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ETHNO ANTI DIABETIC PLANTS USED BY A FEW TRIBES OF RURAL KAMRUP DISTRICT, ASSAM

Jayashree Dutta* and M.C. Kalita

Department of Biotechnology, Gauhati University, Guwahati- 781 014, Assam, India

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Correspondence to Author:

Jayashree Dutta

Research scholar, Department of Biotechnology, Gauhati University, Pin - 781014, Assam

E-mail: jshrdtt@gmail.com

ABSTRACT: Kamrup District of Asasm is bounded by Udalguri and Baksa districts in the north, Meghalaya in the south, Darrang and Kamrup Metropolitan in the east and Goalpara and Nalbari district in the west. The rural part of kamrup district is mostly inhabitated by different tribes such as Boro, Khoronia Kochari, Rajbonghi, and Nepalis. An ethno botanical survey was conducted during the year 2011-2012 in some selected villages to explore the medicinal plants used by the local traditional healers known as 'bej' and 'Ohjha' for treatment of diabetes mellitus. The data's were collected using questionnaire and personal interviews with few local healers. The investigation revealed 56 species of plants belonging to 38 families which are used to cure diabetes. These traditional ethno medicinal plants are consumed either in form of juice, powder, or boiled extract of leave, stem, root, seed, fruit, bark, rhizome and flower. In some cases it was found that the whole plant is directly used as potent medicine.

INTRODUCTION: India is known for its valuable heritage for herbal medicinal knowledge. Its ethnic peoples living in the remote village area still depend to a great extent on the indigenous system of medicine. The North Eastern part of India signifies a Heritage of herbal remedies. It constitutes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. Tribal population of Assam can be broadly divided into hill tribals and plain tribals. Among the hill tribes of Assam, Chakma, Dimasa, Garu, Hazong, Kuki, Karbi Maan, Mizo, Hmar, Naga etc. are common.

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The ST Population of Assam is predominantly rural with 95.3% rural and only 4.7% urban population (Census of India, 2001). Among all the schedule tribe, Boro represent nearly half of the total ST population of the state. (40.9%), Miri (17.8%), Mikhri (10.7%), Rabha (8.4%) Sonowal Kachari (7.1%) Lalung (5.2) Dimasa (3.4%) and Deori (1.2%) [1]. The major plain tribes of Assam are Rabha, Mising, Deori, Tiwa, Sonowal, Mech, Bodo etc.

Presently, Assam has about 16 scheduled castes and 23 scheduled tribes. Tribal people always showed much interest to ethno medicinal practices.

The North-eastern region is blessed with splendid diversity of ethno medicinal plants and traditional medicines prepared from medicinal plants are widely used in this part of country. The tribal people have been always in a close relationship with nature.

These people have a treasure of knowledge on ethno medicinal plants used for treatment of various diseases including diabetes. Diabetes is a metabolic disease that has become a serious problem of modern society due to the severe long-term health complications associated with it. In particular, type 2 diabetes mellitus (T2DM) is the most encountered form of diabetes, which is responsible for more than 80% of the total cases of diabetes [2, 3, 4].

Currently there are more than 30 million people with diabetes mellitus in India and the incidence is increasing. By the year 2024, more than two-thirds of people with diabetes will be in the developing world of which majority would be resident in India and China [5]. Diabetes mellitus is an endocrine metabolic disorder characterized by hyperglycemia, altered lipids, carbohydrates, proteins metabolism and it increases risk of cardiovascular diseases complications. Both the types of diabetes (type 1 and 2) share the common characteristics of hyperglycemia, microvascular and macrovascular complications [6].

Patients with diabetes experience significant morbidity and mortality because of microvascular (retinopathy, neuropathy, and nephropathy) and macrovascular complications such as heart attack, stroke and peripheral vascular disease[7]. Currently, available therapies for diabetes include insulin and various oral antidiabetic agents such as sulfonylureas, biguanides and glinides. Many of them have a number of serious adverse effects; therefore, the search for more effective and safer hypoglycemic agent is one of the important areas of investigation [8].

Medicinal plants have potential effectiveness against diabetes and the phyto chemicals play a major role in the management of diabetes[9]. Plants are the basis of life on earth and are central to people livelihoods. Tribal people are the ecosystem people who live in harmony with the nature and maintain a close link between man and environment [10]**.** The hypoglycemic effect of several plants used as anti-diabetic remedies has been confirmed, and the mechanisms of hypoglycemic activity of these plants are being studied. Many traditional plant treatments for diabetes exist, a hidden wealth of potentially useful natural products for Diabetes control [11].

Alternative therapies with anti-diabetic activity have been researched relatively extensively, particularly in India. To date, over 400 traditional plant treatments for diabetes have been reported[12]. Medicinal plants, since times immemorial, have been used in virtually all cultures as a source of medicine. A study of ancient literature indicates that diabetes was fairly well known and well-conceived as an entity in ancient India. The knowledge of the system of diabetes mellitus, as the history reveals, existed with the Indians since prehistoric age [13].

The ethno botanical information suggests many plants such as *Momordica charantia* (Cucurbitaceae), *pterocarpus marsupium* (Fabaceae), and *Trigonelle forenum greacum* (Fabaceae), *Acacia Arabica* (leguminosae), *Aegle marmelos* (Rutaceae), *Allium sativum* (Alliaceae) *Aleo vera* (Liliaceae), *Ficus bengalensis* (Moraceae) *Swertia chirayita* (Gentianaceae), *Zingiber oficinale* (Zingiberaceae) possess antidiabetic potential, and have been reported to be beneficial for treatment of type 2 diabetes [14]. The World Health Organization recommended the search for beneficial use of medicinal plants for the treatment of diabetes mellitus [15].

Medicinal plants have the advantage of having little or no side effects. Till today metformin is the only ethical drug approved for the treatment of non-insulin dependent diabetes mellitus patients, which is derived from a medicinal plant *Galega officialis* and historically used for treatment of diabetes in medieval Europe [16]

This study focuses on the ethno medicinal plant showing anti diabetic potentiality which is commonly used by the people of rural Kamrup district.

The main objective of this study is to document the use of herbs that are generally used for the treatment of diabetes by the people of rural Kamrup district.

This study is aimed at documenting indigenous knowledge which is very much important from the view point of conservation of biological resources and their sustainable utilization in the management of diabetes and its related complications.

MATERIALS AND METHODOLOGY:

Study area – Kamrup District is situated between 25.46 and 26.49 North Latitude and between 90.48 & 91.50 East Longitude. It is bounded by Udalguri and Baksa districts in the north, Meghalaya in the south, Darrang and Kamrup Metropolitan in the east and Goalpara and Nalbari district in the west. It has a total geographical area of 4, 34,500 acres. Historically, present Assam was referred to as Kamrup in many of the ancient Indian literature. The villages that are studied are under Rangia Subdivision. The Schedule Castes of the state are 16 in number while there are 23 Schedule Tribes in Assam according to Census 1991. Nearly 97.59% of the population lives in villages.

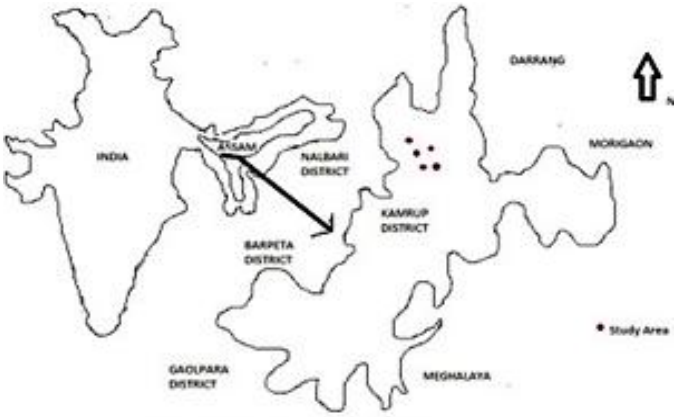

FIG. 1: MAP OF KAMRUP DISTRICT SHOWING STUDY AREA

Selected survey area - Five major villages (Nokul, Hossang , Tetkuri, Jaggikoana, and Khairabari) of rural Kamrup division mainly inhabited by Boro, Rajbonghi, Khoronia Kochari and Nepali were selected for the study (Fig1). The villages were selected on the basis of higher population parameter, economic backwardness, and dependence on medicinal plants. Survey was conducted from June 2011 to August 2012. Tribal people believe in traditional healing of diseases and are so more depended on traditional ethno medicinal plants for treatment of disease like diabetes.

The village Nokul was so named because of the presence of nine different castes of people, where majority are of Boro tribes. The area of village Hossang is covered with more than 60% of tribal population (Boro, Rajbongshi and Khoronia Kocahri).

Tetkuri village have three sub divisions, where more than half a population belong to tribal category. Similarly Jaggikoana and Khairabari villages have a major part of tribal population. While collecting information on ethno – medico botanical aspects, standard approaches and methodologies have been followed [15, 16, 17, 18]. The ethno botanical data were collected using questionnaire, interviews and discussions with some well-known Herbalists and the local healer commonly known as 'Bej' and 'Ohjha' of these five selected Villages.

The Herbalists were interviewed within their localities. Samples of all the medicinal plants cited by the Herbalist were collected and further identification and authentication was done in the Department of Botany, Gauhati University, Assam. The data forms were later analyzed, collated and tabulated to give the botanical names, common names, families and the part of the plants used. The results are presented in **Table 1**.

RESULTS AND DISCUSSION: The data obtained during the investigation period is summarized in **Table 1**. A total of 56 medicinal plants belonging to 38 families were cited by the herbalists as being used in the region for the treatment of diabetes mellitus.

TABLE I: ANTI DIABETIC ETHNO MEDICINAL PLANTS SPECIES USED BY THE LOCAL INHABITANTS OF NOKUL, HOSSANG, TETKURI, KHAIRABARI, AND JAGIKONA VILLAGES OF RURAL KAMRUP DISTRICT

Botanical name	Family	Local name Assamesses (Ass) Boro (B)	Parts	Method to use
Adhatoda vasica Nees	Acanthaceae	Bogabahok (Ass) Bahekagakha (B)	Root	Root powder taken 2 times a day in empty stomach with water
Aegle marmelos (L) Corr Roxb.	Rutaceae	Bael (Ass,) Bahel fithai (B)	Leaves, fruits	3-4 fresh leaves are ground to extract the juice, which is taken with cow's milk daily

Albizia procera (Roxb) Benth.	Mimosaceae	Siris (Ass, B)	Leaves	Leaf juice diluted with water and consumed.
Allium cepa L.	Liliaceae	Piyaz (Ass,) Sambram (B)	Fruit part	Rhizome paste taken with honey.
Aloe Vera. L.	Liliaceae	Ghrita kumara (Ass) Salkuwari (B)	Leaves	Leaf juice consumed with small amount of lemon juice
Alstonia scolaris R.Br.	Apocynaceae	Satiana (Ass)	Leaves, bark	Leave paste and bark extract taken in empty stomach.
Andrographis paniculata Nees	Acanthaceae	Kalmegh (Ass) Sorai gukha (B)	Leave	Leaf juice is administered once a day .
Annona reticulate L.	Annonaceae	Atlas (Ass) Balam phithai (B)	Leaves, fruits	Leaf, fruit juice is taken orally
Areca catecheu Linn	Arecaceae	Tamul (Ass) Goi (B)	Fruit, leaves	Nuts are dried and powdered, that is consumed once a day
Argyreia speciosa Linn. F	Convulaceae	Takoria alu (Ass)	Stem, leaves	Stem and leaf paste used.
Artocarpus lokoocha Roxb.	Moraceae	Diwatenga (Ass) Dawa bifang (B)	Bark	Bark is dried, powdered often mixed in curry or taken directly with water
Azadirachta indica A.Juss	Meliaceae	Neem (Ass) Neem Gwkha (B)	Leaves	Leaf juice is taken in early morning on daily routine.
Bacopa monnieri (Linn.) Penn.	Scrophulariaceae	Brahmi haag (Ass) Bami- Belai(B)	Whole plant	Whole plant juice taken or made curry with fish
Beta vulguris L.	Chenopodiaceae	Beet (Ass, B)	Root	Root juice taken with milk
Brassica juncea (L) Czern.	Brassicaceae	Sorioh (Ass) Besor (B)	Leaves, seed	Seed powder consumed with milk
Butea monosperma (Lam) Taubert.	Fabaceae	Polash (Ass)	Fruit leaves	Fruit is dried and powdered, and leaf juice is consumed.
Calotropis gigantean (L) W Aiton.	Asclepidaceae	Akon (Ass, B)	Leaves	Leaf and flower paste is consumed.
Cannabis sativa Linn	Cannabaceae	Bhang (Ass) Aphing/Khani (B)	Leaf, stem, flower	All parts are dried and consumed in powder form with milk
Cassia fistula L.	Caesalpinaceae	Sunara (Ass) Dhandeleka(B)	Bark	Bark powder is consumed twice a day
Cassia tora L.	Caesalpinaceae	Sarumadelua (Ass) Sobai Sindang (B)	seed	Seed paste is consumed with curry
Catharanthus roseus (L) G. Don	Apocynaceae	Nayantara (Ass) Phanga(B)	Whole plant	Boiled extract of leaf and flower taken orally. Leave juice often consumed directly
Carica papaya	Carricaceae	Aomita (Ass) Muduful fithai (B)	seed	Seeds are shade dried, Powdered and consumed 2 times a day
Cenntella asiatica (L) Urban.	Apiaceae	Manimuni (Ass) Phisa Manamuni (B)	Whole plant	Whole plant is cook with fish
Centella asiatica Linn.	Apiaceae	Bormanimuni (Ass) Geder manamuni (B)	Whole plant	Whole plant paste is directly consumed
Cinnamomum tamala fr. Nus	Lauraceae	Tezput (Ass, B) Sa – belai (B)	Stem, root leave, and bark.	4-5 fresh or dried leaves are simply crushed by hand and kept dipped in a glass of water over-night. Next morning, the filtrate extract is Administered in empty stomach.
Clerondendrum infortunatum L.	Lamiaceae	Vetetita (Ass A) Vate gakha (B)	Leaves	Leaf paste is taken orally
Cocos nucifera L.	Arecaceae	Narikol (Ass) Narengkhol (B)	Fruit	Oil is taken out and consumed

Colocasia esculenta(L) Scholl	Araceae	Kolakachu (Ass) Thasoo (B)	Roots	Root powder and stems are taken
Cucumis melo Roxb.	Cucurbitaceae	Sal kumura (Ass) Khumra (B)	Seed	Seed powder is used
Cucumis trigonus Roxb.	Cucurbitaceae	Gorokhia tioh(Ass) Thaibeng (B)	Fruit	Fruit juice is taken thrice a day.
Cynodond actylonPer	Poaceae	Dubori(Ass) Dubori hagra (C)	Whole plant	Whole Plant juice is taken
Dalbergia sissoo L.	Fabaceae	Sisu (Ass, B)	Pods	Pods taken directly
Dillenia indica Linn.	Dilleniaceae	Outenga (Ass) Thaigir phithai (B)	Fruit leaves	Fresh are cut into Small pieces and properly sun dried. It is then powdered and regularly taken with water to cure diabetes
Enhydra fluctuansLour	Asteraceae	Haleshi (Ass) Alengchi megong (B)	Stem	Plant juice taken. Stems are just boiled and consumed
Ficus religiosa L.	Moraceae	Bot Goss (Ass) Fahkhri (B)	Leaves, fruit	Leaf , fruit taken orally
Garcinia padunculata Roxb.	Clusiaceae	Borthekera(Ass) Thaikha (B)	Fruit	Fruit taken orally
Ipomoea aquatica Forssk.	Convulaceae	Kalmou(Ass) Maande Maigon (B)	Leaves	Dried leaf powder mixed with *Piper nigrum* and taken orally twice a day
Ipomoea batata (L) Lam.	Convulaceae	Mitha alu (Ass) Tha guna (B)	Leaves	Leaf boiled and juice taken orally
Lantana camera L.	Verbenaceae	Guphul (Ass) Ghorphool (B)	Leaves	Leaf paste is consumed.
Lawsonia inermis L.	Lythraceae	Jetuka(Ass) Jenthuka (B)	Leaves	Leaf juice mixed with cow's milk taken once a week.
Leucas apera Spreng.	Lamiaceae	Doron (Ass) Dhumkhu (B)	Whole plant	Whole plant juice taken directly.
Mangifera indica L.	Anacardiaceae	Aam (Ass) Thaiju (B)	Leaves	Dry kernel powder is taken with cow's milk or consumed with curry,
Mimosa pudica Linn.	Mimosaceae	Nilazibon(Ass) Dowsa mukhreb (B)	Whole plant	Whole plant paste is used
Mirabilis jalapa L.	Nyctaginaceae	Gopal godhuli (Ass)	Root	Root juice is taken
Moringa olefira Lam.	Moringaceae	Sajina (Ass) Sojona (B)	Leaves	Leaf juice is taken directly
Morus indica Linn	Moraceae	Nuni (Ass) Thai kunsap (B)	Tender leaf	Leaf juice taken orally
Murraya koeningii (L) Spreng.	Rutaceae	Norosingha (Ass) Narasingha belai (B)	Leaves	Leave paste and powder is taken, dry powder often used in curry.
Nyctanthes arbor tristis L.	Oleaceace	Sewali (Ass) Sepali (B)	Leaves, flower	Young leaf juice is consumed and flower paste is taken orally
Ocimum sanctum L.	Lamiaceae	Tulsi (Ass) Thulungsi (B)	Leaves	Leaf powder taken with honey
Oxalis corniculata L.	Oxalidaceae	Tengesi (Ass) Sengrimekhi (B)	Aerial part	Aerial part of the plant is consumed with fish

Phyllanthus emblica Linn	Euphorbiaceae	Amlakhi (Ass) Amlai (B)	Fruit	Fruit juice taken twice a day
Swertia chirata L.	Gentianaceae	Chirata (Ass) Nagadona (B)	Whole plant	Whole plant extract is consumed.
Terminalia chebula Roxb.	Combretaceae	Selekha(B) Hilikha (Ass)	Fruit	Dried fruits are grind properly to powder, mixed with lemon juice and taken once daily in empty stomach for 3 days
Trigonella foenum graceum Linn	Papilionaceae	Mithi (Ass, B)	Seed	Seed powder is consumed
Piper betle Linn.	*Piperaceae*	Paan (Ass) Fathwi (B,)	Leaves	Leaf powder and paste directly consumed.
Riccinus communis	Euphorbiaceae	Era gos (Ass) Endibelai (B)	Seeds	Seed powder consumed with milk.

Among all the plants as cited by the herbalists, Aegle marmelos, *Allium cepa L., Azadirachta indica A.Juss* ,Catharanthus roseus (L) G. Don, *Dillenia indica Linn*, Clerondendrum infortunatum L, Swertia chirata L. *Mangifera, indica* L. *Mirabilis jalapa* L., *Trigonella foenum graceum Linn, and Cinnamomum tamalafr Nus* were ranked highest. From the study (**Fig. 2**) it has been observed that the leaf part is used maximum for medicinal purposes followed by the fruit and whole plant. But the individual parts of plants such as root, seed, stem and bark have significant importance in ethno medicinal practices. It has been found that different parts of a single species are also used to cure the disease. The plants parts are used either in powdered or paste form or consumed with different cuisine.

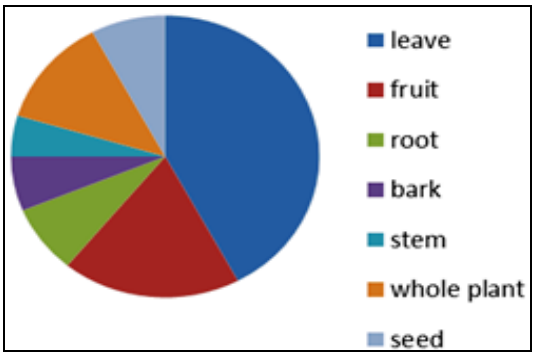

FIG. 2: UTILIZATION PATTERN OF PLANT PARTS

CONCLUSION: There are various constraints associated with studies related to information collection about medicinal plants from traditional sources as some of the herbalist interviewed refused to answer questions for fear of being investigated later by government agencies while others did not wish to divulge their professional secrets.

Mutual contacts, patience, explanation of objectives, respect and financial help were found useful in overcoming such obstacles. A wide range of plants with ethno botanical value against some very important diseases have been reported but much larger number of folk medicine have remained endemic to certain tribal pockets in North East India.

Therefore, the present study was to assess the diversity of ethno medicinal plants used by villagers basically by the tribal community in rural Kamrup district of Assam and to document the traditional medical practices followed in healing complications associated with diabetes. This study has documented 56 medicinal plants mainly used by the tribe of rural Kamrup district for the treatment of diabetes mellitus.

Further detailed studies on the ethno botanical aspects in the region will provide a meaningful ways for the promotion of traditional herbal medicinal practices and scientific validation.

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