



Exploring Medicinal Plants and Their Nutraceutical Attributes from Northern Areas of Pakistan

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Abstract: This study focused on collecting 50 different species of medicinal plants from northern areas of Pakistan. The present research furthers our understanding of the flora in Tehsil Munda District Dir Lower, Khyber Pakhtunkhwa (KPK) province of Pakistan through the comprehensive collection and subsequent analysis. During field expeditions, herbarium specimen collection, and consultation with local healers, the project unveils the rich diversity of medicinal plants in the research region. By highlighting the plant's botanical attributes, and geographical distribution, and reporting the medicinal uses of concerned species like as kidney disease, liver disease, chest disease, respiratory disease, diabetes, heart diseases, headache, Skin diseases, heart diseases, and arthritis, swellings, stomach diseases. It has been concluded from the study that the area is densely covered with highly valued medicinally important flora due to climatic conditions, water, and good soil fertility respectively.

Keywords: Medicinal plants, herbarium, specimen, distribution

1. Introduction

Ethnobotany is the study of the relationship between humans and plants, with special attention to traditional tribal cultures. According to a survey by the World Health Organization, due to poverty and limited access to modern medicine, between 65 and 80 percent of the world's population in underdeveloped countries receives their primary health care from plants. (Awoyemi et al., 2012).

Around 6,000 higher plant species, roughly 6,000 species of vascular plants, approximately 6,000 types of higher plants, an estimated 6,000 plant species found in Pakistan, 12% are used to treat diseases, (Shinwari, 2011) specifically those affecting humans and animals, for which herbal medicines are widely used. As a result, some plant species are thought to be specific to a particular disease, but plants can sometimes be used for a variety of purposes, with women using them most frequently, followed by children as the main collectors of medicines (Shinwari, 2010; Ali et al., 2014). Plants that contain active biochemical constituents and have some response in the curing of disorders in living organisms are known as medicinal plants. In Pakistan, 80% of the people belong to rural areas and still depend upon herbal medicines. Herbal medicines occupy a distinct position right from the primitive period to the present day. The ethno-medicinal history of Plants is as old as man himself and these medicines can be obtained easily from nature and have fewer side effects. (Qureshi et al., 2009).

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A few studies have been carried out in many areas of Pakistan like in the Malakand Division concern to Ethno medicinal. Still, it is not specifically from Tehsil Munda District Dir Lower. Our research supplements the data on ethnobotanical significant species in the Swat district. Likewise, (Shinwari et al., 2010) detailed the importance of medicinal plant species in Shinaki Bar and Valleys, Northern Territory of Pakistan. There are a variety of flora in Dir lower (Tehsil Munda) which is medicinally very important such as bryophytes, pteridophytes, gymnosperm, and angiosperm. The bryophytes (Marchantia, Peltiaepiphylla, Riccia, Funaria, and Poltricumcommne) are rich in number and present in shady places. The Pteridophytes (Adiantum, Aspleniumdulhozy, and Selaginella, etc) are found. The gymnosperms (Pinus Deodar etc) are found in the mountain area.

The present work was conducted in District Dir Lower, Tehsil Munda. This Tehsil is renowned for gathering medicinal plants to address diverse ailments such as cough and fever. The literature review indicates that there is no prior documentation or reporting of the traditional applications of indigenous plants in this region. The current study is expressly crafted to spotlight the medicinal properties of plants found in Tehsil Munda Dir Lower, preserve this knowledge, and raise awareness regarding the preservation and recording of traditional uses of the local flora in Tehsil Munda District Dir Lower, Khyber Pakhtunkhwa (KPK) province of Pakistan.

2. Materials and Methods

2.1 Plant collection

Multiple plant collection expeditions were organized during the spring of 2023 to gather medicinal plants from various sites in Tehsil Munda. Field trips were scheduled based on the flowering or fruiting seasons of the plants. Whole plant specimens of herbs and shrubs were collected, while fruiting or flowering shoots of shrubs and trees were collected systematically, including details such as local name, habitat, locality, date of collection, flower color, etc.

The collected plants underwent a standardized process and they were pressed, dried, and mounted on standard herbarium sheets at Ghazi Umara Khan Degree College Samarbagh Dir Lower. The collection procedure involved the use of tools and equipment such as News halves, Press straps (webbing straps), Field notebook, digger and clippers, Hand lens, collection bottles, mercuric chloride, collection bags, waxed paper Envelopes, cardboard, insecticides, and repellents, maps, camera, color charts, hand pruner, rope, pencil, cutter, GPS, field presser, driers (blotters), tags, and Ethanol.

The gathered specimens underwent identification processes utilizing both the Flora of Pakistan and the expertise of local taxonomists. Interviews were conducted with individuals of various age groups, with a particular emphasis on engaging the elderly community, and a structured questionnaire was employed for this purpose. The plant specimens collected were subjected to a series of steps, including pressing, drying, poisoning, mounting, and subsequent identification. This integrated approach ensures a comprehensive understanding of the collected plants, involving both botanical analysis and insights from local communities, especially the elderly, who often possess valuable traditional knowledge about plant uses.

2.2 Data analysis and questionnaire

The data acquired from questionnaires and semi-structured interviews were organized and tabulated using MS Excel from MS Office 2016. The plants were systematically categorized into their respective families, and information regarding their uses is documented in columns alongside them. This methodical organization in a spreadsheet format allows for a clear and structured presentation of the data, facilitating further analysis and interpretation of the relationships between plant families and their various uses.



3. Results and discussion

Table 1. List of collected medicinal plants Botanical name, local name, and family name.

Species Name	Family	Local Name	Parts Use	Medicinal value	Reference
Calotropis procera	Apocynaceae	Spammy	Leaves, Flowers	tonic, anthelmintic, and expectorant	Qazi et al., 2013
Ricinus communis L.	Euphorbiaceae	Aranda	Leaves, seeds, and roots.	abdominal disorder, arthritis, muscle aches, chronic headache, expulsion of the placenta, menstrual cramps,	Rana et al., 2013
Datura innoxia mill L.	Solanaceae	Baturra	Flower and seeds	teeth infection, epilepsy headache, Skin diseases, Heart diseases, arthritis, swellings, stomach.	Fatima et al., 2015
Zizyus sativa L.	Rhamnaceae	Makhani	Fruits and leaves	Enhancing muscular strength and maintaining a healthy weight are regarded as measures to prevent liver diseases and mitigate the risk of stress ulcers, fatigue, inflammation asthma	Shah et al., 1989
Brassica Campestris L.	Brassicaceae	Sharsham	seed, leaves	Diuretic, night blindness, headache, hair growth, and for muscular pain in body	Nawaz et al., 2018
F. indica Hauskn	Fumariaceae	Shatara	Whole plant	skin disorder, body coolant, blood purification, Vomiting, influenza, diarrhea, fever, liver complaints.	Nasir et al., 2017

Juglans Regia L.	Juglandaceae	Ghooz	Bark, fruit, and leaves	teeth cleaning, leaves used for intestinal infections, Asthma, skin disorder, diabetes, stomach aches.	Taha et al., 2011
Artemisia Maritima L.	Asteraceae	Tarka	Whole plant	Alleviate pain and inflammation, address digestive issues, combat intestinal worms, and treat skin infections, and gallbladder disease.	Petrovska et al., 2012
Brassica Rape	Brassicaceae	Tepar	Roots	headaches, chest complaints, edemas, gonorrhoea, syphilis, and rabies, inflammation of gall bladder, gall stones.	Saeidnia et al., 2012
Vicia sativa L.	Fabaceae	Marghyhpa	Whole plant	skin infections, asthma, bronchitis, urinary disease, Plasters on broken bones, toothache.	Salehi et al., 2021
Sisymbrium irio	Brassicaceae	Jenjarl	Seed	treatment of asthma and treats coughs and chest congestion, and Reduces swelling and cleans wounds.	Hailu et al., 2019
Papaver rhoeas	Papaveraceae	Soorgullay	Flowers	inflammation, respiratory problems, diarrhea, cough, sleep Disorder and pain.	Grauso et al., 2021
Citrus medica	Rutaceae	Turangy	Leaves, flowers, seeds, fruits,	used for asthma, arthritis, headache, stomachache, intestinal disturbance, Digestive disorder.	Panara et al., 2012



Pisum sativum	Fabaceae	Matar	seeds	diabetes, heart diseases, and blood and peas have been used for Arthritis is also used for the stomach.	Zilani et al., 2017
Rumex dentatus	Polygonaceae	Shalkhay	whole	diabetes, diarrhea, skin, liver, and gallbladder Disorder, kidney stone, cough, stomach aches.	Nisa et al., 2013
Fragaria vesca	Rosaceae	Strawberry	Roots, leaves, fruit	increase blood level, diabetes, kidney Issues, stomach, liver, gastrointestinal diseases.	Liberal et al., 2014
Spinacia oleracea	Amaranthaceae	Palak	Leaves	used to treat stomach and intestinal, fatigue, inflame the nation's lungs, Treatment of urinary infection.	Gutierrez et al., 2019
Verbascum thapsus	Scrophulariaceae	Khardag	flower, Leaves	Antiseptic, painkiller, for wound healing. Flowers and leaves are used for Pulmonary infection.	Olmstead et al., 2001
Calendula arvensis	Asteraceae	Ziargully	Flowers	wounds healing, inflammation, skin cancer, infections, varicose veins, treating fevers and chronic infection	Abudunia et al., 2017

Rhaphanus sativa	Brassicaceae	Moli	leaves, seeds, roots	stomach disorders, urinary infections, anti-fever, treatment of asthma, and chest complaints, digestive, diuretic, carminative	Abdou et al., 1972
Moringa olifera	Moringaceae	Suhanjna	Whole plant	skin infection, swelling anemia, asthma, diarrhea, heart Problems, digestive disorders, headaches, fever, joint pains, and wound healing.	Anwar et al., 2007
Psidium guajava	Rosaceae	Amrood	Leaf and fruit	Gastrointestinal health, discomfort, diabetes management, wound recovery.	Gutiérrez et al., 2008
Artemisia scorpaenid	Asteraceae	Juky	Whole plant	liver diseases and inflammatory conditions, as well as for Infection, fever, pain, cancer, and diabetes.	Herman et al., 2011
Colocasia esculents	Araceae	Kachalo	Leaves, stem, and tuber.	asthma, arthritis, diarrhea Neurological disorders, skin disorders, antimicrobial.	Prajapati et al., 2011
Cydonia oblonga	Rosaceae	Boye	Leaves and fruits	digestive disorders, stomach, and intestinal pain as well as diarrhea, Cough, urinary tract, cancer, diabetes.	Al-Snafi et al., 2016



Acacia modesta wall.	Mimosaceae	Palosa	Leaves, flower	wound healing, cough, venereal disease, bacterial infection, Stomach pain.	Napar et al.,2012
Lonicera japonica L.	Caprifoliaceae	Rambal chambel	Steam and flower	For arthritis, mumps, and hepatitis, flowers and buds are used as antibacterial, anti-inflammatory, and antispasmodic.	Kawai et al.,1988
Ocimum dentiform	Lamiaceae	Kashmalay	Leaves and roots	asthma, diarrhea, fever, arthritis, eye diseases, gastric ailments, etc.	Aggarwal et al.,2015
Berberis lyceum	Berberidaceae	Kwary	Root stem-bark.	Yellowing of the skin (jaundice), diabetes, eye infections, fractured bones, internal injuries, diarrhea, and stomachache.	Ahmed et al.,2017
Tagetes minuta	Asteraceae	Dambarguly	leaves, flowers, steam	respiratory inflammations, stomach problems, intestinal, Diseases, breathing problems, ear.	Wanzala et al.,2016
Solanum melongena	Solanaceae	Bengon	fruits	diabetes, cholera, bronchitis, Dysentery, Otitis, toothache, skin, infection, asthma.	Das et al.,2013
Helianthus annuus	Asteraceae	Sunflower	leaf seeds and flowers	heart disease, bronchial, pulmonary infection, high fever, widely used for colds and coughs.	Guo et al.,2017

Malus pumila	Rosaceae	Mantra	Fruits, flowers	reduce the risk of some cancer, cardiovascular disease, asthma, Diabetes reduces cholesterol.	Patocka et al.,2020
Zanthoxylum armatum.	Rutaceae	Dambara	Fruits, seeds, steam bark.	cure of various diseases such as toothache, asthma, gum Bleeding, fever, dyspepsia, and tonics.	Paul et al.,2018
Silybum marianum	Asteraceae	Ghana	Seeds fruits.	liver, gallbladder disorder, neuroprotective, Skin protective.	Porwal et al.,2019
Prunus amygdalus	Rosaceae	Badam	seeds	headache, heart weakness, diarrhea, peptic ulcer, Bladder, breast, mouth spleen, internal kidney stones.	Singh et al.,2022
Rosa indica	Rosaceae	Gulab	Flowers, leaves, root bark	diarrhea, asthma, in heart disease, improves high Blood pressure, nervous stress, and tension.	Rasheed et al.,2015
Nigella sativa	Ranunculaceae	Kalonji	seed	antibacterial, liver tonic, digestive, and diarrheal, analgesic and Antihypertensive.	Gilani et al.,2004
Daphne mucronate	Thymelaeaceae	Marraghony	roots and leaves	Treat toothache, ulcer, rheumatism, and as a purgative and abortive agent.	Lutfullah et al.,2019
Foeniculum vulgare	Apiaceae	Kaga	edible shoot,	Acid reflux (heartburn), abdominal gas, bloating,	Rather et al.,2016



			seed, and leaves	diminished appetite, and colic in infants.	
Ajuga bracteosa wall	Lamiaceae	Goti	mostly root	Anti-inflammatory, antioxidant, rheumatism and gout. Blood Purification diabetes.	Upadhyay et al.,2012
Robinia pseudoacia	Fabaceae	Kikar	Flowers, bark, leaves	Antacid, antibacterial, purgative, and demagogic properties.	Khan et al.,2019
Dysphania botrys	Amaranthaceae	Kharawa	leave and branches	Diuretic, antispasmodic, carminative, and diarrheal properties. Also used for Cancer.	Chen et al.,2018
Ficus carica	Moraceae	Enzar	fruit, root, and leaves	Gastrointestinal issues (colic, indigestion, appetite loss, and diarrhea), respiratory concerns (sore throats, cough, and bronchial problems), inflammatory conditions, and cardiovascular disorders.	Badgujar et al.,2014
Olea ferruginea	Oleaceae	Khona	leaves and seed	Gingival health, gonorrhoea, pertussis (whooping cough), dermatological issues, musculoskeletal problems, and toothache.	Mehmood et al.,2018
Morus alba	Moraceae	Spen toot	Roots, Fruits, and leaves	Vertigo, sleeplessness, premature aging, atherosclerosis, issues with the liver and kidneys, and inflammatory conditions.	Devi et al.,2013

Rumex status	Polygonaceae	Turkey	leave	Antioxidant, anti-nociceptive, anti-diarrheal, and cytotoxic potential.	Ahmad et al.,2019
Carthamus lanatus	Asteraceae	Kareza Ghana	leave	Rheumatism and paralysis, vitiligo and pigmentation issues, psoriasis, oral ulcers, excess phlegm, poisoning, numb extremities, and melancholic tendencies.	Asgarpanah et al.,2013
Allium satsuma	Amaryllidaceae	Oga	whole plant	improve bone health and cholesterol leaves, also used to treat cough And blood pressure.	Londhe et al.,2011
Canna indica L.	Connaceae	Taspaboty	Leave and flower	Use as antipyretic, tonsillitis in eye disease.	Al-Snafi et al.,2015

In this work, we collected 50 plants of angiosperm which is used for various medicinal purposes. These 50 angiosperm plants belong to 29 families out of these 46 are the dicot family and the remaining 04 belong to the monocot family based on habit 29 herbs 11 shrubs and 10 trees. The dominant family was Asteraceae which contains 7 species (*Calendula arvensis*, *Artemisia maritime L.*, *Artemisiascorparaia*, *Tagetes minuta*, *Helianthus annuus*, *Silybum marianum*, *Carthamus lanatus*,) followed by the family Rosaceae which contains 6 species, Brassicaceae 4 species, Fabaceae, 3 species, Solanaceae, Rutaceae, polygonaceae, Amaranthaceae, and limeaceae have 2 species, and Euphorbiaceae, Rhamnaceae, Fumaraceae, Juglandaceae, Papaveraceae, scrothulariaceae, morangiaceae, Araceae, Mimosaceae, Caprifoliaceae, berberidaceae, Ruanunculaceae, Melaceae, Apiaceae, Fabaceae, Moraceae, Amaryllidaceae, Cannaceae have 1 family and these medicinal plants we collected from the different village i.e. Hasham, Rasool Banda and Takooro. The utilization of these plant species for treating various health disorders is deeply rooted in ancient traditions, with knowledge being passed down orally and through practical experience from one generation to the next.

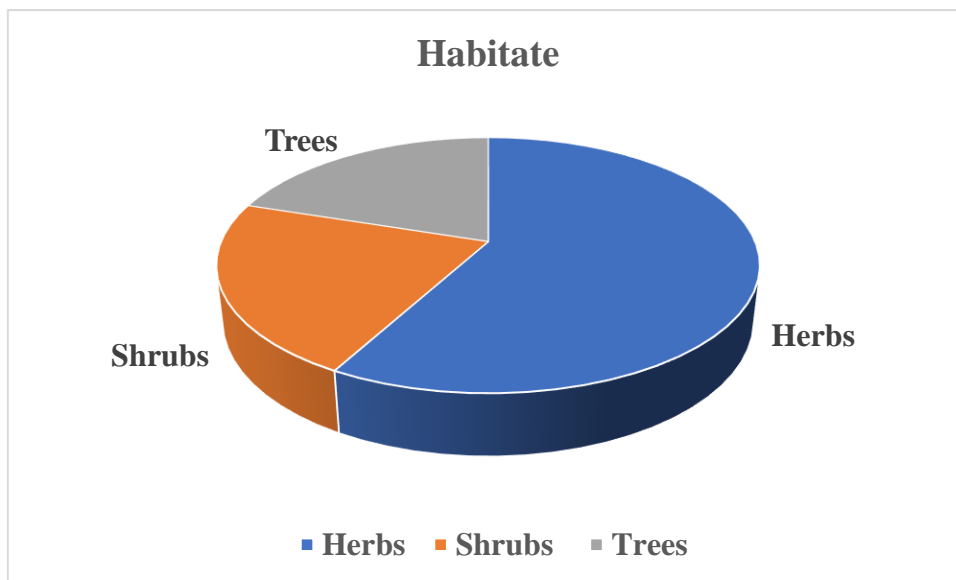


Fig 1. Habitat wise distribution

A similar study was also carried out in Swat Valley by Hamayun, M. (2007), the exploration of medicinal plants present in the regional market aimed to uncover their traditional uses in the region. The study revealed that 51 species of medicinal plants, representing 32 different families, are prominently featured in the primary regional market of Madyan and Mingora. Some of these plants are even traded in national and international markets. The inhabitants of Swat rely on indigenous medicinal plants for treating various ailments, and they also engage in selling these plants in the local market as a means of earning a livelihood. Ethnomedicinal plants have found extensive applications in traditional medicine systems for addressing a variety of ailments. Approximately 80% of the populations in developing countries depend on medicinal plants for treating diseases, thereby playing a crucial role in sustaining and enhancing the well-being of their communities across generations (Tuasha, 2018).

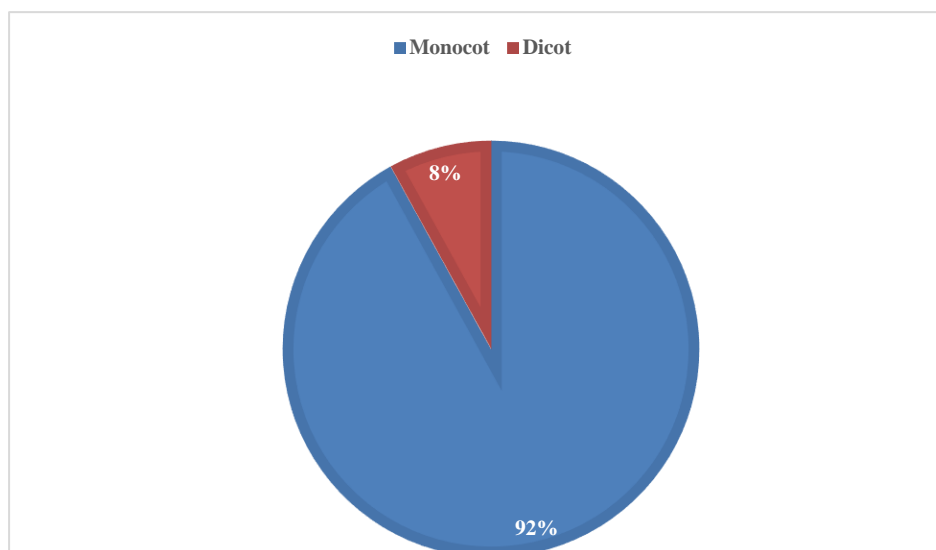


Fig 2. Representation based on cotyledon

The information regarding the uses of these medicinal plants was gathered from local men, women, and herbalists in the area among these 50 plant species *Nigella sativa* is used for the treatment of antibacterial, liver tonic, digestive, and diarrheal, analgesic, and anti-hypertensive. *Daphne mucronate* is used for the treatment of toothache, ulcers, and rheumatism and as a purgative. *Zizyphus jujube* is used in the treatment of respiratory

diseases such as cough, asthma, and laryngitis, and gastrointestinal problems such as constipation, colitis, and liver disease. *Cana indica* is used anti piratic, tonsillitis in eye disease. *Verbbasicum thapsus* is helpful in the pulmonary disease cold, and cough, as a stimulant and vermifuge. *Solanum nigrum* is employed for the treatment of skin inflammation and liver problems. *Ajuga bracteosa* is recorded to relieve abdominal pain, diarrhea, fever, and dysentery. Citrus lemon is used in the treatment of the common cold, flu, etc. Ali et al. (2018) reported that habitat fragmentation and unwise use of these plants pose significant threats to their survival. When these plants lose their habitats, their utility in traditional recipes diminishes, and they may eventually be excluded from the ethnobotanical practices of the area. This situation could exert additional pressure on already inefficient government health facilities.

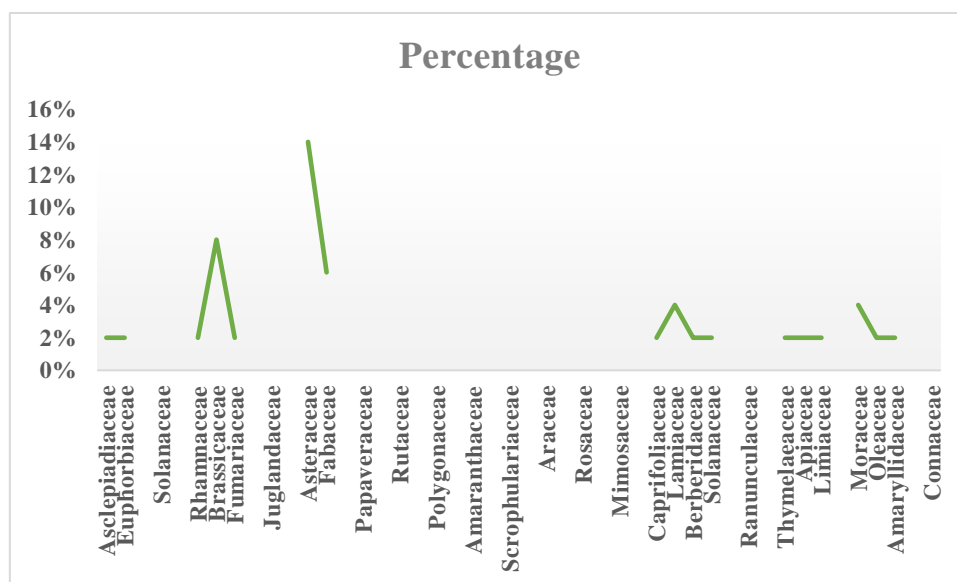


Fig 3. Representation of families

Ahmad et al. (2014) reported a total of 50 plant species from Chail Valley, representing 48 genera across 35 families. The majority were herbs (58%), followed by shrubs (28%), trees (12%), and climbers (2%). Leaves were the most frequently used plant part (33%), followed by roots (17%), fruits (14%), whole plants (12%), rhizomes (9%), stems (6%), barks (5%), and seeds (4%).

On the other hand, Razzaq et al. (2015) identified 25 medicinal plant species from 21 families in the same area. Among these, 19 were herbs, 3 were shrubs, 2 were climbers, and one was a tree. Some of the notable species included *Aconitum violaceum*, *Aconitum heterophyllum*, *Berberis vulgaris*, *Viola canescens*, *Valeriana jatamansii*, *Podophyllum emodi*, *Paeonia emodi*, *Geranium wallichianum*, *Polygonatum verticillatum*, and *Ajuga bracteosa*.

4. Conclusion

The research area, Tehsil Munda District Dir Lower, Khyber Pakhtunkhwa Pakistan, is abundant in medicinal plants with the potential to treat various diseases, offering alternatives to conventional medicines. Extracting different chemicals from these local plants could contribute to addressing health issues in Pakistan and bolster the economy. Preserving indigenous knowledge related to medicinal plant collection and their proper administration is crucial, and it is recommended that this be undertaken collaboratively by various stakeholders, including the government, research organizations, and NGOs. This collaborative effort would ensure the effective documentation and conservation of valuable traditional knowledge for future generations.

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