Ethnopharmacological survey on medicinal plants used in herbal drinks among the traditional communities of Pakistan

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ABSTRACT

Ethnopharmacological relevance: There is very limited information regarding medicinal plants used by traditional healers in Pakistan, for treating wide-ranging diseases. Current study provides significant ethnopharmacological information, both qualitative and quantitative on medical plants in Pakistan and the pharmacological importance of herbal drinks, especially in the discovery of new drugs.
Materials and methods: The current ethnomedicinal field study was conducted from various traditional communities of Pakistan to document usage of medicinal plants as herbal drinks. Data was collected through field interviews from local people and using semi-structured questionnaires. Data was analyzed using quantitative indices such as UV (use value), RFC (Relative frequency of citation), and FL (Fidelity level).
Results: The present study recorded 217 plant species belonging to 174 genera and 69 families used in herbal drinks preparations. Major herbal preparations include decoctions, infusions and juice. According to use reports, significant species were *Aloe vera, Artemisia fragrans, Allium cepa, Senegalia catechu, Alternanthera sessilis, Malva ludwigii, Arnebia benthamii, Cichorium intybus, Coccinia grandis, Dalbergia sissoo*. Major ailment treated with herbal drinks include heartburn, fever, diarrhea, hypertension, and others. Use value (UV) varies from 0.23 to 0.02, with *Mentha arvensis* (0.23) having the highest value of UV followed by *Mentha longifolia* (0.22), *Plantago lanceolate* (0.19), *Achillea millefolium* (0.18), *Coriandrum sativum* (0.18), *Justicia adhatoda* and *Malva sylvestris* (0.17). Values of RFC varies from 0.28 to 0.09 while Fidelity level (FL) among plants varies from 37.5 to 100. *Alternanthera sessilis, Oxytropis lapponica, Millettia pinnata* and *Salvia bucharica* had the highest FL value (100).
Conclusion: The use of medicinal plants is prevalent in traditional communities of Pakistan. Different herbal preparations are in common practice including various herbal drinks a common tradition and much favoured herbal preparation in terms of its results and regarded as reciprocal to modern drugs. Therefore, suggesting further pharmacological, phytochemical evaluation for essential metabolites and chemical constituents.

1. Introduction

Majority of the people in traditional communities of the world are still dependent on herbal traditional remedies for the treatment of common ailments. This has been an established fact that medicinal plants serve as a major source of new drug discovery (Bibi et al., 2014). Ethnobotanical studies have been very much useful to develop interest in traditional health care system, as it is without any side effects (Khan and Hanif, 2006). This traditional practice is mostly similar throughout the world especially in the continents of Asia, Africa, and Latin America (Baquar and Tasnif, 1984). Traditional herbal system of disease cure is more common in tribal communities or ethnic groups (Qureshi and Ghufran, 2005). The use of plant based drinks like herbal teas and herbal powders are of common occurrence and have no side effects in many disorders such as fever, cold, cough and diarrhea (Sabeen and Ahmad, 2009). Even today nearly 25% of all drugs/medicine in the developed world contain constituents derived from medicinal plants (Vitalini et al., 2009; Sher et al., 2000). Herbal medicines are more prevalent in traditional communities (Qureshi and Ghufran, 2005). The use of herbal medicine is a cultural prefrence of the traditional people and regarded as a complete remedial system (Lehane, 1977; Nelson, 1951). The knowledge of herbal prescriptions is today used by chemists to manufacture different valuable

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mixtures and this knowledge of medicinal plants has been acquired from their forefather's for peers (Ahmad and Husain, 2008; Elisabetsky and Castilhos, 1990), but is gradually on decline due to dependence on modern medical practices (Khan et al., 2015).

Commercially important plant species with remedial properties, its crude preparations, especially herbal drinks, traditional knowledge and socio economic importance in the study areas is less discussed in previous studies (Lalfakzuala et al., 2007; Lalramnghinglova, 1999, 1996; Mahanti, 1994). The present study aims to catalogue, identify and document medicinal plants used as traditional medicinal herbal drinks in Pakistan, types of common disorders treated with herbal drinks, evaluate major metabolites, to access the traditional awareness of plants amongst local communities and quantitatively evaluate consensus of usage of plants as herbal drink using various indices like UV, RFC, and FL.

2. Materials and methods

2.1. Study site

Pakistan has rich floral diversity in terms of wild flora and especially have variety of therapeutic and aromatic/scented plants, mainly due to its peculiar phytogeography and wide ranging climatic conditions and blessed with all four seasons. Pakistan has a sub-tropical and semi-arid climate (Chaudhry et al., 2009), located at 30° 00′ N and 70° 00′ E latitudes and longitudes with an area of 796,096 km^2. Summers are hot with an average temperature of 40 °C and cold winters with temperature ranging from 4 to 20 °C, relative humidity ranges from 25% to 50% (Rasul et al., 2012). The annual rainfall ranges from 125 mm, receives monsoon rainfall in summer and winter rainfall is due to western system.

Pakistan has diverse ethnicity in the region, having mixed culture with Punjabi, Baloch Sindhi and Pukhtoons having their cultures, dresses and dishes. National language is Urdu and majority of the people in northern part speak Pashto (Butt et al., 2015), while other languages are Hindko, Potohari, Gujrati, Punjabi, Siraiki, Balochi and Balti (Fig. 1).

2.2. Quantitative data analysis

Various quantitative indices were used to evaluate ethnomedicinal field data recorded from different localities to investigate the use of medicinal plants used as herbal drinks and to access the level of traditional knowledge among the local communities.

2.2.1. Use value (UV)

UV was calculated to evaluate the significance of medicinal plants with highest use for treatment of ailments. UV was calculated by using the formula:

UV = No of ailments/no. of informants (Butt et al., 2015).

2.2.2. RFC (relative frequency citation)

RFC was calculated to elaborate the level of traditional knowledge about the use of plants as herbal drinks using the formula:

$$RFC = FC/N \, (0 < RFC < 1)$$

Where RFC is relative frequency citation, FC (Frequency of Citation) number of informants who cited the species and N is the total number of study informants (Kayani et al., 2014).

2.2.3. FL (fidelity level)

FL was calculated to show preference of one species over others, for treating particular diseases. FL is calculated by using the formula:

$$FL(\%) = Np/N \times 100$$

where Np is the no. of informants who described plant species to treat a precise infection, and N is the total sum of informants that practice the plants as a remedy (Yaseen et al., 2015)

3. Results and discussion

3.1. Data documentation in the study area

Ethnomedicinal filed study was carried out in various localities with rich floral diversity and traditional knowledge including Abbottabad, New Murree, Bhimbher AK, Morgah biodiversity park, Maradori AK, District Bagh, Chikar Muzaffarabad, Mastung, Chitral valley, Motorway M 2, Kallar kahar, Margalla hills National park Islamabad, Salt range, Attock, Central Punjab, Sialkot, Kaghan valley, Tehsil Chakwal, Mardan, Kotli AK, Western Himalayas Gilgit Baltistan, Khanabad Village, Khunjerab National park, Dera Ghazi Khan, Badin and Gallyat during the year 2014-2015 following methods of Heinrich et al. (2009). Most of the plants were collected from wild in their native habitats like high altitude mountainous regions (Dry/moist temperate, alpine/subalpine regions) like, Swat, Skardu, Murree, Chitral, Kaghan etc, while others collected from salt range and dry tropical/subtropical localities including Thar Desert. Among the medicinal plants documented, 74.65% of the species grew in wild and 14.75% of the medicinal species were cultivated as food, while 11.1% of the species were found both in wild as well as cultivated as food plants eg. *Zea mays, Allium cepa, Allium sativum, Avena sativa, Prunus domestica, Momordica charantia, Caralluma tuberculata, Foeniculum vulgare, Daucus carrota, Coriandrum staivum, Cuminum cyminum, Diospyros lotus, Mentha speices etc*. The medicinal species documented were categorized as common, less common and rare. In most of the cases we found the reported plants in common category, only a few were in the rare category.

Medicinal plants reported by informants were collected, dried, pressed and mounted on standard herbarium sheets using herbarium techniques recommended by Jain and Rao (1977). Medicinal plant samples were identified using Flora of Pakistan (Nasir and Ali, 1970-2002), Catalogue of vascular plants of West Pakistan and Kashmir (Stewart, 1972) and authenticated from "www.kew.org/mpns" and (TPL) "The plant List" and by comparing with herbarium samples, voucher specimen numbers were assigned and deposited in the Herbarium of Pakistan (ISL) Quaid-i-Azam University Islamabad-Pakistan.

Total of 250 study informants with various age groups and educational status were interviewed at random from various localities of Pakistan. Ethnomedicinal data on use of plants as herbal drinks was collected through open and semi-structured interviews and free listing (Khan et al., 2015; Bruni, et al., 1997). Prior ethical approval by our university and local administration was obtained, the informants were informed about the purpose of the investigation, adopting Kyoto protocol.

3.2. Demographic characteristics of study area

Field data was collected from informants with various demographic features. The majority of informants were female 66% followed by men 34%. The higher no of female informants indicated the easy access in homes and managements at domestic level (Hardy, 2000). It is found that old aged female are more familiar with traditional system of medicine and are using it frequently. Demographic information on age indicated various age groups, dominated by people having ages (51–72) 34% and have considerable knowledge on the use of medicinal plants as herbal