

Ethnobotanical Explorations on Anti-Diabetic Plants Used by Tribal Inhabitants of Mizoram, India

Jerry Laldingngheta, Lalnundanga, Awadhesh Kumar

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Abstract In this study, ethnobotanical survey was conducted to collect information about medicinal plants used for the treatments of diabetes by tribal people in Mizoram, India. The indigenous knowledge of local traditional healers were consulted about the native plants used for the treatment of diabetes, its area of availability and documentations were done through questionnaire and personal interviews with the local people. This study revealed that, the tribal people and the traditional healers use around 29 species of plants belonging to 23 families to treat diabetes, many of which remains indigenous to different areas of Mizoram. The anti-diabetic medicinal plants used by the tribal inhabitants have been noted along with parts used and its mode of applications. This paper shows the medicinal plants from different families which have high anti-diabetic potential.

Keywords Anti-diabetic plants, Ethnobotanical, Mizoram, Tribal inhabitants.

Introduction

Diabetes mellitus is a metabolic diseases in which a person has high blood sugar, it is due to the pancreas not producing enough insulin or because of cells of the body do not respond to the insulin that is produced. Diabetes mellitus is caused by the abnormality of carbohydrate metabolism which is linked to low blood insulin level or insensitivity of target organs to insulin (Maiti et al. 2004). There are two types of diabetes mellitus, viz. Type 1 and Type II. Type II diabetes is the more common form of diabetes constituting over 90% of the diabetic population (Warjeet 2011). Over the past two decades, the number of people suffering from diabetes is believed to have been rising steadily with high mortality rate in India. The frequency of this disorder is on the rise globally, is likely to hit 300 million by 2025 with India projected to have the largest number of diabetic cases (Mohan 2004).

Though medical heritage is centuries old, millions of people in the rural areas still rely on traditional medicine to congregate their healthcare needs (Ved and Goraya 2008). For the tribal people, herbal medicines have always been favored instead of synthetic drugs as they have no side effects or adverse reactions and are readily available to collect. This has led to the belief that natural products are safe because they are more harmonious with biological systems (Atal 1983). Herbal remedies act as an important source of new oral hypoglycemic compounds for development as pharmaceutical entities for diabetes, or to existing traditional therapies. Ethnobotanical studies of

Jerry Laldingngheta¹, Lalnundanga¹, Awadhesh Kumar*²

¹ Department of Forestry, ² Department of Horticulture, Medicinal & Aromatic plants (HAMP),

Mizoram University, Aizawl, Mizoram 796004, India

e-mail : jerryralte07@yahoo.com

kumarawadhesh9@gmail.com

lalnundanga@rediffmail.com

*Corresponding author

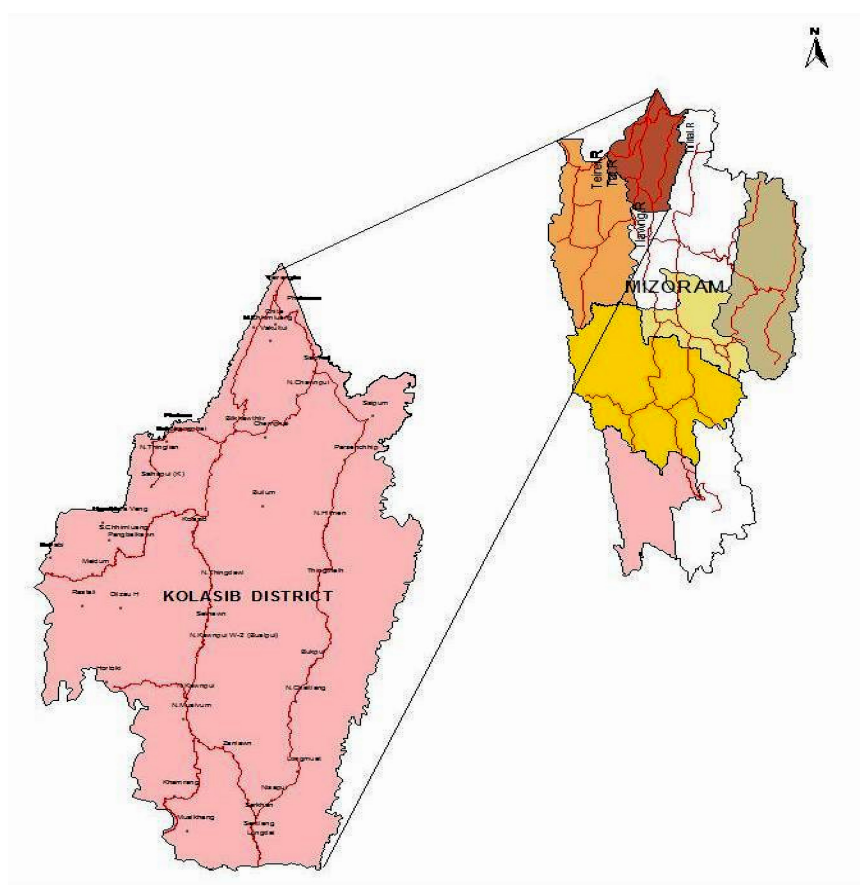


Fig. 1. Map showing Kolasib district.

traditional herbal remedies used for diabetes around the world have identified more than 1,200 species of plants with hypoglycemic activity (Babu et al. 2006).

Mizoram has a rich diversity of medicinal plants; however, they received very little attention with relation to their intrinsic values to human kind especially for managing diabetes. The main priority of this study was to obtain information on the use of plants in the treatment of diabetes by the tribal inhabitants, the plant organs used, method of preparing herbal remedies, with a view to contribute to the search of new natural medicines and for further enhancement of its pharmaceutical uses. Collection of information and documentation of traditional knowledge plays an important role in scientific research on drug development (Ragupathy et al. 2008).

Materials and Methods

Description of study area : Kolasib district

The geographical location of the Kolasib district is in between longitudes $92^{\circ}40' 48''$ East and latitudes $24^{\circ}13' 48''$ North (Fig. 1). The district is bounded on the North and Northwest by Hailakandi district of Assam state, on the West by the Mamit district, on the South and East by Aizawl district and on the Northeast by Caschar district of Assam state. Most of the hill ranges traverse in North-South direction. The area is hilly and undulating with the altitude varying from 722m above sea level. Most of the area is with precipitous slope from deep gorges culminating into several streams and rivers. It is a warm and humid, temperature ranges from $10-35^{\circ}\text{C}$, the climate is

tropical to sub-tropical. The geographical area of the district is 1382.51 (sq.km. The field work was conducted in between September 2014-October 2015.

Ethnobotanical survey

Field investigations were conducted in Kolasib district, Mizoram. During the study, daily activities of the local inhabitants were closely observed and interpersonal contacts were established by participating in their functions. Interaction with a total of 20 informants within the age group of 30 to 60 was done. Among which there was 1 local practitioner. Ethnobotanical data were collected according to the methodology suggested by Jain and Goel (1995) .

The ethnobotanical data were collected through semi structured questionnaires, interviews, field observation and discussion with the local practitioners and informants. Data were documented in the order of local (vernacular) names of anti-diabetic medicinal plants, parts used, methods of remedial preparations.

Results and Discussion

Current investigation indicates that Kolasib district is blessed with splendid diversity of ethnomedicinal plants used for treating diabetes. Table 1, enumerates the data obtained during the investigation.

A total of 29 plant species belonging to 23

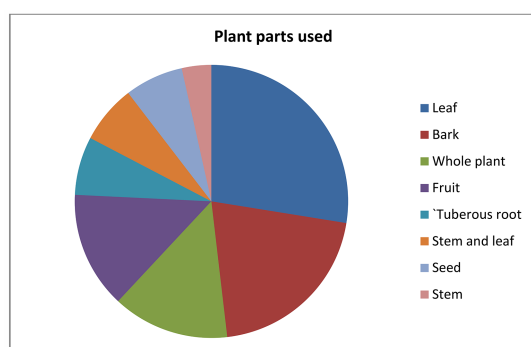
Table 1. Anti-diabetic medicinal plants used by the Mizo ethnic groups in Kolasib, Mizoram.

| Sl. No. | Botanical name | Family | Local name | Plant parts used | Mode of application |
|---------|------------------------------------|----------------|-------------------|------------------|---|
| 1 | <i>Bauhinia variegata</i> | Caesalpiaceae | Vau-be | Bark | Powdered bark infusion is used |
| 2 | <i>Benincasa hispida</i> | Cucurbitaceae | Maipawl | Fruit | Fruit juice is used |
| 3 | <i>Callicarpa arborea</i> | Verbenaceae | Hnahkiah | Bark | Bark is grinded and taken |
| 4 | <i>Catharanthus roseus</i> (L.) | Apocynaceae | Kumtluang par | Whole plant | Decoction of root, stem, leaves is taken thrice a day for a period of one month |
| 5 | <i>Centella asiatica</i> | Apiaceae | Lambak | Leaf/whole plant | Whole plant juice is taken in empty stomach |
| 6 | <i>Cinamomum verum</i> | Lauraceae | Thakthing | Bark | Bark powder made infusion |
| 7 | <i>Citrus grandis</i> | Rutaceae | Sertrawk | Seeds | Seeds are peeled and eaten twice a day |
| 8 | <i>Clerodendrum colebrookianum</i> | Verbenaceae | Phuihnam | Leaf | Leaf paste is taken orally |
| 9 | <i>Colocasiae sculenta</i> | Araceae | Dawl | Leaf | Leaf boiled with water and taken |
| 10 | <i>Costus speciosus</i> | Costaceae | Sumbul | Tuberous root | Mixed with water or root juice is used |
| 11 | <i>Cucumis sativa</i> | Cucurbitaceae | Fang-hma | Leaf | Decoction of leaf is taken orally |
| 12 | <i>Embllica officinalis</i> | Euphorbiaceae | Sunhlu | Bark | Bark grinded into powder and used |
| 13 | <i>Glinusop positifolia</i> | Aizoaceae | Bakhate | Leaf and stem | Boil extract of the plant is used |
| 14 | <i>Ipomea batata</i> | Convolvulaceae | Kawl-ba-hra | Leaves | Leaf boiled and juice is taken orally |
| 15 | <i>Jasminum laurifolium</i> | Oleaceae | Maufimhlo | Stem and leaf | Decoction of stem and leaf is taken twice a day |
| 16 | <i>Logerstroemia speciosa</i> | Lythraceae | Chawnpui | Bark | Infusion of bark is used |
| 17 | <i>Lepionurus sylvestris</i> | Olacaceae | Anpangthuam | Leaf | The leaves are boiled, extracted and taken |
| 18 | <i>Mallotus roxburghianus</i> | Euphorbiaceae | Zawngte-nawh-lung | Leaf and bark | The leaves and bark are used for diabetes |
| 19 | <i>Mangifera indica</i> | Anacardiaceae | Theihai | Young shoots | Decoction of young shoots taken twice a day |

Table 1. Continued.

| Sl. No. | Botanical name | Family | Local name | Plant parts used | Mode of application |
|---------|------------------------------|----------------|--------------------|-----------------------|--|
| 20 | <i>Mirabilis jalapa</i> | Nyctaginaceae | Artukhuan | Tuber | Tuberous roots are boiled and taken |
| 21 | <i>Momordica charantia</i> | Cucurbitaceae | Changkha-rek | Fruits | The fruits are boiled and taken with food |
| 22 | <i>Musa acuminata</i> | Musaceae | Vai-bal-hla | Unripe fruits | Unripe fruit juice is laken orally |
| 23 | <i>Musa glauca</i> | Musaceae | Saisu | Water inside the bark | The water inside the bark is taken twice a day |
| 24 | <i>Phaseolus vulgaris</i> | Fabaceae | Bean | Fruits | Cooked fruits is taken |
| 25 | <i>Phyllanthus fraternus</i> | Euphorbiaceae | Mitthisunhlu | Leaves or whole plant | Boiled extract is used orally |
| 26 | <i>Plantago major</i> | Plantaginaceae | Kel-ba-an | Whole plant | Decoction of the whole plant is taken orally |
| 27 | <i>Scurrula parasitica</i> | Loranthaceae | Thlik-thli-ek-bawm | Leaf | Decoction of leave is taken twice a day |
| 28 | <i>Syzygium cumini</i> | Myrtaceae | Lenhmui | Seed | Seed is grinded into powder and taken for diabetes |
| 29 | <i>Tinospora sinensis</i> | Menispermaceae | Vankaihru | Stem | The stem is made into decoction and taken orally |

families were documented. Among all the species *Mangifera indica*, *Jasminum laurifolium*, *Glinusop positifolia*, *Scurrula parasitica*, *Citrus grandis* are commonly used by the local people for the treatment of diabetes in Kolasib, Mizoram (4th Indian National Seminar 2015). The most dominating families were Cucurbitaceae (3), Euphorbiaceae (3) followed by Verbenaceae (2) and Musaceae (2). The usage of plant parts are Leaf – 8, Bark – 6, Whole plant – 4, Fruit – 4, Tuberous root – 2, Stem and leaf – 2, Seeds – 2, Stem – 1 are shown in Figure 2. Information gathered during this study are in agreement with the previous reports (Jain and Patole 2001, Ignacimuthu et al. 2006, Modak et al. 2007, Ramya et al. 2008).

**Fig. 2.** Number of plant parts used as medicine.

From the data, the majority of parts used as remedies are fresh leaf materials (28%) followed by barks (21%) and fruits, whole plant (14%). However, plant parts like tuberous root, stem and leaf, seeds (7%) and stem (3%) were less frequently used by the people in the area.

Conclusion

From the survey, 29 plants belonging to 23 families for treatment of diabetes were reported and documented. The plant parts used such as leaf, root, stem, bark, fruit, seeds or the whole plant for herbal formulation was also recorded. It was reported that the mode of application of these plants were administered in the form of powder, paste of decoction. The tribal inhabitants of Kolasib district still largely depend on traditional herbal medicines due to their poor socio-economic status and also because of the high cost of modern medicines. These important medicinal plants are found growing and abundantly available for therapeutic use by the tribal inhabitants for treatment of diabetes. Thus, the loss of these potentially valuable genetic resources ultimately affects the whole society. Therefore documentation is important for conservation of anti-diabetic medicinal plants which are endemic to this area otherwise the knowledge might be lost forever.

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