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Ethnomedicinal plants used for treating epilepsy by indigenous communities of sub-Himalayan region of Uttarakhand, India

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ABSTRACT

Ethnopharmacological relevance: Although many plants are claimed to possess anticonvulsant/antiepileptic (AC/AE) properties, but there is very little information available about plants used by various ethnic communities in different parts of India to treat epilepsy, one of the most common disorders of central nervous system (CNS); this communication provides significant ethnomedicinal information on the plants used by indigenous communities: Bhoxa, Tharu and nomadic Gujjars of sub-Himalayan region, Uttarakhand, India to treat epilepsy, so that it could be used as a baseline data for studying chemical constituents and biological activities of these promising plants.

Aims of the study: To record herbal preparations used by the presently studied communities for treating epilepsy and discuss AC/AE properties of the recorded plants.

Research strategy and methods: Ninety one traditional healers (29 Bhoxa, 35 Tharu and 27 nomadic Gujjars) in sub-Himalayan region of Uttarakhand, India were interviewed to collect information on herbal preparations used by them for treating epilepsy. For each recorded species the use value (UV) and fidelity level (FL) was calculated.

Results: A total of 24 plants belonging to 24 genera and 22 families were used by the presently studied communities in 26 formulations to treat epilepsy. According to FL and UV values, most preferred species for the treatment of epilepsy by Bhoxa community are *Ricinus communis* L. and *Datura stramonium* L.; by nomadic Gujjar community are *Martynia annua* L., *Bacopa monnieri* (L.) Wettst. and *Ricinus communis* L.; and by Tharu community are *Allium sativum* L., *Asparagus racemosus* Willd. and *Achyranthes aspera* L. Eight plants viz., *Allium sativum* L., *Boerhavia diffusa* L., *Cassia fistula* L., *Clerodendrum viscosum* Vent., *Datura stramonium* L., *Inula cappa* DC., *Oroxylum indicum* (L.) Kurz and *Pavetta indica* L. recorded in the present survey have been reported for the first time in treatment of epilepsy by these indigenous communities in India. Five out of these eight newly reported plants viz., *Cassia fistula* L., *Clerodendrum viscosum* Vent., *Inula cappa* DC., *Oroxylum indicum* (L.) Kurz and *Pavetta indica* L. have not been pharmacologically evaluated yet for their possible AC/AE properties.

Conclusions: Detailed research on the listed plants and their derivatives may be undertaken to provide new alternative treatments and therapeutic uses for epilepsy or other diseases of CNS. We hope that this article will stimulate further investigations into natural products for new AC/AE agents from the recorded ethnomedicinal plants.

1. Introduction

Epilepsy is the term used for a group of disorders characterized by recurrent spontaneous seizures that apparently result from complex processes involving several neurotransmitter systems such the glutamatergic, cholinergic, and gabaergic system (Almeida et al., 2011). Epilepsy is among the least understood of major chronic medical conditions, even though one in three adults knows someone with the disorder (Kobau and Price, 2003).

The mortality rate among people with epilepsy is two to three times higher – and the risk of sudden death is 24 times greater – than that of the general population (Ficker, 2000). Epilepsy affects nearly 7 million people in India (Kumar et al., 2012) and 50 million worldwide, approximately 40% of them are women (WHO, 2003). As per meta-analysis of previously published and unpublished

Abbreviations: AC/AE, anticonvulsant/antiepileptic; CNS, central nervous system; FL, fidelity level; Gr, grass; H, herb; MES, maximal electro-shock; NA, information not available; PILO, pilocarpine; PTZ, pentylenetetrazole; S, shrub; STR, strychnine; Tr, tree; UV, use value.

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studies to determine patterns of epilepsy by using community-based studies, Sridharan and Murthy (1999) estimated the overall prevalence rate of epilepsy in India at 5.59 per 1000 population, with no statistically different rates between men and women or urban and rural population. In developed countries where drugs are easily available, epilepsy responds to treatment in up to 70% of the patients, but in developing countries 75% of people with epilepsy do not receive effective treatment (Kumar et al., 2012). As per Sridharan and Murthy (1999) the number of population with epilepsy in rural areas of India is ~4.1 million, three fourths of whom will not be getting any specific treatment. According to Bharucha (2003) medical treatment for wealthy patients in some large Indian cities is as advanced as that anywhere in the world, yet there remains a large rural population of patients with epilepsy whose illness is unrecognized and untreated by medical personnel. In this context, folk remedies are very important as they are considered readily available, inexpensive, time tested and may provide cheap alternative to rural population.

India is rich in ethnic diversity and has a well practiced knowledge of herbal medicines (Jain, 1991; Pandikumar et al., 2011). Sub-Himalayan region of Uttarakhand is very rich in biodiversity and is home to some of the important indigenous communities of the region. These communities are totally dependent on the natural resources for their diverse daily needs and have invaluable knowledge about medicinal uses of plants growing in their vicinity (Gaur and Tiwari, 1987; Negi et al., 1993; Pande et al., 2006). Wondimu et al. (2007) opined that collecting and documenting indigenous knowledge on medicinal plants may add information to the valuation of biodiversity and to forward suggestions for its sustainable use and conservation, besides that unrecorded information may be lost forever. Therefore, there is an urgent need to record this precious ethnomedicinal knowledge so that in future it could aid in drug discovery and development of affordable healthcare for poor and rural people. Knowledge about the ethnomedicinal plants used by indigenous communities of sub-Himalayan region is very meager except few recent attempts made by Gaur and Sharma (2011), Sharma and Painuli (2011), Sharma et al. (2011a, 2011b, 2012, 2013). Keeping the aforesaid facts in view the present study was undertaken to record herbal preparations used by three important indigenous communities i.e. Bhoxa, Tharu and nomadic Gujjars of sub-Himalayan region, Uttarakhand, India in treatment of epilepsy and discuss their anticonvulsant/antiepileptic properties.

2. Research strategy and methods

2.1. Study area

The eastern part of North-West Himalaya covers the state of Uttarakhand, which includes two major divisions of Kumaon and Garhwal. The state lies between latitude 28°42′ and 31°28′N, and longitude 77°35′ and 81°50′E, and bounded in northwest by Himachal Pradesh, in north by Tibet, in east by Nepal and in south by Uttar Pradesh. The sub-Himalayan region in Uttarakhand stretches along the southern periphery, and consists of a long chain of narrow as well as low altitude mountain ranges of about 300–1000 m asl. It is an intermediate region between Gangetic plains and mountainous Himalaya, and has a width of about 30–40 km standing with scattered mountains. The present study was conducted in sub-Himalayan region in the districts of Dehradun, Haridwar, Pauri and Udham Singh Nagar. The region has very rich biodiversity of plants and animals. It supports different forest types, which vary in species composition according to change in elevation and latitude (from east to west).

Regular field trips were undertaken between 2008 and 2012 in different seasons viz., winter (November to March), summer (April to June) and rainy (July to October), for the collection of ethnomedicinal information related to treatment of epilepsy from three important indigenous communities of Uttarakhand viz., Bhoxa, Tharu and nomadic Gujjars (for detailed information about the studied communities see Sharma et al., 2012). Tharu is the largest primitive indigenous community of Uttarakhand, whereas Bhoxa is third largest indigenous community of Uttarakhand. Nomadic Gujjar community is one of the most important migratory communities of the Himalaya. They traditionally travel to the higher Himalayan meadows during summer & monsoon, and return back to lower Himalaya in winters. These communities live harmoniously in the interior parts of the forests of the region and over the centuries have accumulated a vast knowledge about plants used to cure various ailments. Studied communities live in different parts of the sub-Himalayan region of Uttarakhand, India. 23 Bhoxa villages, 16 Nomadic Gujjar villages and 33 Tharu villages were visited during the course of the study.

2.2. Sampling and interview of traditional healers

Ethnomedicinal information was obtained through a series of interviews with traditional healers, who still practiced their indigenous system of medicine. A pre-designed questionnaire was used to interview the informants. Informants were asked about the vernacular names, methods of preparation, route of administration, part (s) used, dosage and duration. Interviews and discussions were carried out using a local dialect for easy communication with the participants. A total of 91 traditional healers (29 Bhoxa, 27 nomadic Gujjars and 35 Tharu) were interviewed to collect information on herbal preparations used by them for treating epilepsy. Ethical clearance was not obtained and no written prior consent was taken from the participants, as it was not the requirement at the Universities where research was conducted (HNB Garhwal University and Hamdard University). However participants were clearly informed about the objective of the study and their right to withdraw from the study at any time. Authors tried to remain neutral and no suggestion about any plant was given to collect accurate information. The traditional healers were specifically asked about plants used for the treatment of epilepsy along with method of preparation and mode of administration of the prescribed medicine. The traditional healers were requested to accompany the authors to collect the plant specimens from adjoining forest areas. In some cases when the experienced and knowledgeable persons were unable to visit the forest area, the fresh specimens were collected from the forest with details of their habit, habitat, height of the plant, fragrance and taste, flower and fruit nature, etc., and consequently shown to them to obtain accurate information. Epilepsy is commonly called as “Apasmar” or “Mirgi” by the local communities. Various symptoms are used to identify epilepsy by the traditional healers. The disease is diagnosed as the patients attacked with fits, usually occur at the interval of twelve, fifteen or thirty days with a few exception of varying time limits. Other symptoms include loss of consciousness, subversion, derangement of eyes, emittance of froth from the mouth, convulsion and tossing of arms and legs. Rarely the disease could be recognized at juvenile incubatory stage, as indicated by deep anxiety, shivering, feeling of heavy breathing and thirst, stupefaction, excessive perspiration etc.

2.3. Identification of plants

The representative samples of the plant species used by the traditional healers were collected for preparation of the herbarium specimens. The plant specimens were identified with the help of Flora of the District Garhwal North West Himalaya (Gaur, 1999). For