

Chapter 1

Antidiabetic medicinal plants of India

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Abstract: The present study documented the ethnomedicinal plants useful in management of diabetes in the different states of India. Field surveys were carried out in the selected states (Odisha, Haryana, Himachal Pradesh, and Maharashtra) from the year 2022 to 2025. The informations were collected through interviews with the local communities using semi-structured questionnaires. A total of 40 plant species belong to 39 genera and 28 families were enumerated having anti-diabetic uses. Among these, some of the most used species are *Andrographis paniculata*, *Azadirachta indica*, *Momordica charantia* and *Phyllanthus emblica*. The present study highlights the importance of local plants in the management of diabetes and draw attention towards their sustainable utilization and conservation.

Keywords: Ethnomedicinal, diabetes management, global health problem

Introduction

The prevalence of diabetes has nearly doubled from the 20th century to the 21st century, with lifestyle changes being a significant contributing factor

(Hossain et al., 2024). Globally, other key factors include obesity, population growth, poor dietary practices, socioeconomic inequalities, and genetic predisposition (Hu, 2011). Diabetes poses serious health consequences, including a high risk of cardiovascular disease, blindness, kidney failure, and limb amputation (Nazar et al., 2024; Khajuria et al., 2025; Uti et al., 2025), as well as a substantial economic burden. Approximately 537 million adults worldwide live with diabetes, representing 10.5 % of the global population (Uti et al., 2025). The situation is particularly dire in low- and middle-income countries like India, where diabetes affects a significant portion of the working-age population. While prevention and management are feasible, they require sustainable lifestyle changes and a shift towards natural and organic products. India has a rich tradition of using natural remedies for diabetes management, highlighting the need for documentation and validation of such knowledge (Debbarma et al., 2017). Present study aims to enumerate common plant species in India used to manage diabetes and draw attention to the therapeutic potential of medicinal plants and natural products.

Methodology

A field survey was conducted from 2022 to 2025 in selected states of India (Odisha, Haryana, Himachal Pradesh, and Maharashtra). Local communities were engaged through interviews and discussions, during which a total of 40 plant species were documented, along with their used parts. The collected data were cross-verified with previously reported ethnobotanical studies on antidiabetic plants to authenticate their medicinal potential (Aradhana et al., 2022; Kumar, 2025; Pradhan et al., 2025). The study adhered to standard methods of ethnobotanical survey, ensuring a rigorous and reliable documentation of traditional knowledge (Jena et al., 2025).

Results and discussion

Present survey documented 40 plant species from diverse botanical families, showcasing the rich ethnobotanical heritage of Indian traditional medicine (Table 1; Figures 1-10). The Fabaceae, Malvaceae, Amaranthaceae, and Cucurbitaceae families were predominantly represented. Various plant parts were utilized for their therapeutic properties, with leaves, barks, and roots being the most frequently used, followed by fruits, flowers, and whole plant preparations. Notably, specific plants like *Azadirachta indica* and *Aegle marmelos* are recognized for their hypoglycemic properties, primarily utilizing their leaves, whereas species like *Pterocarpus marsupium* and *Santalum album* are valued for their medicinal bark.

Table 1: Ethnomedicinal plants used to treat diabetes

Plant Name	Family	Common Name	Parts used
<i>Abrus precatorius</i> L.	Fabaceae	Rosary pea	Leaf
<i>Achyranthes aspera</i> L.	Amaranthaceae	Devil's horsewhip	Root
<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Bael	Leaf
<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Mountain Knotgrass	Whole plant
<i>Ailanthus excelsa</i> Roxb. (Figure 1)	Simaroubaceae	Tree of heaven	Bark
<i>Alangium salviifolium</i> (L.f.) Wangerin (Figure 2)	Cornaceae	Sage-leaved Alangium	Leaf
<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Acanthaceae	Green chiretta	Leaf
<i>Azadirachta indica</i> A.Juss.	Meliaceae	Neem	Leaf
<i>Bacopa monnieri</i> (L.) Wettst.	Plantaginaceae	Brahmi	Leaf

<i>Barleria cristata</i> L.	Acanthaceae	Bluebell barleria	Root
<i>Cajanus cajan</i> (L.) Huth	Fabaceae	Pigeon pea	Leaf
<i>Calotropis gigantea</i> (L.) W.T. Aiton	Apocynaceae	Crown flower	Flower
<i>Cassia fistula</i> L. (Figure 3)	Fabaceae	Golden shower	Root
<i>Cinnamomum verum</i> J.Presl	Lauraceae	Cinnamon	Inner bark and root
<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Ivy gourd	Flower and young fruit
<i>Curcuma longa</i> L.	Zingiberaceae	Turmeric	Rhizome
<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Bermuda grass	Whole plant and rhizome
<i>Dioscorea alata</i> L.	Dioscoreaceae	Greater yam	Tuber
<i>Ficus religiosa</i> L.	Moraceae	Peepal	Unripe fruit
<i>Gmelina arborea</i> Roxb. ex Sm.	Lamiaceae	Gamhar	Young leaf
<i>Grewia tiliifolia</i> Vahl	Tiliaceae	Dhaman	Bark
<i>Helicteres isora</i> L. (Figure 4)	Malvaceae	East-Indian screw tree	Root/bark
<i>Hemidesmus indicus</i> (L.) R.Br.	Apocynaceae	Indian sarsaparilla	Root
<i>Hibiscus × rosa-sinensis</i> L.	Malvaceae	Chinese hibiscus	Petal
<i>Afrohybanthus enneaspermus</i> (L.) Flicker	Violaceae	Spade flower	Whole plant
<i>Madhuca longifolia</i> (L.) J.F. Macbr.	Sapotaceae	Indian butter tree	Bark
<i>Momordica charantia</i> L. (Figure 8)	Cucurbitaceae	Bitter gourd	Fruit
<i>Oxalis corniculata</i> L. (Figure 7)	Oxalidaceae	Creeping wood-sorrel	Leaf
<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Indian gooseberry	Fruit
<i>Phyllanthus niruri</i> L.	Phyllanthaceae	Gale of the wind	Whole plant
<i>Plumbago indica</i> L.	Plumbaginaceae	Scarlet leadwort	Root

<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Indian kino tree	Bark
<i>Punica granatum</i> L.	Punicaceae	Pomegranate	Root, bark and fruit
<i>Santalum album</i> L.	Santalaceae	Indian sandalwood	Bark
<i>Saraca asoca</i> (Roxb.) W.J.de Wilde	Caesalpiniaceae	Sita Ashok	Flower
<i>Scindapsus officinalis</i> (Roxb.) Schott (Figure 5)	Araceae	Gajapippali	Inflorescence
<i>Semecarpus anacardium</i> L.f.	Anacardiaceae	Marking nut tree	Fruit
<i>Sida cordifolia</i> L.	Malvaceae	Country mallow	Root
<i>Spondias pinnata</i> (L.f.) Kurz (Figure 6)	Anacardiaceae	Wild mango	Bark of young branch
<i>Tamarindus indica</i> L.	Caesalpiniaceae	Tamarind	Seed



Figure 1: Leaves and flowers of *Ailanthus excelsa*



Figure 2: Flowers of *Alangium salviifolium*



Figure 3: Flowers and fruits of *Cassia fistula*



Figure 4: Flowers of *Helicteres isora*



Figure 5: Fruit of *Scindapsus officinalis*

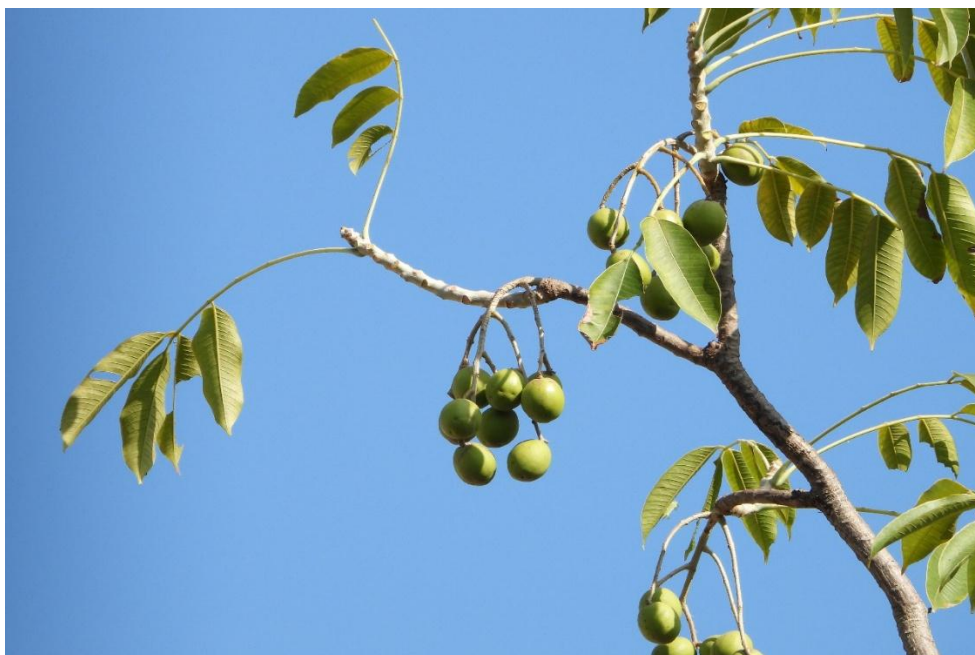


Figure 6: Leaves and fruit of *Spondias pinnata*

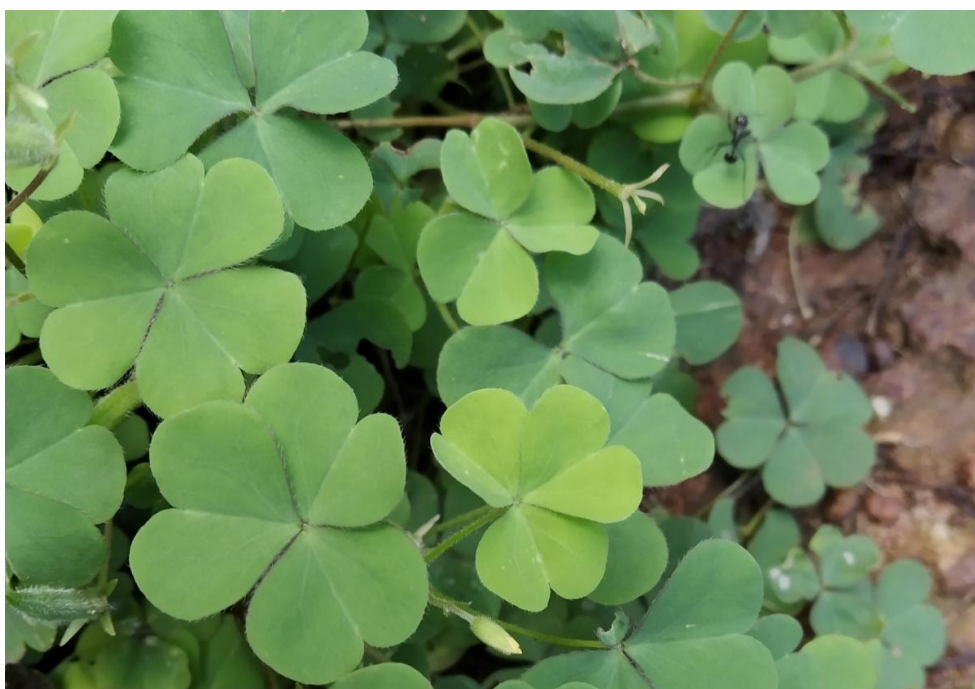


Figure 7 : Leaves of *Oxalis corniculata*



Figure 8: Fruit and seeds of *Momordica charantia*

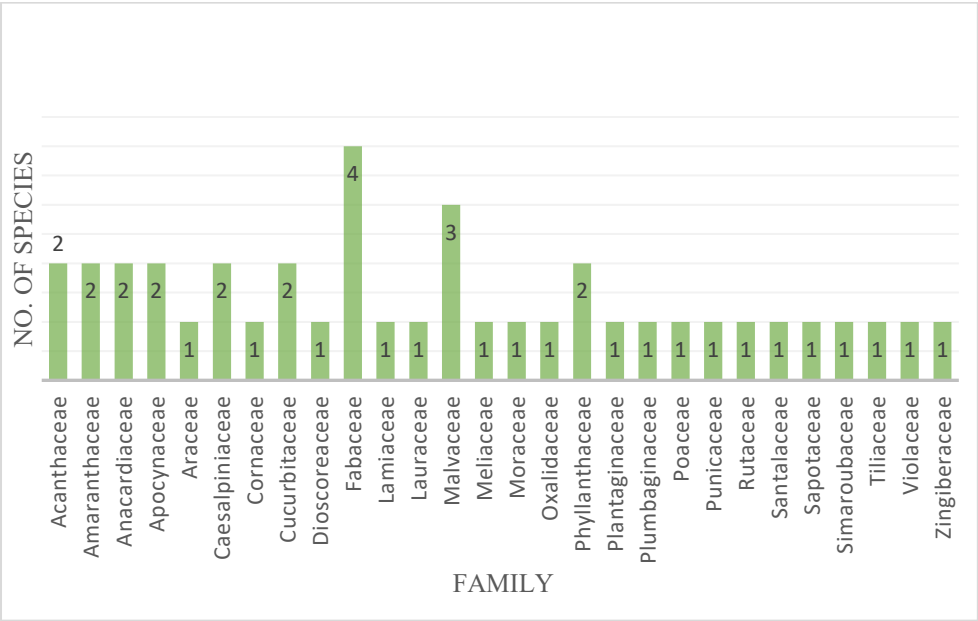


Figure 9: Diversity of antidiabetic medicinal plants in 28 families

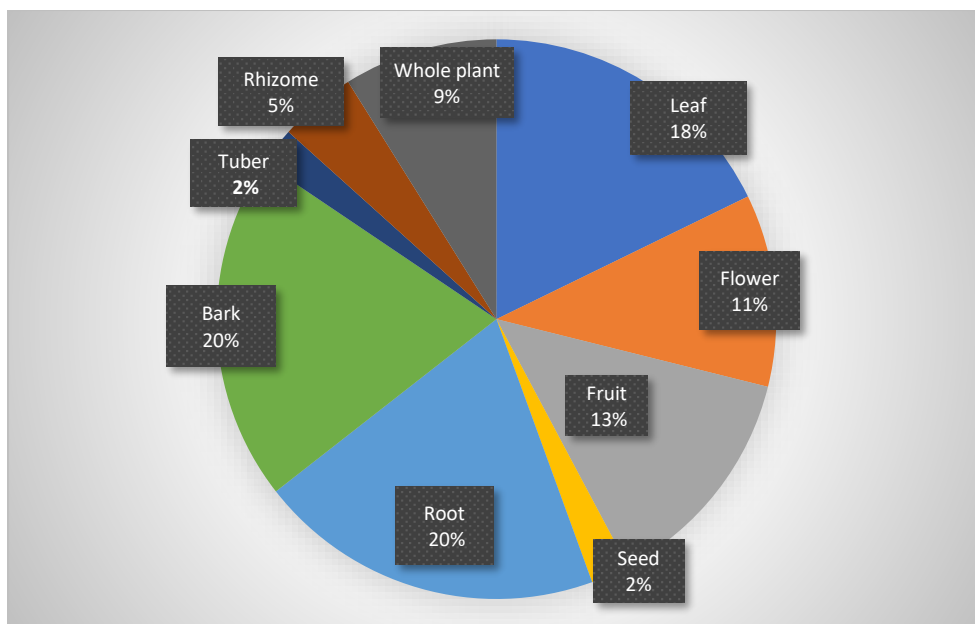


Figure 10: Percentage of parts used for diabetes management

Moreover, some plants such as *Momordica charantia* (Bitter gourd), *Phyllanthus emblica* (Indian gooseberry), and *Coccinia grandis* (Ivy gourd) are well recognized in both folk medicine and scientific studies for their strong antidiabetic properties. The use of multiple parts in some species, such as *Punica granatum* (Pomegranate), where root, bark, and fruit are all utilized, reflected the complex phytochemical composition and therapeutic adaptability of these plants. The survey results not only provided a brief understanding into the biodiversity of India's medicinal flora but also highlighted the importance of preserving and validating traditional knowledge to support the development of effective plant-based antidiabetic therapies. Over the last three to five years, several peer reviewed studies have validated the antidiabetic potential of traditional Indian medicinal plants, showing diverse mechanisms and therapeutic benefits (Sharma et al., 2023).

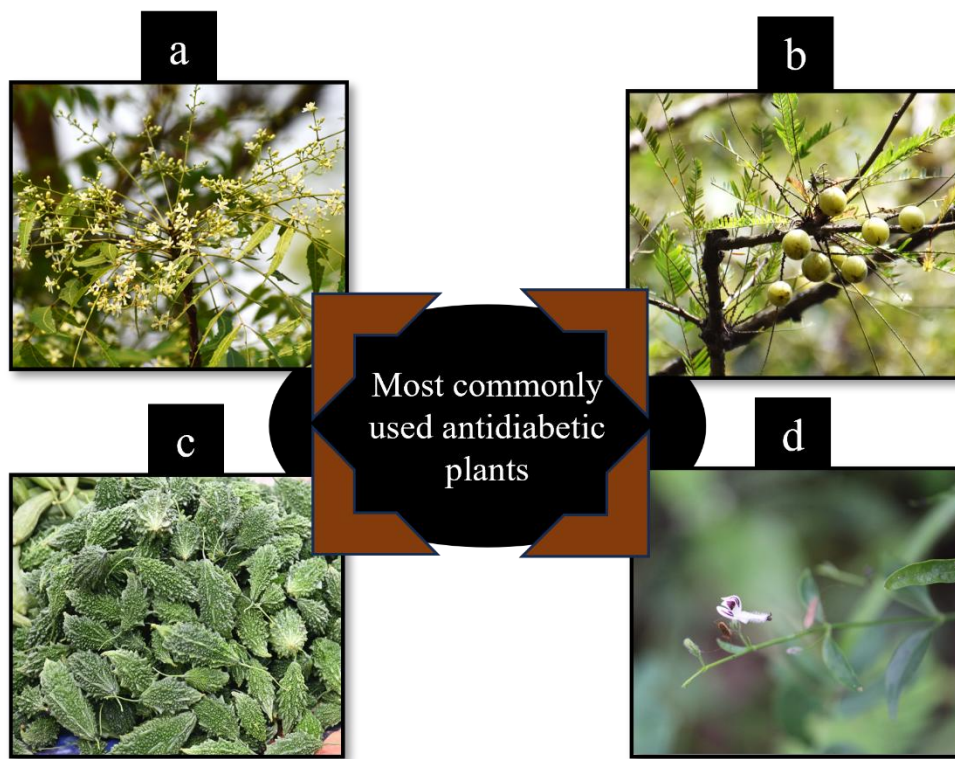


Figure 11: Most common plants used in diabetes; a) *Azadirachta indica*, b) *Phyllanthus emblica*, c) *Momordica charantia*, and d) *Andrographis paniculata*

In 2025, Yusuf and his co-workers studied about 47 plant species which have antidiabetic properties. Uti et al., reviewed about 15 antidiabetic plants with their major bioactive compounds. *Sesuvium portulacastrum* was evaluated in *Journal of Pharmacy and Bioallied Sciences*, showing significant in vitro α -amylase and α -glucosidase inhibition, along with in silico evidence suggesting a multitarget interaction with diabetic pathways, often outperforming acarbose in assays (Mukundh et al., 2024). Additionally, a landmark in vitro and in silico study published in *Indian Journal of Biochemistry and Biophysics* evaluated *Withania somnifera* root extract, demonstrating potent inhibition of key glucose-regulating enzymes (Narayanaswamy et al., 2025).

Conclusion

Diabetes is a global health problem. It creates lot of problems and its management is in high priority. Lot of allopathic medicines are available with side effects. In this aspect, present study draw attention towards the use of 40 local plants in the management of diabetes. The present study provides a base line data for advance experimental works using the enumerated plants.

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