Research Article

Ethnobotanical Study of Indigenous Medicinal Plants of District Swabi, Khyber Pakhtunkhwa, Pakistan

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Abstract | An ethnobotanical survey was carried out in district Swabi, Khyber Pakhtunkhwa, Pakistan to investigate medicinal flora of the study area. Data was collected through questionnaires and interviews with traditional healers and local residents. Interviews with eighty informants showed that medicinal plants were used to cure forty different ailments. Factors such as informant characteristics, plant types, parts used, and preparation methods were analyzed and the processes involved in making the medications. A total of 115 plant species belong to 55 families and 97 genera were collected and identified from various grouping and communities. The dominant plant family was Poaceae, with 10 species recorded. Followed by family Asteraceae and Euphorbiaceae with 7 species, Brassicaceae and Solanacaeae with 6 species respectively. The most commonly used parts were leaves, seeds, whole plants, stems, fruit, root, flower, latex, gums, bulb, bark and Pulp. The information was analyzed using the Relative Frequency Citation (RFC), and other quantitative indices. Highest and lowest relative frequency citation value were noted. The species which have highest relative frequency citation value are *Peganum harmala* L. (0.80) and the species which have lowest relative frequency citation value was *Cannabis sativa* L. (0.05). Our results showed that medicinal plants have been used to treat a wide range of conditions including coughing, sneezing, chest and back pain, asthma, stomach problems, constipation, skin problems, fever, diabetes, blood purification, digestive and stomach problems, throat infections, vomiting, diarrhea, dysentery, ulcers and liver problems. It is concluded that Swabi is recognized as one of the potential site for medicinal flora in District Swabi, Khyber Pakhtunkhwa, Pakistan, this is the first tentative assessment of the quantitative analysis of the medicinal flora of these therapeutic plants. Proper documentation and taxonomic identification of medicinal plants are essential to preserve this historical medical heritage and ensure its continuation.

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Introduction

Ethnobotany is the study of the traditional uses of plant species, including their medicinal, and protective functions. It describes how the community interacts with plants, transferring knowledge from older to younger generations. In Pakistan, especially in rural areas like Khyber Pakhtunkhwa, there is a lot of traditional knowledge on the use of plants, which is often unknown. The relationship between plants and humans and focuses on indigenous knowledge and practices regarding the use of plants in specific areas (Hameed *et al*., 2011). Ethnobotany is the study of how societies use medicinal plants in specific regions and cultures (Hameed *et al*., 2011). Documenting indigenous knowledge, particularly related to medicinal plants leading to the development of modern medicine (Cox, 2000). This information is also useful for ecologists, pharmacists and taxonomists. and nature managers. It contributes to the conservation and prosperity of the area by maintaining its traditional use (Mahmood *et al*., 2011). Indigenous peoples have used natural medicinal plants for centuries, exploiting them in various ways in the natural environment (Adnan and Hélscher, 2011). In rural areas, the use of wild plants for healing and cooking has long been a tradition (Shinwari, 2010). Some research suggests that plant extracts such as *Salix alba* L. offer an alternative to drugs such as aspirin, which can cause side effects (Mahmood *et al*., 2011). Approximately 70% of the world's population depends on traditional medicine for their primary health care needs (Murad *et al*., 2011). As defined by conklin, ethnobotany focuses on the use of anthropological methods to understand the relationships between people, their environment, and plants. Ethnomedicinal plants that contain active biochemical constituents and have a physiological response to diseases are known as medicinal plants (Ghani and Batul, 2012). In Pakistan only 600-700 species of plants are used medicinally, while herbal medicines are widely used by 80% of the population in Asia and Africa (Ghimire *et al*., 2006). Educational services on medicinal plants such as *Achyranthes aspera, Datura stramonium* L., *Atropa belladonna* L., *Ephedra* L. and *Cinchona officinale* L. bark is very important to inform the public about their use in the treatment of various diseases with alkaloids such as daturine, atropine, belladonine, ephedrine and quinine. Pharmaceutical companies are using medicinal plants as genetic resources for new drugs, ultimately affecting indigenous communities, where locals rely on accessible and affordable traditional herbs (Karunamoorthi *et al*., 2013). Ethnobotanical studies show the power of medicinal plants for mountain people who used medicinal plants to treat themselves and their animals. In recent years, research about traditional medicine is the focus of many scientists in Pakistan (Shinwari, 2010). Due to high mountains, plain areas and prevailing climatic conditions, the medicinal plants of District Swabi have richest biodiversity. Therefore, the current study was undertaken to document the use of native medicinal plants of District Swabi located in the Khyber Pakhtunkhwa Pakistan.

Materials and Method

Study area

District Swabi is located in Khyber Pakhtunkhwa, Pakistan. It is situated between the rivers Kabul and Indus, at an elevation of 341 metres above sea level. It is the fourth-most popular district and it lies between 33°-55' and 34°-23' North latitudes and 72°-13' and 72°-49' East longitudes. The total area of district Swabi is 1,543 square kilometers. May and June show significant rises in temperature, with July, August, and September showing almost constant temperatures. June was the month with the highest recorded temperature of 41.5°C. January had the lowest temperature ever recorded, which was 2°C. The vegetation of Gadon region is very rich. Typical woody vegetation includes *Quercus* sp. *Acacia nilotica* L., *Pinus roxburgii* Sarg., *Tamarix aphylla* (L.) H. Karst. and *Acacia modesta* L. Dominant shrubs include *Dodonaea viscosa* L., while *Saccharrum spontanum* L. etc. are common (Figure 1).

Data collection

A study conducted in the district Swabi, Khyber Pakhtunkhwa, Pakistan between 2020-2021 used various materials such as cutting tools, mobile cameras and paper bags for sampling. The ethnomedicinal survey conducted from January to August 2020 in the study area included literature research, field visits, Questionnaire, Interviews and documentation. Indigenous valuable knowledge about medicinal plants was collected through random questionnaires and group discussions (Interviews) with local people, especially local elders and local magistrates, about their knowledge. The use of plants and other data was recorded through interviews and questionnaires, according to (Martin's, 2010) methodology.

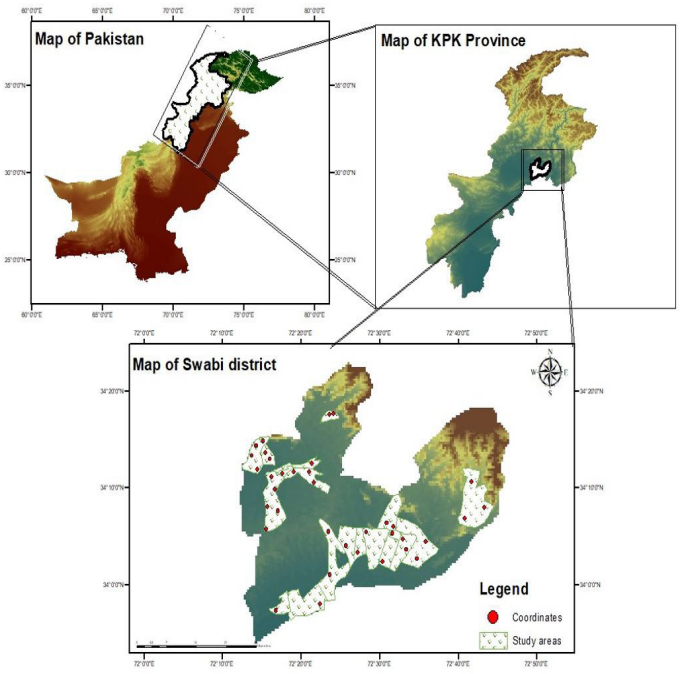

Figure 1: *Map showing the geographical location of the study area District Swabi Khyber Pakhtunkhwa, Pakistan.*

Identification and preservation

Medicinal plants were collected, identified, and conserved in the herbarium of Islamia College, University Peshawar. The collected samples were identified with the help of flora of Pakistan (Ali and Qaiser, 2007). Plant specimen preparation, mounting, drying, and preservation were all performed according to standard procedure (Jain and Rao, 1977). By family name, vernacular name, and ethnomedical usage, plants with the proper nomenclature were organized alphabetically.

Quantitative analysis of data

Relative frequency citation (RFC): The collected plants were classified into different groups based on information about their ethno-medicinal uses. The relative frequency citation is calculated using the formula (Mohammad, 2023).

$$RFC = FC / N$$

The percentage of informants citing a particular species determines its RFC value. N is the total number of informants participating in the study; FC is the number of informants who cited the species; and RFC is the relative frequency citation. When no one says the plant is beneficial, the RFC is 0; when all informants mention the species is used, the RFC is 1.

Results

Diversity of medicinal plants

Our study reveals that District Swabi supports a diverse range of medicinal plant species. We collected and identified 115 species of Plants from various groupings and communities. Floristically, these 115 plants species belong to 55 families and 97 genera (Figure 2, Table 1). The Poaceae family, which accounted for 10 representative plant species, was the most prevalent family. The Asteraceae and Euphorbiaceae family came in second with 7 representative species and Solanacaeae represent 6 species, Brassicaceae with 6 species, family Lamiaceae and Rosaceae with 5 species, Malvaceae represents 4 species, family Amaranthaceae, Scrophulariaceae, Cucurbitaceae and Moraceae having 3 species, Mimosaceae, Pteridaceae, Nyctaginaceae, Apocynaceae, Verbenaceae, Cannabaceae, Polygonaceae, Fabaceae, Rutaceae, Apiaceae and Zygophyllaceae represents 2 species while Acanthaceae, Asparagaceae, Berberidaceae, Boraginaceae, Caesalpiniaceae, Carophyllaceae, Chenopodiaceae, Convolvulaceae, Cruciferae, Cuscutaceae, Cyperaceae, Aizoaceae, Alliaceae, Fumariaceae, Liliaceae, Lythraceae, Menispermaceae, Myrtaceae, Oleaceae, Oxalidaceae, Papaveraceae, Pedaliaceae, Portulacaceae, Primulaceae, Rubiaceae, Punicaceae, Ranunculaceae, Rhamnaceae, Tamaricaceae, Sapindaceae, Vitaceae, and Zingiberaceae are represented by only 1 species of medicinal plants in the study area. Due to diversity of medicinal plants from District Swabi is recognized as a potential site for medicinal plants flora in Khyber Pakhtunkhwa, Pakistan.

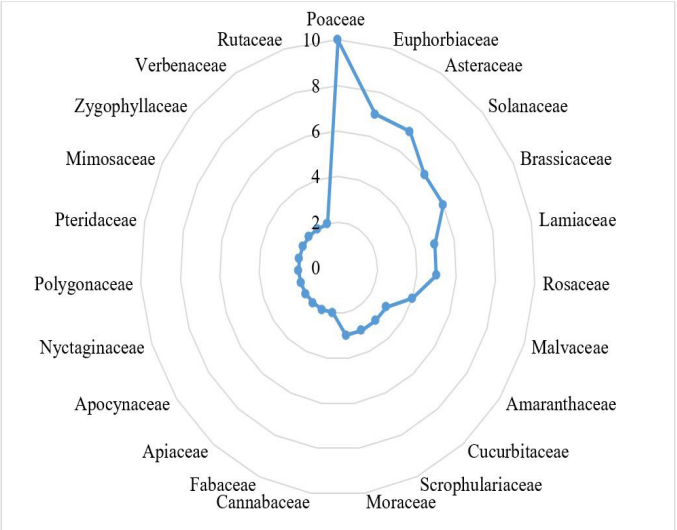

Figure 2: *Family wise distribution of species.*

Table 1: *Ethnomedicinal data include scientific name, family name, common name, habitat, parts used, methods of drugs preparation and diseases treatments.*

S. No	Scientific name	Family name	Local name	Habit	Part used	Methods of drug preparation	Diseases treatment
1	*Ziziphus jujuba* Mill HG-1, ICP, Peshawar	Rutaceae	Dambara	Tree	Fruits	Leaves are chewed	Diabetes
2	*Artemisia scoparia* L. HG-2, ICP, Peshawar	Asteraceae	Chaho	Herb	Whole plant	Paste of leaves	Cardiac problem
3	*Acacia nilotica* L. HG-3, ICP, Peshawar	Mimosaceae	Desi Kikar	Tree	Gum	Decoction paste	Joint pain
4	*Cannabis sativa* L HG-4, ICP, Peshawar.	Cannabaceae	Bhung	Herb	Leaves	Dried leaves	Wounds
5	*Anagallis arvens*is L. HG-5, ICP, Peshawar	Primulaceae	Billi booti	Herb	Whole plant	Decoction	Epilepsy
6	*Asphodelus tenuifolius* (Cav,) HG-6, ICP, Peshawar	Liliaceae	Piaze	Herb	Root	Seed is given with milk of cow	Scorpion bite
7	*Adiantum incisum* L. HG-7, ICP, Peshawar	Pteridaceae	Shapogay	Herb	Whole plant	Infusion of whole plant	Fever
8	*Carthamus oxycanthus* M. Bieb. HG-8, ICP, Peshawar	Asteraceae	Kariza	Herb	Seeds	Paste and powdered	As tonic
9	*Amaranthus spinosus* L. HG-9, ICP, Peshawar	Amaranth-aceae	Gnar	Herb	Leaves	Extract of leaves	Constipation
10	*Calotropis procera* L. HG-10, ICP, Peshawar	Apocynaceae	Spolmai	Shrub	Latex	Latex is used	Used for cholera
11	*Artemisia maritima* L. HG-11, ICP, Peshawar	Asteraceae	Tharkha	Herb	Whole plant	Powder made from whole plant	Skin disease
12	*Cronopus didymus* L. HG-12, ICP, Peshawar	Brassicaceae	jungale-haloon	Herb	Whole plant	Extract of plant	Bone fractures
13	*Adiantum capillus–veneris* L. HG-13, ICP, Peshawar	Pteridaceae	Shapogy	Herb	Whole plant	Infusion of whole plant	Fever
14	*Cassia fistula* L. HG-14, ICP, Peshawar	Caesalpin-iaceae	Amaltas	Tree	Seed	Decoction of root	Useful in delivery
15	*Agave americana* L. HG-15, ICP, Peshawar	Asparagaceae	Kanwar panra	Shrub	Pulp	Pulp is mixed with sugar	constipation
16	*Catharanthus roseus* L. HG-16, ICP, Peshawar	Apocynaceae	Rose peri-winkle	Herb	Flower	Decoction	Cancer
17	*Convolvulus arvensis* L. HG-17, ICP, Peshawar	Convolvu-laceae	Prewaty	Herb	Whole plant	Make powdered	Digestive issues
18	*Amaranthus viridis* L. HG-18, ICP, Peshawar	Amaranth-aceae	Ganhar	Herb	Leaves	Extraction of leaves	Snake bites
19	*Brassica campestris* L. HG-19, ICP, Peshawar	Brassicaceae	Sharrsham	Herb	Leaves	Extracted oil from seed	Antimicrobial
20	*Acacia modesta* L. HG-20, ICP, Peshawar	Mimosaceae	Kikar	Tree	Gum	Gum powdered	Back pain
21	*Conyza ambigua* DC. HG-21, ICP, Peshawar	Asteraceae	butter weed	Herb	Whole plant	Whole plant extract	Diabetes
22	*Chenopodium album* L. HG-22, ICP, Peshawar	Chenopo-diaceae	Larmy Sarmy sag	Herb	Leaves and Shoot	Decoction and pow-dered of seed	Used for fever
23	*Cordia myxa* L. HG-23, ICP, Peshawar	Boraginaceous	Lasura	Tree	Fruit	Paste of fruit	Knee problems
24	*Cirsium arvensis* L. HG-24, ICP, Peshawar	Asteraceae	Creeping thristle	Herb	Whole plant	Leaf, stem and root decoction	Cough

Table continues on next page.....

S. No	Scientific name	Family name	Local name	Habit	Part used	Methods of drug preparation	Diseases treatment
25	*Capsella bursa-pastoris* L. HG-25, ICP, Peshawar	Brassicaceae	Batwaboty	Herb	Seed	Powdered of seeds	Against fever
26	*Chrozophora tinctoria* L. HG-26, ICP, Peshawar	Euphorbiaceae	Neeli booti	Herb	Leaves	Leaves boiled in water	Stomach problem
27	*Dodonea viscosa* L. HG-27, ICP, Peshawar	Sapindaceae	Ghurasky	Shrub	Leaves	Leaf extract and past of fruit	Gas problem
28	*Citrullus colocynthis* L. HG-28, ICP, Peshawar	Cucurbitaceae	Kurtamah	Shrub	Root	Fruit processed in sweet dish	Constipation
29	*Ammi visnaga* L. HG-29, ICP, Peshawar	Apiaceae	Sperki	Herb	Seed	Used for stomach problem	Stomach problem
30	*Boerhaavia diffusa* L. HG-30, ICP, Peshawar	Nyctaginaceae	Insut	Herb	Roots	Infusion can be prepared from plant	Wounds healing
31	*Cymbopogon citratus* HG-31, ICP, Peshawar	Poaceae	Lemon grass	Herb	Whole plant	Dried and fresh leaves	In tea
32	*Cuscuta reflexa* Roxb. HG-32, ICP, Peshawar	Cuscutaceae	Akash bail	Herb	Stem	Paste is made from leaves	Anti-dandruff
33	*Datura stramonium* L. HG-33, ICP, Peshawar	Solanaceae	Daltoora	Shrub	Flower	Seed contain alkaloids	Relieve pain
34	*Dactyloctenium aegyptium* (L.) Willd. HG-34, ICP, Peshawar	Poaceae	Crow foot grass	Herb	Whole plant	Stem and Leaf decoction	Kidney stone
35	*Desmostachya Bipinnata* L. HG-35, ICP, Peshawar	Poaceae	Drab	Herb	Whole plant	Stem decoction	Intestinal worms
36	*Erigeron Canadensis* L. HG-36, ICP, Peshawar	Asteraceae	Horse wood	Herb	Flowers	Crushed and dried the flower	Gastric disorder
37	*Datura innoxia* Mill. HG-37, ICP, Peshawar	Solanaceae	Batura	Herb	Leaves	Leaves and seeds extract	Epilepsy
38	*Dichanthium annulatum* L. HG-38, ICP, Peshawar	Poaceae	Murgha	Herb	Whole plant	Leaf, Stem decoction	Digestion
39	*Euphorbia helioscopia* L. HG-39, ICP, Peshawar	Euphorbiaceae	Peryan dolay	Herb	Roots	Powdered of root	Roots is purgative
40	*Jasminum officinale* L. HG-40, ICP, Peshawar	Oleaceae	Jasmine	Herb	Flowers	Decoction of entire plant	Skin problems
41	*Citrus medica* L. HG-41, ICP, Peshawar	Rutaceae	Nimbo	Tree	Fruit	Fruit past and Infusion of leaves	Hair growth
42	*Emex spinosa* L. HG-42, ICP, Peshawar	Polygonaceae	Toothed dock	Herb	Whole plant	Make extract of leaves	For stomach pain
43	*Eleusine indica* L. HG-43, ICP, Peshawar	Poaceae	Madhani	Herb	Whole plant	Leaf, root decoction	Fever
44	*Digera muricata* L. HG-44, ICP, Peshawar	Amaranthaceae	Lesua	Herb	Fruit	Plant boiled in water and used	Antibacterial
45	*Euphorbia hirta* L. HG-45, ICP, Peshawar	Euphorbiaceae	Asthma weed	Herb	Leaves	Juices of leaves	Asthma
46	*Euphorbia hypericiflolia* L. HG-46, ICP, Peshawar	Euphorbiaceae	Baby prostata	Herb	Whole plant	Dried and powdered	Gastric problems
47	*Imperata cylindrical* L. HG-47, ICP, Peshawar	Poaceae	Cotton grass	Herb	Whole plant	Whole plant decoction	Wound healing
48	*Ficus carica* L. HG-48, ICP, Peshawar	Moraceae	Enzar	Tree	Fruits	Minerals in Fruit	Used as a Tonic
49	*Fumaria indica* L. HG-49, ICP, Peshawar	Fumariaceae	Shatara	Herb	Whole plant	Decoction	Fever

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S. No	Scientific name	Family name	Local name	Habit	Part used	Methods of drug preparation	Diseases treatment
50	*Hebiscus rosa sinensis* L. HG-50, ICP, Peshawar	Malvaceae	Gurhal	Tree	Leaves	Extract of leaves	Sexual dysfunction
51	*Euphorbia prostrata* L. HG-51, ICP, Peshawar	Euphorbiaceae	Hazar dani	Herb	Whole plant	Roots powder	Relieve pain
52	*Cyperus rotundus* L. HG-52, ICP, Peshawar	Cyperaceae	Dela	Herb	Rhizome	Dried rhizome	Fever
53	*Humulus scandens* L. HG-53, ICP, Peshawar	Cannabaceae	Japanese hops	Herb	Whole plant	Dried grinded and make powdered	Diuretics
54	*Foeniculum vulgare* Mill. HG-54, ICP, Peshawar	Apiaceae	Sonf	Herb	Seed	Seeds in dried form	Used as stimulant
55	*Galium aparine* L. HG-55, ICP, Peshawar	Rubiaceae	Zag	Herb	Whole plant	Extract of leaves	Diuretics
56	*Malvastrum tricuspidatum* A. Gray HG-56, ICP, Peshawar	Malvaceae	False mallow	Herb	Leaves	Extract of leaf	Treat wounds
57	*Malva parviflora* L. HG-57, ICP, Peshawar	Malvaceae	Chees weed	Herb	Stem	Fresh form and powdered form	Digestive issues
58	*Lantana camara* L. HG-58, ICP, Peshawar	Verbenaceae	Punch phul	Shrub	Whole plant	Juices of plant	Chronic diseases
59	*Justicia adhatoda* L. HG-59, ICP, Peshawar	Acanthaceae	Bashok	Shrub	Leaf	Leaves paste	Coughing
60	*Lindenbergia indica* L. HG-60, ICP, Peshawar	Scrophulariaceae	Pathar chatty	Herb	Flowers	Flower and leaves extract	Fever
61	*Medicago minima* L. HG-61, ICP, Peshawar	Fabaceae	Nary shpeshty	Herb	Whole plant	Stem decoction and Leaf extract	Cough
62	*Malva neglecta* Wall. HG-62, ICP, Peshawar	Malvaceae	Panirak	Herb	Seed	Leaves extract	Cough
63	*Portulaca oleracea* L. HG-63, ICP, Peshawar	Portulacaceae	Verdolaga	Herb	Whole plant	Fresh juices	Kidneys problem
64	*Mentha longifolia* L. HG-64, ICP, Peshawar	Lamiaceae	Velanay	Herb	Whole plant	Dried leaves	Carminative
65	*Oxalis corniculata* L. HG-65, ICP, Peshawar	Oxalidaceae	Trewakay	Herb	Whole plant	Whole plant dried	Fever
66	*Nasturtium officinale* W.T. Aiton HG-66, ICP, Peshawar	Brassicaceae	Temera	Herb	Seed	Making syrups from leaves and stem	For breast feeding
67	*Momordica balsamina* L. HG-67, ICP, Peshawar	Cucurbitaceae	Jangali karela	Herb	Fruit	Fruit are cooked	Obesity
68	*Misopates orontium* (L.) Raf. HG-68, ICP, Peshawar	Scrophulariaceae	Bandakay	Herb	Seed	Paste of whole plant	Treat tumours
69	*Mirabilis jalapa* L. HG-69, ICP, Peshawar	Nyctaginaceae	Gulabasay	Herb	Flower	Ghee placed on fresh leaves	Skin problems
70	*Otostegia limbata* (Benth.) Boiss HG-70, ICP, Peshawar	Lamiaceae	Azghakay	Shrub	Whole plant	Fresh leaves (40 gram) mixed in water	Mouth sore
71	*Mentha arvensis* L. HG-71, ICP, Peshawar	Lamiaceae	Podina	Herb	Leaves	Flowers is chewed	Tongue infection
72	*Papaver somniferum* L. HG-72, ICP, Peshawar	Papaveraceae	Doda	Herb	Seed	Boil in water and then used	Back pain
73	*Peganum harmala* L. HG-73, ICP, Peshawar	Zygophyllaceae	Spelanay	Herb	Whole plant	The mature plant dried and burn	For blood cleaning

Table continues on next page.....

S. No	Scientific name	Family name	Local name	Habit	Part used	Methods of drug preparation	Diseases treatment
74	*Phylanthus fraternus* G.L. Webster HG-74, ICP, Peshawar	Euphorbiaceae	Gulf leaf flower	Herb	Whole plant	10 grams of this plant materials	Hepatitis
75	*Stellaria media* L. HG-75, ICP, Peshawar	Caryophyllaceae	Chickweed	Herb	Whole plant	Extract leaves	For joint pain
76	*Solanum xanthocarpum* L. HG-76, ICP, Peshawar	Solanaceae	Kantkari	Herb	Fruits	Dried fruit, decoction	Cigarettes
77	*Rumex crispus* L. HG-77, ICP, Peshawar	Polygonaceae	Curled dock	Herb	Whole plant	Young leaves boiled and used	Vitamin A and C
78	*Sisymbrium irio* L. HG-78, ICP, Peshawar	Brassicaceae	Khoobkal	Herb	Whole plant	Fruit infusion and make powdered	Face pimples
79	*Setaria glauca* Beauv HG-79, ICP, Peshawar	Poaceae	Baira	Herb	Stem	Decoction of leaf and stem	Wound healing
80	*Rosa indica* L. HG-80, ICP, Peshawar	Rosaceae	Gulab	Shrub	Roots	Petals of rose	Heat stroke
81	*Sesamum indicum* L. HG-81, ICP, Peshawar	Pedaliaceae	Kunzaly	Herb	Seed	Extract oil from seed	Cancer
82	*Ricinus communis* L. HG-82, ICP, Peshawar	Euphorbiaceae	Castor	Shrub	Seeds	Leaves are heat up and used for abdomen	Back pain
83	*Vitis vinifera* L. HG-83, ICP, Peshawar	Vitaceae	Angoori	Shrub	Fruit	Fruit in fresh form	Excrete urine
84	*Ziziphus nummularia* L. HG-84, ICP, Peshawar	Rhamnaceae	Beri	Tree	Leaves	Leaves Extract	Blood purifier
85	*Ranunculus sceleratus* L. HG-85, ICP, Peshawar	Ranunculaceae	Gul-e-Ashraf	Herb	Entire plant	Make juice	Asthma
86	*Trianthema portulacastrum* L. HG-86, ICP, Peshawar	Aizoaceae	Carpet plant	Herb	Whole plant	Decoction and Infusion of plant	Constipation
87	*Tribulus terrestris* L. HG-87, ICP, Peshawar	Zygophyllaceae	Malkunday	Herb	Root, Leaves	Dry powder of entire plant	Healing of wounds
88	*Verbena officinalis* L. HG-88, ICP, Peshawar	Verbenaceae	Shamakay	Herb	Aerial parts	Gum powdered	Infection
89	*Prosopis juliflora* L. HG-89, ICP, Peshawar	Fabaceae	Masquit pod	Shrub	Stem, leaves	Flower infusion	Kidney stones
90	*Solanum surattense* Burm.f. HG-90, ICP, Peshawar	Solanaceae	Maraghoni	Herb	Whole plant	Decoction of root	Sedative
91	*Sorghum halepense* pers. HG-91, ICP, Peshawar	Poaceae	Johnson grass	Herb	Whole plant	Root, stem and leaf decoction	Cough
92	*Verbascum thapsus* L. HG-92, ICP, Peshawar	Scrophulariaceae	Kharghwag	Herb	Seed	Decoction of seeds	Respiratory issues
93	*Alium sativum* L. HG-93, ICP, Peshawar	Alliaceae	Uga	Herb	Leaves	Leaf extract and paste of fruit	Asthma
94	*Solanum nigrum* L. HG-94, ICP, Peshawar	Solanaceae	Kachmacho	Herb	Leaves	The juice of plant of the leaves	Cough
95	*Withania somenifera* L. HG-95, ICP, Peshawar	Solanaceae	Kotilal	Shrub	Roots	Make powdered from roots	Remove swelling
96	*Sonchus asper* L. HG-96, ICP, Peshawar	Asteraceae	Shodapay	Herb	Fresh shoots	Roots of the plant	Malaria
97	*Vitex negundo* L. HG-97, ICP, Peshawar	Lamiaceae	Marmandy	Tree	Leaves	Extract of leaves and flower.	Reduce sex drive

Table continues on next page.....

S. No	Scientific name	Family name	Local name	Habit	Part used	Methods of drug preparation	Diseases treatment
98	*Tinospora cordifolia* (Giloy) HG-98, ICP, Peshawar	Menisper-maceae	Gilo	Herb	Whole plant	Extract of plant	Cough
99	*Zingiber officinale* L. HG-99, ICP, Peshawar	Zingiberaceae	Adrak	Herb	Rhizome	Resins	Constipation
100	*Tamarix aphylla* (L.) H. Karst. HG-100, ICP, Peshawar	Tamaricaceae	Ghaz	Shrub	Bark	Major bark compo-nents	Teeth infection
101	*Punica granatum* L. HG-101, ICP, Peshawar	Lythraceae	Anar	Shrub	Fruit	Fruit dried bark	Stomach issues
102	*Mentha viridis* L. HG-102, ICP, Peshawar	Lamiaceae	Podina	Shrub	Leaves	Dried leaves	Cancer
103	*Psidium guajava* L. HG-103, ICP, Peshawar	Myrtaceae	Amrood	Tree	Fruit	Leaf extract	Diarrhea
104	*Berberis lycium* L. HG-104, ICP, Peshawar	Berberidaceae	Zyarlargy	Shrub	Whole plant	Powder	Ulcer
105	*Morus nigra* L. HG-105, ICP, Peshawar	Moraceae	Toot	Tree	Stem, Leaves	Wood used as fuel	Throat infection
106	*Momordica charantia* L. HG-106, ICP, Peshawar	Cucurbitaceae	Kheera	Herb	Fruit	Fruit extract	Measles
107	*Avena sativa* L. HG-107, ICP, Peshawar	Poaceae	Jamdarai	Herb	Stems	Powder form	Gastro problems
108	*Cynodon dactylon* L. HG-108, ICP, Peshawar	Poaceae	Kabal	Herb	Whole plant	Alcohol extract	Headache
109	*Morus alba* L. HG-109, ICP, Peshawar	Moraceae	Spin toot	Tree	Leaves, flower	Leaf extract	Insomnia
110	*Prunus persica* L. HG-110, ICP, Peshawar	Rosaceae	Shaltalu	Tree	Fruit	Cosmetics	Rashes
111	*Raphanus sativus* L. HG-111, ICP, Peshawar	Cruciferae	Molai	Herb	Fruit	Powdered	Indigestion
112	*Rosa webbiana* Wall. ex Royle HG-112, ICP, Peshawar	Rosaceae	Zangali gulab	Tree	Fruit	Rose water extract	Stomach issues
113	*Prunus armeniaca* L. HG-113, ICP, Peshawar	Rosaceae	Khoobani	Tree	Fruit	Gum	Constipation
114	*Spinaceae oleraceae* L. HG-114, ICP, Peshawar	Brassicaceae	Palak	Herb	Whole plant	Leaves extract	Increase blood level
115	*Pyrus communis* L. HG-115, ICP, Peshawar	Rosaceae	Nashpati	Tree	Fruit	Leaves extract	Branches are used as a thatching materials

Legends: Specimen Herbarium Voucher Number-HS, Huma Gul; ICP, Islamia College, University, Peshawar, Pakistan.

Ethno veterinary plant species

In this study, a total of 40 plant species were identified to be used to treat a variety of aliments by the local farmers, shepherds and local herders in the study area. The results collected during the study are summarized in tabulated form (Table 1). The table provides information about each medicinal plant species, including its scientific name, family, common name, life form, parts used, methods of drug preparation, and the diseases treated.

Habitat of medicinal plants

The present study, revealed that the herbs with 82 species (71%) were the most commonly used life form by the inhabitants (Figure 3), followed by shrubs having 17 species (14%) and trees with 17 species (15%) each. The dominant use of herbaceous plants in the study area in the preparation of remedies is due to profuse growth and easy availability in the wild as compared to other life forms.

Informant's features

For information about these plants ethnomedicinal plants, interviews with 80 respondents were conducted. Most informants were men (57) rather than women (23). Most of them were 60 years old,

while some people were 40-55 years old. Due to the lack of educational facilities, most of the people were illiterate. They showing that they had an unawareness of education (31) (Figure 4). Many people had completed their education (49). Every informant was spoken Pashto.

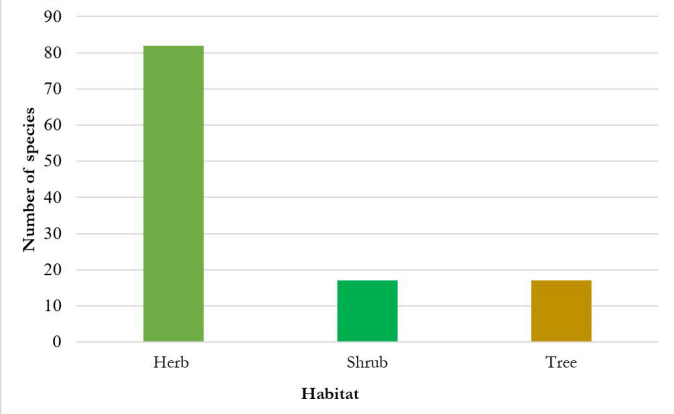

Figure 3: *Habitat wise distribution of medicinal plants species.*

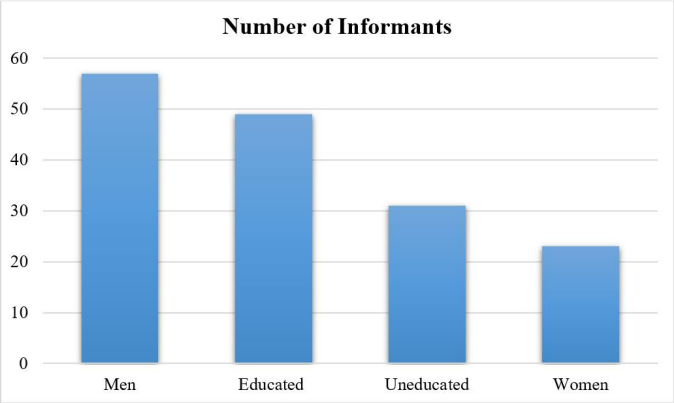

Figure 4: *Showing the number of respondents.*

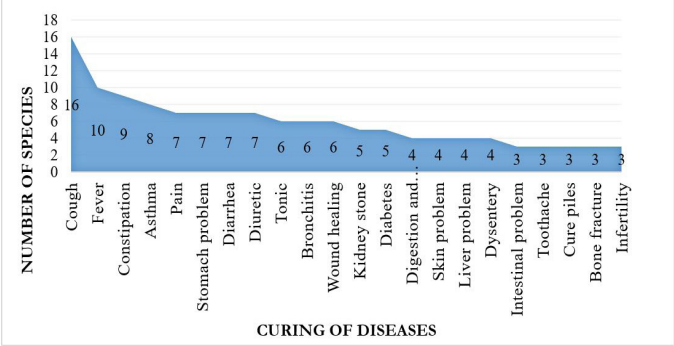

Figure 5: *Number of plant species used for different diseases.*

Curing of diseases

Of the plant parts, the upper part of the leaves is widely used for various ailments. For example, the leaves of *Cirsium arvensis* are used to treat coughs, bronchitis, wounds, and the *Dodonea viscosa* L. leaves are used for gas problems. Certain plants have nutritional benefits exclusive to their fruits. Plant regeneration is seriously threatened by the usage of the entire plant, including the stem and rhizome. Various types of formulations have been prepared from different plants to treat various diseases and conditions (Table 1). Most of the ethno-veterinary medicines have been prepared in the form of powders, followed by raw, ground compresses and pastes, extracts and infusions, etc. The most popular method of preparing medicine was powder, which was used to treat diseases in humans and animals. All of these prepared materials were used for the curing of diseases (Figure 5).

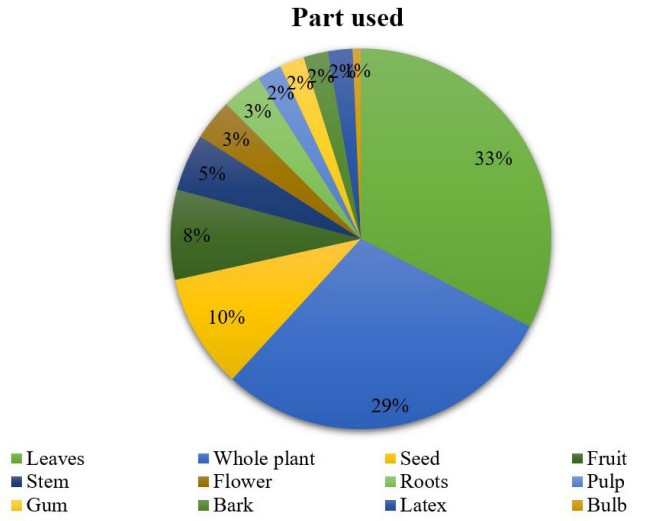

Figure 6: *Classification of plants based on their parts used for medicinal purposes.*

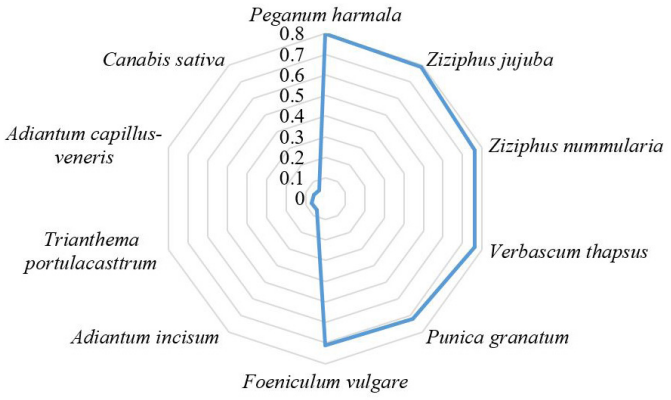

Figure 7: *Species with highest relative frequency citation values.*

Part used

The most commonly utilized parts, according to parts used, are Leaves (33%), Seed, whole plant (29%), Stem (10%), Fruit (8%), Root (4%), Flower (3%), Latex (2%), Gums (2%), Bulb (2%), Bark (2%), and Pulp (2%) (Figure 6).

Table 2: *Relative frequency citation value of plants species.*

S. No	Plant name	RFC values	No of informants citing useful species	No of informants
1	*Ziziphus jujuba* Mill.	0.79	63	80
2	*Peganum harmala* L.	0.8	64	80
3	*Verbascum thapsus* L.	0.76	60	80
4	*Ziziphus nummularia* Burm.f.	0.76	60	80
5	*Punica granatum* L.	0.72	57	80
6	*Foeniculum vulgare* Mill.	0.71	56	80
7	*Trianthema portulacastrum* Lin.	0.07	6	80
8	*Adiantum incisum* Forssk	0.07	6	80
9	*Cannabis sativa* L.	0.05	4	80
10	*Adiantum capillus-veneris* L.	0.06	5	80

Relative frequency citation

The local significance of each species in a research area is shown by its relative frequency of citation (RFC). The number of informants citing a valuable species (FC) divided by the total number of informants in the survey (N) yields this indicator. The species that were listed were the highest relative frequency citation and the lowest relative frequency citation. *Ziziphus jujube* Mill. (0.79), *Ziziphus nummularia* L. (0.76), *Peganum harmala* L. (0.80), *Punica granatum* L. (0.72), *Foeniculum vulgare* Mill. (0.71) and *Verbascum thapsus* L. (0.76), are the species with the highest relative frequency citation value. *Adiantum capillus-veneris* L. (0.06), *Trianthema portulacastrum* Linn. (0.07), *Cannabis sativa* L. (0.05) and *Adiantum incisum* Forssk. (0.07), are the species with the lowest relative frequency citation value (Table 2 and Figure 7).

Discussion

In Pakistan, especially in rural areas of Khyber Pakhtunkhwa, there is a lot of traditional knowledge on the use of plants, which is often unknown. Indigenous peoples have used natural medicinal plants for centuries, exploiting them in various ways in the natural environment. In rural areas, the use of wild plants for healing and cooking has long been a tradition. Our study revealed that District Swabi support a diverse vegetation of medicinal plant species. We collected and identified 115 species of plants from various groupings and communities. Floristically, these 115 plants species belong to 55 families and 97 genera. The Poaceae family, which accounted for 10 representative plant species, was the most prevalent family. The Asteraceae and Euphorbiaceae family came in second with 7 representative species and Solanacaeae represent 6 species, Brassicaceae with 6 species of medicinal plants in the study area. Due to diversity of medicinal plants from District Swabi is recognized as a potential site for medicinal plants flora in Khyber Pakhtunkhwa, Pakistan. According to earlier research, Asteraceae was also predominant (Shaheen *et al*., 2017). Similar research was carried out by various ethnobotanists in other parts of Pakistan. For example, 84 plants with medicinal importance were recorded from Lal Suhanra National Park in Bahawalpur (Wariss *et al*., 2014). A total of 51 plants with medicinal significance were recorded from Thakht-e-Sulaiman Hills (Ahmed et al., 2016). Similar to this, a different study (Barkat-Ullah *et al*., 2011) documented 169 medicinal plants found in the Malakand Pass Hills indicated that stems were the most often used portion, followed by leaves and the entire plant. Our findings, however, coincide with study, which found that leaves are typically used to treat various diseases in Pashtun tribal areas. Indigenous ethnomedical knowledge is primarily transmitted through orally, without written documentation, from one generation to the next. In many places of the world, tribal and rural communities continue to engage in similar traditions. People who were older and less educated had more experience with preparing and employing treatments. Applying empirically supported ethnoveterinary treatments to rural regions increases cattle production and helps in improving poor quality (Zafar et al., 2005).

Different type of medicinal plant species has been identified to be used by the local farmers, shepherds, and herders in Pakistan's, District Swabi, to treat a variety of diseases during the period of the current study. The following information is provided for each plant species: habitat, part used, disease treated, botanical name, family name, and vernacular name.

These results have been gathered from the study. According to the current study, which includes 82 species, plants were the most widely used living form by the locals. Subsequently, there were 17 species of shrubs and 17 species of trees documented from the study area. Due to their widespread growth and ease of availability in the wild when compared to other life forms, herbaceous plants are primarily used in the research area for the development of treatments. Because herbs are easily gathered, most traditional healers favor using them for various purposes (Rana *et al*., 2015; Rehman *et al*., 2022).

According to Khan *et al*. (2015), traditional herbal treatments were used to cure a variety of animal ailments. Similarly, Hassan *et al*. (2014) reported using 28 medicinal plants from 23 families in the Lower Dir District of Khyber Pakhtunkhwa, Pakistan, to cure a variety of cattle ailments. In the Jhang district of Pakistan, Badar *et al*. (2017) identified 46 medicinal plants from 31 families that are used to treat 26 different types of cattle diseases. The younger generation knew very little about traditional medicines, but older people had much more knowledge about curing livestock-related issues. These findings coincide with (Khattak *et al*., 2015; Zerabruk and Yirga, 2012). They discovered that the majority of respondents were older and that relatively few young people were using traditional techniques to cure animals.

Our study revealed that the upper part of the leaves of *Cirsium arvensis* L. are used to treat coughs, bronchitis and wounds, and the leaves of *Dodonea viscosa* L. are used for gas problems. The fruits of certain plants have their own nutritional value. The use of the whole plant, stem and rhizome poses a major threat to the regeneration of medicinal plants. Different plants have been used to create a variety of compounds that are used to treat different illnesses and ailments. Before being consumed raw, ground compresses and pastes, extracts and infusions, etc., the majority of ethno-veterinary medications were made as powders. When preparing medicine to treat diseases in both humans and animals, powder was the most widely utilized approach. These manufactured substances were all employed in the treatment of illnesses (Aziz *et al*., 2016, 2018) conducted similar investigations in Ladha, South Waziristan, and Mohmand agency, reporting 82 and 64 medicinal plants utilized for treating various diseases, respectively. Additionally, several researchers from other regions of Pakistan have documented the ethno-medical significance of plants (Ibrar *et al*., 2007).

In the present study the most commonly utilized parts, according to parts used, are Leaves (47), Seed (14), whole plant (42), Stem (7), Fruit (11), Root (5), Flower (5), Latex (3), Gums (3), Bulb (1), Bark (3), Pulp (3). Ethnic tribes use leaves to prepare herbal ethno veterinary medication all over the world (Vijayakumar *et al*., 2015). Similar results were found by Erarslan and Kultur (2019), who stated that the majority of ethno veterinarian treatments were made by the local Turkish residents using leaves. Comparing collecting leaves to harvesting underground parts like stems, bark, or the entire plant, Poffenberger *et al*. (1992) showed that collecting leaves did not constitute a significant hazard to the survival of plant species. The use of specific plant parts suggests that these parts have the most therapeutic potential; however, in order to confirm the location information, both pharmacological screening and biochemical testing are necessary. It is safe for plant communities to use leaves. Compared to other plant components, it is easier to gather and create the formulation for the leaves (Rehman *et al*., 2022). Decoction and powder form (12%) were the most often used preparations; extract (9%), paste (6.4%), juice (8%), infusion (5.60%), raw food (4%), herbal tea (4.80%), oil form (2.40%), poultice (11%) and toothbrush (3.20%) were the next most popular forms. The most popular way to prepare indigenous herbal medicines is decoction, which is simple to make by mixing with water or tea (Khan et al., 2011).

Each plant species' RFC indicates how important it was to the informants who reported using it (Vitalini et al., 2024). The range of the research area's RFC values was 0 to 1. A high rate of plant species utilization among the local population in that area is indicated by the largest value of citation frequency (Ahmad *et al*., 2017). According to its relative frequency of citation (RFC), each species local significance in a research field is indicated in the current study. The value of this measure is obtained by dividing the total number of informants in the survey (N) by the number of informants citing a valued species (FC). Our findings reveal that the species with the lowest relative frequency citation and the highest relative frequency citation were listed. The species which have lowest relative frequency citation

value was *Trianthema portulacastrum* Linn. (0.07), *Adiantum incisum* L. (0.07), *Cannabis sativa* L. (0.05) and *Adiantum capillus-veneris* L. (0.06). The species which have highest relative frequency citation value are *Ziziphus jujube* Mill. (0.79), *Peganum harmala* L. (0.80), *Verbascum thapsus* L. (0.76), *Ziziphus nummularia* Burm.f. (0.76), *Foeniculum vulgare* Mill. (0.71) and *Punica granatum* L. (0.72). *Ficus palmata* Forssk. was found with the highest RFC (0.78), followed by *Ficus benghalensis* L. (0.76), *Dalbergia sissoo* Roxb. (0.75) and *Psidium guajava* L. (0.75), and *Ricinus communis* L. (0.71). People who live in the study area are quite familiar with these plants because they are so prevalent there. In order to find new medications, phytochemical investigation of plants with high RFC values should be carried out in the future (Mukherjee and Wahile, 2006). Because of the increased anthropogenic activities, strategies for sustainable use of these plants should be place in order to reduce overexploitation of these plant species (Ahmad *et al*., 2017).

Conclusion

The purpose of this study was to gather medicinal plant natural sources in district Swabi, Pakistan. A rich diversity of medicinal plants that are traditionally used to treat various illnesses was supported by the study's findings. The current data may play a major role in Pakistan's pharmaceutical companies as well as regional farms that cultivate medicinal plants. Enhancing collaboration between traditional healers (hakims) and modern healthcare providers could improve the effectiveness and integration of traditional medicine in primary healthcare. It is essential to properly document and identify specimens in order to Preserve and pass on this historical medical knowledge to future generations. To identify these therapeutic plants' active biochemical components, more research is needed. In the Swabi district, Khyber Pakhtunkhwa, Pakistan, this may be the first tentative assessment of the quantitative analysis of the medicinal flora of these therapeutic plants. Proper documentation and taxonomic identification of medicinal plants are essential to preserve this historical medical heritage and ensure its continuation.

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Novelty Statement

The use of medicinal plants in tehsil Lahor and Gadoon Valley in District Swabi has been documented in previous research; nevertheless, this study is notable because it considers the perspectives of both male and female respondents, effectively documenting a larger spectrum of indigenous knowledge.

Author's Contribution

Huma Gul and Iqra Anwar: Designed and carried out research. Khair Ul Ibrar and Anwar Hussain Khan: Performed the data analysis. Collected the data and did fieldwork. Maira Fazal: Provided
logistic support.

Conflict of interest
The authors have declared no conflict of interest.

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