

AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED BY SOUTHERN COMMUNITIES OF KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

The study is based on traditional knowledge regarding the medicinal uses of plants in southern region of Khyber Pakhtunkhwa. Classical to applied ethnobotanical approaches were applied to document the ethnomedicinal data and their quantitative analysis using frequency citation (FC), use report (UR), relative Use value (UV), relative frequency of citation (RFC), informant consensus factor (ICF). Various number of informants including 40 (Respiratory Disorders), 33 (GIT diseases), 17 (Sexual diseases) and 22 (for Skin disorders) were investigated using ethnobotanical methods. In addition to this, as a whole 58 medicinal species of plant and 45 genera belong to 32 families were nominated, although the Amaranthaceae, Leguminosae, Alliaceae, Poaceae and Asteraceae (7, 7, 5, 4 and 4 species) are most dominant in the present study. Amaranthaceae family is the dominant family of medicinal plants due to presence of high level of active ingredients which is responsible for antioxidant activity and plants of this family also contain defensive potential for antibacterial and antifungal activity. Species collected for preservation of herbarium specimens should be submitted to the herbarium as voucher specimens. Dominant living herbs (35) followed by shrubs, trees and grasses 6, 6, 2 respectively. The most common diseases are related to respiratory, gastrointestinal and skin diseases. The herbal medicines were prepared as powder, juice and decoction

Keywords: Quantitative ethnobotany, medicinal plants, indigenous community

INTRODUCTION

To produce food, clothing shelter, transportation, flavors, fertilizers and medicine and fragrance the man expect on nature for their vital requirements from the start of the age (Nazar *et al.*, 2022). The Plants provide the ground for practical folk medicine systems that are presents for thousands of years and continue to provide humankind with recent treatment. Despite the fact, that some of the beneficial properties associate to plant confirm to be wrong, doubtless, hundred or thousand years of used of medicinal plant therapy is based on the observational recommendation (Krupa *et al.*, 2019). The Plants employ as drugs for thousands of years. Recent elliptic drugs evolved from primal drugs and it is expected that so many new beneficial treatments will be exposed and advertise in future, as it has been still, follow on to undergo and provide by folk knowledge and concepts (Kundu *et al.*, 2022). So, the many countries in the world, the medicinal plants use is often related with black magic and false belief, because people don't have the scientific vision to clarify and conclude the healthful activity of plant. The unreasonable knowledge is the Doctrine of signatures, elements of which are found in many of the healing cultures of the globe is one of the examples (Quinlan, 2022).

The medical history of plants parallels the creation of life on Earth. The practice of medicinal plants is as old as popular civilization (Khan *et al.*, 2021). For a long time, plants have been the only and valuable source of natural products for human health care (Lourenço *et al.*, 2019). Throughout the ages, plants have been used for medicinal as well as other uses (Hauptvogel *et al.*, 2019). They are used in almost all types of ailments, from minor injuries to chronic heart disease. A large part of the world's population, especially in developed countries, expects to use traditional herbal medicine systems to treat various health-related complications (Dutra *et al.*, 2016).

Pakistan is rich in natural vegetation including lush green forests, blooming fields, green forests, attractive, attractive and fragrant flowers, delicious fruits and a natural economy of medicinal plants (Khan and Irshad, 2022). Pakistan has diverse climatic zones and an extraordinary biodiversity of about 6,000 species of higher plants. It has been stated that 600-700 species are used medicinally, representing up to 12%

of the total flora (Jahangir *et al.*, 2022). Local groups in different regions of Pakistan have centuries-old familiarity and knowledge about the traditional uses of plants growing in those regions (Ahmad *et al.*, 2014a).

With the current emergence of new diseases and the exploitation of new drugs, medicinal plants have attracted much scientific and commercial attention, which has put enormous pressure on wild medicinal biodiversity. Over-harvesting, habitat destruction and bioprospecting for novel species have pushed medicinal plants to extinction (Shafi *et al.*, 2021). Before then, about 15,000 medicinal plants could face global extinction. Experts estimate that Globe detects at least one potentially important drug every two years. So, there are many threats in our sphere to the universal resources (García-Pérez *et al.*, 2020). The threats because of loss of habitation and humiliations, over using of resources, invasive alliance and even metrological condition also altered (Nandini and Giridhar, 2019). The term biodiversity" means the complete complication and assortment of entity, at all extent, from historical diversification, likely species and even environ diversification. Many taxonomists and botanist used the term conservation of biodiversity, usually to assign the header to sustain and either part of this natural diversification (Wilkinson *et al.*, 2021). The plant conservation is an important inherent of achievement for conservation diversifications. The elimination possibility of plant is found, because in all over the globe, preference given to conservations (Bobo-Pinilla *et al.*, 2022).

However, the objective of this ethnobotanical survey is to identify the plants and parts used in the treatment of various diseases as well as their preparation methods among traditional medicine practitioners in the southern regions of Khyber Pakhtunkhwa, Pakistan.

MATERIAL AND METHODS

After thorough survey of the previously published literature on southern regions i.e., Karak, Bannu and Lakki Marwat was frequently visited from march to august as this is a peak season for the collection of plant specimen and data regarding of medicinal uses, Different conservation issues and observation of diversity of species (Fig. 1). This research work is divided into 3 stages' i.e. field work to collect and observe diversity of different plant species, second phase includes laboratory work and in third phase compilation of the data obtained during field visits.

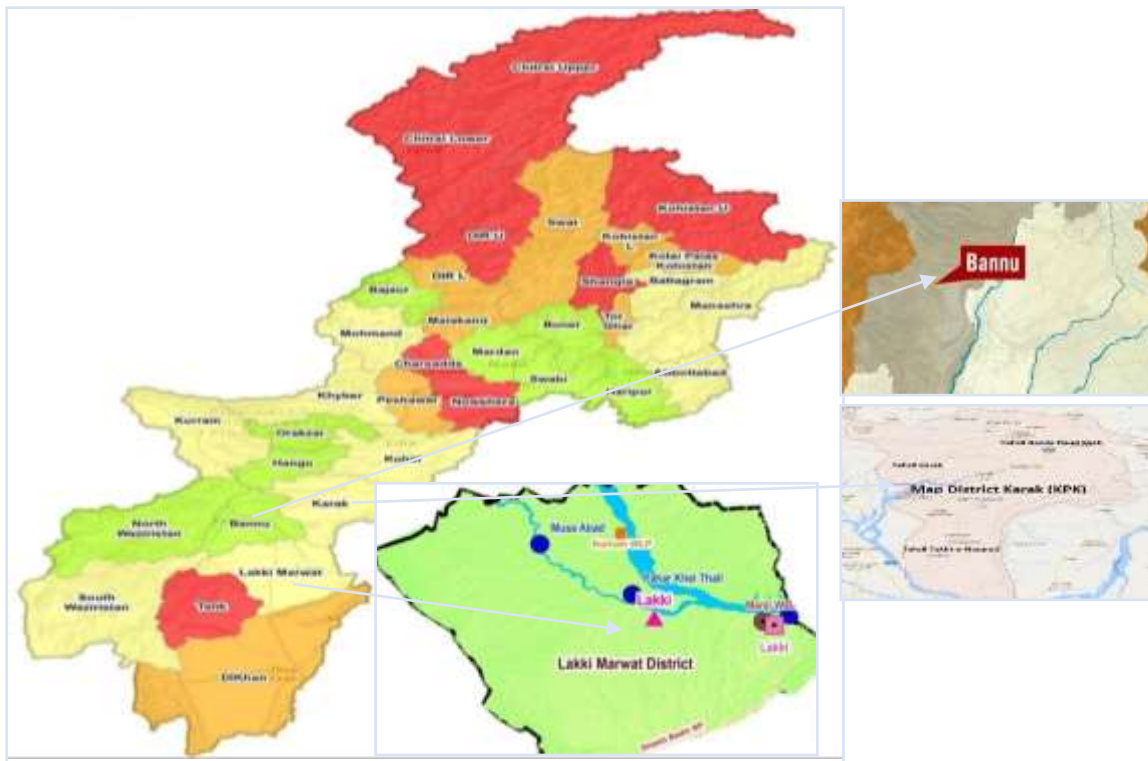


Fig. 1. Map of the study area (District Karak, Bannu and Lakki Marwat, Pakistan).

The process of plant materials collections and drying

The southern regions of Khyber Pakhtunkhwa are unique biodiversity of medicinal plants and the important medicinal plants was collected from various areas i.e., Karak, Bannu and Lakki Marwat. Each and every plant which was used locally for disease treatment was used for extraction with 70% ethanol. Plant parts were washed, material was shade dried and dried, grinded to powder and used for extraction. Different localities of southern regions were surveyed for the collection of plants almost for a period of two years. The work was done through well planned survey covering all flowering seasons. The native medicinal plants collected from various places of southern regions.

Documentation of traditional and ethno-medicinal knowledge

The number of informants was interviewed in their Local language (Pushto) of the native informants. Usually, most of civilized peoples speaks and understand the national language of Pakistan. Advance sampling methods was used interviewed 415 local interviewers, out of 415, 160 (38.55%) are indigenous people and 25 (6.02%) by the traditional health practitioner (THPs) were interviewed at fields, homes, religious places (Masjids) and male working places. Out of 415, 180 (43.37%) informants are male while 50 (12.02) are females. Most of the male interviewers are comprised the government employer which is retired, farmers, as well as shop keepers although mainly the female's inhabitants work in houses. The more knowledge about plants is present by the old peoples whose age range from 55-70 and then age group 45-55 years contain less information as compared to the old ones (Table 1). Most of the female informants was uneducated and working in the field of crops and also work in the houses which is known as house wives. Conversation was managed with existing approval to the inhabitants and also notice the international society ethical code of ethnobiology. Observe and focusing on the local peoples spasmodically depending on plants and plant collection professionally, To the start of the interview randomly chosen the first informant and more and more ranges to the inhabitants was kept in mind of their suggestion and also their interest towards plants and to documents some local plants concepts in mainly and specifically medicinal plants.

Demographic information

Demographic information (age, gender) and conservation status were collected using a semi-structured questionnaire administered at each site. The news and info about the scope of plants, plant growth, plant collection, and parts of the plants i.e., roots and stem etc. The regional and traditional use of important medicinal plants species is medicinal, fuel wood, timber and fodder etc, were obtained through arbitrary information which collects from 500 informants with various gender and ages. During medicinal plants survey some personal concepts were also documented. The evidence analysis also gets with the help of group discussion with the informants collectively different ages peoples of Karak, Bannu and Lakki Marwat that include both genders i.e., male and female of the society. Classified, tabulated, analysed and complete the data for final report.

RFC (Relative frequency citation)

The autochthonous information is tentatively checked to utilize FC and RFC by the informants. The RFC intended via close &to assent b/w sources to utilize the restorative species of plants here. Its ascertained utilizing followed given formula (Abbas *et al.*, 2016).

RFC =FC/N

Frequency of Citation (FC) shown the quantity of the testifier which referred known species; RFC (relative frequency citation) is the relative recurrence reference and the number of informants (N) is the aggregate numbering sources join given studies. So, the estimation of relative frequency citation depends upon referring to extent in the sources for nominated plant species.

Used value

Plants utilization standards are possessed and follow (Bibi *et al.*, 2014).

$$\text{Used value} = \text{quantity of utilization}/N$$

The N represent the total number of inhabitants and U represent the amount of utilization average which collect from each source for known species of plant and the Use value convey quantifiable sum of qualified purpose of species of plant.

FL (Fidelity level)

The FL demonstrates and preference to single plants to the others for treating known sickness problem (Kharchoufa *et al.*, 2021). The FL actually represents the important species used for curing specific diseases. The following FL equation is.

$$\text{Fidelity level} = \text{Iu/Ip} \times 100$$

Here for source quantity (Ip) used of plant species for specific infections and Iu is the average numbering of informants that described any ailments for same plant.

MUV (Medicinal used value)

Medicinal used value shows related therapeutic significance of known plants narrowly. Medicinal used value is clearly changing the UV (Used value). The medicinal use value is analyses by little changes and by analyze the following.

$$\text{Medicinal used value} = \frac{1}{4} \times \text{MUi} = \text{N}$$

The numbering MUi shown the known medicinal uses by every informant for a specific plant and N are the cumulative number of witnesses present in the study (Begum *et al.*, 2022).

RESULTS**Plant Resources of Southern regions (Ethnomedicine)**

The concept of native local flora uses in different Tehsil and District of southern regions is centuries old custom and is transferred from generation to generation. The exact knowledge of medicinal plant usage is in danger and will not for next generations if they are not preserved or documented in proper ways. The collection of therapeutic plant is mostly from wild, in which many types of chemical ingredients are extracted after introducing them into industrial sites. The local collection agent is unawares the correct practices of assemble medicative plants. Flora of the regions are in in danger because large amount of utilization i.e., extraction, exploitations by regional representatives, grazing, cutting, deforestation, quick urbanization e.g., Roads and the construction of buildings, growth of populations, system of irrigations, naturals disasters i.e., erosion, thunder storms, flooding and the army operations are the main reasons of endangerment.

Informant's demographic information's

The recent survey of plant collection, total 415 inhabitants including domestic people 160 (38.55%) also the Traditional health practitioner (THPs) 25 (6.02%) are interrogate at field, home, religious and male working places homes (Masjids). Total 180 (43.37%) interviewer are male and 50 (12.04%) are female. The male interviewers are high because of easily approach to everywhere other than the female because due to gender intolerance parda (mask). The other reason is liberal division because the male work in the field and earn money as well while the female work and spend domestic life. On the other hand, the old age female is more traditional and creative to use herbal treatments while the male is interested to sharing the folk knowledge of the traditional uses of plants. The division on the base of age factor, the interviewer is divided into various groups (Table 1). The informants having age between 65–85years share more concepts followed by age group 55–65 years old. Information on the bases of education the folk concepts is more in uneducated individuals (43.37%) and the concept is decline in educated communities (12.04%) (Table 1).

Ethnobotany profile of Southern regions

The communities of District Karak, Bannu and Lakki Marwat have venerable folk knowledge of highest uses of plants. Domestic knowledge transferred to them from generations to generation of the plants. As the extrications to different variety of effective ingredients and many uses of plants are communally abused. Various classifications of eastward drugs like homeopathy, Ayurveda and Unani etc. were totally depends to theopathic effect to known plants. But precious properties of domestic concepts of such plants are disintegrating firstly then the knowledge is not available for conservation and documentation for the coming generations. Approximately, total of the remedial plants is non-cultivated or natural which used in the areas. So, the regional representatives are unconcerned of the right way of collections of economically important medicative plants. The disappearance of the flora from the area due to deforestations, grazing, soil erosions,

extractions, cutting, quick colonization's etc by the local peoples. Afghan refugees are the main reasons of endangerment.

Table 1. Demographic data of informants.

S. No.	Variables	Categories	Total informants	Informant %age
1	Informant category	Traditional health practitioner	25	6.02
		Indigenous people	160	38.55
2	Gender	Female	50	12.04
		Male	180	43.37
			415	99.98
3	Age	20-35 years	95	22.89
		35-50 years	100	24.09
		50-65 years	95	26.50
		65-85 years	115	21.68
		80 years and above	20	4.81
			415	99.97
4	Educational background	Illiterate	180	43.37
		Primary	75	18.07
		Middle	65	15.66
		Matric	45	10.84
		Inter and graduated	50	12.04
			415	99.98

Table 2. Informant Consensus Factor (ICF) values.

S. No	Disease Categories	Number of Use Report (Nur)	Number of Taxa (Nt)	Informant Consensus Factor (ICF)
01	Respiratory Disorders	40	22	0.45
02	GIT diseases	33	22	0.33
03	Sexual diseases	17	7	0.58
04	Eye diseases	6	4	0.33
05	Fevers	14	12	0.14
06	Cardiovascular disorders	18	14	0.22
07	Muscle & skeletal disorders	20	11	0.45
08	Skin disorders	22	10	0.54
10	Urinary disorders	16	12	0.25
11	Wounds	12	10	0.16
12	Immune system	4	2	0.50

†

Table 3. Medicinal uses of wild and cultivated plants of southern regions of Khyber Pakhtunkhwa, Pakistan.

S.NO.	Plant Name	Local Name	Family	Life Form	Plant Part Used	Mode of Utilization	Diseases Treated	FC	RFC	UR	UV
1.	<i>Abelmoschus esculentus</i> Moench	Bandi	Malvaceae	Herb	Fruit	Decoction	Laxative, Digestive, demulcent, Constipation, emollient, Gonorrhea	56	0.11	6	0.10
2.	<i>Acacia modesta</i> Wall	Dalosa	Leguminosae	Tree	Stem	Decoction	Abdominal pain, Skin disorders, Cough, throat infection	55	0.11	4	0.07
3.	<i>Acacia villosa</i> Delile	Kiker	Leguminosae	Tree	Roots	Decoction	Leucorrhea, anemia and weakness, Wound healing, sexual debility and night fall	45	0.09	5	0.11
4.	<i>Adiantum capillus-veneris</i> L.frag	Sprabotary	Amaranthaceae	Herb	Root	Decoction	Diuretic, Asthma, cough, Pyorrhea, Kidney stone, Cold, fever, L. gnosy, Purgative, laxative, Pneumonia, Cough, cholera, gonorrhea, insect bite	46	0.09	14	0.30
5.	<i>Adiantum bickertonii</i> Blume	Sprabotary	Amaranthaceae	Herb	Leaves	Decoction	Pneumonia, Cough, cholera, gonorrhea, insect bite, asthma expectorant	52	0.10	6	0.11
6.	<i>Adiantum capillus-veneris</i>	Marae	Adiantaceae	Herb	Whole plant	Powder	Used for curing scorpion bites, expectorant, ematic and diuretic.	60	0.12	4	0.06
7.	<i>Aerva lanata</i> L.frag	Harsai	Amaranthaceae	Herb	Leaves	Powder	Gastric ulcers, Arthritis, demulcent diuretic, Healing wounds	78	0.15	4	0.05
8.	<i>Aerva perita</i> (Burm.f.) Merr.	Tor Sassi	Amaranthaceae	Herb	Leaves	Powder	Healing wounds, Blood purifier, Asthma	90	0.18	3	0.03
9.	<i>Ajuga reptans</i> Benth	Maraos	Lamiaceae	Herb	Whole plant	Powder	Blood purifier, sour throat diabetes, colic for infants	67	0.13	4	0.05
10.	<i>Albizia lebeck</i> (L.) Benth	Sareen	Mimosaceae	Tree	Whole plant	Decoction	Sexual disorders, Impotency, Tonic, diuretic, blood purifier, Asthma, Tuberculosis, diarrhea, eye troubles	70	0.14	7	0.10

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11	<i>Albizia leucodermis</i> Meib. &	Hedgeroodia	Leguminosae	Shrub	Leaves	Infusion	Blood purifier, useful for kidney stone and used for pain relief	87	0.17	3	0.03
12	<i>Allium conopsea</i> Redoute	Pizakal	Alliaceae	Herb	Whole plant	Juice	Fungus infection, chicken pox and small pox	80	0.16	3	0.03
13	<i>Allium cepa</i> L.	Pysak	Alliaceae	Herb	Leaves	Paste	Stimulant, diuretic, aphrodisiac and expectorant, antiseptic, soothe the irritation caused by scorpion and hornet stings	73	0.14	3	0.06
14	<i>Allium graveolens</i> Lam.	Zargali Pysak	Alliaceae	Herb	Whole plant	Juice	Aphrodisiac, expectorant pain relief	48	0.09	3	0.06
15	<i>Allium jacquesevorum</i> Regel	Jargali Pysak	Alliaceae	Herb	Whole plant	Powder	Aphrodisiac, expectorant pain relief	82	0.16	3	0.03
16	<i>Allium sativum</i> L.	Oqqa	Alliaceae	Herb	Leaves	Juice	Effective in heart diseases and hypertension, diaphoretic, diuretic, expectorant and antiseptic, hysteria, flatulence, asthma and whooping cough, epilepsy	89	0.17	10	0.11
17	<i>Aloe barbadensis</i> Mill.	Zargava	Aloaceae	Herb	Leaves	Past	Purgative, laxative, especially in joints pain	93	0.18	3	0.03
18	<i>Asteriscandera pungens</i> Kunth	Narukay	Asteraceae	Herb	Whole plant	Powder	Chicken pox, small pox and Fungus infection	95	0.19	3	0.03
19	<i>Asparagus urticae</i> Pallex	Rharzaka	Asparagusaceae	Herb	Whole plant	Powder	Cooking as Vegetable, Blood purifiers, piles, constipation	56	0.11	3	0.05
20	<i>Asparagus scorvire</i> L.	Nahsar	Prunellaceae	Herb	Leaves	powder	Snake biting, purgative sexual desire & tonic.	34	0.06	4	0.11
21	<i>Asarum quingense</i> L.	Mongali	Rubiacae	Herb	Fruit	Powder	Astringent aperiants, sexual desire tonic and emollient	102	0.20	5	0.04
22	<i>Asplenium nidus</i> L.	Zargali	Papaveraceae	Herb	Whole plant	Infusion	Kidney pain, Laxative treatment of malaria	75	0.14	3	0.04

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23	<i>Aristida obtusiloba</i> Walter	Terrakulai	Poaceae	Grass	Whole plant	Powder	Skin disease, wound healing	69	0.13	2	0.02
24	<i>Asparagus gracilis</i> Salmk.	Zyngulji	Asparagaceae	Herb	Whole plant	Decoction	Insomnia, chronic cough, Purgative, laxative	61	0.12	4	0.06
25	<i>Asphodelus tenuifolius</i> Cav.	Dizakhal	Asphodelaceae	Herb	Whole plant	Juice	Vomiting, Arthritis, Constipation	93	0.18	3	0.03
26	<i>Asparagus adscendeas</i> Boiss	Agharkhal	Leguminosae	Herb	Whole plant	Powder	Heart diseases and hypertension, diaphoretic, diuretic, expectorant and antispasmodic, effective in hysteria	66	0.13	6	0.09
27	<i>Asparagus boveatus</i> L.	Mozak	Fabaceae	Herb	Whole plant	Past	Purgative, Tonic for sexual desire.	60	0.12	2	0.03
28	<i>Asparagus monantholus</i> Bunge	Agharkhal	Leguminosae	Herb	Leaves	Decoction	Body tonic, Kill Intestinal worms	55	0.11	2	0.03
29	<i>Asparagus poliochaetos</i> Fischl	Agharkhal	Leguminosae	Shrub	Seed	Powder	Tonic, emollient and for digestion	71	0.14	3	0.04
30	<i>Avena fatua</i> L.	Kerqara	Poaceae	Herb	Whole plant	Infusion	Constipation, Dysentery, Diarrhea, Diuretic and laxative	61	0.12	5	0.08
31	<i>Avena sativa</i> L.	Kerqara	Poaceae	Herb	Whole plant	Infusion	Nerve tonic, antispasmodic, Diuretic and laxative	65	0.12	4	0.06
32	<i>Aspidosiphon</i> A. Mus	Neean	Meliaceae	Tree	Leave	Juice	Balance blood sugar levels, treat skin diseases, Anti-diabetic medication, Sedative	69	0.13	4	0.05
33	<i>Bacilla rubra</i> (Wight) A.J.Scott	Karabkha	Chenopodiaceae	Herb	Whole plant	Decoction	Vomiting, Blood pressure, constipation, Intestinal worms	54	0.10	4	0.07
34	<i>Bhutagora veruculosa</i> (L.) Nees	Sorqulaji	Amaranthaceae	Herb	Stem	Decoction	Dysentery, Diarrhea, Stomach problem, Kidney problem	37	0.11	4	0.07
35	<i>Boragin</i> <i>qin</i> <i>ca</i> Sw.	Danderabad	Myrtaceae	Herb	Whole plant	Powder	Leaves act as cooling agent, Used for fuel and fodder	59	0.11	1	0.01
36	<i>Bougainvillea</i> Comm. ex Just.	Darqara	Myrtaceae	Climber	Leaves	Juice	Skin disease, Intestinal worms and ornamental	45	0.08	2	0.04

37	<i>Brassica campestris</i> L.	Ortol	Brassicaceae	Herb	Whole plant	Paste	Leucorrhea, menstrual disorder, body weakness and pain.	46	0.09	3	0.06
38	<i>Brassica rapa</i> L.	Tepur	Brassicaceae	Herb	Root	Past	Laxative, Constipation, skin disease	81	0.16	2	0.02
39	<i>Bromus distachyus</i> Curtis	Sesal	Poaceae	Grass	Whole plant	Powder	Used for Kidney stone, dysentery	83	0.16	2	0.02
40	<i>Buxus populifera</i> C.K.Schneid.	Botal	Buxaceae	Tree	Leaves	Powder	Diarrrhea, dysentery.	81	0.16	2	0.02
41	<i>Calendula arvensis</i> L.	Zeremlat	Asteraceae	Herb	Leaves	Juice	Tonic, diaphoretic and antihelmintic, stimulant and antispasmodic	71	0.14	3	0.07
42	<i>Calligonum polygonaoides</i> L.	Balanza	Polypodiaceae	Shrub	Whole plant	Powder	Use as blood purification, anti-inflammatory, Bark act as pain killer, smoke used for snuff preparation	72	0.14	3	0.04
43	<i>Callistemon citrinus</i> Sieber	Brush booty	Myrtaceae	Shrub	Stem	Juice	Used for face pimple, skin diseases and ornamental	79	0.15	2	0.02
44	<i>Calotropis procera</i> W.T.Aiton	Sjalnaska	Asclepiadaceae	Shrub	Whole plant	Powder	Used for kidney stones, gastritis, Wound healing, arthritis, vomiting and diarrhea	76	0.15	6	0.07
45	<i>Conoclinium zinnifolium</i> L.	Bangay	Compositae	Herb	Leaves	Decoction	Decoction of leaves is as sedative and narcotics, also used as a cooling agent	66	0.15	1	0.01
46	<i>Capparis decidua</i> B.D. Jeyar.	Tap	Capparidaceae	Tree	Leaves	Powder	Laxative, antihelmintic and swellings	62	0.12	3	0.04
47	<i>Capparis squarrosa</i> L.	Kakral	Capparidaceae	Shrub	Leaves	Decoction	Wound healing, Diabetes, Dysentery, Cough, Chest complaints, Eye trouble, Pain killer, Constipation, Arthritis	65	0.13	8	0.12
48	<i>Capiscium aurantiu</i> L.	Marach	Solanaceae	Herb	Fruit	Powder	Stomach problem, anticancer	32	0.06	2	0.06

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49	<i>Carthamus tinctorius</i> M. Bieb.	Aghryz	Asteraceae	Herb	Seed	Powder	Ulcer, itch, white spots	33	0.06	3	0.09
50	<i>Carriacuruphalus</i> Vahl	Zarstean	Leguminosae	Herb	Leaves	Powder	Constipation, Stomach problem	37	0.07	2	0.05
51	<i>Euphorbia pulchella</i> (Scribn.)	Wairabas	Euphorbiaceae	Herb	Whole plant	Decoction	Ringworm, urine burning and delaying ejaculation	09	0.21	3	0.02
52	<i>Daucus carota</i> L.	Galara	Apiaceae	Herb	Root	Juce	Stimulant, carminative, effective in kidney and uterine pain.	30	0.20	4	0.03
53	<i>Adria vesifera</i> (L.) M. Bieb.	Deera	Verbinaceae	Shrub	Whole plant	Infusion	Sedative and diuretic	35	0.22	2	0.01
54	<i>Magnesia pyraeae</i> (Wall. ex Lawson).	Serabhat	Celastraceae	Shrub	Whole plant	Powder	Skin diseases, arthritis, blood purifier, asthma, pneumonia, Worms	09	0.07	6	0.16
55	<i>Morus nigra</i> Thunb.	Tor looth	Moraceae	Tree	Fruit	Decoction	Laxative sore throat, Cough, throat pain, kill abdominal worms	103	0.20	5	0.04
56	<i>Yucca schottiana</i> F.T. Wats	Zarbulat	Asteraceae	Herb	Leaves	Past	Dyspepsia, Sout and rheumatism. Bitter tonic, stomachic, nutritive, diuretic. It is biliary and liver disorders, dropsy, rheumatism arthritis, Laxative, dysentery	11	0.09	14	0.29
57	<i>Xanthium strumarium</i> L.	Karhaka	Asteraceae	Herb	Whole plant	Decoction	Diseases of bladder, Purgative and laxative	15	0.08	3	0.06
58	<i>Ziziphia olerabilis</i> Lam	Berra	Rhamnaceae	Tree	Fruits	Powder	Memory disorders, blood disorders and sexual weakness	31	0.06	3	0.09

Medicinal plant diversity of Southern regions

As a whole 58 medicinal species of plant & 45 genera belong to 32 families were nominated and as healing habits against disease pathogens, although the Amaranthaceae, Leguminosae, Alliaceae, Poaceae and Asteraceae (7, 7, 5, 4 and 4 species) (Table 3).

Amaranthaceae and Leguminosae family is the dominant family of medicinal plants due to high content of betalain pigment which is responsible for antioxidant activity and plants of this family also contain active ingredients that help the body to fight various diseases. During this study it was found that most of the species belonged to herbs (35) followed by 6, 6, 2 of shrubs, trees and grasses respectively. The investigation is related to the study which (Ahmed *et al.*, 2014), However, in Mastung, Balochistan Province, Pakistan, the most recommended habitats were grass and shrubs (Bibi *et al.*, 2014), These relationships are due to the nature of the vegetation, climatic conditions and geographical positions of the regions. The purposes for the high rate of herbs are that they are effortlessly developed in each living space, they can be easily gathered, put away and can be used effectively in homemade medicines.

Parts of medicinal plants use

The data of medicinal plant parts used in medicinal plant preparation are presented. The most commonly used plant parts are whole plants (26%), followed by leaves (18%) and fruits (5%), respectively. The use of whole plants and leaves in herbal medicine has been commonly found in many ethnomedical surveys, as most herbal medicines use either the leaves or the whole plant. It is known that the whole body of the plant contains active ingredients. This can be explained by the fact that most of the informants acquired traditional knowledge which is different from scientific education. The whole plant and leaves are used more often than other parts because they are more abundant, easier to collect than roots, tubers and from a conservation point of view, collecting the whole plant will prevent the plant from disappearing (Table 3).

Preparations methods

There are two methods of preparation of herbs i.e., internal (decoction, infusion, herbal tea, maceration, powder, juice) external (paste, oil). The most commonly used preparation is powder with 21 followed by decoction with 12. Juice 8, paste 5 and infusion 4, respectively. Similar results have been found in previous ethnomedical studies conducted in different parts of the world. Most of the plants used in this study are mixed with other ingredients like honey, milk, water and dates. As this compound can easily eat plants with a bitter taste. Some plants are also eaten raw (Table-3).

The most frequently cited plant species and medicinal uses

The present survey shows that the most cited plant is *Lippia nodiflora* with 110 references, followed by *Euphorbia prostrata* with 109 references and *Daucus carota* with 102 references. The greatest value of medicinal plants is that these plants are well-known and used more frequently by local people, describing a source of sustainability. The following studies show that the most cited is *Lippia nodiflora* which is used as sedatives and diuretics and for treating skin diseases, followed by *Euphorbia prostrata* which is used for skin diseases, liver disorders, ringworm and used for delayed release medications. We found similar results for *Periploca* in other ethnomedical surveys (Rashid *et al.*, 2015). *Ziziphus mauritiana* is also used to treat indigestion, heal wounds and as a body tonic. *Peganum harmala* L. is also highly cited for treatment of skin diseases, fever and respiratory diseases, the same medicinal use has been reported from other parts of Pakistan (Ahmad *et al.*, 2020). As reported by informants, medicinal plants treating various diseases are divided into 13 classes. The most prevalent disease type is gastrointestinal disease, a finding similar to other ethnomedical surveys conducted in other parts of Pakistan. Balochistan, Abbottabad, Gilgit, Sindh, Azad (Ahmed *et al.*, 2014b; Bano *et al.*, 2014; Bibi *et al.*, 2014; Kayani *et al.*, 2015; Yaseen *et al.*, 2015). The second most common type of illness was respiratory failure. Glandular disorders formed the 3rd division. This is very similar to acute and chronic diseases being collectively cured by traditional medicine (Ouelbani *et al.*, 2016).

New reports and new uses

Recent research shows that forty-six new plant species with local uses. The remaining 11 species have been documented in previous research papers for various similar and different drugs. At the level of local areas, we can refer to the following example:

- In a recent study, *Ziziphus nummularia* is used for the treatment of respiratory diseases, glandular diseases and venereal diseases and according to Rashid *et al.*, (2015) this herb is used for gastrointestinal disorders and skin diseases. Used for treatment.
- In the present study another plant *Xanthium strumarium* is used for the treatment of musculoskeletal disorders and also helps in the treatment of cardiovascular disorders while the previous reported by Butt *et al.*, (2015).
- *Maytenus royleanus* with UV 0.16 is often used for skin diseases, musculoskeletal disorders, respiratory diseases and gastrointestinal disorders. This important medicinal plant is valuable for further phyto and medicinal research.

Based on the statistical analysis, the following plant species are significant in terms of high UV values: *Taraxacum officinale* (0.30) and *Achyranthes aspera* (0.29) are plants with high UV values. *Taraxacum officinale* is used to treat skin diseases and gastrointestinal diseases and the other plant is used as antiseptic and gastrointestinal diseases (Table 2).

Analysis of ethnomedicinal data (Quantitatively)

ICF factor

Thus, the value of the factor of informed consent varies from 0.14 to 0.58. The highest ICF value is 0.58, reported for sexual disorders with 17 reports of use and 7 species, followed by skin disorders with 0.54. Higher values of the informant agreement factor indicate more similar information between informants. About the highest ICF value of GID (Gastrointestinal Disorder), and related concepts are studied or presented in Thar Sindh desert (Yaseen *et al.*, 2015). GIT disorder is the most informed consensus factor in other studies such as Algeria (Ouelbani *et al.*, 2016), Morocco (Jamila and Mostafa, 2014) and Spain (Parada *et al.*, 2009). The highest cost of GIT disorders is due to the unhealthy lifestyle of the natives. The symptoms of this disease are so common that it is easily recognized by traditional healers (Chander *et al.*, 2016). The lowest ICF values are observed for Cardiovascular disorders (0.37) followed by fevers (0.14) and Wounds (0.16) (Table 2).

RFC (Relative frequency citations)

Thus, the relative frequency citations shown to resolve the more utilize species of plant in the regions for the reference to interviewer to interview for the specific plant species. The range of RFC was from 0.22 to 0.06. The highest value of relative frequency citations were 0.22 for *Lippia nodiflora* and noted that the therapeutic species of plants are frequently present and individuals are already known with these therapeutic uses i.e., cough, abdominal pain, skin disease, throat infections and stomach diseases. The nominated therapeutic species of the area in the research area involved *Acacia modesta* Wall 0.45, *Acacia nilotica* (L.) (0.43), *Aerva javanica* (burm.f.) (0.4), *Euphorbia prostrata* (0.21), *Morus nigra* (0.20) and *Alternanthera pungens* (0.19), respectively. The Table 3 is shown the highest to lowest RFC values.

Used value

The UV (use value) is the significant approach that appears the similar essential species of plants or families of plants for communities. The studies values range is 0.30 to 0.01 species having highest use value are *Achyranthes aspera* (0.30), *Taraxacum officinale* (0.29), *Allium sativum* (0.11), *Achyranthes bidentata* (0.11), *Anagallis arvensis* (0.11), *Albizia lebbek* (0.10) and *Abelmoschus esculentus* (0.10). The high used value indicates that these species are highly suggested and well-knowns by interviewers that indicates significance of species. After all the plants with less used values is *Alhagi maurorum* (0.03) and *Aerva persica* (0.03). This least used values are determined by the evidence of that species have low or few medicinal uses known to the local informants (Table 3).

Availability status of medicinal plants

The accessibility to medicinal plants reduced during the last years. According to Traditional health practitioner and the native peoples, there were plenty of medicinal plants in the past years. This leads to the increased in the market need of medicinal plants, absence vacancies event in the regions and inappropriate methods of harvesting like digging of whole plant, cutting in the wrong place.

DISCUSSION

The present study shows that the inhabitants of the study area have a very rich cultural tradition of using medicinal plants. The degree of ethnobotanical richness of the study area is directly attributed to its floristic diversity. Similarly, many studies have found similar cultural uses of plants from Khyber Pakhtunkhwa. Khan *et al.* (2021) reported a total of 157 plants. Similarly, Begum *et al.* (2022) found a total of 75 medicinal plants for human use and 20 for veterinary use in the southern regions of Khyber Pakhtunkhwa. The presence of more vegetation in the study area reflects its biodiverse vegetation which is similar to Islam *et al.* (2021), who reported 83 species of medicinal plants from Chitral Valley. The prevalence of certain plant families in the present results is consistent with previous reports (Haq *et al.*, 2022). Widespread use of medicinal plant species from these families may be the main reason for the various active phytochemicals in the form of alkaloids, terpenoids, flavonoids and phenols (Shaheen *et al.*, 2019). Herbs (35%), followed by shrubs (6%) and trees (6%) were considered the most common life forms of medicinal plants in the present study, which is consistent with previous findings (Birjees *et al.*, 2022). The most common method of administration of traditional herbal recipes in the present study was powder (21%), followed by decoction (12%) and juice (8%). This contradicts the findings of (Jan *et al.*, 2021), who stated that decoction is the preferred method of preparation of the treatment. The powder may have the potential for convenient and maximum efficacy, due to its high solubility (Begum *et al.*, 2022). The local people of the area commonly used every part of the plant, but the whole plant turned out to be the most used part in this study, due to its ease of collection and composite material. Our findings are similar to the reports of (Ahmed *et al.*, 2015; Qasim *et al.*, 2014; Amjad *et al.*, 2017) which confirmed that the whole plant is a common part of the flora used in Khyber Pakhtunkhwa.

The above ethnomedicinal establishment creates ideas that how the economic medicative species are present inside the neighborhood cultural system and promote strong relations b/w biological storage and the conservations of adjacent sociable tradition. During ethnobotanical data collection some unexperienced things are happen which are danger for conservation and biodiversity of medicinal plants because of unexperienced collectors collect plants half of the plants collect and half of the plants collect and wasted. There are needs a quick response on this net worth social data. The exchange and records of such process over amend and processing can encourage making home developed pharmacopeia. Everybody in this circle have massive vegetation's location of traditional applications of medicinal plant as herbal treatments are the main way of treatment among the areas. The Large number of concepts of traditional applications of plant is spreading step by step in Pakistan.

CONCLUSION

Documenting traditional knowledge about the uses of medicinal plants before it is lost to future generations is very important as it helps in the discovery of new medicines. This study identified several important medicinal plants used in various food treatments by traditional healers in the southern regions of Khyber Pakhtunkhwa. Western medicine has become commonly available in the study area, but due to cost and time unavailability, people in the southern regions of Khyber Pakhtunkhwa still rely heavily on herbal medicine to treat their ailments. Common ailments treated include indigestion, colds, fevers, snakebites, headaches and skin conditions. In this study, several plant species with high utility value (Used Value), relative frequency (RFC) and utilization rate (UR) were used in decoctions, infusions, herbal teas for the treatment of skin diseases, asthma. It has been also used for gastritis, wound healing, rheumatism, vomiting, diarrhea, cough, constipation, painful urination, snake bite. Research is needed to study these medicinal plants to develop new bioactive compounds.

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