

ETHNOBOTANICAL SURVEY OF PLANTS NEAR MANGLA DAM, DISTRICT MIRPUR, AZAD JAMMU AND KASHMIR BY USING MICRO STATISTICAL TOOLS

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Received Date: 12-04-2022; Accepted Date: 09-06-2022; Published Date: 30-06-2022

ABSTRACT

Plants have been particularly significant and incredibly important for the people. The use of plants as medicine is crucial in developing nations like Pakistan, especially when it comes to providing accessible and affordable healthcare. However, research to ascertain the informant consensus factor (ICF), and fidelity level (FL) have been few, which is why this investigation was carried out. This work was carried out in the surroundings of Mangla dam in the District Mirpur Azad Jammu and Kashmir, where 40 informants and 5 Hakims were questioned about their medical expertise using a semi-structured questionnaire. Total 50 plants belonging to 33 families were investigated with their botanic name, common name, family, plant part used, habitat and medicinal importance. Plants included here were known to exist and were being employed to treat different types of human illnesses. The main objective of the recent investigation was to enlist and investigate the ethnobotanically significant plants and their medicinal uses to cure different health problems in District Mirpur. Data analysis through FL depicts that *Spinacia oleracea* have highest fidelity level of 95% followed by the *Vitis vinifera* with fidelity level of about 94% and were predominantly used. With ICF values ranging from 0.15 to 0.85, there were several agreements among the informants regarding the plants to be employed for each illness group. The highest ICF value is recorded for fever (0.85) followed by hepatitis (0.8) and then followed by malaria, constipation and pneumonia (0.75). Leaves were the parts of plants having the highest usage (42%) followed by the fruit (40%) used by the native people to cure various diseases. Infused is the dosage form having the highest probability of nearly 32% success followed by fresh juice 22%. Rosaceae

has been master family with 4 plant species followed by Solanaceae, Rutaceae and Umbelliferae with 2 plant species in each. Therefore, this study shows the depth of medical expertise of District Mirpur and serves as a foundation for further pharmacological investigation.

Key Words: Ethnobotanical, Micro-statistical, *Spinacia oleracea*, *Vitis viniferous*, Mangla Dam

INTRODUCTION

Ethnobotany is the study of plants concerning local populations and focuses on how groups of people are organized based on their habits, habitats, and other factors (Berlin *et al.*, 1972). The term "ethnobotany" first appeared when the earliest man noticed how animals gathered and harmed different plants for food and healing wounds (Mahmood *et al.*, 2011). Accepting the dynamic relationships between biological variation and social and traditional systems is facilitated by ethnobotany (Husain *et al.*, 2008; Mahmood *et al.*, 2011). Ethnobotanical techniques are vital for emphasizing regionally unique plant species, typically for novel fundamental treatments. Records of indigenous knowledge with specific medicinal values of plant species delivered various dynamic random drugs (Cox, 2000). About 25% of medications originate from plants, and many more are created through the synthesis of plant compounds. For their primary healthcare, almost 80% of people in poor nations rely only on traditional indigenous remedies (Malik *et al.*, 2010).

Pakistan's environment is varied, and although widely spread, it is rich in medicinal herbs. No well-organized attempt has been made to save and promote herbs appropriately, and all the plants under study are developing barren (Shinwari and Khan, 2000). In several parts of Pakistan, ethnobotanical trainings have been conducted (Qureshi *et al.*, 2011). Ethnobotanical plants have not been thoroughly investigated, utilized, confirmed, or recognized in many emerging nations. Most of the knowledge still held by traditional hakims is either lost or verbally transmitted to the following generation (Amiri *et al.*, 2013).

The Azad Kashmir valley lies between latitudes 34.24'25 north and 73.28'14 east longitude. Azad Jammu and Kashmir valley has a total area of 13,297 square kilometers (Km²). With a total area of 1,010 km² (390 sq mi), Mirpur is the largest city of Azad Jammu and Kashmir, with a population of about 370,000, as per the 1998 census. Mirpur AJK is located 125 km (68 miles) to the southeast of Islamabad. Mirpur is located at the extreme south of Azad Kashmir at an elevation

of 459 m (1509 ft). The location of Mirpur AJK is between 73.31° and 73.55° longitude and 33.11° and 33.34° latitude. The Mirpur district is comprised of both plain and hilly terrain. It has a hot environment with an annual maximum temperature of 40°C and similar geographical features to Pakistan's neighboring districts of Jhelum and Gujrat. Plains and Himalayan foothills make up the topography of Mirpur, AJK. This 100 km² district contains the Mangla Dam, which provides 35% of Pakistan's electrical needs (Asad, 2009). The diversity of herbs, shrubs and trees in this area shows the diversity of climate conditions (Stewart, 1972).

Bukhari (1996), conducted an ethnobotanical investigation in Azad Kashmir's Machiara National Park in Muzaffarabad. He claimed that 69 plant species were being employed in folklore and as crude medications by the tribal people to treat a variety of illnesses. 26 plant species from 24 groups were identified by Gilani *et al.* (2001) as having ethnobotanical uses in Ayubia National Park. Mehmood *et al.*, (2011a) conducted research on the use of traditional ethnomedicinals by the local elders of district Bhimber Azad Jammu and Kashmir. Ethnomedicinal data was collected by means of questionnaire method, interviews and direct observations. A total of 38 plant species belonging to 22 families were reported of having ethnomedicinal utilization. Mahmood *et al.*, (2011b) also carried out the investigation of ethnomedicinally important plants from district Mirpur and reported 29 plants from 20 families which exhibit ethnomedicinal properties. All these authors offered details such as the species' scientific name, local name, part used, and uses. According to their findings, the majority of plant species work well as natural cures for a variety of ailments, including cancer, diabetes, jaundice, backaches, stomachaches, and even cancer.

District Mirpur is rich in diversity of ethnomedicinal and economic plants some of which are of pharmacologically importance while many are useful against various diseases in primary health care. Although richness of natural vegetation of some of areas which have varieties of medicinal and aromatic plants is still unknown. This natural supply at present is not functional according to resource availability, which results in shortage of many medicinally important plants.

The aims and objective of the study is to explore the ethnobotanical importance of plants which grow near Manga dam. To check the validity of the data by applying micro statistical tools

(FL and ICF). Another important aim of the study was to investigate the correlation between number of species and number of medicinal uses among males and females.

MATERIALS AND METHODS

Data collection

To achieve our objectives, questionnaires were used, with mainly open and closed ended interviews with local people and herbalists. To gather information on ethnobotanical plants, a random sample of 40 informants and 5 hakims were interviewed. Locals, hakims, and farmers make up our informants. Informants were questioned about the plants or plant components they use to treat various illnesses. The respondent also gave us information on how a specific plant is utilized, its dose form, its part used, and its formula for treating various disorders.

People were free to discuss the plants used to treat various diseases in the open-ended interviews. In order to get the most accurate information possible from the subjects, we conducted interviews with them in their native language. Urdu and Punjabi were utilized most frequently.

Collection and preservation of plants

During the field trip plants specimen were also collected and identified. Identification was done by various methods; with the help of available literature, local people and internet via online flora of Pakistan and then preserved. Moreover, the available herbaria also help us to identify the plants. The data documented about the plant species during field survey was its local name, part used and dosage form.

The specimens were collected, pressed, dried, poisoned with copper sulphate solution, again dried and then pasted on the standard herbarium sheets. The purpose of poisoning is to avoid fungal attack on the plants so as to ensure the availability of our herbaria for further study. All the necessary data about the plants were collected and then mentioned in the herbarium sheets so as to describe the plant in a perfect way. The herbaria were prepared and submitted in the herbarium of Botany Department MUST.

Data analysis

Various statistical tools were employed in the data analysis process. The informant consensus factor (ICF), fidelity level (FL), family index (FI), and Spearman's rank correlation were used to evaluate and support the validity and reliability of ethnobotanical activity and information.

Fidelity level (FL)

The fidelity level (FL), is the percentage of informants claiming the use of a certain plant for the same purpose, was calculated for the most frequently reported usage or ailments as;

$$FL = N_p/N \times 100$$

Where N is the number of informants who use the plant as a botanic or medicine to treat any given ailment, and N_p is the number of informants who claim to use a plant species for a specific purpose or disease (Ishtiaq *et al.*, 2012).

Informants Consensus Factor (ICF)

Informants Consensus Factor (ICF) identifies the agreements of the informants on the reported medicines for the group of ailments. It was calculated by the following equation;

$$ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where n_{ur} =number of used citation in each category and n_t =number of species used. This method is helpful in selection of plants for further studies in pharmaceutical analysis and other research projects.

Family index (FI)

Family index is used to check which family members are mostly used to cure against various diseases.

Direct Matrix Ranking (DM)

Additionally, a direct matrix ranking that shows the population densities of the tree species and their conservation status in the study area was employed. The plants that are most frequently used by the locals in the study area to treat various illnesses are those on which DMR shows the highest biotic pressure.

RESULTS

The current study is based on local knowledge of the most frequently used medicinal plants near Mangla dam Mirpur, AJK. There are reported to be 50 plant species from 33 different families in the research region. Research work was focused on the traditional medicinal uses of that area. During this work, 5 Hakims and 40 local informants were interviewed. The following section provides information on ethnomedical applications and statistics regarding the treatment of various illnesses based on data collected from local residents via questionnaires.

(1) *Acacia nilotica* L.

Local name: Kikar

Family: Leguminosae

Habitat: Tree

Part used: Bark, leaves and flowers

Medicinal uses: Bark and leaves are used for treatment of cough and toothache while the dried flowers are reported effective for the treatment of leucorrhoea.

(2) *Amaranthus viridis* L.

Local name: Ghanar

Family: Amaranthaceae

Habitat: Herb

Part used: Leaves

Medicinal uses: It is laxative and used for stomach problems. Its leaves are cooked and eaten for curing stomach inflammation.

(3) *Aloe barbadensis* Mill.s

Local name: Aloevera

Family: Asphodelaceae

Habitat: Herb

Part used: Leaves

Medicinal uses: It is used in skin treatment. Gel is orally eaten in order to lose the weight. It is also used to beautify the skin.

(4) *Riccinus communis* L.

Local name: Naroli

Family: Euphorbiaceae

Habitat: Herb

Part used: Leaves, seeds, bark and root

Medicinal uses: Seeds are used to cure paralysis as well as plant is used to cure ulcer and urinary disorders. Moreover, seed chewing is also reported in inducing abortion.

(5) *Cynadon dactylon*

Local name: Khabal grass

Family: Poaceae

Habitat: Herb

Part used: Whole plant

Medicinal uses: Root is diuretic and laxative. Floral parts are used to purify the blood and also used against dysentery. Powder of grass is also used as stomachs.

(6) *Butea monosperma* Lam.

Local name: Chichra

Family: Papilionaceae

Habitat: Tree

Part used: Leaves, wood and gum

Medicinal uses: Gum is used as tonic and also given to treat backache after child birth is women. Leaves are palatable for goats and wood is used as fuel wood.

(7) *Mentha spicata* L.

Local name: Podina

Family: Labiateae

Habitat: Herb

Part used: Leaves

Medicinal uses: Leaves are used to improve digestion. Decoction of leaves is effective in treating gastric problems

(8) *Melia azadarchta* L.

Local name: Dharik

Family: Meliaceae

Habitat: Tree

Part used: Leaves

Medicinal uses: Leaves and fruit powder are used as blood purifier. Ripen fruits used against diabetes. Decoction of leaves is used to treat skin problems.

(9) *Cymbopogon citratus* DC.

Local name: Lemon grass

Family: Poaceae

Habitat: Herb

Part used: Whole plant

Medicinal uses: Decoction is used to weight loss. It is also used for cough and fever.

(10) *Citrus limon* L.

Local name: Lemon

Family: Rutaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Lemon is effective in flu, headache and colds. It also helps greatly in stopping hemorrhages, regulates blood pressure, improving digestion, cleaning the blood and skin, promoting dieting and weight loss.

(11) *Solanum melongena* L.

Local name: Bangen

Family: Brassicaceae

Habitat: Herb

Part used: Fruit

Medicinal uses: Fruit is used to cure skin problems e.g. (Phul beri). Fruits are used to cure paralysis and anemia.

(11) *Citrus reticulata* Blanco

Local name: Orange

Family: Rutaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: The fruit is antiemetic, aphrodisiac, astringent, laxative and tonic. The flowers are stimulant. Fruit is a good source of vitamin C.

(12) *Coriandrum sativum* L.

Local name: Dhania

Family: Umbelliferae

Habitat: Herb

Part used: Leaves

Medicinal uses: Leaves are used to cure diarrhea, stomach pain, constipation and loss of appetite. It is used as candy meats.

(13) *Anethum graveolens* L.

Local name: Soye

Family: Umbelliferae

Habitat: Herb

Part used: Leaves

Medicinal uses: Seeds are used to cure paralysis and also cancer

(14) *Ficus carica* L.

Local name: Anjeer

Family: Moraceae

Habitat: Tree

Part used: Fruit

Medicinal uses: It is also used in curing jaundice. Fruit of *Ficus carica* is taken to treat piles with empty stomach.

(15) *Pyrus malus* L.

Local name: Apple

Family: Rosaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Fruit is used to cure diarrhea, anemia, pneumonia and hepatitis

(16) *Rosa indica* L.

Local name: Rose

Family: Rosaceae

Habitat: Herb

Part used: Flower

Medicinal uses: Rose petals are used in making rose oil that is steam distilled by crushing. Rose water is an effective astringent that reduces swelling of capillaries beneath the skin.

(17) *Caltropis procera* W.T.

Local name: Desi ak

Family: Asclepiadaceae

Habitat: Wild shrub

Part used: Stem, bark, leaves, seeds and root

Medicinal uses: Dysentery is treated with bark. Diarrhea and skin conditions, particularly snake bites, are treated with milk juice. Additionally, it works well for cough, cholera, and malaria. It is used for toothache and headache also cures piles.

(18) *Parthenium hysterophorus* L.

Local name: Thandi boti

Family: Asteraceae

Habitat: Wild shrub

Part used: Leaves and flowers

Medicinal uses: Its leaves and flowers are ground up and used to treat diabetes. Leaves contains carminative qualities.

(19) *Allium sativum* L.

Local name: Lehson

Family: Liliaceae

Habitat: Herb

Part used: Bulb

Medicinal uses: Bulb is used to cure paralysis, heart diseases and to maintain the blood pressure.

(20) *Morus nigra* L.

Local name: Kala toot

Family: Moraceae

Habitat: Tree

Part used: Fruit

Medicinal uses: It is administered internally to treat diabetes, hypertension, bronchitis, coughs, and asthma. The fruit stimulates the kidneys' vitality.

(21) *Olea europea* L.

Local name: Olive tree

Family: Oleaceae

Habitat: Tree

Part used: Fruit and seeds

Medicinal uses: Fruit is used for skin problems. Oil obtained is used for hair improvement. Liver and stomach problems.

(22) *Syzygium cuminii* L.

Local name: Jamon

Family: Myrtceae

Habitat: Tree

Part used: Leaves and fruit

Medicinal uses: Its fruit has anti-diabetic, stomachic, hepatic, and hair-stimulating properties

(23) *Azadirachta indica* L.

Local name: Neem

Family: Meliaceae

Habitat: Tree

Part used: Leaves, flower, oil and seed

Medicinal uses: It is advised for chicken pox patients to lie on neem leaves.

(24) *Eryobotyria japonica* L.

Local name: Locate

Family: Rosaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Like other fruits it is also used in pregnancy. It is ingredient of many patent medicines. It is used against liver problems, cough, vomiting and elimination of thirst.

(25) *Vitis vinifera* L.

Local name: Anghoor

Family: Vitaceae

Habitat: Climber

Part used: Fruit

Medicinal uses: It is beneficial for the treatment of cough, abdominal pain and cold. Dried fruit fried in oil is eaten for the treatment of cough.

(26) *Nerium oleander* L.

Local name: Ghandera

Family: Apocynaceae

Habitat: Shrub

Part used: Leaves

Medicinal uses: Milk extracted from its leaves is used for the treatment of Abscesses.

(27) *Cucurbita pepo* L.

Local name: Kadoo

Family: Cucurbitaceae

Habitat: Climber

Part used: Fruit

Medicinal uses: Seeds are used for the treatment of urinary bladder and fever.

(28) *Capsicum annum* L.

Local name: Sabaz mirach

Family: Solanaceae

Habitat: Herb

Part used: Fruit

Medicinal uses: Used to cure indigestion. Also used for the treatment of stomach inflammation in animals.

(29) *Memordica charantia* L.

Local name: Karela

Family: Cucurbitaceae

Habitat: Climber

Part used: Fruit

Medicinal uses: Liquid extracted from its fruit is beneficial for purifying blood and it is also beneficial for diabetic patients.

(30) *Cannabis sativa* L.

Local name: Bhang

Family: Cannabiaceae

Habitat: Shrub

Part used: leaves

Medicinal uses: Leaves are used to cure urogenital diseases. It is also considered as a cooling agent.

(31) *Solanum nigrum* L.

Local name: Kanch-mach

Family: Solanaceae

Habitat: Wild herb

Part used: Leaves, berries and stem

Medicinal uses: Vegetables made from leaves are energizing and effective at treating back pain. The fruit is consumed as a laxative to treat abdominal pain. Both liver and berries can be eaten. Hepatitis is treated with fruits. Stem is used for mouth problems.

(32) *Solanum surattense* L.

Local name: Mokree

Family: Solanaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Its fruit is cooked which is beneficial for the treatment of stomach inflammation, joint pain and asthma.

(33) *Mangifera indica* L.

Local name: Aam

Family: Anacardiaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Fruit is used to cure cold and green fruit is mixed in spices for curing indigestion and also used for making pickle.

(34) *Punica granatum* L.

Local name: Anar

Family: Lytharaceae

Habitat: Shrub

Part used: Fruit

Medicinal uses: It is used for the treatment of liver diseases. Its fruit is eaten for blood improvement.

(35) *Tribulus terrestris* L.

Local name: Pakhra

Family: Zygophiliaceae

Habitat: Herb

Part used: Fruit, seed and leaves

Medicinal uses: Diuretic calm the body, leaf extract dissolves kidney and bladder stones, and fruit stops early ejaculation.

(36) *Spinacia oleracea* L.

Local name: Palak

Family: Amaranthaceae

Habitat: Herb

Part used: Leaves

Medicinal uses: It is laxative and also act as an effective iron source for human.

(37) *Psidium guajava* L.

Local name: Amrood

Family: Myrtaceae

Habitat: Tree

Part used: Fruit

Medicinal uses: Fruit is eaten for the treatment of constipation while the ash of burned fruit mixed with honey is used for treatment of cough.

(38) *Zingiber officinale* L.

Local name: Adrak

Family: Zingiberaceae

Habitat: Herb

Part used: Rhizome

Medicinal uses: Decoction is used for severe coughing and to reduce weight loss. Rhizome is used to cure gout and cardiovascular disorder.

(39) *Allium cepa* L.

Local name: Pyaz

Family: Liliaceae

Habitat: Herb

Part used: Whole plant

Medicinal uses: Onion cures headache. Onion protects the body from different diseases helps in maintain good health. Moreover, it is used for arthritis treatment.

(40) *Raphanus sativus* L.

Local name: Muli

Family: Brassicaceae

Habitat: Herb

Part used: Root

Medicinal uses: Roots are used to cure deafness, gout and cough and also considered as stomach and heart tonic.

(41) *Moringa oleifera* L.

Local name: Suhajna

Family: Moringaceae

Habitat: Tree

Part used: Leaves, root and legume

Medicinal uses: Leaves are used to cure paralysis, cold. Joint pain, cancer and vomiting.

(42) *Dalbergia sissoo* L.

Local name: Tali

Family: Papilionaceae

Habitat: Tree

Part used: Leaves and wood

Medicinal uses: Wood boiled with water used as a blood purifier. Other than medicinal it is also used as bio-fertilizer, wood excellent in making furniture.

(43) *Ziziphhus mairei* dode L.

Local name: Beri

Family: Rhamnaceae

Habitat: Shrub

Part used: Fruit

Medicinal uses: Fruit is edible and considered as a blood purifier and also used against snake bite. Decoction of fruit is used to treat bronchial disorder. Moreover, wood is used as fuel.

(44) *Piper longum* N.

Local name: Kali mirach

Family: Piperaceae

Habitat: Tree

Part used: Seed

Medicinal uses: Seeds are used to cure paralysis, adds in digestive process and goods for stomach pain.

(45) *Albizia lebbek* L.

Local name: Shreen

Family: Mimosaceae

Habitat: Tree

Part used: Leaves and seeds

Medicinal uses: Seeds are used in curing kidney infections. It is a blood purifier and tonic. Leaf extract is used to treat eye issues. The extract has cooling properties as well. Sexual disorders are treated using seeds.

(46) *Petasites hybridus* L.

Local name: Butterbur

Family: Asteraceae

Habitat: Herb

Part used: Roots

Medicinal uses: Its roots are used for cough, fever, lung diseases and headache

(47) *Phoenix dactylifera* L.

Local name: Khajoor

Family: Areaceae

Habitat: Tree

Part used: Fruit and seeds

Medicinal uses: Fruit is used for increased growth and heart patients. Seed powder is used for heart patient and joint pain.

(48) *Fumaria indica* L.

Local name: Papra

Family: Papaveraceae

Habitat: Herb

Part used: Whole plant

Medicinal uses: Papra is used for skin infection. It is also used for constipation and stomach diseases. Leaves are applied on wound and snake bites. Whole plant is used in malaria.

(49) *Prunus armeniaca* L.

Local name: Khubani

Family: Rosaceae

Habitat: Tree

Part used: Fruit and seed

Medicinal uses: Fruit is nutritious, cleansing and somewhat laxative. From the seed, edible semi-drying oil is obtained. The oil has a soothing effect on the skin, which is why it is utilized in cosmetics, fragrances, and even pharmaceuticals.

Table 1: Species distribution according to their families with their percentage near Mangladam of District Mirpur AJK.

S/N	Families	Plants	Percentage %
1	Papilionaceae	2	4%
2	Labiataeae	1	2%
3	Mimosaceae	1	2%
4	Meliaceae	2	4%
5	Moringaceae	1	2%
6	Solanaceae	3	6%
7	Asclepiadaceae	1	2%
8	Asteraceae	2	4%
9	Liliaceae	2	4%
10	Moraceae	2	4%
11	Rutaceae	2	4%
12	Oleaceae	1	2%

13	Zingiberaceae	1	2%
14	Brassicaceae	2	4%
15	Myrtaceae	2	4%
16	Umbelliferae	2	4%
17	Rosaceae	4	8%
18	Leguminosae	1	2%
19	Amaranthaceae	2	4%
20	Asphodelaceae	1	2%
21	Canabinaceae	1	2%
22	Euphorbiaceae	1	2%
23	Poaceae	2	4%
24	Rhamnaceae	1	2%
25	Cucurbitaceae	2	4%
26	Anacardiaceae	1	2%
27	Lytharaceae	1	2%
28	Zygophyllaceae	1	2%
29	Vitaceae	1	2%
30	Apocynaceae	1	2%
31	Piperaceae	1	2%
32	Papaveraceae	1	2%
33	Areaceae	1	2%

Table 2: Percentage of plant parts used in treatment of disease in District Mirpur AJK.

S/N	Plant part	Uses	Percentage (%)
1	Whole plant	4	8%
2	Stem	4	8%
3	Roots	5	8%
4	Leaves	21	8%
5	Berries	1	8%
6	Fruit	20	8%
7	Bark	3	8%
8	Flowers	4	8%
9	Seeds	6	8%
10	Wood	2	8%
11	Gum	1	8%
12	Bulb	1	8%
13	Oil	1	8%
14	Rhizome	1	8%
15	Legume	1	8%

Table 3: Dosage % of plants of District Mirpur AJK

S/N	dosage	Uses	Percentage
1	Infused	16	32 %
2	Chewing	1	2 %
3	Mixture	4	8 %
4	Fresh-juice	11	22 %
5	Powder	4	8 %
6	Oil	3	6 %

Table 4: Family index with higher number in the study area of Mirpur AJK

S/N	Families	No. of species	Ranking
1	Rosaceae	4	1 st
2	Solanaceae Labiataeae	3	2 nd
3	Papilionaceae Mimosaceae	2	3 rd
4	Meliaceae	2	3 rd
5	Liliaceae Moringaceae	2	3 rd
6	Moraceae	2	3 rd
7	Rutaceae Asclepiadaceae	2	3 rd
8	Brassicaceae Asteraceae	2	3 rd
9	Myrtaceae	2	3 rd
10	Umbelliferae	2	3 rd
11	Amaranthaceae	2	3 rd
12	Poaceae	2	3 rd
13	Cucurbitaceae	2	3 rd
14	Anacardiaceae	1	4 th
15	Labiataeae	1	4 th
16	Mimosaceae	1	4 th
17	Moringaceae	1	4 th
18	Zygophiliaceae	1	4 th
19	Asclepiadaceae	1	4 th
20	Asteraceae	1	4 th
21	Oleaceae	1	4 th
22	Zingiberaceae	1	4 th
23	Leguminosae	1	4 th

24	Asphodelaceae	1	4 th
25	Canabinaceae	1	4 th
26	Euphorbiaceae	1	4 th
27	Rhamnaceae	1	4 th
28	Lytharaceae	1	4 th
29	Papavaraceae	1	4 th
30	Zygophyllaceae	1	4 th
31	Vitaceae	1	4 th
32	Apocynaceae	1	4 th
33	Piperaceae	1	4 th

Table 5: Fidelity level of the plants in study area in Mirpur AJK.

S/N	Species	Local name	Disease	F.L%=Np/ Nx100
1	<i>Memordica charantia</i>	Karela	Diabetic patient	63%
2	<i>Cymbopogon citratus</i>	Lemon grass	Weight loss	42%
3	<i>Melia azadarchia</i>	dharik	Blood purifier	66%
4	<i>Mentha spicata</i>	Podina	Gastric problems	77%
5	<i>Amaranthus viridis</i>	Ghanar	Stomach problems	82%
6	<i>Aloe barbadensis</i>	Aloevera	Joint pain	78%
7	<i>Cynadon dactylon</i>	Khabal grass	Against dysentery	44%
8	<i>Rosa indica</i>	Rose	Reduce swelling of capillaries beneath the skin	90%
9	<i>Riccinus communis</i>	Naroli	Cure paralysis	55%
10	<i>Butea monosperma</i>	Chichra	treat backache	33%
11	<i>Capsicum annum</i>	Sabz mirach	Stomach inflammation	71%
12	<i>Calatropis procera</i>	Desi aak	Cure ulcer	88%
13	<i>Morus nigar</i>	Kala toot	Asthma	40%
14	<i>Allium sativum</i>	Lehson	Cure indigestion	56%
15	<i>Eryobotyria japonica</i>	Locate	Cure liver problem	35%
16	<i>Parthenium hysterophorus</i>	Thandi bhoti	Cure diabetes	59%
17	<i>Syzygium cuminii</i>	Jamon	Anti-diabetic	66%
18	<i>Olive europea</i>	Olive tree	Stomach problems	45%

19	<i>Fumaria indica</i>	Papra	Malaria	70%
20	<i>Petasites hybridus</i>	Butterbur	Fever	33%
21	<i>Azadiracha indica</i>	Neam	Chicken pox	50%
22	<i>Phoenix dactylon</i>	Khajoor	Joint pain	91%
23	<i>Zingiber officinale</i>	Adrak	Cardiovascular disease	52%
24	<i>Albizia lebbek</i>	Shreen	Kidney infection	30%
25	<i>Dalbergia sissoo</i>	Tali	Blood purifier	78%
26	<i>Moringa oleifera</i>	Suhajna	Cancer	45%
27	<i>Raphnus sativus</i>	Muli	Cure deafness	47%
28	<i>Zizipus mairei</i>	Beri	blood purifier	75%
29	<i>Allium cepa</i>	Pyaz	Cures headache	85%
30	<i>Solanum surratense</i>	Mokree	Sore throat	49%
31	<i>Psidium guajava</i>	Amrood	Cough	69%
32	<i>Spinacia oleracea</i>	Palak	Effective iron source	95%
33	<i>Tribulus terrestris</i>	Pakhra	Backache	56%
34	<i>Mangifera indica</i>	Aam	Cure cold	87%
35	<i>Punica granatum</i>	Anar	Liver disease	82%
36	<i>Solanum nigrum</i>	Knack match	Cure backbone	61%
37	<i>Cannabis sativa</i>	Bhang	Urogenital disease	55%
38	<i>Nerium oleander</i>	Ghandera	Treatment of abscesses	44%
39	<i>Vitis vinifera</i>	Anghoor	Abdominal pain	94%
40	<i>Cucurbita pepo</i>	Kadoo	Cure fever	81%
41	<i>Acacia modesta</i>	Kiker	Treat tuberculosis	53%
42	<i>Ficus carica</i>	Anjeer	Cure jaundice	64%
43	<i>Pyrus malus</i>	Apple	Cure diarrhea	40%
44	<i>Anethum graveolens</i>	Soye	Cure paralysis	78%
45	<i>Coriandrum sativum</i>	Dhania	Cure stomach pain	86%
46	<i>Solanum melongena</i>	Bangen	Cure paralysis	51%
47	<i>Citrus reticulate</i>	Orange	Cure constipation	73%
48	<i>Citrus limon</i>	Lemon	Weight loss	80%
49	<i>Piper longum</i>	Kali mirach	Stomach pain	77%
50	<i>Prunus armeniaca</i>	khubani	Skin cleansing	84%

Table 6: Status of species according to habitat

S/N	Status of species	No. of species	Total %
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1	Herbs	20	40 %
2	Shrubs	6	12%
3	Trees	21	42%
4	Vines	3	6%

Table 7: Informant consensus factor (ICF) of disease in district Mirpur

Diseases	Species (nt)	All species %	Used citation (nur)	ICF=(nur-nt)/nur-1
Joint pain	3	6 %	5	0.5
Heart disease	4	8 %	5	0.25
Backache	4	8 %	8	0.57
Abdominal pain	2	4 %	4	0.66
Cough	10	20 %	15	0.35
Stomach pain	13	26 %	17	0.25
Diabetes	5	10 %	9	0.5
Blood purifiers	17	34 %	20	0.15
Cure paralysis	5	10%	8	0.42
Skin disease	7	14%	9	0.25
Fever	2	4%	8	0.85
Malaria	2	4%	5	0.75
Urinary disease	2	4%	3	0.5
Constipation	3	6%	9	0.75
Dysentery	3	6%	6	0.6
Pneumonia	2	4%	5	0.75
Weight loss	3	6%	9	0.75
Hepatitis	3	6%	11	0.8

DISCUSSION

The current study details the native use of 50 medicinally significant plants from 33 families near Mangla dam, Mirpur Azad Jammu and Kashmir. The main goal of this study was to document the diverse native uses that the locals made of these plants. The medicinal plants are a source of income and healing for the local women. We can identify conservation problems through ethnobotany, such as instances where the harvest rate exceeds the regrowth rate. The overharvested medicinal plants must be urgently conserved so that future generations may benefit from these priceless plants, which are a true gift from nature to humanity.

Especially for new crude medicines, ethnobotanical techniques help in highlighting locally significant plant species. Various essential modern pharmaceuticals were made possible by the documentation of traditional knowledge, particularly the medicinal benefits of plant species (Cox, 2000). Most medications are synthetic equivalents of chemicals derived from plants, and about 25% of drugs come from plants. For their primary healthcare, almost 80% of people in developing nations still rely on traditional indigenous medicine (*Malik et al.*, 2010).

The present research was conducted in district Mirpur. More than 75% inhabitants in Mirpur are living traditionally and are dependent on ethno medicines. Old people are equipped with the indigenous knowledge but the young generation is not interested in preserving this knowledge so the original knowledge is not eroded.

We interviewed the people of all professions such as Hakims, household women, farmers, Pansare, old people as well as young generation. We preferred interviewed of old people because old people have better knowledge as compared to young generation. Young people did not respond well so we realized that the knowledge about the plants among young generation is going to be disappearing due to lack of interest.

We employed the questionnaire approach and asked respondents to share their knowledge of the plants used to treat various ailments. A proper way of interview was followed and we used the local language so as to gain maximum information from the people.

Total 40 informants were interviewed in the area of district Mirpur through open ended interview. We asked them how they are using herbal medicines for the treatment of different diseases. They told us that is the cheapest and most reasonable way of treatment and also have no side effects as compared to allopathic medicines.

A total of 33 families were recorded containing 50 medicinal plant species. Solanaceae and Rosaceae with 4 plant species, Papilionaceae, Meliaceae, Asteraceae, Liliaceae, Moraceae, Rutaceae, Brassicaceae, Myrtaceae, Umbelliferae, Amaranthaceae, Poaceae, Cucurbitaceae with 2 plant species and Labiateae, Mimosaceae, Moringaceae, Asclepiadaceae, Oleaceae, Zingiberaceae, Leguminosae, Asphodelaceae, Cannabiaceae, Euphorbiaceae, Rhamnaceae,

Anacardiaceae, Lytharaceae, Zygophyllaceae, Vitaceae, Apocynaceae, Piperaceae, Papaveraceae, Areaceae represented by one species of medicinal plant each.

Table 1 indicates that Rosaceae is the leading family with four numbers of medicinal plant species and occupied the first rank. While Solanaceae have on the 2nd position with the three numbers of plant species. Rutaceae is the 3rd rank with only 2 medicinal plant species. Leguminosae in on 4th rank with one medicinal plant species.

Table 2 depicts the parts of the plants which were used for the treatment of different diseases. It was found during the survey that leaves of the collected plants were the part which is used most frequently having highest percentage that is 42 % followed by the fruit 40% and then seeds 12 %. The leaves are commonly used by the local people as the leaves are easily available to the people living in the village and easily used in different recipes. Percentage of using whole plant, stem, root, berries, bark, flower, wood, gum, bulb, oil and legume shows that only a few people use them in their local recipes for the treatment of different diseases.

Table 3 lists the dose forms often employed in the study region for treating various disorders, including chewed, mixed, infused, fresh juice, powder, and oil. Most commonly used by the locals is infused, which has a percentage of approximately 32%; next is fresh juice, which has a percentage of about 22%; then, mixtures and powder, which has a rate of 8%; oil, which has a percentage of 6%; and chewing, which has a percentage of just 2%.

Family index of plants with higher number in the study area of Mirpur AJK is shown in Table 4. Data showed that Rosaceae is the 1st rank family with the highest number of plant species (4) followed by Solanaceae and Labiate which are ranked 2nd.

Fidelity level of the data in Table 5 depicts that *Spinacia oleracea* is the leading plant species which is frequently used by the local people of district Mirpur AJK for the treatment of various diseases. It is an effective iron source for human. Table 6 indicates that most widely used plant species are trees with 42%, followed by herbs 42%, shrubs 12% and least percentage is of vines 6% in district Mirpur AJK.

The informants consensus factor (ICF) identifies the agreements of the informants on the reported cure in the study area is shown in Table 7. The highest (ICF) IS (0.85) for fever followed by (0.85) for hepatitis and (0.75) for pneumonia, malaria and constipation and for abdominal pain (0.66).

CONCLUSION

People are using plants for different purposes, fodder and many more. As a result, essential plant species have decayed due to the high biotic pressure. So it is the need of time to preserve the medicinal flora of the world. As the younger generation is not engaged in this sector, the indigenous knowledge of the people is also constrained to a small number of individuals. It is not being passed on to the following generation. Therefore, this research is crucial for obtaining the indigenous knowledge of the elderly and locals. With this kind of research, we may capture the local knowledge of the population and preserve it for future researchers. Plants are an excellent way to interact with the environment, and because they are essential to our survival, we must protect our native flora. This invaluable knowledge of ethnomedicine must be preserved and passed on to the next generation, or we risk losing a priceless resource that is quickly vanishing. This study provides details on a wide range of plants that can be researched for potential pharmaceutical use in the future and preserved for use by the local community in a more sustainable manner.

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