

Antihepatopathic Plants Used by the Lepcha Tribe of the Sikkim and Darjeeling Himalayan Region of India

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ABSTRACT. Members of Lepcha tribe are aborigines in the Sikkim and Darjeeling Himalayan Region. Famed as born naturalists and known to be a “vanishing tribe,” the ethnomedicinal traditions of these people are characterized by multiple remedies for a single ailment. The present study revealed the Lepchas use 36 species of plants belonging to 28 families as liver related ailments. Of these plants, 53 percent have not been reported earlier as hepatoprotective agents and may be used in the development of modern antihepatopathic drugs. doi:10.1300/J044v13n03_03 [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2007 by The Haworth Press. All rights reserved.]

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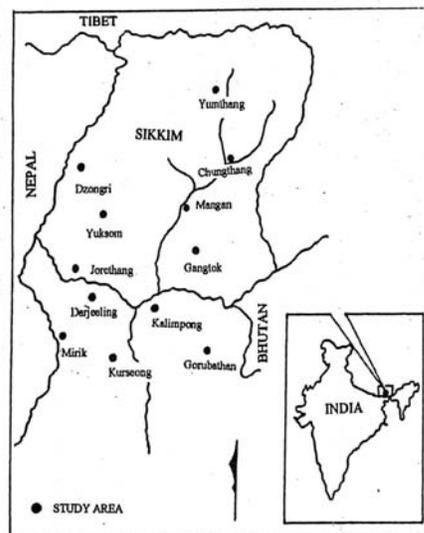
INTRODUCTION

The liver, the largest organ in the body, metabolizes a number of substances and plays an important role in the detoxification of xenobiotics, maintaining blood sugar levels, and the metabolism of alcohol. This organ also helps in carbohydrate and fat storage and in heat regulation by the body (1). Hepatopathy (disorders of the liver) may be due to the formation of fatty liver, liver cirrhosis, jaundice, viral infections, toxins, and other afflictions. In all such conditions, however, the normal function of the liver is hampered. To date, no effective medicine for hepatopathy is available and as such, curing liver diseases has become a major goal of modern medicine.

In the ethnomedicinal and traditional medicine systems of India, numerous medicinal plants and their formulations are used for treatment of liver disorders. In the absence of a reliable liver protective drug in the modern medicine, a number of medicinal preparations in ayurveda are recommended for the treatment of liver disorders (2). The hepatoprotective agents in these preparations appear to interfere with the pathological process and help with the recovery of liver functions (10). Such herbal anti-hepatopathy agents are favored over other medicines by being more compatible with human physiological systems, for easy availability, cultural acceptability, and economic feasibility, and for their effectiveness and relatively low cost (16).

The Sikkim and Darjeeling regions, situated in the Himalayas between 87° 59' and 88° 53' East longitude and 26° 31' and 28° 10' North latitude (5), represent important areas of biodiversity in the Eastern Himalayas of India (Figure 1). Due to a wide array of climatic zones, this territory is rich in floral diversity with many endemic elements and a number of species that have become rare, threatened, or endangered (4). The Lepchas, the aboriginal tribe of this mountain tract, have Mongolian roots and are animists and nature worshippers. Regarded as a "vanishing tribe" (8) due to habitat loss, the tribe members, who inhabit the inaccessible areas in the mountains and forests (3), are born naturalists with separate names for nearly every bird, plant, orchid, and butterfly to be found in the region (7). Being close to nature, the tribe has many ethnomedicinal traditions.

FIGURE 1. Study area in Sikkim and Darjeeling Himalayan region.



In the present study, descriptions and preparations for 36 species of plants used by the Lepcha tribe of Sikkim and Darjeeling Himalayas as hepatoprotective agents are reported.

MATERIALS AND METHODS

To collect ethnomedicinal information and herbarium specimens, field trips to different areas of Sikkim and Darjeeling hills were conducted regularly between September 2001 and April 2003. The Lepcha tribal people, including Bongthings and Mun-Bongthings (Lepcha medicine men and women, respectively), village chiefs, community leaders, and knowledgeable persons were interviewed during the course of the study. Information was also gathered within the area from many other elderly people with knowledge of Lepcha ethnomedicine. To gain rapport with

the tribal members, Lepcha social organizations and interpreters belonging to Lepcha tribe were engaged to help locate and interview informants.

Preliminary identification of collected plant materials was done with the help of the traditional medicine practitioners. The local names of the plants and information regarding their use were also recorded with the help of these practitioners and village elders. Only information that was obtained and cross checked with at least seven different informants was incorporated into this study. The collected plants were subsequently identified at the Panchavati Greentech Research Society, Darjeeling, and voucher herbarium specimens were deposited in the herbarium of the Medicinal Plants Division, Panchavati Greentech Research Society, Darjeeling, India.

RESULTS

The present study revealed 36 species of plant belonging to 28 different families, which were utilized as hepatoprotective agents by the Lepcha tribal people in the Sikkim and Darjeeling Himalayan region (Table 1). The medicinal recipes were prepared by the Lepchas as an extract, paste, powder, decoction, juice, or infusion, depending upon the plant material. Generally, the parts used from a plant were roots and rhizomes, roots and stem bark, flowers, fruits, leaves, and stem. During the present study, 75 percent of the harvesting patterns related to the enumerated plants was destructive due to the use of specific plant parts, such as the roots and rhizomes (50%), stem (14%), and the whole plant (11%).

DISCUSSION

The Lepchas have expressed the belief that their herbal medicines were especially good for liver and stomach diseases (6). Of the reported plants, 19 species (53%) were hitherto unreported hepatoprotective agents when compared with the *Dictionary of Indian Folk Medicine and Ethnobotany* (9). Essentially, the efficacy of any hepatoprotective drug is dependent on the ability to reduce the harmful effects of attacks on the liver or to maintain normal hepatic physiology that has been disturbed by a hepatotoxin (12).

The hepatoprotective ability of plants has been related to: antilipoperoxidant properties (10) and activity increases of antioxidative enzymes,

TABLE 1. Antihepatopathic medicinal plants used by the Lepcha tribe.

Botanical name Family Voucher no. ¹	Habit	Local name (in Lepcha)	Method of use and administration ²
<i>Aphanamixis polystachya</i> (Wall.) Park. Meliaceae DRC-207	Tree	Tangruk	Stem bark paste (5 g) taken twice daily for 1 month
<i>Berberis aristata</i> DC. Berberidaceae DRC-111	Shrub	Sutangkung	Root bark extract (5-10 ml) taken twice daily for 1 week
<i>Cassia fistula</i> Linn. Caesalpiniaceae DRC-109	Tree	Mundarkung	Fruit pulp (10 ml) taken twice daily for 3-4 weeks
<i>Cautleya gracilis</i> (Sm.) Dandy Zingiberaceae HINR-111	Herb	Gemara	Decoction of fresh rhizome (20-25 ml) taken twice daily for 1-2 weeks
<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees & Eberm. Lauraceae GCS-378	Tree	Napsor	Decoction of stem bark (20-30 ml) taken once a day for 3-4 weeks
<i>Citrullus colocynthis</i> Schrad. Cucurbitaceae HINR-129	Climber	Karhyo	Root extract (5 ml) taken once a day for 5-7 days
<i>Corydalis govaniiana</i> Wall. Fumariaceae HINR-85	Herb	Talizang	Root decoction (15-20 ml) taken once or twice daily for 2-3 months
<i>Costus speciosus</i> (Koen.) Sm. Costaceae PPR-249	Herb	Ruyang	Extract of tubers (10 ml) taken in empty stomach for 1 month
<i>Curculligo orchoides</i> Gaertn. Amaryllidaceae DRC-146	Herb	Dhamsang	Decoction of rootstock (25 ml) taken once daily (after breakfast) for 5-6 weeks
<i>Cuscuta reflexa</i> Roxb. Convolvulaceae PGRS-240	Climber	Druhl-shuck	Whole plant juice (15-20 ml) taken with raw palm sugar twice daily for 1 week
<i>Dolichos uniflorus</i> Linn. Papilionaceae PGRS-240	Herb	Pheltase	Dry seeds (20-30 g) boiled with water (200-300 ml) and the whole thing is taken twice daily for 15-20 days
<i>Eclipta prostrata</i> Linn. Asteraceae HINR-133	Herb	Mangaruk	Leaf juice (5-10 ml) or leaf decoction (20-ml) taken thrice daily for 7-10 days
<i>Hedychium aurantiacum</i> Rosc. Zingiberaceae DRC-168	Herb	Ribirip	Infusion of rhizome powder (40-50 ml) taken once daily for 2-3 weeks
<i>Juniperus recurva</i> Buch.-Ham. ex D. Don Cupressaceae HINR-43	Shrub	Chukboo	Decoction of 2 fruits taken twice daily for 1 week
<i>Kaemferia rotunda</i> Linn Zingiberaceae DRC-231	Herb	Myalrip	Decoction of fresh rhizome (20-30) ml taken twice daily for 1 month

TABLE 1 (continued)

Botanical name Family Voucher no. ¹	Habit	Local name (in Lepcha)	Method of use and administration ²
<i>Mahonia acanthifolia</i> G. Don. Berberidaceae HINR-39	Shrub	Kantirip	Stem and root bark decoction (15-20 ml) taken twice daily for 15 days
<i>Melissa parviflora</i> Benth. Lamiaceae PGRS-49	Herb	Buranjot	Leaf decoction (20-25 ml) taken twice or thrice daily for 10-15 days
<i>Mussaenda treutleri</i> Stapf. Rubiaceae DRC-97	Shrub	Tumberik	Root decoction (10-15 ml) taken twice or thrice daily for 10-15 days
<i>Myrica esculenta</i> Buch-Ham. ex D. Don. Myricaceae DRC-88	Tree	Kobush	Stem bark extract (10-20 ml) taken once daily for 1-2 months
<i>Nardostachys jatamansi</i> DC. Valerianaceae DRC-177	Herb	Spango	Infusion of dried root (25-30 ml) taken once daily for 1 month
<i>Oroxylum indicum</i> (Linn.) Vent. Bignoniaceae DRC-134	Tree	Phagorip	Root bark decoction (10-15 ml) taken once daily for 1 month
<i>Oxalis corniculata</i> Linn. Oxalidaceae PGRS-69	Herb	Panorip	Whole plant juice (5-7 ml) taken once daily for 6-7 weeks
<i>Persea duthiei</i> (King ex. Hook. f.) Kost. Lauraceae DRC-253	Tree	Phomkung	Leaf juice (5-10 ml) taken twice daily for 15-20 days
<i>Picrorhiza kurroo</i> Royle ex Benth. Scrophulariaceae DRC-189	Herb	Duprasu	Root powder (0.5-1 g) taken once daily for 10-15 days
<i>Piper longum</i> Linn. Piperaceae PGRS-37	Climber	Kautin	Decoction of dried fruit (10-15 ml) taken twice daily for 3-4 weeks
<i>Rubia cordifolia</i> Linn. Rubiaceae PGRS-169	Climber	Vyumrik	Root decoction (10-15 ml) taken twice daily for 10-15 days
<i>Rumex nepalensis</i> Spreng Polygonaceae HINR-85	Herb	Chyasyu	Infusion of the whole plant (50-60 ml) taken twice daily for 15 days
<i>Saussurea costus</i> (Falc.) Lipsch. Asteraceae DRC-193	Herb	Rustang	Root extract (20-25 ml) taken once daily for 5-6 weeks
<i>Sphaeranthus indicus</i> Linn. Asteraceae DRC-54	Herb	Mundirip	Decoction of root (40-50 ml) taken once a day for 2-3 months
<i>Swertia chirayita</i> (Roxb. ex Flem.) Karst. Gentianaceae DRC-187	Herb	Rungkyon	Infusion of the whole plant (30-40 ml) taken twice daily for 15-20 days
<i>Terminalia chebula</i> Retz. Combretaceae HINR-48	Tree	Sallmkung	Decoction of fruits (20-25 ml) taken once a day for 5-6 weeks

Botanical name Family Voucher no. ¹	Habit	Local name (in Lepcha)	Method of use and administration ²
<i>Tinospora cordifolia</i> (Willd.) Hook. f. & Th. Menispermaceae PGRS-55	Climber	Kantherric	Fresh vine extract (10-20 ml) taken twice daily for 2-3 weeks
<i>Urtica dioica</i> Linn. Urticaceae DRC-163	Herb	Sarong	Decoction of leaves and roots (40-50 ml) taken twice daily for 1-2 months
<i>Valeriana hardwickii</i> Wall. Valerianaceae PGRS-139	Herb	Chammaha	Root extract (10-15 ml) taken twice daily for 10-15 days
<i>Woodfordia fruticosa</i> (Linn.) Kurz. Lythraceae HINR-89	Tree	Chunghyekdum	Infusion of dried flowers (40-50 ml) taken twice daily for 4-6 weeks
<i>Zanthoxylum acanthopodium</i> DC. Rutaceae PGRS-44	Shrub	Sungrukung	A single raw fruit chewed twice daily for 1-2 months

¹If more than one species of plant in the same genera was used for the same purpose, only the more commonly used species was enumerated.

²Decoction = solution derived by boiling the medicinal herbs with approximately three volumes of water, infusion = liquid obtained by soaking plant parts in hot water for a considerable time, extract = liquid obtained by grinding the plant parts with equal volumes of water and filtering through a fine cloth, juice = liquid obtained by crushing and pressing useful plant parts without water, paste = product obtained by grinding fresh plant parts, powder = product obtained by grinding dried plant parts.

such as superoxide dismutase (SOD), catalase, glutathione peroxidase (GPx), glucose-6-phosphate dehydrogenase (G6PD), and glutathione reductase (GR); suppressive effects on hepatic cytochrome P-450 systems; and an ability to revamp the body defense systems and the capacity to stimulate cellular regeneration (15). The antioxidant and hepatoprotective activities of natural products, such as flavonoids, in some of the plant materials used by the Lepchas are well-known. For example, piperine from *Piper longum* could be an inhibitor of cytochrome P-450, thereby providing an hepatoprotective effect (13).

Information on hepatoprotective plants is important because herbal drugs have proven more effective and compatible in liver related problems. Thus, primary information on these plants may lead to further pharmacological research and may provide guidance in selecting plant material for drug discovery (11). Since multiple herbal remedies are already found in the Lepcha traditional system of medicine in the Sikkim and Darjeeling Himalayas, a scientific screening for bioactivity could be expected to be positive for some plants and could lead to unusual molecules and new drugs that may be useful in treating hepatopathy (3). Such possibilities may be greater for medicinal plants of the Indian Himalayan region as the environmental stresses to which the plants are subjected may initiate the synthesis of novel biomolecules.

The necessity of destructive harvest for many of the plant materials used by the Lepcha poses a definite threat to the genetic stock and to the diversity of medicinal plant (14), especially among the Zingiberaceae and Asteraceae that had the largest number of plants used as hepatoprotective agents. Increasing demand for medicinal plants from the Himalayan region has resulted in unsustainable harvesting and consequently loss of other medicinal species. In addition, the use of forest land for developmental activities is a destructive activity as 90 percent of ethnomedicinal plants used by the tribals are extracted from the forest. In addition, natural calamities, such as earthquakes, landslips, and floods, and their association with demographic variation can lead to losses in biodiversity.

An interesting feature of the Lepcha traditional system of medicine is both male and female medicine practitioners enjoy equal rights. Female healers, however are often more adept and more respected in the trade (3).

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