Urban Ethnobotany of Jammu: Documentation of Ethno-medicinal plants used in diabetes management

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ABSTRACT

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| The present investigation deals with the use of ethnomedicinal plants for diabetes management in urban areas of Jammu. Several field surveys were conducted in Jammu district from the year from 2022 to 2024, for the documentation of medicinal plant usage among local communities. The data were collected through interviews with the local inhabitants using semi-structured questionnaires. Plant species were documented, collected, identified and categorized based on their anti-diabetic properties. A total of 20 plant species spread over 19 genera and 14 families were reported having anti-diabetic ethnomedicinal uses. Among these, eight species such as *Alstonia scholaris, Butea monosperma, Eucalyptus globulus, Hibiscus × rosa-sinensis, Ipomoea carnea, Kalanchoe pinnata, Monoon longifolium*, and *Oxalis corniculata* were novel addition to the ethnobotanical knowledge of Jammu & Kashmir. The findings further highlight the urgent need for conservation efforts to safeguard both medicinal plant biodiversity and indigenous knowledge, promoting sustainable practices and integrating traditional plant-based remedies along with modern healthcare diabetes management while preserving cultural heritage. |

*Keywords: Urban Ethnobotany, diabetes, , medicinal plants, novel,* *Hibiscus,*

1. INTRODUCTION

Diabetes is a complex metabolic disorder diagnosed by persistently elevated blood sugar levels, primarily caused by impaired insulin action, insufficient insulin secretion or a combination of both. (Suji and Sivakami, 2003; Mirhoseini et al., 2013). Diabetes affects approximately 100 million people each year and is ranked as the seventh leading cause of death globally. A recent statistical update from the International Diabetes Federation (IDF) indicate that an estimated 537 million adults, aged 20 to 79 are currently living with diabetes. This number is expected to increase to 643 million by 2030 and probably 783 million by 2045 (Parasher et al., 2024) The Indian subcontinent has emerged as a major hotspot for this growing health crisis. Among adults aged 20 to 79, the estimated prevalence rates of the disease are 8.31% in India compared to the 7.77% in Sri Lanka, 6.72% in Pakistan, and just 3.03% in Nepal (Rizvi and Mishra, 2013). Nagarathna et al., 2020 recorded that the number of individuals with diabetes in India is expected to reach 79.4 million by the year 2030.

Diabetes manifests in different forms, Type I, Type II, and gestational diabetes are the most prevalent ones. Type I diabetes arises when beta cells of pancreas fail to produce adequate insulin, and it is more commonly diagnosed in children. In contrast, Type II diabetes occurs when insulin receptors become resistant to the insulin produced by the body (Neamsuvan et al., 2015). Type II form is the most widespread and is often linked to an unhealthy lifestyle, including poor diet, physical inactivity, stress, and obesity, on the other hand, gestational diabetes develops during pregnancy. Clinically, Diabetes mellitus is recognized as a silent disease, contributing as one of the major risk factors for health (Lima et al., 2016). Uncontrolled management makes the patients susceptible to developing complications like nephropathy, retinopathy, neuropathy, and cardiovascular diseases which add to the morbidity of the disease leading to premature deaths (Padhi et al., 2020).

**Modern allopathic medicine**

Managing diabetes mellitus remains a global challenge causing many countries to declare it as a pandemic of the 21st century. The primary and most effective treatments for diabetes mellitus are Insulin injections and hypoglycemic agents which are commonly used to regulate the blood sugar levels in the patients. However, these medications are associated with various limitations like limited tolerability, high cost, and other potential side effects making them less effective in preventing long-term complications of the disease (Swanston-Flatt et al., 1989; Parasuraman et al., 2014). Given the growing understanding of diabetes and its associated risks, there is a need to identify alternative treatments with fewer adverse effects. Medicinal plants serve as valuable sources for potential complementary or alternative therapies for diabetes and other health conditions (Eddouks et al., 2014).

**Herbal remedy**

The use of medicinal plants has contributed to a decline in the occurrence of various diseases due to their protective effects against oxidative damage and their ability to reduce inflammation. WHO accounts that nearly 90% of diabetes patients in developing countries depend on plant-based remedies for managing the disease. Globally, around 21,000 medicinal plant species have been identified, with approximately 2,500 of them found in India (Rani et al., 2020). Among these, about 800 plant species have been recognized for their antidiabetic properties (Patil et al., 2011). Recent studies have focused on exploring traditional uses, evaluating the *in-vitro* effects of medicinal plants, and identifying their bioactive compounds to develop herbal medicines (Asadi-Samani et al., 2017). Several researchers have worked on the plants which are traditionally used by various indigenous communities against diabetes in different parts of India (Ryakala et al., 2010; Thirumalai et al., 2012; Mishra et al., 2019; Das et al., 2023; Singh et al., 2023) and Jammu & Kashmir (Bhatia et al., 2014; Gairola et al., 2014; Shah et al., 2015; Ajaz and Ahmed, 2017; Khan and Paul, 2017; Parasher et al., 2024), but there is no report of plants being used by the indigenous populace district Jammu against diabetes. Keeping this in view, the present study was conducted to identify the plants growing in the urban areas and used by the people, who have access to the allopathic medicine, as an alternative medicine for the prevention and treatment of diabetes.

2. material and methods

**2.1 Study Area**

Jammu District, one of the districts of Jammu province, is the winter capital of Jammu and Kashmir (J&K), the northernmost Union Territory of India. The district shares its borders with Pakistan and Ladakh. Jammu district and is located along the banks of the Tawi River. It lies between 32°44'46" N and 75°50'51" E, with an average elevation of 327 meters above sea level, and is divided into 21 tehsils. The district experiences a subtropical and humid climate, with summer temperatures reaching up to 46°C and winter temperatures dropping to 4°C (Saleem et al., 2024)

**2.2 Survey and data collection**

Systematic and extensive field surveys were conducted from June 2022 to July 2024 across various locations in Jammu district, including Nagrota, Gandhi Nagar, Canal Road, R.S. Pura, Shakti Nagar, Akhnoor and Khour (Table 1). The exploration covered diverse plant habitats such as roadsides, riverbanks, forests, meadows, valleys, and grasslands to document the ethnomedicinal flora of the region. Informants were selected randomly from the study area for the documentation of traditional knowledge and prior informed consent were taken from the them. Informants were chosen from different age groups and occupation like students, businessmen, shopkeepers, milkmen, teachers, elder people and were interviewed using semi-structured questionnaire and asked about the local name of plant, parts used, ailments treated etc. Plants mentioned by the informants which are traditionally used against several disease were collected from the nearby urban areas and were dried, mounted on herbarium sheets and identified by consulting the regional herbaria like herbaria of the Department of Botany, University of Jammu (HBJU), and Janaki Ammal Herbarium, Indian Institute of Integrative Medicine (RRLH), Jammu, and with the help of various regional floras (Kachroo et al., 1977; Sharma and Kachroo 1981; Dhar and Kachroo, 1983; Singh and Kachroo, 1994; Swami and Gupta, 1998).The latest accepted names and nomenclatural classification of the taxa were checked using Plants of the World Online (POWO, 2025).

**Table 1. Study sites visited**

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| --- | --- | --- |
| S. No. | Study Site | Geo-Coordinates |
| 1 | **Nagrota** | 32°47'54" N 74°54'54" E |
| 2 | **Gandhi Nagar** | 32°42'09" N 74°51'33" E |
| 3 | **Canal Road** | 32°43'48" N 74°50'51" E |
| 4 | **R.S. Pura** | 32°36'17" N 74°43'53" E |
| 5 | **Shakti Nagar** | 32°44'13" N 74°50'22" E |
| 6 | **Akhnoor** | 32°53'54" N 74°44'11" E |
| 7 | **Khour** | 32°50'38" N 74°27'32" E |

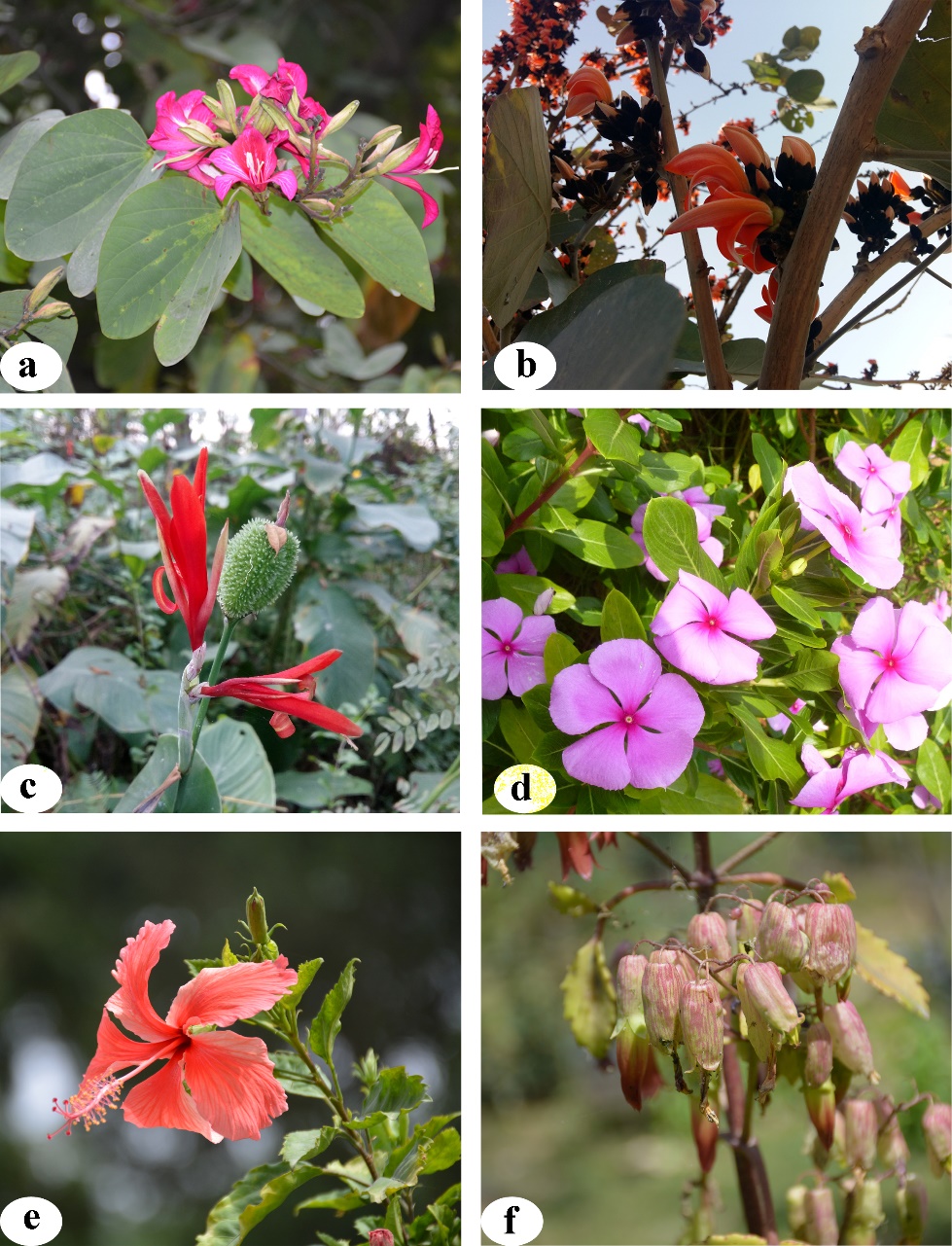
3. results and discussion

**3.1 Diversity of the plant species**

The present study identified twenty plant species from 19 genera and 14 families, which are traditionally used by the urban population of Jammu district for diabetes management (Table 2, Fig. 1). Among the plant families, Fabaceae exhibited the highest representation with three species, followed by Apocynaceae, Cucurbitaceae, Moraceae, and Myrtaceae, each contributing two species. The remaining families were represented by a single species each (Fig. 2). Literature also supported that the species from Fabaceae and Apocynaceae have been widely used for diabetes treatment in Odisha and Telangana (Das et al., 2023; Singh et al., 2023). Interestingly, the present study also revealed that the Fabaceae was the most prevalent family associated with diabetes treatment.

In this study, trees were found to be the most commonly utilized plant habit for diabetes treatment, accounting for 50% of the recorded species. This was followed by herbs (25%), shrubs (15%), and climbers (10%) (Fig. 3). Similar findings have been reported in previous studies (Mishra et al., 2019; Singh et al., 2020; Das et al., 2023; Singh et al., 2023), where trees were identified as the primary source of antidiabetic plants. The preference for trees may be attributed to the diverse usable parts, availability, abundance of bioactive compounds and deep-rooted significance in traditional medicine.

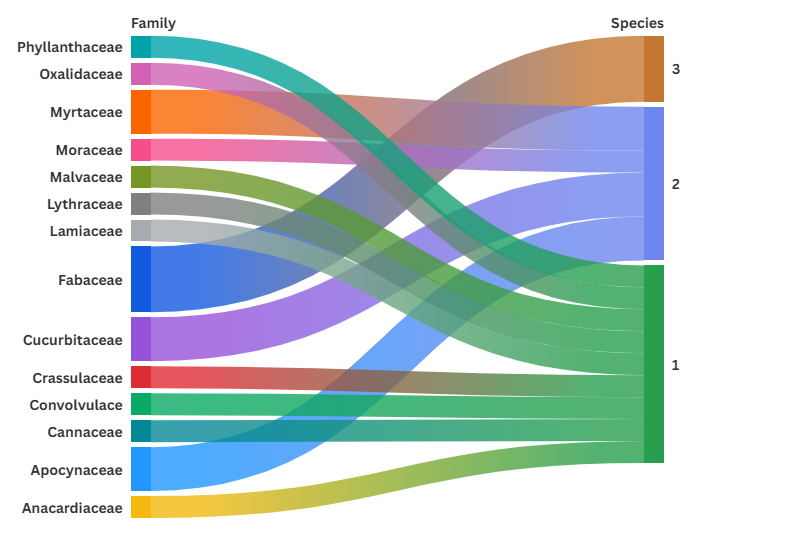
Of the various plant parts used, leaves, flowers, fruits, and stem bark were the most frequently used (18.75%), followed by roots (9.38%), while whole plants and stems contributed 6.25% each, and seeds were the least used (3.13%) (Fig. 3). Previous studies have also been highlighted the major uses of leaves for diabetes treatment (Begum et al., 2018; Singh et al., 2020; Das et al., 2023; Singh et al., 2023). However, Naini and Mamidala (2013) reported roots as the dominant plant part used in diabetes management.



**Fig. 1. Some of the plant species used against diabetes: a) *Bauhinia purpurea*, b) *Butea monosperma,* c)** ***Canna indica,* d)** ***Catharanthus roseus*, e)** ***Hibiscus × rosa-sinensis,* f)** ***Kalanchoe pinnata***

**Table 2. Plants used by the local people of district Jammu to treat diabetes and status of the species in Ayurvedic Pharmacopeia of India (API)**

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| --- | --- | --- | --- | --- | --- | --- |
| Botanical name | Family | Local Dogri names | Habit | Flowering and Fruiting | Part used as medicine | API status |
| *Alstonia scholaris* (L.) R.Br. | Apocynaceae | Satpatra | Tree | March to July | Stem bark | Mentioned |
| *Bauhinia purpurea* L. | Fabaceae | Kalyad | Tree | September to November | Flowers | Not mentioned |
| *Butea monosperma* (Lam.) Kuntze | Fabaceae | Plah | Tree | February to June | Flowers | Mentioned |
| *Canna indica* L. | Cannaceae | Keli | Herb | June to October | Seeds | Not mentioned |
| *Catharanthus roseus* (L.) G.Don | Apocynaceae | Sadabahar | Shrub | April to September | Flowers | Not mentioned |
| *Coccinia grandis* (L.) Voigt | Cucurbitaceae | Kantoori | Climber | August to September | Fruits | Mentioned |
| *Eucalyptus globulus* Labill*.* | Myrtaceae | Safeda | Tree | September to March | Leaves | Mentioned |
| *Hibiscus* × *rosa-sinensis* L. | Malvaceae | Gulhar | Shrub | March to October | Flowers, Leaves and Roots | Not mentioned |
| *Ipomoea carnea* G.Frost | Convolvulace | Akk | Herb | March to November | Stem | Not mentioned |
| *Kalanchoe pinnata* (Lam.) Pers. | Crassulaceae | Goethe | Herb | November to March | Whole plant, Leaves |  |
| *Lawsonia inermis* L. | Lythraceae | Maendi | Shrub | April to September | Stem bark, Roots, Flowers | Mentioned |
| *Mangifera indica* L. | Anacardiaceae | Amb | Tree | March to July | Roots, Stem bark, Leaves, Fruits | Mentioned |
| *Momordica charantia* L. | Cucurbitaceae | Karela | Climber | June to October | Fruit | Not mentioned |
| *Monoon longifolium*(Sonn.) B.Xue & R.M.K.Saunders | Fabaceae | Sita shok | Tree | March to July | Stem bark | Not mentioned |
| *Morus alba* L. | Moraceae | Toot | Tree | April to June | Stem bark | Not mentioned |
| *Morus nigra* L. | Moraceae | Shehtoot | Tree | April to August | Fruits | Not mentioned |
| *Ocimum tenuiflorum* L. | Lamiaceae | Tulsi | Herb | June to October | Stem, Leaves, Flowers | Mentioned |
| *Oxalis corniculata* L. | Oxalidaceae | Changeri ghaa | Herb |  | Whole plant | Mentioned |
| *Phyllanthus emblica* L. | Phyllanthaceae | Ambla | Tree | March to July | Fruits | Mentioned |
| *Psidium guajava* L. | Myrtaceae | Marood | Tree | April to September | Stem bark, Leaves, Immature fruits | Not mentioned |

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**Fig. 2. Alluvial diagram showing the number of species in the respective families**

**Fig. 3. Percentage of plant parts used in herbal anti-diabetic remedies**

**Fig. 4. Percent contribution of different ethno-medicinal plant habit**

**3.2 Usage of Medicinal plants**

In the present study, the stem bark of *Alstonia scholaris* has been recorded for its use in diabetes treatment, while previous studies have documented its medicinal applications for conditions such as dyspepsia, liver disorders, diarrhea, and skin diseases (Akhtar & Bano, 2002; Banik et al., 2010). However, its specific use against diabetes in Jammu and Kashmir has not been previously reported, making this a novel ethnomedicinal claim for the region.

Similarly, the flowers of *Bauhinia purpurea* have been widely recognized for their antidiabetic properties in various global studies (Malaysia, 2023; Gudavalli et al., 2024), but no prior documentation exists regarding their use for diabetes treatment in Jammu and Kashmir. In urban areas of Jammu, the flowers of *Butea monosperma* are utilized for diabetes management, a well-established medicinal application (Somani et al., 2006; Ahmed et al., 2012; Talubmook & Buddhakala, 2012). However, while *B. monosperma* flowers have previously been reported in Jammu and Kashmir for treating urinary retention and irregular menstruation (Shah et al., 2015; Rao et al., 2015), but their role in diabetes treatment has not been documented before. This finding represents a novel addition to the ethnobotanical knowledge of the region.

Similarly, the seeds of *Canna indica* have been documented for their antidiabetic properties in the study area. However, previous research by Vanita and Sunita (2018) highlighted the potential of its roots in diabetes management. Similarly, the fruits of *Coccinia grandis* are commonly used in the study area for diabetes treatment, a practice that has also been documented in other regions (Hossain et al., 2024). Additionally, this usage was previously reported from the Kathua district of Jammu & Kashmir (Parasher et al., 2024).

Several plants, including *Eucalyptus globulus, Hibiscus × rosa-sinensis, Ipomoea carnea, Kalanchoe pinnata, Monoon longifolium,* and *Oxalis corniculata*, have been extensively studied for their antidiabetic properties (Rahmatullah et al., 2009; Raj et al., 2014; Revathi et al., 2017; Begum et al., 2018; Abdelaali et al., 2023; Bisht et al., 2024). However, no prior records exist of these species being used for diabetes management by the people of Jammu & Kashmir. This study, therefore, presents new ethnomedicinal insights specific to the region.

**3.3 Novelty of the study**

There is scarce information available on anti-diabetic uses of medicinal plants used by people in the urban areas of Jammu which makes this study a first ever investigation for further research to benefit the locals. The present study also provides anti-diabetic ethnomedicinal uses of eight plants *viz*., *Alstonia scholaris, Butea monosperma, Eucalyptus globulus, Hibiscus × rosa-sinensis, Ipomoea carnea, Kalanchoe pinnata, Monoon longifolium, Oxalis corniculata*, as novel additions to the ethnomedicinal data of Jammu & Kashmir. Although the anti-diabetic properties of these plants have been well established by researchers in other parts of the country, however, there are no previous reports of their usage against diabetes from Jammu & Kashmir. Hence, these findings represent a significant and novel addition to the ethnobotanical knowledge of the region.

4. Conclusion

The present study highlights the rich ethnomedicinal knowledge of urban communities in Jammu district regarding the use of plant species for diabetes management. The findings of this study underscore the importance of preserving and further exploring traditional plant-based remedies in the management of diabetes and other diseases as well. Given the growing threat of habitat destruction and urbanization, urgent conservation efforts and scientific validation of these medicinal plants are essential for integrating traditional knowledge into modern healthcare practices.

CONSENT: As per international standards or university standards, Participants’ written consent has been collected and preserved by the author(s).

**Disclaimer (Artificial intelligence)**

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**Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.**

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**Details of the AI usage are given below:**

**1.**

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