



## A Review on Indigenous Medicinal Plants of North East India used as Antidiabetic

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### ARTICLE HISTORY

Received: 07.10.2023

Accepted: 29.10.2023

Available online: 31.12.2023

### DOI:

10.5530/ajphs.2023.13.54

### Keywords:

Diabetic mellitus, Ant diabetic, herbal plants, North East India, Hyperglacimia

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### ABSTRACT

Diabetes mellitus is one of the most prevalent metabolic conditions and a leading cause of death in recent years. Obesity and a poor lifestyle are determined to be the primary causes of diabetes. Studies and research are being conducted to learn how to treat and cure this condition. The main drawback of taking oral hypoglycemic drugs, which are typically prescribed to treat diabetes, is that they might have some unfavorable side effects. But, the herbal medications due to their natural origins and lower rate of side effects are now being used widely in the treatment of such diseases. Herbal medicines have experienced an exponential growth and popularity over the past few years in both developed and developing nations. A number of studies have been done already in different states of North East and a comprehensive review was conducted to gather knowledge on the traditional medicines used to treat diabetes mellitus in North East India. This study provides a significant resource for future research, drug discovery, and the development of alternative medicines for treating diabetes mellitus by consolidating the knowledge of native medicinal plants from North East India that may have ant diabetic effects. The scope, methods, important findings, and possible ramifications of a study on native medicinal herbs of northeastern India that are employed as ant diabetic medicines are highlighted in this abstract.

### INTRODUCTION

In rural areas of developing nations, traditional plant-based medicine is used by around 80% of the population. Even in wealthy nations, interest in therapeutic plants is growing. In fact, 25% or more of pharmaceuticals used in the last 20 years have generally been derived from plants, with the other 25% being chemically modified natural chemicals [1]. Even so, only 5%15% of the roughly 250,000 higher plants have ever had their pharmaceutical activity investigated. Studies over the past few decades have demonstrated the importance of studying therapeutic plants and the abundance of bioactive phytochemicals or bio nutrients in medicinal plants. These phytochemicals play a crucial role in preventing chronic diseases like cancer, diabetes, and coronary heart disease [2]. The main classes of phytochemicals with disease-preventive qualities include dietary

fiber, substances that help with detoxification, antioxidants, anticancer medications, neuropharmacological agents, and substances that boost the immune system [3].

Diabetes is a disorder in which the body produces insufficient energy and improperly breaks down meals. The majority of the food we consume is converted into glucose, or sugar, which our bodies may utilize as fuel. A hormone called insulin is produced by the pancreas, an organ located close to the stomach, to assist glucose absorption into our body cells [4]. A diabetic either can't use their own insulin properly or doesn't produce enough of it. Your blood sugar levels will rise as a result of this. This is why diabetes is often referred to as sugar [5]. Diabetes mellitus (DM), according to the World Health Organization (WHO), is a degenerative and chronic illness that develops when the pancreas does not generate enough insulin or when the body cannot

properly utilize insulin [6].

## GEOGRAPHICAL IMPORTANCE'S OF NORTH-EAST INDIA FOR HERBAL MEDICINES

India's northeast (NE) is home to a diverse range of ethnic groups, cultures, and customs. Eight states make up the northeast area: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. This region is home to an abundance of flora and fauna, as well as distinctive physical characteristics and climate variations. They serve as a repository for the naturally occurring, in-the-forest therapeutic herbs. The native population of this area has a strong faith in the folk cures from their original cultures and only uses their traditional medicinal herbs as a form of treatment [7].

The north-eastern (NE) area of India is one of the world's biodiversity hotspots due to its abundant biodiversity. The

Eastern Himalayan biosphere serves as the biological representative of the area, which is home to a variety of indigenous plants and animals [5].

A native culture appears to have ingrained knowledge of herbal medicinal products for many ailments. The community in question derives its indigenous identity from its long-standing connections to its natural plants and animals. Numerous plants are now used as medicines as a result of this relationship. Therefore, the local population relies on traditional medicinal plants to treat a variety of illnesses [8]. The various tribes heavily rely on the traditional systems of treatment. Their ancestors left them with a wealth of traditional knowledge about medicinal herbs, which has been handed down orally from generation to generation orally. Rich flora diversity has given its inhabitants an early advantage for watching and examining the abundant flora and animals to establish their own indigenous practices [7].

**Table :** Indigenous medicinal plants of North East India as Ant diabetic activity

Sl no	Name of the plant	Family	Common name/local name	Parts used	Traditional mode of administration	State found	Isolated compound	Main phytochemical constituents	Active chemical constituents responsible for ant diabetic effect	In vitro in vivo model study	References
1	<i>Allium sativum</i>	<i>Aliaceae</i>	Rosun /Naharu	Bulb of the plant	For a duration of few months, 3-4 cloves of a bulb are fried in mustard oil and taken with the typical meal, twice or three times every day.	Assam	Allyl propyl65 disulfide	allicin, flavonoid, alliin, diallyl	Allyl propyl65 disulfide	In vitro diffusion model, (streptozotocin (STZ)-induced diabetic rats)	7,9,10
2	<i>Catharanthus roseus (L.) G. Don</i>	<i>Apocynaceae</i>	Nayantara.	Roots, leaves, whole plant.	For eight to ten weeks, 20 cc of the decoction—made from leaves and roots—must be taken orally once every day.	Assam, Manipur, Mizoram	Catharanthine, vindoline, vindolinene, vinblastine, vincristine	Flavonoids, coumarins, glycosides, quinones, tanins	Catharanthine, vindoline, vindolinene, vinblastine, vincristine	Alloxan induced diabetic rats	9,11
3	<i>Momordica charantia L.</i>	<i>Cucurbitaceae</i>	Tita kerela	Fruit	A 50 ml serving of raw fruit juice is also ingested together with 2-3 cooked fruits once day through 5-6 weeks.	Assam, Manipur, Arunachal Pradesh, Mizoram	charantin, polypeptide-p and vicine	Peptides, amino acids, phenolic compounds, Terpenoids	charantin, polypeptide-p and vicine	streptozotocin (STZ) induced diabetic rats	12,13,14
4	<i>Allium cepa L.</i>	<i>Aliaceae</i>	Onion	Bulb	Raw onion is taken orally	Assam, Manipur, Arunachal Pradesh, Mizoram		allicin, quercetin, fisetin		Alloxan induced diabetic rats	9
5	<i>Inula cappa</i>	<i>Asteraceae</i>	Buarthau	Leaves, roots	For 6 to 8 weeks, 20 to 30 ml of the juice made from the crushed leaves/roots, <i>Plantago asiatica</i> , and <i>Lobelia angulata</i> is given orally once day.	Mizoram				Alloxan induced diabetic rats, corticosteroid (dexamethasone) induced hyperglycaemia in mice	9,11
6	<i>Tinosporacordifolia</i>	<i>Menispermaceae</i>	Sagunilota	Stem	A dry stem's aqueous and alcoholic extract and decoction are both given orally once day for 45 to 50 days.	Assam and Arunachal Pradesh	Barberin, Magnoflorine, Palmatine, Jatrorrhizine	terpenoid, alkaloid, lignans, steroids	Berberin, Magnoflorine, Palmatine, Jatrorrhizine	streptozotocin (STZ-) induced diabetic rats	9,15
7	<i>Trigonella foenumgraecum</i>	<i>Fabaceae</i>	Methi	Seed	For four to six months, 5-10 g of seeds and seed powder are added to meals and ingested twice or three times every day.	Assam	Trigonelline, Sotolon [3-hydroxy-4,5-dimethyl-2(5H)-furanone], Trigonellin	carbohydrates, proteins, lipids, alkaloids, flavonoids	Flavonoids, alkaloids	streptozotocin (STZ-) induced diabetic rats, alloxan induced diabetic rats	16,9,17
8	<i>Ficus benghalensis L.</i>	<i>Moraceae</i>	Bot Gos (Banyan)	Bark	For three months, 100 g of bark was consistently taken once day orally to create an infusion.	Assam	3-O-beta-D-galactosyl cellobioside, palarogonidin	flavonoids, phenols, terpenoids	3-O-beta-D-galactosyl cellobioside, palarogonidin	Alloxan induced diabetic rats	18,9
9	<i>Syzygiumcumini</i>	<i>Myrtaceae</i>	Kala jamuk	Bark	For six weeks, the decoction is usually consumed once day and is made from bark.	Assam	gallic acid, umbelliferone, and ellagic acid	Flavonoids, steroids	gallic acid,	streptozotocin (STZ-) induced diabetic rats, alloxan induced diabetic rats	19,20,9
10	<i>Curcuma longa</i>	<i>Zingiberaceae</i>	Haldi	Roots	Dried powder taken orally two times a day	Assam and Arunachal Pradesh	Curcumin, Ferulic acid	curcumin (diferuloylmethane), demethoxycurcumin, and bisdemethoxycurcumin	curcumin, Ferulic acid	STZ-nicotinamide-induced rats, streptozotocin (STZ-) induced diabetic rats	21,14

## MATERIALS AND METHOD

This study is based on a thorough analysis of literature from both national and international publications. We examined the results of various investigations on pharmacologically active plants that have been used to treat diabetes mellitus. We concentrated on locating specific ethnobotanical survey publications linked to diabetes mellitus in the systematic review. Later, for information on the models or bio-assays used to evaluate the effects of plant extracts on diabetes mellitus, the references found throughout the search were checked. People's attention has been stirred by the experimental studies on hypoglycemic plants in this review.

### DATA SOURCES AND SEARCH STRATEGY

In this investigation, we searched the literature using Elsevier, Science Direct, Springer Link, and search engines like Pub Med and Google Scholar. Cross-referencing "plants," "medicinal plants," and "plant extracts" with "hyperglycemia" and "hypoglycemic activities" was done during the search. Additional keyword combinations include ethnobotanical study, northeast, hyperglycemia, medicinal plants, particular status of the northeast, traditional hypoglycemic plants, etc.

### INCLUSION AND EXCLUSION CRITERIA

We have included the full-text publications from the ethnobotanical study of the northeast, which are only available in English, to the inclusion criteria. survey on ethnobotany was only done in the northeast. Articles that were intended to be translated into another language, book chapters, plants intended for ethnoveterinary use, and articles that lacked adequate information were also removed.

### DATA EXTRACTION

At first every article's title and abstract was carefully evaluated to filter out those that weren't relevant to the subject. Second, in a table, plants with just hypoglycemic action were put in the table.

### ANALYSIS AND REPORTING

The information acquired from the literature search was thoroughly evaluated, and numerous details such as the plant's name, family, scientific name, mechanism of action, and utilized plant components were screened out.

## DISCUSSION

Diabetes is a metabolic illness which has been linked to significant economic loss, which can limit a country's ability to thrive. In addition, poorly managed diabetes causes a wide range of chronic consequences, including blindness, heart failure, and kidney failure etc [22]. The Promotion of research into newer hypoglycemic and potentially antidiabetic drugs is of tremendous importance in order to stop this worrying medical condition. In the current review is concentrated on the list of herbal plants that have a hypoglycemic impact. However, pharmacological studies and clinical trials should be used to validate their efficacy [23]. Future research on the results of prolonged clinical studies may aid in understanding the effects of medicinal herbs. Additionally, investigations on a number of plants with hypoglycemic properties have so far produced optimistic findings, suggesting that new herbal treatments for hyperglycemia will be identified in the upcoming days.

## CONCLUSION

The current study offers support for using some conventional treatment of diabetic mellitus. This might be a basis for the creation of standardized herbal preparations against diabetes using ethno-traditional knowledge and the discovery of novel chemical entities for the creation of diabetic medications in the future. The study found that the indigenous populations of the study area (North East India) utilized traditional botanicals to treat diabetes. The treatment is also economically and biologically reliable. On the other hand, several of these plant-derived medications have the potential to provide long-term, cost-effective control of diabetes through dietary modifications, nutritional supplementation, and combination therapy with synthetic agents. This antidiabetic activity is primarily caused by the presence of bioactive molecules. To assess the mechanisms of action of medicinal plants with antidiabetic effects, more research must be done.

## REFERENCES

1. Bérdy, János. "Thoughts and facts about antibiotics: where we are now and where we are heading." *The Journal of antibiotics* 65.8 (2012): 385-395.
2. Heinrich, Michael, and Simon Gibbons. "Ethnopharmacology in drug discovery: an analysis of its role and potential contribution." *Journal of pharmacy and pharmacology* 53.4 (2001): 425-432.
3. Al-Mijalli, Samiah Hamad, et al. "Antioxidant, Antidiabetic, and Antibacterial Potentials and Chemical Composition of *Salvia officinalis* and *Mentha suaveolens* Grown Wild in Morocco." *Advances in Pharmacological and Pharmaceutical Sciences* 2022 (2022).
4. Mukhtar, Y., A. Galalain, and UJEJoB Yunusa. "A modern overview on diabetes mellitus: a chronic endocrine disorder." *European Journal of Biology* 5.2 (2020): 1-14.
5. Kalita, Bipul Ch, et al. "Anti-Diabetic Plants Used by Apatani Tribe of Arunachal Pradesh, India." *Journal of Bioresources* 4.2 (2017): 73-79.
6. Mohammed, Abubakar, Dileep Kumar, and Syed Ibrahim Rizvi. "Antidiabetic potential of some less commonly used plants in traditional medicinal systems of India and Nigeria." *Journal of Intercultural Ethnopharmacology* 4.1 (2015): 78.
7. Thomson, Martha, et al. "Anti-diabetic and hypolipidaemic properties of garlic (*Allium sativum*) in streptozotocin-induced diabetic rats." *Int J Diabetes Metab* 15.3 (2007): 108-115.
8. El-Saber Batiha, Gaber, et al. "Chemical constituents and pharmacological activities of garlic (*Allium sativum* L.): A review." *Nutrients* 12.3 (2020): 872.
9. Ryakala, Venkat Kishore, et al. "Ethnobotany of plants used to cure diabetes by the people of north east India." *Medicinal and aromatic plant science and biotechnology* 4.1 (2010): 64-68.
10. Faith Oyelere, Sunday, et al. "A detailed review on the phytochemical profiles and anti-diabetic mechanisms of *Momordica charantia*." *Heliyon*, 2022, vol. 8, núm. 4, art. 09253. (2022).
11. Chattopadhyay, R. R. "A comparative evaluation of some

- blood sugar lowering agents of plant origin." *Journal of ethnopharmacology* 67.3 (1999): 367-372.
12. Joseph, Baby, and D. Jini. "Antidiabetic effects of Momordica charantia (bitter melon) and its medicinal potency." *Asian pacific journal of tropical disease* 3.2 (2013): 93-102.
  13. Jia, Shuo, et al. "Recent advances in Momordica charantia: functional components and biological activities." *International journal of molecular sciences* 18.12 (2017): 2555.
  14. Bharti, Sudhanshu Kumar, et al. "Antidiabetic phytoconstituents and their mode of action on metabolic pathways." *Therapeutic Advances in Endocrinology and metabolism* 9.3 (2018): 81-100.
  15. Kumari, Suketha, et al. "Efficacy of Integrated Ayurveda treatment protocol in type 2 diabetes mellitus A case report." *Journal of Ayurveda and Integrative Medicine* 13.1 (2022): 100512.
  16. Khosla, P., D. D. Gupta, and R. K. Nagpal. "Effect of Trigonella foenum graecum (Fenugreek) on serum lipids in normal and diabetic rats." *Indian Journal of Pharmacology* 27.2 (1995): 89.
  17. Zhou, J., L. Chan, and S. Zhou. "Trigonelline: a plant alkaloid with therapeutic potential for diabetes and central nervous system disease." *Current medicinal chemistry* 19.21 (2012): 3523-3531.
  18. Ahmad, Saeed, et al. "Phytochemical composition and pharmacological prospectus of Ficus bengalensis Linn.(Moraceae)-A." *Journal of medicinal plants research* 5.28 (2011): 6393-6400.
  19. Perera, P. R. D., S. Ekanayake, and K. K. D. S. Ranaweera. "Antidiabetic compounds in Syzygiumcumini decoction and ready to serve herbal drink." *Evidence-Based Complementary and Alternative Medicine* 2017 (2017).
  20. Prabakaran, Kandan, and Govindan Shanmugavel. "Antidiabetic activity and phytochemical constituents of Syzygiumcumini seeds in Puducherry region, South India." *Int J PharmacognPhytochem Res* 9.7 (2017): 985-89.
  21. Dong-wei, Zhang, et al. "Curcumin and diabetes: A systematic review." *Evidence-Based Complementary and Alternative Medicine* 2013 (2013).
  22. Barretto, Roselle, et al. "Teff (Eragrostis tef) processing, utilization and future opportunities: a review." *International Journal of Food Science & Technology* 56.7 (2021): 3125-3137.
  23. Singh, Neetu, et al. "A review on traditional uses, phytochemistry, pharmacology, and clinical research of dietary spice Cuminum cyminum L." *Phytotherapy Research* 35.9 (2021): 5007-5030.



**Cite this article :** Himanshu Gogoi, Lakhyajit Borah, Izaz Hussain, Sunmon Raj Dutta, Nihalini Kalita, Charlisar Teron, Prasurjya Saikia, Shivam Rongpi  
 A review on indigenous medicinal plants of north east India used as antidiabetic  
 Asian J. Pharm. Hea. Sci.. 2023;13(4):2900-2903. DOI : 10.5530/ajphs.2023.13.54