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Traditional knowledge on poisonous plants of Udhampur district of Jammu and Kashmir, India

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ABSTRACT

Ethnopharmacological relevance: Poisonous plants comprise the third largest category of poisons known around the world. Other than affecting the humans directly, they are the major cause of economic losses in the livestock industry since the advent of civilisation. Aim of the present study was to collect and systematically document the traditional knowledge of poisonous plants of Udhampur District for the benefit of humanity before it is entombed forever.

Material and methods: Direct interviews of the informants were conducted and the plants identified as poisonous by them were collected, identified and herbarium sheets were prepared. The data collected through interviews was analysed with two quantitative tools viz. the factor informant consensus and fidelity level.

Results: A total of 90 toxic plants were listed from the study site. Most dominant toxic families were Fabaceae, Asteraceae, Solanaceae, Apocynaceae and Euphorbiaceae. Most of the poisonous plants were herbs (57.1%) and the whole plant toxicity was reported to be the highest (32.4%) followed by leaves (23.1%). According to the factor informant consensus, gastrointestinal category had the greatest agreement closely followed by the death category. The most important species on the basis of fidelity level for gastrointestinal category were *Cannabis sativa*, *Cassia occidentalis*, *Cuscuta reflexa*, *Euphorbia helioscopia* and *Euphorbia hirta*, for death category were *Anagalis arvensis*, *Embelia robusta* and *Prunus persica*, for dermatological category *Euphorbia royleana*, *Leucaena leucocephala*, *Parthenium hysterophorus* and *Urtica dioica*, and for sexual illness category were *Calotropis procera* and *Carica papaya*.

Conclusion: Further phytochemical and pharmacological studies are required to ascertain the toxic components of the poisonous plants, so that they may be utilised for the betterment of future generations.

1. Introduction

Poisonous plants have always been part of our daily life and some of them are so common that we do not even suspect their toxic nature (Secmen and Leblebici, 1987). On the one hand, they are a serious menace to life and bodily functions of man and animals causing death or illness through accident, ignorance or bad intention resulting in huge economic loss, yet, on the other, several of them in regulated doses constitute very potent and effective remedies for curing diseases (Chopra et al., 1984). Indigenous people all over world use poisonous plants for different purposes such as hunting, fishing, wars and treating diseases (Al-Qura'n, 2005). Toxins from plants are closely related to health aspects of humans and animals (Habermehl, 2004) and toxic constituents from them are often applied as effective treatments of some refractory symptoms of human diseases (Harvey et al., 1998).

The significance of the study and awareness of poisonous plants increase manifold in the Indian subcontinent as it possesses the largest livestock population in the world, which accounts for 7% of its income (Chamnah et al., 2010). The Indian livestock sector today has 185 million cattle, 98 million buffaloes, 124.5 million goats, 6 million sheep and 6.3 million camels. This represents 16% of the world's cattle, 57% of world's buffaloes, 18% of world's goats, and 6% of the world's sheep. Animals, particularly the grazing livestock are indiscriminate eaters. When hungry, they ingest food as well as non-food plants, particularly during the periods of scarcity. Absence of specific grazing areas or pastures in our country aggravates the menace of plant toxicity due to the wide distribution of non-food toxic plants in the waste lands, the so-called grazing areas of our livestock (Bhatia, 2011 unpublished).

Udhampur has a total of 3.78 million cattle, 2.26 million buffaloes, 1.59 million goats and 2.52 million sheep (as per livestock census

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held in the year 2008). About 80% of the population of the district depends on agriculture and rearing of livestock is the main source of income. So, the knowledge and understanding of the poisonous plants and their adverse effects is crucial for the development and implementation of effective management practices in future. The knowledge of these poisonous plants is passed on from one generation to another through local and elderly people. Indigenous knowledge is a very important and inexhaustible information bank providing useful leads for general awareness and toxicological research (Huai and Xu, 2000). But, much of the knowledge amassed over millennia by tribals and passed on verbally over many generations, in many localities in India and elsewhere, is in danger of being lost forever (Schultes, 1991). It is facing the threat of rapid erosion because much of the knowledge resides with local healers (Hakims and Vaidyas) and elderly community members and disappears as they die. So, it is the paramount need of the hour to collect and systematically document this precious traditional knowledge for the benefit of humanity before it is entombed forever with the cultures that gave birth to it (Schultes, 1991; Sharma et al., 2012). Keeping this thing in mind, the present study was conducted in the Udhampur district of Jammu and Kashmir, to tap the ethnotoxic knowledge of the locals.

2. Material and methods

2.1. Study site

District Udhampur of Jammu and Kashmir State lies between 32° 34′ and 39° 30′ North latitude and 74° 16′ and 75° 38′ East longitude and has a total area of 2380 km^2. The district has an altitudinal range of 600–2900 m above mean sea level due to which the district has subtropical to temperate climate. The annual temperature of the study site varies between 42 °C in summers and 1.0 °C in winters, and average rainfall slightly over 1551 mm (Bhatia, 2011 unpublished).

2.2. Data collection

A total of 131 local inhabitants were interviewed. The diagnosis of plant poisoning of livestock by the informants was primary on basis of history, clinical syndrome observed and remains of toxic plants in the gastrointestinal tracts of the affected animals. The plant reported as poisonous by the informants was collected, dried and then pasted on the herbarium sheet. The identification of the plant specimen was done by the herbaria of Department of Botany, University of Jammu, Jammu and Indian Institute of Integrative Medicine, Jammu, and with the help of various regional floras (Sharma and Kachroo, 1983; Swami and Gupta, 1998) and Chopra et al. (1984). A voucher specimen of each plant was finally deposited in the herbarium of University of Jammu vide sheet numbers JUH 13978 to 14067. The International Plant Names Index (http://www.ipni.org) was followed for the botanical nomenclature of species.

2.3. Data analysis

For the analysis of the general use of plants the factor informant consensus (F_{ic}) (Heinrich et al., 1998; Gazzaneo et al., 2005) were used. The factor was originally used to highlight plants of particular intercultural relevance and the agreement in the use of plants. The various ailments caused by the poisonous plants were classified into broad ailment categories on the basis of Heinrich et al. (1998). An agreement in the use of plants in the illness categories between the populations can be studied through this method. F_{ic} values will be low (near 0) if plants are chosen randomly, or if informants do not exchange information about their use. Values will be high (near 1) if there is a well-defined selection criterion in the community and/or if information is exchanged between informants (Gazzaneo et al., 2005; Srithi et al., 2009; Sharma et al., 2012). The F_{ic} was calculated as the number of use citations in each category (n_{ur}) minus the number of species used (n_t), divided by the number of use citations in each category minus one (Heinrich et al., 1998):

$$F_{ic} = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

The fidelity level (Fl), which is the ratio between the number of informants who independently suggested the use of a species for the same major purpose and the total number of informants who mentioned the plant for any use (Andrade-Cetto, 2009), was calculated for the most frequently reported diseases or ailments for the categories with the highest F_{ic}:

$$\mathrm{Fl}(\%) = \frac{N_p}{N} \times 100$$

where N_p is the number of informants that claimed a use of a plant species to treat a particular disease, and N is the number of informants that used the plants as a medicine to treat any given disease (Friedman et al., 1986; Andrade-Cetto, 2009). Simple use-mentions (Um) refer to the mentions for one plant given by all the informants for a specific disease (Andrade-Cetto, 2009).

With the help of these tools one can determine the illness category which had the maximum "consensus" in a population (using the F_{ic}) and the plant with major fidelity (using the Fl) (Andrade-Cetto, 2009).

3. Results

3.1. Demographic characteristics of informants

A total of 131 local inhabitants, including 84 men and 47 women were interviewed to tap the traditional knowledge on poisonous plants of the study area. They included *hakims* and *vaidyas* (local healers), *gujjars* and *bakkarwals* (nomads), veterinary personnel, livestock rearers, dairy owners, *ponywallas* and milkmen. All the informants were related to animals, while local healers and veterinary personnel cure these animals, other informants own them (animals). The traditional healers were all men. Most of the informants were of the age group between 46 and 75 years (59.5%). Only 26.7% of the informants were illiterate (Table 1).

Table 1
Demographic characteristics of the informants.

Gender	
Male	84 (64.1%)
Female	47 (35.9%)
Age-group	
24–35	18 (13.7%)
36–45	21 (16.0%)
46–55	22 (16.8%)
56–65	27 (20.6%)
66–75	29 (22.1%)
76–85	10 (7.6%)
86–95	4 (3.1%)
Educational qualification	
Illiterate	35 (26.7%)
1–5 class	30 (22.9%)
6–10 class	25 (19.1%)
Intermediate	15 (11.5%)
Undergraduate	16 (12.2%)
Postgraduate	10 (7.6%)