obtained were designed as crude extracts were labelled and stored in refrigerator for further study.

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**Collection of bacterial strains** – The specific human pathogenic bacteria viz; *Pseudomonas* sp., *Escherchia coli*, *Streptococci* sp. and *Staphylococcus* sp. were obtained from the dept. of Microbiology. Standard paper disc method was (5) used for testing the antibacterial efficacy of plant extracts.

## RESULTS AND DISCUSSION

It is evident from **Tables 1 and 2** that the inhibitory activity was exhibited by the components present in the root extracts of *Berberis lycium* and not by the solvents used for extraction. Among the different extracts tested against the mixed culture of specific human pathogenic bacteria viz., *Pseudomonas* sp., *Escherchia coli*, *Streptococci* sp. and *Staphylococcus* sp., the methanolic exhibited maximum inhibitory zone (16 mm) followed by isopropanol extract (13 mm) and ethanol extract (12 mm) (**Table 3**). The aqueous showed the least inhibitory zone of 10 mm diameter. The highest inhibition in the methanol extract may be attributed to the fact that alkaloids are highly soluble in polar solvents. The methanolic extract when tested against the test bacterial pathogenic strains (**Table 4**), exhibited maximum inhibitory zone (12 mm), followed by *Pseudomonas* (11 mm) and *Staphylococcus* (10 mm). However, no effect was found on *Streptococcus*. The maximum inhibition against the gram negative bacteria, (*E. coli* and *Pseudomonas*) may be attributed to the fact that some chemical constituents present in the root extract of *Berberis lycium* interfere with the protein synthesis of these bacteria (6). Inhibitory effect against *Staphylococcus* sp. by the plant extract was also reported by (7).

## CONCLUSION

Although this study investigating the *in vitro* antibacterial activity, the results showed that the extracts from *Berberis lycium* root possessed good antibacterial activity, confirming the great potential of bioactive compounds and are useful for rationalizing the use of this plant in primary health care. *In vivo* data may be helpful in determining the real potential usefulness of this plant for the treatment of infectious diseases.

**Table 1.** Inhibitory activity of 10% root extract of *Berberis lycium* against the mixed culture of human pathogenic bacteria (*Pseudomonas* sp., *Escherchia coli*, *Streptococci* sp. and *Staphylococcus* sp.)

Extract	Antibacterial activity
Aqueous	+
Ethanol	+
Iso pro panol	+
Methanol	+

**Table 2.** Inhibitory activity of solvents used for extract against the mixed culture of human pathogenic bacteria (*Pseudomonas* sp., *Escherchia coli*, *Streptococci* sp. and *Staphylococcus* sp.)

Solvents	Antibacterial activity
Distilled water	-
Ethanol	-
Isopropanol	-
Methanol	-

**Table 3.** Inhibition zone of 10% root extract of *Berberis lycium* using different solvents for extraction against the mixed culture of human pathogenic bacteria (*Pseudomonas* sp., *Escherchia coli*, *Streptococci* sp. and *Staphylococcus* sp.)

Root extract	Zone of inhibition (mm)
Aqueous	10
Ethanol	12
Isopropanol	13
Methanol	16

**Table 4.** Inhibitory activity of 10% methanolic root extract of *Berberis lycium* against the human pathogen bacterial strains

Bacteria	Zone of inhibition (mm)		
	10% methanolic extract	Gentamycin	Amoxicillin
<i>Streptococcus</i> (G +ve) - LFSSM011	-	31	30
<i>Staphylococcus</i> (G +ve) 10 LFSSM012	10	28	27
<i>E. coli</i> (G -ve) 12 LFSSM013	12	24	23
<i>Pseudomonas</i> (G-ve) 11 LFSSM016	11	21	22

**REFERENCES**

1. Farnsworth, N. R., Akerele, O., Bingel, A.S., Soejarto, D.D., Guo, Z., Medicinal plants in therapy. Bulletin World Health Organisation, 63: 965-981, 1985.
2. Hooker, J. D., Flora of British India. Reeve and Co, London, pp 640, 1882.
3. Chandra, G. V., Purohit, M., Medicinal plants of India. ICMR, New Delhi, pp 377, 1980.
4. Chopra, M., Chatterji, A., Pakrashi, S.C., The treatise on Indian medicinal plants CSIR, New Delhi, pp 33-35, 1981.
5. Haq, I., Qazi, N.S., Ishan, I., Pharmacognostic studies of *Berberis lycium* from northern areas of Pakistan. *Hamdard Medicine*, 42: 47-50, 1999.
6. Peach, K., Tracy, M.V., Modern methods of plant analysis. *Springer Verlag, Berlin*, 2: 645, 1955.
7. Stermitz, F.R., Tawara, M.J., Lorenz, P., Zenewicz, L., Lewis, K., 5-methoxy hydnocarpic acid and phenophorbide: *Berberis* species components that potentiate berberine growth inhibition of resistant *Staphylococcus aureus*. *Journal of Natural Products*, 63: 1146-1149, 2000.