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## Ethnobotanical survey of medicinally important shrubs and trees of Himalayan region of Azad Jammu and Kashmir, Pakistan



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## ABSTRACT

**Ethnopharmacological relevance:** Present study was commenced with an aim to document the indigenous knowledge of medicinally important shrubs and trees of Himalayan region of Azad Jammu and Kashmir, Pakistan. This is the first contribution to the quantitative ethnobotany of this region, as no reported data focusing on shrubs and trees from the area have been published. Study reported the ethnobotanical significance of medicinal plants for the treatment of various diseases.

**Method:** Study was conducted during 2012–2014 following standard ethnobotanical methods. The ethnomedicinal data was collected through informed consent semi-structured interviews of 160 key informants. Documented data was analyzed by using quantitative indices of informant consensus factor (ICF), fidelity level (FL), use value (UV) and relative frequency citation (RFC).

**Results:** A total of 73 shrub and tree species belonging to 56 genera and 37 families were reported to be used ethnomedicinally for the treatment of various ailments. Medicinal plant diversity showed that Rosaceae was dominating family with (9 spp.) followed by Moraceae (7 spp.), Euphorbiaceae, Mimosaceae, Pinaceae, Rhamnaceae (4 spp. each), Oleaceae (3 spp.), Apocynaceae, Caesalpiniaceae, Ebenaceae, Fagaceae, Lythraceae, Papilionaceae, Acanthaceae, Verbenaceae (2 spp. each) while remaining 22 families were represented by one species each. Leaves (23%) were highly utilized plant parts, followed by fruits (22%), bark (18%), seeds (10%), roots (9%), flowers (8%), whole plant and aerial parts (4% each) and stem (2%). Modes of preparation fall into 14 categories including powder (33 reports) followed by decoction (29 reports), paste (22 reports), juice (18 reports), infusion (12 reports), raw (8 reports), extract and latex (5 reports each), gum and oil (4 reports each), fresh part and pulp (2 reports each), chewed and cooked (1 report each). The highest FIC was recorded for Gastro-intestinal disorders (0.58) followed by nail, skin and hair disorders (0.44). Maximum fidelity level (FL=100%) was expressed by *Abies pindrow*, *Adhatoda vasica*, *Bauhinia variegata* and *Cedrela serrata*. Based on use value *Juglans regia* (0.88) was found most significant species followed by *Acacia nilotica* (0.83), *Phyllanthus emblica* (0.81), *Pinus roxburghii* (0.75) and *Punica granatum* (0.71).

**Conclusion:** The area has a rich diversity of medicinally important shrub and tree species. The tradition of using plants for medicinal purposes is still alive in the local community but recently this tradition is gradually declining in new generation. Therefore awareness is needed to be raised among the local people on sustainable use and conservation of local flora.

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## 1. Introduction

According to World Health Organization (WHO) about 80% of the population in developing countries depends on the traditional medicinal plants for primary health care, income generation and livelihood improvement (Calixto, 2005; WHO, 2002). Globally, 422,000 flowering plants are reported (Govaerts, 2001). Out of these, about 50,000 plants are used for medicinal purposes (Schippmann et al., 2002) and only 5000 plants had been screened phytochemically to investigate their

active constituents. While for the rest of the plants only preliminary phytochemical investigations had been carried out (Mahmood et al., 2011). Medicinal plants have been used as a source of medicines since human civilization (Hill, 1952). Because of unique phytogeography and diverse climatic conditions, Pakistan has a great diversity of medicinal and aromatic plants (Bano et al., 2014). Out of the total 5700 medicinal plants about 400–600 are found in Pakistan (Malik et al., 2005). In mountainous areas of Pakistan people use plants for various ailments and for long time they have been dependent upon plant resources for their food, health, shelter, fuel and other purposes (Hussain and Khaliq, 1996; Ahmad et al., 2009; Alam et al., 2011).

In recent years, ethnobotanical knowledge of medicinal plants has gained significant consideration among the scientific societies

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(Heinrich, 2000). Rising prices of synthetic drugs have enhanced the interest of medicinal plants usage as a re-emerging health aid and synthesis of new plants derived drugs (Hoareau and DaSilva, 1999). Number of reports to investigate the medicinal properties of indigenous plant species either by ethnic people or rural communities around the world as well as in Pakistan is increasing day by day (Arellanes et al., 2003; Reddy et al., 2006; Maregesi et al., 2007; Mann et al., 2008; Sulaiman et al., 2011; York et al., 2011; Nunkoo and Mahomoodally, 2012; Mahmood et al., 2012; Abbasi et al., 2013; Shrivastava and Kanungo, 2013; Ahmad et al., 2014; Kayani et al., 2014; Bibi et al., 2014).

Azad Jammu and Kashmir is bestowed with a unique biodiversity and is a remarkable source of medicinal plants for indigenous people. Diversity of economically important plants is fairly rich in Azad Kashmir (Shinwari, 1996; Ahmad et al., 2010; Alam et al., 2011). Even though, few efforts had been made on the use of indigenous medicinal plants particularly shrubs and trees in traditional health care by local communities of Azad Jammu and Kashmir (Mahmood et al., 2012; Ajaib et al., 2010; Qureshi et al., 2007; Dar, 2003; Saghir et al., 2001; Shahzad and Qureshi, 2001). Unfortunately, all these studies were conducted qualitatively and no quantitative ethnobotanical work has been undertaken in this region yet. In this regard the present study can be considered as the first effort which deals with ethnomedicinal uses of shrubs and trees in the region. Present study aimed to not only document the indigenous knowledge of medicinal plants of Himalayan region of Azad Jammu and Kashmir and to analyze ethnobotanical information using quantitative indices of use value (UV), frequency citation (FC), relative frequency citation (RFC), informant consensus factor (ICF) and fidelity level (FL) but also make a comparison of medicinal uses of plants with previously published literature.

## 2. Methodology

### 2.1. Study site

In Pakistan, the Himalayan range occupies the regions of Deosai, Chilas, Kaghan, Kohistan and Kashmir (Bano et al., 2014). Himalayan region of Kashmir is situated within the northwestern folds of the recently designated Global Biodiversity Hotspot of the Himalayas

(Mittermeier et al., 2005). Geologically it is younger but an integral part of main Himalayan range. Specific medicinal plants are found in Himalayas (Dhar et al., 2000). The famous Silk-route between China and Indo-Pak sub-continent passes from the Azad Jammu and Kashmir Himalayas (Khan, 1994). The area of Azad Jammu and Kashmir is located in the foothills of Himalayas between 73–75° East longitude and 33–35° North latitude, comprising an area of 13,297 km<sup>2</sup>. The altitude ranges between 360 m in the south and 6325 m in the north above sea level. The area is endowed with natural beauty having diversified habitats, such as lakes, rivers, streams, springs, meadows, steep mountain slopes and roads, cultivated fields, waste lands etc. (Anonymous, 2006). Kashmir valley enjoys a temperate climate during summer but is very cold in winter. The main rivers are Jhelum, Neelum and Poonch. The Northern districts (Muzaffarabad, Bagh, Poonch, Sudhanoti etc.) are generally mountainous while Southern districts (Kotli, Mirpur, Bhimber etc.) are relatively rolling and plain (Fig. 1).

According to 1998 population census the state of Azad Jammu and Kashmir had a population of 2.973 million, which is estimated to be grown to 3.5 million in 2006. The majority of rural population depends on forestry, livestock, agriculture, sericulture etc. The mountainous ecosystems are relatively unstable and have low productivity. Within this fragile environment, however there are great varieties of ecological niches upon which people base their livelihoods. Small landholdings, short cropping seasons, lack of irrigation and scarcity of cultivable lands are the main factors limiting farm income (AJK CDP, 2005).

### 2.2. Ethnobotanical field interviews and data collection

Ethnobotanical field surveys were carried out to compile the indigenous knowledge of the local communities of Azad Jammu and Kashmir about the use of medicinal plants for the treatment of various ailments. Following the protocol for ethnobotanical data documentation, field surveys were carried out from March 2012 to March 2014 (Alexiades, 1996; Martin, 2004). Ethnobotanical data was obtained through semi-structured interviews, questionnaires, group discussions and face to face conversation with local inhabitants of valley having sufficient traditional knowledge of useful indigenous medicinal plants (Martin, 1995; Cotton, 1996; Pardo-de-Santayana et al., 2007). Before the interviews began prior informant consent (PIC) was received from

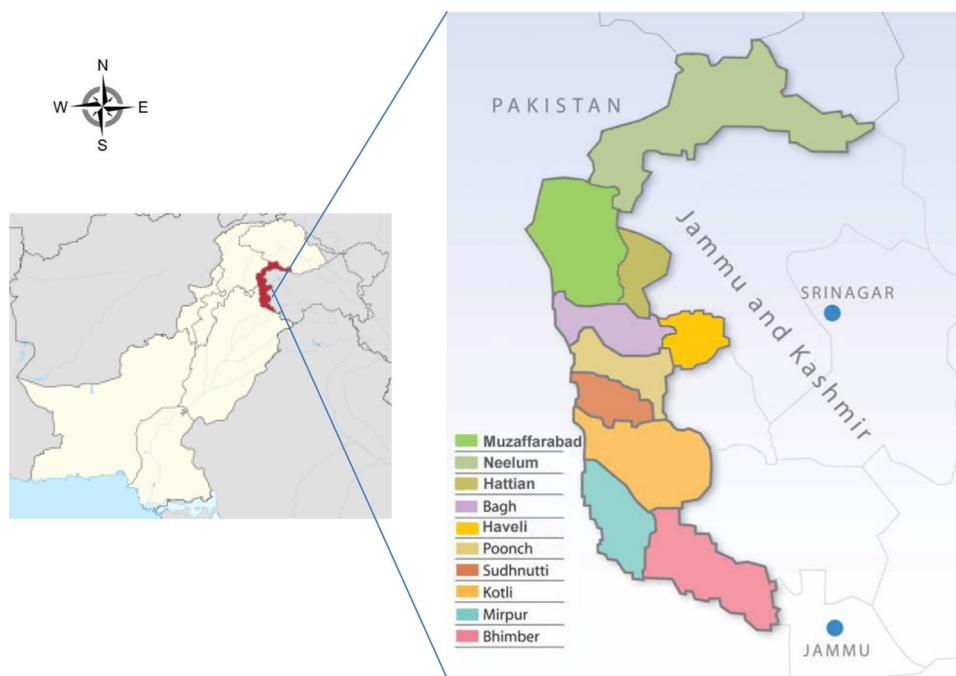


Fig. 1. Map showing the study area.

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