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Traditional herbal recipes used for the treatment of diabetes by ethnic groups of district Mahoba, Uttar Pradesh, India

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Abstract

The history of ethnomedicine is as old as human civilization. Medicinal plants have played an important role in treating and preventing a variety of diseases throughout the world. The present study was aimed to investigate the traditional utilization of medicinal plant for diabetes in district Mahoba of Uttar Pradesh, India. The local inhabitants of the district have a long history of traditional plants used for medicinal purposes. Different herbs are used by different tribes to treat various diseases. The knowledge of traditional formulation of medicinal plants is inherited from one generation to other. These traditional herbal plants are used to treat different ailments by the ethnic groups are already getting scientific evidence based research. They are found effective to Local people of area use different parts of plants like root, stem, leaf, seed, bark, flower etc. in the preparation of different recipes to treat diabetes. Recent findings support that these ethnomedicinal herbs are effectively used to treat diabetes mellitus. There are 15 plant species belong to different 10 families used in diabetes treatments which are enumerated with exact method of drug preparation, dose and mode of application.

Keywords: Antidiabetic herbs, Bundelkhand region, Diabetes mellitus, ethnomedicine, Mahoba, traditional herbal practice

Introduction

Medicinal plants have an important contribution in the healthcare system of local communities across the world for various types of ailments. Out of the total 4,22,000 flowering plants reported from the world, more than 50,000 are used for medicinal purposes (Hamilton, 2004) [2]. The healing power of traditional herbal medicines has been realized and documented since *Rigveda* and *Atharvaveda*, most of which involve the use of plant extracts. In last few decades, traditional knowledge on primary healthcare has been widely acknowledged across the world. From the ancient period man lives closely associated with nature and depended on it for their survival. "Many living groups of people having diversified ethnic history of rituals and performance, who are more or less isolated from modern world and are closely associated with their ambient vegetation is the imperia of ethnobotanical research." (Pal and Jain, 1998) [7]. The highest popularity of medicinal plant in rural areas is due to high cost of allopathic drugs and their side effects. Traditionally used medicinal plants have been a source of relief in controlling different types of diseases. Combining traditional folk remedies and modern health care therapy can create better medications to prevent the disease (Venkatachalapathi *et al.*, 2017) [10].

India is one of the most populated country and diabetic capital of the world. Diabetes is a metabolic disorder where in the human body does not produce or in properly used insulin, a hormone that is required to convert sugar, starch and other food into energy. Diabetes mellitus is characterized by constant high levels of blood glucose (Sugar). It is metabolic disorder and 2.8% of the world's population suffering from this disease and it is expected to increase more than 5.4 by (Sarmah *et al.*, 2021) [8]. In India more than 50 million people suffering from diabetes (Daimari *et al.*, 2019) [1]. Traditional use of plants and plant-parts has been a deep rooted practical knowledge in the culture and livelihood of the people living in the Mahoba district of Bundelkhand region, Uttar Pradesh. They have been using different medicinal plants in their health care practices and a deep belief and knowledge in their native folklore medicine for remedies (Thirumalai *et al.*, 2012) [9].

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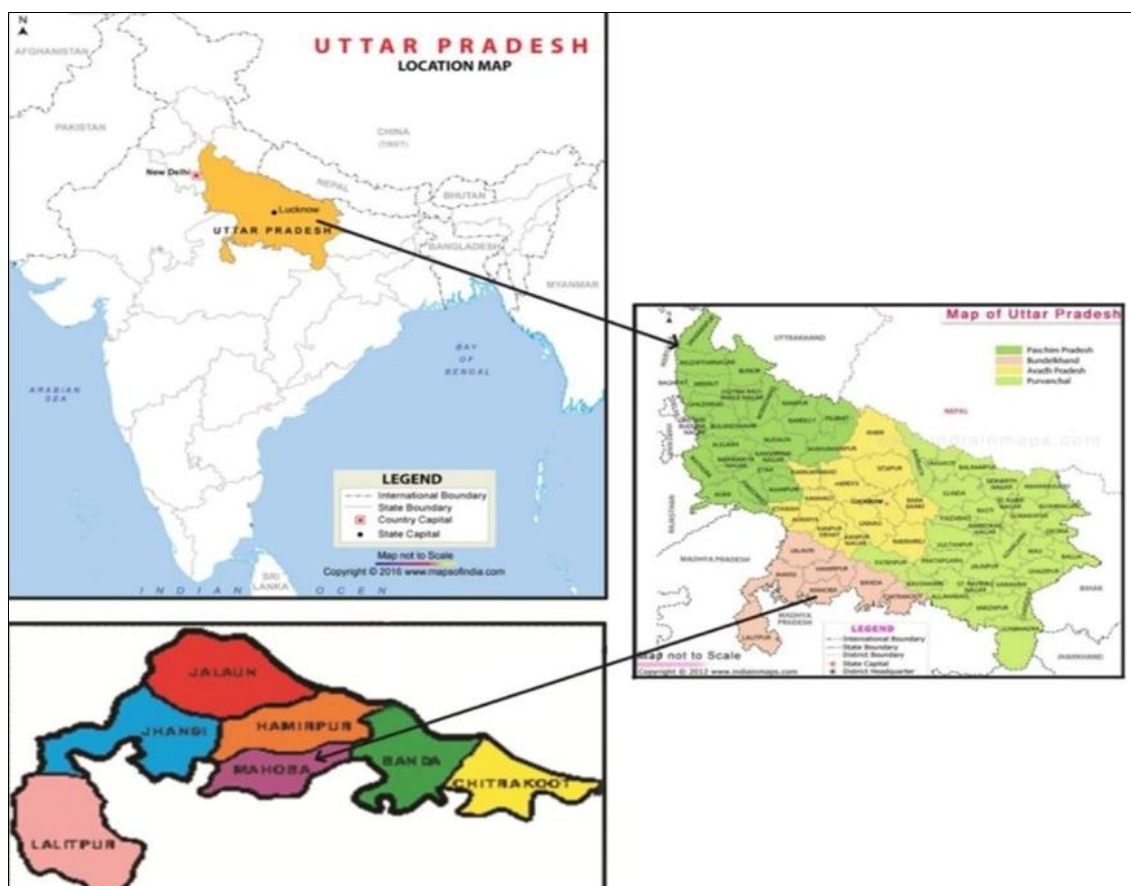
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Mahoba is a very backward and under developed area of Bundelkhand region of Uttar Pradesh but good repository of medicinal plants. It is situated between latitude 25° 18' N and longitude 79° 53' E surrounded on the East by district Banda, on the West by the district Jhansi, on the South by state of Madhya Pradesh and on the north by district Hamirpur of South-western Uttar Pradesh. The total area of district is about 3071 sq. k.m.. The district is inhabited by a large section of rural population and different Tribes (*Viz.*, Saharia, Kol & Gond) and Nomads (*Viz.*, Kanjad, Kanfara, Padcola and Jasaundhi). These people utilize plant recourses to meet their requirements, including diabetes herbal medicines. Notable diabetes studies have been made in India by Buch *et al.* (1973), Mathew (1984), and Jain (1991, 1999 Yadav *et al.*, 2021) [4, 3, 11], but no work has been done from the area under

study. The knowledge of ethnomedicinal flora is decreasing very fast from tribal societies due to the natural death of the older tribal people in various tribal groups throughout the world. Their conventional traditional knowledge and wisdom may die with them. Hence, it is important for us to collect maximum information on ethnomedicinal plants and to do documentation of indigenous traditional knowledge of useful medicinal plants and their therapeutic uses for future generation & before we loose them forever from the tribal communities.

Therefore, the present study was aimed at investigating the traditional knowledge of medicinal plants in Mahoba district of Uttar Pradesh in order to explore plant species that are used locally for treatment of diabetes and also document traditional formulation from these medicinal plants.



Map 1: Location map of Mahoba district in Uttar Pradesh, India

Materials and Methods

Mahoba is one of the least populated district of Uttar Pradesh. It has a population of 875,958 (as of 2011) peoples spread over 521 villages and the district is divided into three tehsils named Kulpahar, Charkhari and Mahoba. Several field visits were organized and information was gathered from tribals, rural and old knowledgeable people in different seasons of the year. In the duration of field trips information was gathered by having personal interaction with elderly peoples of the villages and noting the local names of the plant being used for the treatment of diabetes. These local names of the plant were verified by collecting samples from the locality. These collected plant specimens were identified with the help of available taxonomic literature. The questionnaire was also prepared to collect data like the local name of the plant, parts of the plant used for diabetes disease, mode of administration, side effects if any recorded. Ethnomedicinal data of this region was also compared with data available from other

region. Data on diabetes plants were arranged according to Bentham & Hooker's system of classification. Specimens and voucher deposited in the "Duthie Herbarium" Department of Botany, University of Allahabad, Prayagraj. The data collected in the field were formatted and preserved carefully.

Observation and results: In the present investigation, 15 angiospermic plant species of 10 families have been documented in which 13 are dicotyledon and 2 are monocotyledon. Plants are arranged with their botanical name, family, local name, plant characters, locality, collection number, user group, part used and mode of application given below (Table-1).

1. *Butea monosperma* (Lam.) Kuntze

Family: Fabaceae

Local name: Dhak, Palas

Plant characters: A medium sized deciduous tree. Leaves

pinnately trifoliate. Flowers fascicled at the nodes of racemes with bright orange red and fruits pod, thickened at the sutures containing a single seed.

Locality: Mahoba

Collection number: VKP-14 (Duthie Herbarium, A.U., Prayagraj)

Users: Saharia, Kol, Gond and Villagers

Parts used: Leaves and fruits

Mode of application: Two tea spoonfuls of an aqueous extract of leaves and fruits are given once a day.

2. *Clitoria ternatea* Linn

Family: Fabaceae

Local name: Aparajita

Plant characters: Beautiful woody climber with solitary, bright blue flowers. Pods beaked, 8-10 seeded.

Locality: Kharela

Collection number: VKP-144 (Duthie Herbarium, A.U., Prayagraj)

Users: Gond and Villagers

Parts used: Flower

Mode of application: Flower juice, 20 ml decoction is given orally twice a day.

3. *Pongamia pinnata* (Linn.) Merr

Family: Fabaceae

Local name: Karanj

Plant characters: A moderate sized, glabrous, deciduous tree with spreading branches and pinkish, flowers in axillary racemes. Pods woody, oblique one seeded indehiscent. Seed reniform.

Locality: Kabrai and Mataundh

Collection number: VKP-1 (Duthie Herbarium, A.U., Prayagraj)

Users: Gond, Kol and Vaidya.

Parts used: Seeds

Mode of application: Seed soaked in water then crushed and given orally twice a day.

4. *Eucalyptus citriodora* H.K

Family: Myrtaceae

Local name: Safeda

Plant characters: Tall, smooth tree up to 40 m high, with oblique, aromatic leaves and peeling stem. Flowers short, pedicelled, compacted in panicles on short leaflets branches, capsule many seeded.

Locality: Srinagar

Collection number: VKP-21 (Duthie Herbarium, A.U., Prayagraj)

Users: Villagers and Vaidya

Parts used: Leaves

Mode of application: Five fresh leaves is given orally daily morning.

5. *Syzygium cumini* (Linn.) skeels

Family: Myrtaceae

Local name: Jamun

Plant characters: An evergreen tree with paniculate cymes. Flowers whitish, fragrant. Fruits juicy, berries, black or purple when ripe, ovoid, oblong or globose.

Locality: Srinagar

Collection number: VKP-199 (Duthie Herbarium, A.U., Prayagraj)

Users: Gond, Kol and Villagers

Parts used: Seed

Mode of application: Dried seed powder is given orally with the paste of long peppers (3:2).

6. *Coccinia grandis* (Linn.) Voigt

Family: Cucurbitaceae

Local name: Kunduru

Plant characters: Perennial, twinning herb, Stem glabrous, grooved. Leaves 5 lobed, cordate at base. Flowers large, white. Male flowers in 1-3 together in leaf axis. Female flowers solitary calyx campanulate. Fruit ellipsoid oblong, cylindrical, with rounded ends. Seeds ovoid compressed.

Locality: Kulpahar

Collection number: VKP-147 (Duthie Herbarium, A.U., Prayagraj)

Users: Villagers, Vaidya and Kol.

Parts used: Leaves

Mode of application: Leaf juice is given orally thrice a day.

7. *Momordica charantia* Linn

Family: Cucurbitaceae

Local name: Karela

Plant characters: Slender, climbing herbs with hairy stem, reniform leaves, tendril simple. Flowers monoecious male flowers solitary, peduncles slender petal-lemon yellow. Female peduncles bracteates near the base. Fruit fusiform with numerous triangular tubercles.

Locality: Jaitpur

Collection number: VKP-141 (Duthie Herbarium, A.U., Prayagraj)

Users: Villagers and Kol

Parts used: Fruits

Mode of application: About 15 ml fruit juice with 10 ml juice of *Gymnema sylvestre* leaves is given orally twice a day.

8. *Glossocardia bosvallea* (L. F.) DC

Family: Asteraceae

Local name: Jalneem

Plant characters: Prostrate, diffusely branched, glabrous herbs up to 10 cm long with grooved stem. Heads terminal or axillary solitary. Ray florets 2-dentate and disc florets 4-lobed. Pappus of two small stiff awns.

Locality: Jaitpur

Collection number: VKP-202 (Duthie Herbarium, A.U., Prayagraj)

Users: Villagers, Kol and Vaidya.

Parts used: Leaves

Mode of application: Leaf juice decoction (50 ml) is given orally twice a day.

9. *Catharanthus roseus* (Linn.) G. Don

Family: Apocyanaceae

Local name: Sadabahar

Plant characters: An erect herb, 30-60 cm high. Leaves short-period. Flowers solitary axillary or paired white. Calyx segments filiform, Follicles slender, striate, glabrous.

Locality: Dharaun

Collection number: VKP-200 (Duthie Herbarium, A.U., Prayagraj)

Users: Villagers, Gond and Vaidya

Parts used: Leaves

Mode of application: Leaf juice is given orally twice a day.

10. *Gymnema sylvestre* R. Br.

Family: Asclepiadaceae

Local name: Gurmar

Plant characters: A large stout, woody climber. Young parts yellow, pubescent. Leaves ovate, oblong, acute, and thickly coriaceous. Flowers-greenish yellow corymbose cymes. Follicles solitary or in pairs.

Locality : Dharaun and Kharela

Collection number: VKP-44 (Duthie Herbarium, A.U., Prayagraj)

Users: Gond and Vaidya

Parts used: Leaves

Mode of application: Dried leaves powder (10-20 gms) divided into three doses and taken thrice a day after meals.

11. *Bacopa monnieri* (Linn.) Penell

Family: Scrophulariaceae

Local name: Jalnim

Plant characters: A prostrate herb, with spreading or ascending branches, rooting at nodes. Leaves, obovate, oblong or spatulate. Flowers bluish, purplish or white, solitary, pedicellate. Capsule ovoid.

Locality: Kabrai

Collection number: VKP-211 (Duthie herbarium, A.U., Prayagraj)

Users: Villagers and Vaidya

Parts used: Leaves

Mode of application: Aqueous leaf juice is given orally twice a day for one month.

12. *Clerodendrum phlomidis* L.f.

Family: Verbenaceae

Local name: Inni

Plant characters: Large shrubs, branches pubescent, whitish grey. Leaves ovate, sub rhomboid. Flowers in dichotomous axillary cymes. Bracts obovate or lanceolate, acute, leafy, serrate. Drupe ovate, enclosed in resistant calyx.

Locality: Mahoba and Kharela

Collection number: VKP-39 (Duthie Herbarium, A.U., Prayagraj)

Users: Kanjad, Gond and Vaidya

Parts used: Whole plant

Mode of Application: Extract of the plant is given orally twice a day.

13. *Acalypha indica* L.

Family: Euphorbiaceae

Local name: Kuppi

Plant characters: Annual herbs, up to 0.5 m height. Stem with many branches. Leaves glabrous. Stipule subulate, filiform. Inflorescence axillary. Female flowers 1 or 2, towards the base of inflorescence. Capsule hispid. Seeds ovoid and smooth.

Locality: Kharela and Kabrai

Collection number: VKP-74 (Duthie Herbarium, A.U., Prayagraj)

Users: Kol and Vaidya

Parts used: Leaves

Mode of application: Two tea spoonfuls leaf juice is given daily for one month.

13. *Allium cepa* L.

Family: Liliaceae

Local name: Pyaz

Plant characters: Biennial bulbous herb. Bulbs enclosed in red or white skin, pungent smell.

Locality: Dharaun

Collection number: VKP-382 (Duthie Herbarium, A.U.,

Prayagraj)

Users: Villagers and Gond

Parts used: Leaves

Mode of application: Two tea spoonful leaf juice is given orally twice a day.

14. *Allium sativum* L.

Family: Liliaceae

Local name: Lahsun

Plant characters: Biennial bulbous herb. Bulbs comprise of cloves enclosed in a white skin.

Locality: Kabrai

Collection number: VKP-167 (Duthie Herbarium, A.U., Prayagraj)

Users: Kol, Gond and Villagers

Parts used: Clove (bulb)

Mode of application: Roasted clove is given orally.

Discussion

The healthcare system of rural India mostly depends on the knowledge of local medicines, mainly derived from plant. Exploring this knowledge will always be beneficial to human kind that lead to effective drug discovery and will act as a first aid to many ailments. Plants are natural antioxidants and effective herbal medicines, in part due to their anti-diabetic compounds, such as flavonoids, tannins, phenolic, and alkaloids that improve the performance of pancreatic tissues by increasing the insulin secretion or decreasing the intestinal absorption of glucose or in any otherway (Kooti *et al.* 2016)^[5] In the same context, more researches are needed in order to separate the active components of plants and molecular interactions of their compounds for analysis of their curative properties not only for diabetes but for other ailments (Kumar *et al.*, 2021)^[6]. Traditional knowledge on medicinal plants is under the threat of extinction with current rate of modernization. Hence, it needs a comprehensive study for documentation of the medicinal plants and their conservation.

Conclusion

In the present investigation, 15 medicinal plant species used for the treatment of diabetes were reported and documented. *Syzygium cumini*, *Gynema sylvestre* and *Allium cepa* were the important common species prescribed by many traditional healers. The rural people of Mahoba district are highly dependent on the traditional herbal medicine because of their poor socio-economic conditions and availability of effective drug plants. The wide variety of plants that are used to treat diabetes mellitus in this area supports that traditional value of the medicinal plants is the backbone of the primary health care system for the rural people of district Mahoba. The present study will be helpful to protect the ancient and traditional ethnomedicinal knowledge of ethnic group and also to preserve and transfer the knowledge to the next generation for the development of effective herbal remedies in the near future. Hence, these plant species could be taken up for further pharmacological and clinical studies useful in formation of novel drugs.

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