

## Short Communication

# Antibacterial spectrum of traditionally used medicinal plants of Hazara, Pakistan

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The use of medicinal plants for treatment of infections is an old age practice. On the basis of this important practice, this study was initiated to evaluate the antibacterial effects of medicinal plants, commonly used by the community of Hazara region of Pakistan. Antibacterial spectrum of traditionally used medicinal plants was determined by disc diffusion method under incubation period of 24 to 48 h at 37°C. Four medicinal plants were tested against the different species of human pathogenic bacteria. It was observed that *Incarvillea emodi* have good activity against *Proteus* and significantly active against *Staphylococcus*. *Vernonia anthelmintica* revealed significant activity against *Staphylococcus* and *Proteus*. However, *Pseudomonas* is resistant to *Adiantum capillus-veneries* and this plant is negligibly active against other tested microorganism. *Mentha longifolia* is significantly active against *Proteus*, while negligibly active against other tested microorganisms. *Escherichia coli* is however, resistant to *M longifolia*.

**Key words:** Biological activity, medicinal plants, *Incarvillea emodi*, *Vernonia anthelmintica*, *Adiantum capillus-veneries*, *Mentha longifolia*, Hazara, Pakistan.

## INTRODUCTION

Majority of herbs used by humans as a seasonal food yield useful medicinal compounds. These substances are useful for the maintenance of human and animal health. Majority of the people from Hazara (Pakistan) still rely on specific herbs for the treatment of their skin infections, injuries and gastrointestinal problems. These plants are also traditionally in practice from generation to generation. The use of herbs for treatment of diseases is as old as human origin. Modern scientists have conducted many studies on the importance of medicinal plants and their less toxic effects on human health. Several natural products have been isolated from plants

and used as the remedy for many diseases. Majority of people in Pakistan, especially at hilly areas, treat their disease by using medicinal plants rather than allopathic drugs (Bukhari et al., 2011). Humans have been using plants for centuries because plants provide them medically useful compounds (Cordell, 1981).

It has been estimated that more than two thirds of the world's population rely on plant-derived drugs; More than 7000 medicinal compounds used in the Western pharmacopoeia are derived from plants (Caufield, 1991). 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). It has only been in the past two decades or so that interest

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**Table 1.** Antibacterial spectrum of medicinal plants.

Bacteria	<i>Vernonia anthelmintica</i>	<i>Mentha longifolia</i>	<i>Incarvillea emodi</i>	<i>Adiantum capillus-veneris</i>	Ampicillin	Control (distilled water)
<i>Escherichia coli</i>	+	n.a	+	+	++++	n.a
<i>Pseudomonas</i>	+	+	+	n.a	++++	n.a
<i>Staphylococcus</i>	++	+	++	+	++++	n.a
<i>Proteus</i>	++	++	+++	+	++++	n.a

++++, Excellent activity (80 to 100% inhibition); +++, good activity (60 to 70% inhibition); ++, significant activity (30 to 50% inhibition), +, negligible activity (10 to 20% inhibition); n.a, no activity. Size of blank filter paper disc = 6 mm (diameter).

in higher plant antimicrobial agents has been re-awakened worldwide and the literature in this area is becoming substantial (Mistscher et al., 1984).

Unani system of medicine is reliable and support the utility of herbal medicines. Keeping in view this important practice and literature regarding use of herbs in Unani Medicine and preparation, this study was designed. The plants selected for this research are commonly in practice and recommended by Unani system of medicine for different infirmities. This study only focused on the evaluation of antibacterial effects of medicinal plants commonly in practice by the people of Hazara, Pakistan.

## MATERIALS AND METHODS

Plants (*Incarvillea emodi*, *Vernonia anthelmintica*, *Adiantum capillus-veneris* and *Mentha longifolia*) were collected from different altitudes of Hazara division, Pakistan. Taxonomical and Botanical identification of the plants were done by taxonomists of Botany Department of Hazara University, Mansehra, Pakistan. Plants were kept at room temperature for 15 days for complete drying, and then ground to fine powder with the help of electric grinder. Subsequently, the plants' powder was sunk into methanol for 15 days at room temperature. After 15 days each plant solution was filtered separately and condensation of filtered solution was done with the help of condenser; methanol was separated, leaving behind pure plants extracts.

The pharmacological evaluation was done by disc diffusion method. Hydric solution of each plant extract was prepared separately; a blank disc of filter paper with diameter of 6 mm was dipped in each solution. These soaked discs were picked out from the solution and allowed to dry for few seconds near fire lamp and then kept on agar plates after streaking microbes. After incubation of 24 to 48 h at 37°C, diameter of the clear zone around the discs was measured and compared against the inhibition produce by standard antimicrobial agent.

## RESULTS AND DISCUSSION

The findings of this study showed that *V. anthelmintica* has 30 to 50% inhibition against *Staphylococcus* and *Proteus*, while it exhibits 10 to 20% inhibition against the *Escherichia coli* and *Pseudomonas*. *E. coli* showed resistance to the medicinal plant, *M. longifolia* and *Pseudomonas* was resistant to *Adiantum capillus-veneris*. Moreover, *M. longifolia* revealed 10 to 20%

activity against the *Pseudomonas* and *Staphylococcus*, and 30 to 50% activity against the *Proteus*. *I. emodi* had 10 to 20% activity against the *E. coli* and *Pseudomonas*, while against the *Staphylococcus* and *Proteus* it showed 30 to 50 and 60 to 70% activity, respectively. Furthermore, the medicinal plant *A. capillus-veneris* was inactive against *Pseudomonas*, and had 10 to 20% activity against the all other tested bacteria (Table 1). The percentage activity of medicinal plants is represented in its comparison with the activity produced by the standard antibacterial drug ampicillin that has 80 to 100% activity against all the tested bacteria. Excellent activity was 80 to 100% activity, 60 to 70% good activity, 30 to 50% significant activity and 10 to 20% negligible activity.

Ampicillin and other antibiotics are commonly recommended by physicians for infections, but beside their beneficial role in treatment they also have some adverse effects for those who use them for long time and sometimes show immediate adverse reaction in patients. The use of many antibiotics is strictly prohibited for pregnant women because of their role in miscarriage. The most common adverse effects of antibiotics are allergy, nausea, vomiting, etc. Though the plants screened for their biological activity did not show excellent activity against the tested bacteria, they are still in practice by people, especially by pregnant women, without any reported adverse effects. This statement is supported by Bukhari et al. (2011) who reported that persons with different human illness like swollen eyes, soar throat, wounds and infections in fractured bones treated with *Berberis lycium* had no adverse effect from the said medicinal plant. Traditional healers have long used plants to prevent or cure infectious conditions. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, alkaloids and flavonoids, which have been found *in vitro* to have antimicrobial properties (Cowan, 1999).

Concerning the plant *Adiantum cuneatum*, results have confirmed and justified the popular use of this plant for the treatment of dolorous processes (Louisiane et al., 2003). In this study, we have used *A. capillus-veneris* that do not have valuable antibacterial activity. The extract of *I. emodi* a plant of Bignoniaceae family, shows good activity against the *Staphylococcus* and *Proteus*. A study by Rasadah and Houghton (1998) revealed that crude

extract of all species of Bignoniaceae family have antibacterial activity against Gram positive and negative bacteria and yeast. *Tabebuia spectabilis*, a plant of Bignoniaceae family is the most active against the Gram positive bacteria.

In present study, *V. anthelmintica* presents good activity against *Staphylococcus* and *Proteus*, but was negligibly active against *E. coli* and *Pseudomonas*. It has also been reported that *Vernonia amygdalina* has significant bactericidal activity against five Gram positive bacteria, while lacking efficacy against the Gram negative strains (Erasto, 2006). It is therefore recommended that the plants showing good activity against the tested bacteria can be use as safer antimicrobial agents or phytomedicine.

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