

Short Communication

A comparative analysis of the pharmacological effectiveness of *Berberis lycium* and penicillin G

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The importance of medicinal plants in traditional healthcare practices provides opportunity to new areas of research. However, information on the uses of plants for medicine is lacking from many interior areas of District Mansehra. Keeping this in view, the present study was initiated. This study attempts to shade lights on the comparative pharmacological efficacy of *Berberis lycium* (medicinal plant) and drug penicillin G. The pharmacological activities of both the *B. lycium* and penicillin G were determined by disc diffusion method with incubation period of 24 to 48 h at 37°C. It was observed that, *B. lycium* showed excellent activity against the tested microorganism, *Escherichia coli* and *Proteus* (80 to 100%) and good activities against the tested microorganisms pseudomonas and staphylococcus (60 to 70%). While penicillin G showed excellent activity against all tested microorganisms. It is recommended that, *B. lycium* can be used for the treatment of diseases caused by tested microorganisms because of its excellent and good activity. It is also observed that, *B. lycium* do not have any adverse effect on those people who have this in long practice.

Key words: *Berberis lycium*, penicillin G, disc diffusion, pharmacological activity.

INTRODUCTION

The use of medicinal herbs (plants) in the treatment of infection is an age-old practice and several natural products are used as phytotherapeutic for treatment of many diseases. Human infections constitute a serious problem and most frequent pathogens are microorganisms such as bacteria and fungi. In Pakistan, reliance on herbal medicine might be due to the high cost of conventional allopathic medicine and inaccessibility of modern health care facilities. Further, traditional medicine is often deemed a more appropriate method of treatment especially in remote villages. In spite of the many potent and specific drugs available for the treatment of different diseases, there is a public swing towards herbal remedies in a number of countries, especially Pakistan (Rouf et al. 2007).

The folk utilization of medicinal plants of Nara desert and Cholistan areas (Ansari et al., 1993; Chaudhry and Arshad, 1987), Sind province (Ishaque et al., 1988), Baluchistan (Goodman and Ghafoor, 1992), Northern Chitral (Khan and Le, 1996) has been reported. Out of 6000 wild plants, about 2000 medicinal plants are known in Pakistan (Stewart, 1972) and only a small proportion of these have been so far commercially exploited. *Berberis lycium* a traditional medicinal plant is commonly used in bone fractures, skin diseases, chronic diarrhea, diabetes and piles, blood purifier and tonic. The watery extract from the root and stem known as rasout is used in ophthalmia. Plant bricks are used for pharyngitis and for the improvement of internal wounds and throat pains (Shinwari et al., 2007). Herbal medications in particular, have seen a revival of interest due to a perception that, there is a lower incidence of adverse reactions to plant preparations compared with synthetic pharmaceuticals. Coupled with reduced cost of plant preparations, makes

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Table 1. Comparative pharmacological efficacy of *B. lycium* and penicillin G.

Bacteria	Plant	Penicillin G	Control (distilled water)
<i>E. coli</i>	++++	++++	n .a
<i>Pseudomonas</i>	+++	++++	n .a
<i>Staphylococcus</i>	+++	++++	n .a
<i>Proteus</i>	++++	++++	n .a

+++ = Excellent activity (80 to 100% inhibition); ++ = good activity (60 to 70% inhibition); n .a = no activity. Size of blank filter paper disc = 6 mm (diameter).

the search for natural therapeutics an attractive option (Chariandy et al., 1999) . In South African traditional medicine, the use of plants is a widespread practice and the persistence in the use of medicinal plants among people of urban and rural communities in South Africa could be considered as evidence of their efficacy (Meyer and Afolayan, 1996). In this study, the pharmacological efficacy of penicillin G was compared with *B. lycium* and presented as seminar report.

MATERIALS AND METHODS

B. lycium was collected from village Kanshian Tehsil Balakot District Mansehra Hazara division. It is about 1000 to 15000 feet at altitude. Plant was identified by taxonomist of the Department of Botany, Hazara University, Mansehra, Pakistan. Roots were separated and kept in dark at room temperature for 15 days for complete drying and then grounded to fine powder. Hydric extract of roots were taken for the antimicrobial activity. An aliquot of 10 ml of nutrient broth was inoculated with the test organisms and incubated at 37°C for 24 h. Using a sterile pipette, 0.6 ml of broth culture of the test organism was added to 60 ml of molten agar that was pre-cooled to 45°C, mixed well and poured into sterile Petri plates. Duplicate plates were prepared for each organism. Using 0.1 ml pipette, 100 micro liter of test sample was dissolved in an appropriate solvent and poured into labeled cups. The same concentration of the standard antimicrobial agents and the solvent (as control) were used. The filter paper discs were soaked into test solution and placed on agar plates on labeled location, incubated at 37°C for 24 to 48 h. The diameter of the zone of the inhibition was measured.

Blank filter paper disc of 6 mm was dipped in to the root extract for few min; disc was picked out and allowed to drying by keeping near the fire lamp for few seconds, then kept on agar plate after microbial streaking. After incubation at 37°C, diameter of the clear zone around the disc was measured and compared against the inhibition produced by the disc of known concentration of antibiotics (penicillin G). Plant was tested against the *Escherichia coli*, *pseudomonas*, *Staphylococcus* and *Proteus*.

RESULTS

Pharmacological activity of *B. lycium* and penicillin G

The antibacterial activity of the crude extract of *B. lycium* was tested against different human bacteria. The pharmacological evaluation was done by disc diffusion

method. Four bacteria were used in this study. Growth in the medium containing the extract was determined by measuring linear growth (mm) and growth inhibition (%) was calculated with reference to negative control as shown in Table 1. The extract showed significant activity against human bacteria *E. coli* and *Proteus* (80 to 100%), while it showed a good activity against *Pseudomonas* and *Staphylococcus* (60 to 70%). While penicillin G showed excellent activity against all tested microorganisms

In order to determine the adverse effect of *B. lycium* on the people who continuously use this medicinal plant, a survey was conducted in the areas of Kanshian and Kaghan valley. Three thousand peoples were randomly selected in the areas with age range from 30 to 60, admitted to use plants for self and for their children. All the people stated that, *B. lycium* do not have any adverse effect. According to this survey, the roots of *B. lycium* is used as remedy for swollen and sore eyes, broken bones, wounds, gonorrhoea, curative piles, unhealthy ulcers, acute conjunctive and in chronic ophthalmia, also used as bitter tonic astringent, diaphoretic and febrifuge.

DISCUSSION

In the present investigation, we were able to compare the antibacterial activities of penicillin G and *B. lycium* a traditional medicinal plant and presented a seminal report. It was observed that *B. lycium* showed excellent activity against the tested microorganism, *E. coli* and *proteus* (80 to 100% inhibition) and good activities against the tested microorganisms *Pseudomonas* and *Staphylococcus* (60 to 70% inhibition) . While penicillin G showed excellent activity against all tested micro-organisms. Penicillin G is a natural antibiotic which consists of -lactom ring and could be destroyed by the lactemase-producing bacteria. This drug also showed adverse effect on human health. The most common adverse effects are allergy, nausea and vomiting. Plants of Berberidaceae are having lot of medicinal uses and are included in British and Indian Pharmacopoeias, (Srivatava et al., 2006). One of the species called *Berberis aristata* is reported to be hepatoprotective, (Janbaz et al., 2000). Fruits of *Berberis vulgaris* have anticholinergic and antihistaminic effects,

(Shamas et al., 1999). In the absence of modern health facility in the remote areas of Pakistan, people depend on plants for medicinal purposes. Berberine, as an alkaloid isolated from *B. lycium*, has hypotensive action, (Khan et al., 1969). *B. lycium* is traditionally used medicinal plant for treating various diseases including diabetes mellitus, particularly by the local inhabitants of Hamaliya region, (Muhammad et al., 2006). *B. lycium* had been used for reducing serum cholesterol in broilers (Chand et al., 2007), for treatment of hepatitis, stomach ache, a cooling agent and wound healing (Hassan et al., 2010), anti-hyperlipidemic effect in alloxanized rabbits (Wojtowicz et al., 2004; Maciejewski et al., 2001). *B. lycium* proved an antimicrobial agent and could be used against the diseases caused by the tested micro-organisms; however, its effect could be slower than penicillin G.

REFERENCES

- Ansari KA, Malik AR, Maher AQ (1993). Survey of medicinal plants in district Khairpur. Ann. J. Res. Sci. Sindh, 1:19-26.
- Chand N, Durrani F, Qureshi F, Durrani Z (2007). Role of Berberis lycium in reducing serum cholesterol in broilers. Asian-Australien J. Pl. Sci., 21: 563-568.
- Chaudhry SM, Arshad M (1987). Some medicinal plants of Cholistan. Cholistan Institute of Desert Studies, Annual report, printed by Islamia University, Bahawalpur, Pakistan, pp. 59-110.
- Chiariandy CM, Seaforth CE, Phelps RH, Pollard GV Khambay BP (1999). Screening of medicinal plants from Trinidad and Tobago for antimicrobial and insecticidal properties, J. Erthnopharmacol., 64: 265-270.
- Goodman SM, Ghafoor A (1992). The ethnobotany of Southern Baluchistan, Pakistan with particular reference to medicinal plants. Fieldaina Bot., 10: 1-84.
- Hassan S, Mohammad AY, Sher H (2010). Forest resource utilization assessment for economic development of rural community in northern parts of Pakistan. J. Med. Plants Res., 4: 1786-1798.
- Ishaque M, Memom A, Shahani NM (1988). Survey and Domestication of Wild Medicinal Plants of Sind Province, Pakistan. A Final Research Report, Sind Agricultural University, Tandojam.
- Janbaz KH, Gilani AH (2000). Preventive and curative effect of Berbarine in hepatotoxic rodents. Fitoterapia, 71: 25-33.
- Khan AA, Le Feure J (1996). Indigenous knowledge of plants (A case study in Chitral). In Shinwari, Z.K., Khan BA. and Khan, A.A. (eds). Proceeding of the First Training Workshop on Ethnobotany and Its Application to Conservation, pp. 136-151.
- Khan I, Qayum A, Qureshi Z (1969). Hypotensive action of Berberine, Life Sci., 17: 993-1001.
- Maciejewski R, Rucinski P, Burski K, Figura T (2001). Changes in glucose, cholesterol and serum lipid fraction levels in experimental diabetes. Ann. Univ. Mariae Curie Sklodowska, 56: 363-368.
- Meyer JJM, Afolayan AJ, Taylor MB, Engelbrecht L (1996). Inhibition of herpes simplex virus type 1 by aqueous extracts from shoots of *Helichrysum aureonitens* (Asteraceae). J. Ethnopharmacol., 52: 41-43.
- Muhammad W, Muhammad AUS, Rizawan AQ, Iqbal M, Rabia A, Saeed Y (2006). Traditional uses of various plants of northern areas. Acta Botanica Yunnanica., 28: 535-542.
- Rauf A, Musa KB, Abbasi FM, Chattha MR, Mahmood TZ (2007). Status, utilization and trade of Hazara areas healing plants of Pakistan. JFAE, 5: 236-242
- Shamas F, Ahmadiani R (1999). Anticholinergic and antihistaminic activity of Berberis fruit. J. Ethanopharmacol., 64:161-166.
- Shinwari I, shinwari M, Shah M (2007). Medicinal plant of Margalla hills Islamabad, HEC Pakistan, p. 36.
- Srivatava S, Vartika R, Srivatava M, Rawat A (2006). Environ. Monit. Assess., 116: 315-320.
- Stewart RR (1972). An annotated catalogue of vascular plants from West Pakistan and Kashmir. In Nasir, E. and Ali, S.I. (eds). Flora of West Pakistan. Karachi, pp. 74-102.
- Wojtowicz Z, Wrona W, Kis G, Blaszczyk M, Solecka A (2004). Serum total cholesterol, triglyceride and High density lipoproteins (HDL) levels in rabbit during the course of experimental diabetes. Ann. Univ. Mariae Curie Sklodowska, 59: 258-264.