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Research Journal of Agricultural Sciences
An International Journal

P- ISSN: 0976-1675
E- ISSN: 2249-4538

Volume: 13
Issue: 03

Res. Jr. of Agril. Sci. (2022) 13: 871–875

CARAS

www.rjas.org

Res. Jr. of Agril. Sci. (May-Jun 2022)
13(3): 871–875

ISSN: 0976-1675 (P)
ISSN: 2249-4538 (E)

Full Length Research Article

Ethno-Medicinal Practices among the Nepali Community for the Treatment of Diabetes of Tinsukia: A Case Study in Tinsukia District of Assam, India

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Received: 14 Apr 2022 | Revised accepted: 17 Jun 2022 | Published online: 22 June 2022
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A B S T R A C T

The Nepali community of Assam, especially rural people has a long tradition of folk practices of utilization of medicinal plants for various health problems. In this study (which was carried out from March, 2020 to Dec, 2021) an attempt has been made to find out the traditional beliefs and management practices of such Ethno-Medicinal plants for the treatment of diabetes by the Nepali community of the selected six villages of Tinsukia district of Assam. The methodology comprises thorough participant observations, interviews with semi-structured questionnaires (along with Key Informants), surveys and discussions with traditional healers (Amchis), elderly persons and medical officers. Documented data was evaluated using the quantitative ethno-botanical indices of Fidelity Level (FL) and Use Value (UV). Over all 28 plant species were recorded, belonging to 25 genera and 19 families which are used by the above-mentioned community to cure diabetes in the studied area. The plant species having the highest use value were *Azadirachta indica* followed by *Catharanthus roseus, Centella asiatica, Terminalia chebula*. The fidelity level was 100% for *Azadirachta indica, Momordica charantia, Solanum nigrum, Terminalia chebula* followed by *Justicia adhatoda, Catharanthus roseus.* Ample scope is there to investigate the phytochemistry and pharmacological effectiveness of the plant species that could be the basis for the isolation and development of some novel phyto-therapeutic active compounds in the future, as no or very less research has been done on it.

Key words: Ethno-Medicinae, Nepali community, Folk practices, Medicinal plants, Diabetes

Ethno-medicine is a set of empirical local practices on the basis of indigenous knowledge of a social group frequently transmitted orally from generation to generation. It deals with the therapeutic use of extracts from flowers, fruits, roots, seeds, barks, stems, leaves, alone or as an adjunct to other forms of alternative health care or physical manipulation e.g., massages. A major portion of Nepali people depends on agriculture and animal husbandry for survival. They rely mostly on the plant and animal resources of forests, cultivated lands, and common lands. The various ethnic groups of this country have developed their own knowledge systems for the use of plants in food, clothing, shelter, medicine and their spiritual needs [1].

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It is found in the Puranas, Epics and other historical sources that from the historic times Nepali speaking people migrated from neighboring areas like Nepal, Tibet, Bhutan, etc. and resided in different parts of Assam. After the British occupation of Assam, under the patronage of the colonial government, a large number of Nepalese migrated to this region in search of life as Gorkhas and Soldiers. Nepalese have also migrated to Assam valley where the vast spread of greenery, dense forests and hills, and abundance of wastelands which was full of green vegetation. In Assam they are found in almost all the districts of Assam. Ethno medicine and its practices differ from tribe to tribe, community to community, even village to village [2]. Nepali community has a rich knowledge of diseases, their identification, and application of herbal medicines for their treatment. Hundreds and thousands of traditional healers i.e., "*Amchis*" are engaged in herbal medical practices, and their livelihood entirely depends on the plant resources [3-4]. The ethnic people of Nepali community use about 23% of flowering plants for their medicinal properties [5].

Different ethno medicinal studies had been documented by various Scientists and different research workers from various places of N.E. India from time to time. and some of the periodic works towards the knowledge of medicinal plants have also been reported such as [6-14] etc. Ethno-botanical

knowledge on plant resources has been constantly diminishing because of changing perception of the local people, increasing influence of global commercialization and socioeconomic transformation. Therefore, the chief objective of the ethno-botanical exploitation and documentation of indigenous knowledge about the usefulness of a vast pool of genetic resources of Tinsukia district of Assam, is purposely needed.

MATERIALS AND METHODS

This study was carried in six (6) Nepali people dominated villages namely Ambikapur, Dhekiajan, Balijan, Borjan, Topa basti and Lekhapani, of Digboi and Margherita division of Tinsukia district of Assam, India. Tinsukia district is situated between 27°23' – 27°50' latitude and 95°22' - 95°40' longitude and covers an area of 3790 km^2. The northern, eastern, and southern part is totally bounded by Arunachal Pradesh. The south border is shared by the Changlang District of A. P. north by East Siang & Lower Dibang Valley Dist. of A.P. and east by Lohit Dist. Of A. P., north-west by Dhemaji Dist. of Assam and south-west by Dibrugarh dist. of Assam. It is flat terrain without any hill with some low lying and marshy areas. The river Brahmaputra and Dibru are passing almost northern and Buri Dehing is passing through southern side of Tinsukia district. The climate is moderate and temperature is ranges from 21°C to 35°C during summer and in winter, the temperature falls down as low as 13°C. There is a large tract of Reserve Forest in the eastern, northern and southern regions of the district. The total forest cover is about 1,55,97,700 hector which includes Dibru- saikhowa National Park, Dehing Patkai N.P., two wildlife sanctuaries and 135 Reserve Forest i.e., 22.30% of the total geographical area of the district. The forests serve as storehouses to a variety of naturally growing medicinal and aromatic plant species. The distance of studied area is within 15 - 35 KM of the Tinsukia town.

Intensive field work has been carried covering almost all the seasons of the year in the Nepali people inhabited villages meeting the traditional healers as well as men & women who used phytomedicine. The methods employed in the study were-through field visit, participant observations, interviews with semi-structured questionnaires, surveys and discussions with "*Amchis*", elderly persons, even local man, women, cultivators and medical officers.

The entire work had been done on the basis of primary data, and all the information about the plants were recorded as suggested by Jain [15] with regards to their vernacular names, plant part used, process of preparation of medicine either individually or in combination with other plant parts, and mode of application and doses for the treatment of diabetes. The specimens were collected, photographs taken and plant species were identified with the help of Flora of Assam [16], Weeds of North East India [17] and Handbook of Field and Herbarium Methods, New Delhi [18].

Quantitative analysis of ethnomedicinal data

An illustrative method of using the frequencies and percentages was used to evaluate the socio-demographic data of the informants. The ethnomedicinal usage of plants was quantitatively assessed using the Fidelity Level (FL) & Use Value (UV).

Fidelity level (FL)

The Fidelity Level (FL) was calculated to determine the percentage of informants who mentioned the uses of certain plant species to treat a particular ailment in the study area.

$$FL\ (\%) = \frac{lp}{lu} \times 100$$

Where, *lp* is the number of informants who independently claimed the utilization of a plant species for the same major ailment and *lu* is the number of informants who mentioned the plant for any major Ailment [19].

Use value (UV)

The Use Value (UV) determines the relative importance of plants known locally. It was calculated using the following formula:

$$UV = \frac{\Sigma U_i}{N}$$

Where, *Ui* is the number of uses mentioned by each informant for a given species and *N* is the total number of informants.

Data recorded during the study

Around 54 informants between the age group 21 and 80 years have participated in the present study, comprising 72.22% male 27.78% female of which 57.40% were illiterate and 42.59% were literate. Majority of the informants were of age 51-60 years (35.18%) and 41-50 years (29.93%). Most of the people in the study area were animal raisers (59.26%) and traditional health practitioners (31.48%).

Table 1 Socio-demographic data of the tea tribe informants of Tinsukia district of Assam (N=54)

Variable	Categories	No. of informants	Frequency (%)
Gender	Male	39	72.22 %
	Female	15	27.78 %
Literacy rate	Literate	23	42.59%
	Illiterate	31	57.40%
Age	21 – 30 years	6	11.11%
	31 – 40 years	8	14.81 %
	41 – 50 years	14	29.93 %
	51 – 60 years	19	35.18 %
	61 – 70 years	5	9.26%
	71 – 80 years	2	3.70 %
Category of the informants	Indigenous people	54	100 %
	Traditional health practitioners (Amchis)	17	31.48 %
	Animal raisers	32	59.26 %
	Servicemen	5	9.26 %
Duration of experience of traditional health practioners	Less than 1 year	2	3.70%
	1 – 10 years	5	9.26 %
	10 – 20 years	7	12.96 %
	20 – 30 years	2	3.70 %
	More than 30 years	1	1.85 %

Information of plant species recorded during the study

The plant species recorded in the studied area are arranged in an alphabetical order and their botanical name, local name, family, parts used, methods of preparation and doses of drugs applied for the treatment, UV and FL are summarized in (Table 2). A total of 28 species of medicinal plants were recorded in the studied area. These belong to 25 genera and 19 families, which are used to cure diabetes by the Nepali community of the studied area.

Table 2 List of ethno-medicinal plants Recorded during the study period

List of phytomedicinal plants used to cure for diabetes						
S. No.	Botanical name and family	Local Name/ English name	Plant part used	Method of preparation and doses used	Use value (UV)	Fidelity level (%)
1	*Acacia nilotica subsp. indica* (Benth.) Brenan Fabaceae	Babul(N)/ Thorny acacia/W	Leaves, Bark,	Fresh leaves & bark extracts are consumed 2-3 times / day orally to treat Diabetes	0.07	68.52
2	*Azadirachta indica* A. Juss., Meliaceae,	Neem (N)/Tree/ Indian Lilac/ W/C	Tender shoot, leaf and bark/Tree	Fresh leaves & tender stems are taken or leaf extract is taken orally for the treatment of diabetes	0.15	100
3	*Benincasa hispida* (Thunb.) Cogn. Cucurbitaceae	Kubindo(N) /Ash gourd/ C	Fruits & seeds	Fruits are consumed as vegetables for the treatment of diabetes	0.056	38.89
4	*Bombax ceiba* L. Bombacaceae	Simal(N)/ Silk cotton tree/W	Root & bark	Root & bark juice is used to cure diabetes, diarrhea & dysentery etc	0.07	46.29
5	*Bryophyllum pinnatum* (Lam.) Oken. Crassulaceae	Patharchatta(N)/ Life plant/ W/C	Leaf	Take half a cup of leaf extract at empty stomach every day for 3 months for the treatment of diabetes	0.09	59.26
6	*Cassia occidentalis* (L.) Link. Fabaceae	Thulo tapre (N)/Coffee weed/ W	Seeds	Matured seeds are roasted and then served as tea	0.07	72.22
7	*Catharanthus roseus* (L.) G. Don. Apocynaceae	Barahmashey. (N)/ periwinkle/ C	Whole plant	Complete sun-dried leaves, stems and flowers are crushed and made powder or 5 – 6 leaves are directly plucked, smashed and taken orally	0.13	96.29
8	*Centella asiatica* (L.) Urban. Apiaceae	Golpatta(N)/ Indian pennywort. / Wild	Whole plant.	Fresh leaves are crushed to sap and take the juice early in the morning in empty stomach with water for 6 – 12 months	.0.13	81.48
9	*Coccinia grandis* (L.) Voigt. Cucurbitaceae	Barela(N)/ Ivy gourd/ C	Roots	Root extracts are consumed 2-3 times / day for the treatment of diabetes	0.056	46.29
10	*Diplocyclos palmatus* (L.) Jeffery Cucurbitaceae	Sava/Marble vine/W	Fruit	Fresh fruits consumed in sufficient amounts 2 – 3 times a day until cure	0.037	22.22
11	*Ficus benghalensis L.*, Moraceae,	Sarane(N)/Banyan fig Tree/ W	Bark and milky latex	Bark extract is taken regularly to cure diabetes	0.056	50.00
12	*Ficus racemosa* L., Moraceae	Loa-Satar(N)/ Cluster fig/ Shrub/ W	Fruits	Fruit extracts are consumed regularly for the treatment of diabetes	0.07	59.26
13	*Ipomea aquatica* Forsk. Convolvulaceae	Kalmi saag(N) / Water spinach / W	Tender leafy twig	A half cup of tender leafy twig extract is taken on an empty stomach in the morning for the treatment of diabetes	0.037	31.48
14	*Ipomoea batatas* (L.) Lam., Convolvulaceae	Kandamula (N))/Herb/Sweet Potato/ C	Tuberous root and leaf juice	Tuberous root and leaf extract is given regularly to treat diabetes	0.056	38.89
15	*Justicia adhatoda* L Acanthaceae	Vashak (N)/Malabar nut/ W/C	Leaves, flowers	Leaves and flower extracts or dried powder are taken at empty stomach in the morning for the treatment of diabetes	0.09	94.44
16	*Momordica charantia* L. Cucurbitaceae	Tite Kerela(N) / Bitter melon/ cultivated	Fruit	Take half a cup of fruit extract on an empty stomach in the morning to cure it	0.07	100
17	*Nerium indicum* Mill. Apocynaceae	Karavira(N)/Indian oleander/ C	Flowers	Flower extract is given regularly to treat diabetes	0.09	87.03

18	*Nyctanthes arbor-tristis* L Oleaceae	Parijat(N)/ Night flowering jasmine / C	Leaf	Leaf extract is obtained from fresh leaves in water and by adding black salt consumed orally two times per day until cure	0.056	72.22
19	*Paederia foetida* L. Rutaceae	Paadeiree(N)/ Chinese fever vine/W	Leaf	The plant is boiled and crushed and the juice is taken with a little salt both orally or with rice for a few days	0.11	81.48
20	*Emblica officinalis* Gaertn. Euphorbiaceae.	Ainselu.(N)/Indian gooseberry / W/C	Bark and Fruit	Bark and Fruit juice with black salt are taken regularly for the treatment of diabetes	0.09	64.81
21	*Rubus alceifolius* Poir. Rosaceae	Bipemkanta (N) / Giant Bramble/ W	Rhizome.	2 – 3 teaspoonful juice of rhizome with black salt takes orally twice a day until cure	0.037	31.48
22	*Scoparia dulcis* L Plantaginaceae	Mitha Jhar(N) / Goat wed/W	Leaf.	Take half a cup of leaf extract at empty stomach in the morning for 1 week or till cure	0.056	64.81
23	*Solanum nigrum* L Solanaceae	Kaalo Biheen(N) / Black nightshade/ W	Tender leafy twig	Tender leafy twig and flower bud boiling with water take along with meal for the treatment of diabetes	0.09	100
24	*Solanum torvum* Sw. Solanaceae.	Thulo-biheen(N) / Turkey berry/ W	Young vegetative leafy bud	Tender leafy twig and flower bud boiling with water & take along with meal	.0.07	8518
25	*Syzygium cumini* (L) Skeels Myrtaceae	Kala Jamun(N)/ Java Plum/ C	Bark, leaf, fruit	Fresh Bark and leaf extract or Bark, Leaf and seed Powder is consumed 2 – 3 times daily until cure. The fruit juice in sufficient amount takes two times daily until cure	0.07	68.52
26	*Terminalia chebula* Retz. Combretaceae	Harro(N) / Black Myrobalan / W	fruits	Fresh fruit extract and seed Powder is consumed 2 – 3 times daily until cure. The fruit juice in sufficient amount takes two times daily until cure	0.13	100
27	*Trichosanthes wallichiana*(Seringe) Weight Cucurbitaceae	Konwa bhaturi/Australian daisy weed/ W	fruits	The fruits are boiled and taken with a little salt both orally or with rice for a few days	0.04	25.92
28	*Wedelia chinensis* (Osbeck) Merrill. Asteraceae	Bhringraj /Pila bhangara(N)/ Chinese wedelia/ W	Whole plant	Whole plant extract is taken orally for the treatment of diabetes	0.056	51.85

W = wild; C = cultivated; N = Nepali name

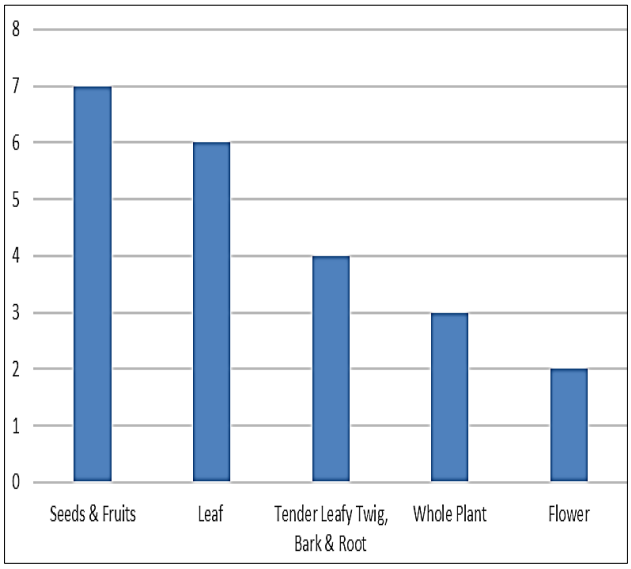

Fig 1 Parts used

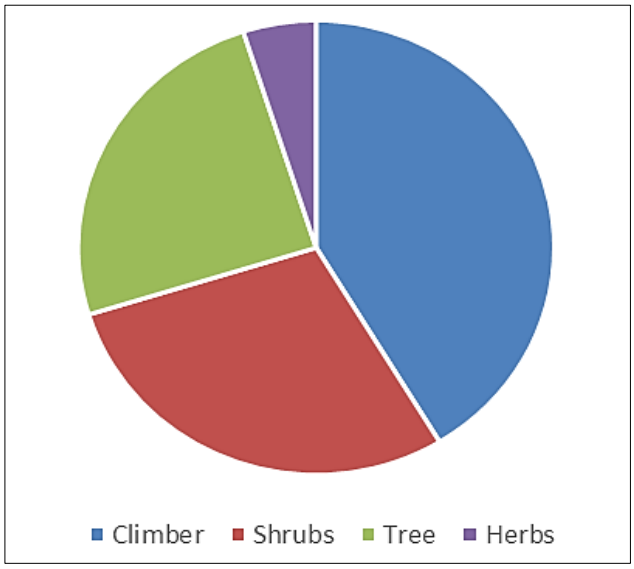

Fig 2 Growth form

RESULTS AND DISCUSSION

The highest numbers of plants which were recorded in the families are *Cucurbitaceae* (5), followed by *Fabaceae*, *Apocynaceae*, *Moraceae*, Convolvulaceae, and *Solanaceae* (2) are shown in (Table 2). In this study area the highest Use Value (UV) ranked the *Azadirachta indica* (0.15), followed by *Catharanthus roseus*, *Centella asiatica* (0.13). The Fidelity Level (FL) of the recorded plants have been calculated which showed the highest percentage of 100% for *Azadirachta indica*, *Momordica charantia*, *Solanum nigrum*, *Terminalia chebula* followed by *Catharanthus roseus* (96.29) and *Justicia adhatoda* (94.44) and *Solanum torvum* (85.18).

(Fig 1) depicts the percentage of different plant part used for the preparation of herbal medicine were leaves and seeds/ fruits (22.22%) is to be the most frequently used plant part followed by tender leafy twig, bark & root (14.81%), whole plant (11.11%), and flowers (7.40%).

It is seen from (Fig 2) that the growth form of the medicinal plant species climbers (35.71%), shrubs (25.00%) were more frequently used for traditional medicine preparations as compared to trees and herbs (21.42 & 17.85% respectively).

The use of Ethno-medicinal plants among the Nepali community in different parts of Assam is infused in their culture and rituals since time immemorial. The collected plants are both cultivated and wild. The study showed that different parts of the same plants or different plants are used for the treatment of different ailments.

CONCLUSION

Thus, from the above study it can be concluded that the local traditional healers (Amchis) of the studied area are rich in ethnomedicinal knowledge and they are the main repository of ethnomedicinal knowledge. They have strong faith in ethnomedicines, and the majority of people rely on phytomedicine for common health problems. Plants such as *Azadirachta indica*, *Momordica charantia*, *Solanum nigrum*, *Catharanthus roseus*, *Justicia adhatoda*, are used more frequently. Out of these plants the ethnobotanically important plants which are recorded during this project such as, *Cassia occidentalis*, *Diplocyclos palmatus*, *Rubus alceifolius*, Terminalia chebula, *Trichosanthes walliciana* are very few in number and rare. The survey also found out that they were less conscious about the documentation and preservation of ethno-medicinal practice and medicinal plants. The ethno-medicinal knowledge of this community is gradually eroding due to modern pharmacology, easy access of modern medicines, and general disinterest among younger generations in particular. At last there needs to be a thorough phytochemical and pharmaceutical investigation and isolation of the bioactive compounds and elucidation of their chemical structures of plants used by Nepali community as medicine for future potential value. So, for the conservation and propagation of these valuable ethno-botanical important plant species should be seriously considered.

Acknowledgements

I would like to thank traditional healers (Amchis) and local senior citizens of Nepali community of studied areas for sharing their indigenous knowledge throughout the field study, without their participation this research would not have been possible. I am also very thankful to Dr. Namita Nath, Prof. Guwahati University, Dr. Apurba Bhaskar Gogoi, Retired Associate Prof. of Tinsukia College, for their help during the field study.

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