Quantitative ethnomedicinal study of the Flora of district Swabi, Khyber Pakhtunkhwa, Pakistan

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Research

Abstract

Background: The current study was based on ethnomedicinal uses of the plants of district Swabi, Khyber Pakhtunkhwa, Pakistan. Different statistical indices were quantitatively used to evaluate the new knowledge of the inhabitants.

Methods: Frequent field visits were carried out from 2019 to 2022 in different seasons of the year. A questionnaire was used to collect all the information regarding taxa's traditional uses. The questionnaire was made to identify the knowledge of rural men, women, and their immediate families regarding the collection of medicinal plants along with their use in a community. Women were seldom interviewed, and this was a unique opportunity to investigate their plant knowledge.

Results: A total of 154 plant taxa with 130 genera distributed in 58 families were used for the treatment of different ailments. Amongst them, the leading family was Poaceae with 14 taxa (9.09%), the second leading family was Fabaceae having 13 taxa (8.44%), followed by Amranthaceae with 11 taxa (7.14%). Habit wise 87 taxa (56.49%) were herbs, 38 taxa (24.67%) were shrubs, and 29 taxa (18.83%) were trees. Habitat wise 90 taxa (58.44%) were mesophytes, 16 taxa (10.38%) were sciophytes, and 48 taxa (31.16%) were xerophytes. Abundance wise 92 taxa were common (59.74%), 62 taxa were rare (40.25%); 142 taxa (92.2%) were wild, and 12 taxa (7.79%) were cultivated. Different parts of the taxa were utilized for the treatment of various ailments viz. leaves of 78 taxa (50.6%), roots of 19 taxa (12.3%), and Fruits of 17 taxa (11%) were used.

Conclusion: The valuable information about the primeval use of medicinal taxa by the residents for the treatment of various disorders. The inhabitants of the area have diverse knowledge about the remedies of medication for effective work against them.

Keywords: Ethnomedicinal, Flora, Swabi, Khyber Pakhtunkhwa, Pakistan.

Background

Medicinal plants consist of active biochemical constituents that give sure physiological responses in different illnesses (Giday *et al.* 2003). Plant based therapeutic medications still are the lowest cost and easily reachable source of curing in the primary health medication for the poverty level countries (Ahmad *et al*. 2016; Irfan *et al.* 2018d). The therapeutically enriched plants are the primary source in the healthcare system of the resident communities still considered the majority of the rural population of the world (Haq *et al.* 2011; Bano *et al.* 2014; Estrada *et al.* 2021).

The appellation of therapeutic plants in terms of curing potential suggests the various quantities and qualities of medicinal plants and also provides a potentially rich stance in the pharmaceutical field (Adnan *et al.* 2015). Owingof well potential factor in the world, these therapeutic plants still are considered enriched with active ingredients, up till now humans were dependent on these plants for the formation of drugs and effective medication (Hassan *et al*. 2020; Yebouk *et al.* 2020). In the absence of these therapeutic plants, the life existence of humans in the world would be troubled, and most of the population is dependent on the plants because these therapeutic plants are the raw material of the medication (Aziz *et al.* 2018; Sher *et al.* 2011).

The chasing of therapeutic plant-based ethnobotany and ethnopharmacology provides a new round source of knowledge, which proved a route for the discovery of new drugs and new classes of active ingredients in the past (Gidey *et al.* 2015; Arshad *et al.* 2022). Quantitatively based approach in the field of ethnomedicine is a modern method attributed to the previous work. The various indices calculations on previous scientific inquiries provided an apparent sight of partisanship of therapeutic plants which suggest planting for future therapeutic plant ingredients by phytochemical analysis (Orech *et al.* 2007; Rashid *et al.* 2022). So far recent standpoint is that traditional communities have diverse knowledge about the therapeutic plant uses and their mode of recipes, and approaching these suggestions by phytosociological quantitative indexes is a vital tool for researchers seeking to recognize this valuable information (Herndon *et al.* 2009; Irfan *et al.* 2018a). Plant-derived extraction in proper fraction has a biological role in contradiction of pathogenic organisms such as bacterial microbes, fungi, and viruses. These were causative agents of several ailments in humans in other living organisms, but these can be controlled by therapeutic applications of plants (Aziz *et al.* 2018). The maximum number of taxa in rural areas of Pakistan is used for curing inflammation, stomach problems, and dermal disorders (Murad *et al.* 2013; Khan *et al.* 2014).

The previous assessments showed the native medicinal flora of the area had great potential for curing different disorders and still dependency is urging on the medicinal plant due to the low cost (Sher *et al.* 2011). For the proper action against a disease these medicinal plants have active ingredients with the potential of curing a particular disease, but these ingredients depend upon the extraction protocol and preparation (Irfan *et al.* 2018f). In the recent period, the development of medication and drugs from medicinal plants is undoubted. In recent eras, medicinal plants are playing a vital role in the development and production of modern drugs, and owing to that researchers are focusing on the traditional uses of plants which are called ethnomedicine (Irfan *et al.* 2021; Jan et al. 2022; Mir et al. 2022a). The assessed study covers the area of district Swabi, which is one of the enriched parts of the Khyber Pakhtunkhwa province according to ethnomedicine. The analysis was quantitatively based which provides a new route of knowledge of the residential area of district Swabi.

Materials and Methods

Study site

The presented study was conducted in the villages of District Swabi, Khyber Pakhtunkhwa, Pakistan. The study site was located between the Kabul River and the Indus River which were considered the border lines with other cities, its geographical coordinates the latitude and longitude coordinates were: 34.120155, 72.470154. In the current study mostly the people of villages were explored because these people were highly concerned with the traditional knowledge. The maximum area of study belonged to the plain areas which were highly fertile due to their high water-holding capacity. The study area is present within the monsoon and western dew which increase humidity and rainfall. Temperature decreases and increases according to altitude and elevation. In winter the temperature falls up to 10°C to 4°C and December is the coolest month of the year. Most of the rains occur during the monsoon of the year. The summer temperature of the study site was going from 37°C to 42°C and temperatures were exist very hot (Mussarat *et al.* 2014).

Data collection and layout

Different materials (such as cutter, mobile camera, paper bags etc.) were used during the sampling. The study was conducted during 2019-2022 in district Swabi, Khyber Pakhtunkhwa Pakistan (Fig. 1). Questioners were prepared and used for interviews. The Interviews were taken from the old people, practitioners, and sages who were experts in medicinal plant uses, and recipe administration, and the results were documented by counting the proformas. During the field visit all the data related to plants viz. scientific name, vernacular name, family, habitat, locality, parts used, medicinal use, and the folk recipe uses were documented in the field in a notebook. The plants were identified with the flora of (Ali and Qaiser, 1993) and each specimen was pasted on an herbarium sheet and allotted specimen numbers and stored also transferred to the herbarium Department of Botany, University of Swabi. The data were presented in tabulated form using various statistical indices.

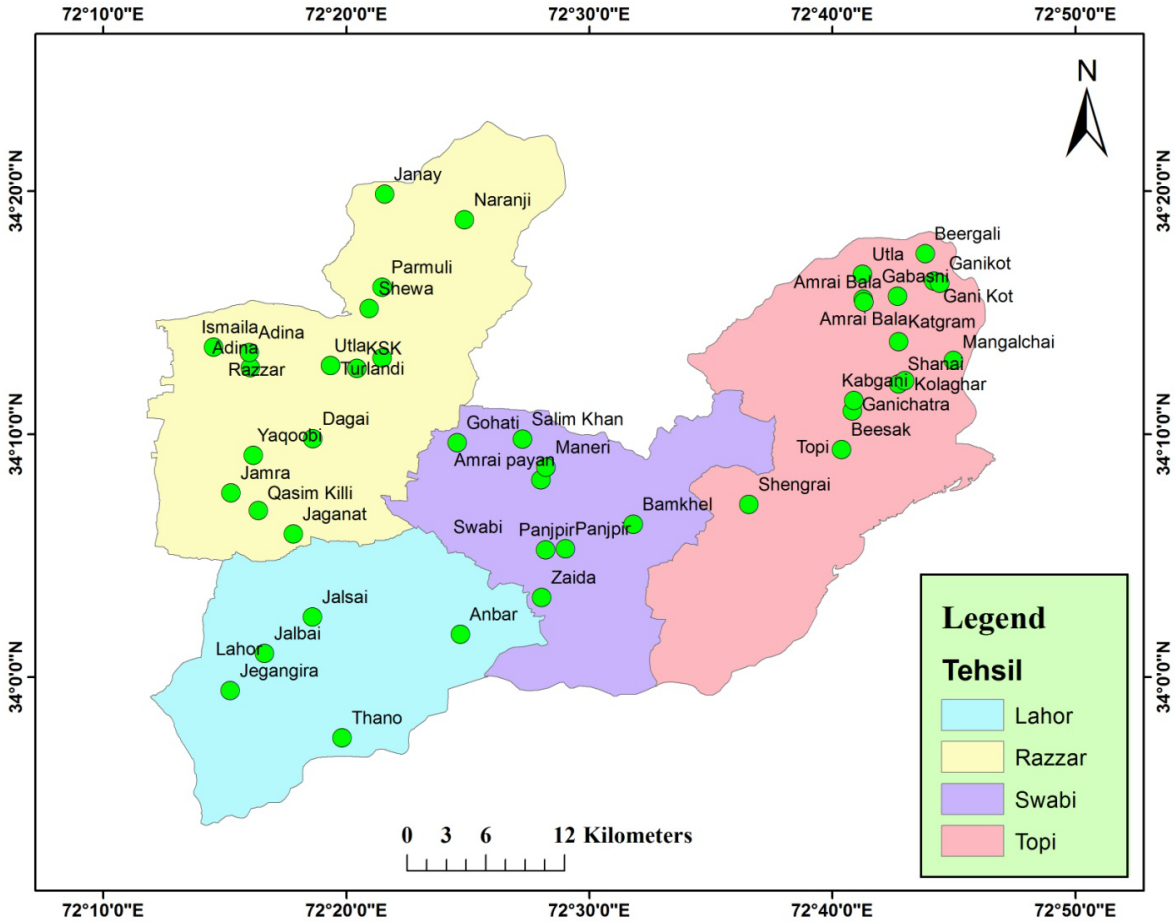

Figure 1. Map of the district Swabi, Khyber Pakhtunkhwa, Pakistan

Quantitative Data Analysis

Different statistical calculable indices were analyzed of ethnomedicinal was approached on the Flora of study site viz.

Informant consensus factor

The ICF index is a quantitative parameter to predict the value of similarities among the informant's reports of each taxon and categorize the ailments. the index helps in the categorization of diseases in a particular area, and in the calculation of this index outcomes resulted between the value 0 to 1. The index was approached according to (Heinrich *et al.* 1998) by using the given equation.

$$ICF = \frac{(Nur - Nt)}{Nur - 1}$$

"Nur" is indicating the frequency of the whole taxa reporting by informants for each class of diseases. And "Nt" is representing the entire frequencies of taxa in the reports.

Use value (UV)

The UV parameter is mostly used to estimate the relative importance of useful taxa. it is predicted by the combination of a taxa which is reported with the number of uses per taxa. The high value predicting the prominent taxa of the resident area. The approach of index analyzed by the below-given equation using the reference of (Wali *et al.* 2019; Mir *et al.* 2022b)

$$\sum \frac{\mathrm{Ui}}{N} = \mathrm{UV}$$

"UV" is the value of the importance of each taxon based on the number of reports of informants, "Ui" is the number of recorded uses of particular taxa, and "N" stands for the total number of informants. .

Fidelity Level (FL)

The FL index parameters predicting the application of some plants which were reported by the informants for a particular disease of the resident area using the informer numerals. FL index is calculated by the sum of the informer's numeral divided by the reports of informants for a disease. The required findings were calculated according to the given equation by (Ogeron *et al.* 2018; Mahmood *et al.* 2013) below

$$100 \times \frac{\mathrm{Np}}{\mathrm{N}} = \mathrm{FL}$$

"NP" stands for the total number of informants and "N" indicates the total number of taxa informants of plants used for specific ailments. Relative Frequency Citation (RFC)

The RFC parameters were calculated based on the previous citation for predicting the importance and the resident vitality of each taxon. The index was calculated according to the equation of (Ali-Shtayeh *et al.* 2008; Albuquerque, 2009) below.

$$(0 < RFC < 1)\frac{\mathrm{FC}}{\mathrm{N}} = \mathrm{RFC}$$

RPL is a parameter that predicts the ratio between the numeral of diseases cured by a specific taxon and the total numeral of informants of any ailment. The index was approached with previous examination of (Ali-Shtayeh *et al.* 2008) on the basis of popular and unpopular.

Rank Order Priority (ROP)

ROP originated index from the FL and RPL indexes, determined for the ranking of therapeutically vital plants. The calculation was performed based on the equation of (Rosero *et al.* 2018) below.

$$\mathrm{ROP} = \mathrm{FL} \times \mathrm{RPL}$$

Jaccard index (JI):

The analysis of Jaccard index were performed for the comparison of our findings with previous ethnomedical assessment. The main aim of the analysis was providing the similarity of current taxa with previous published data. For the comparison of the data Jaccard index frequency were indexed using the equation of (Ouelbani *et al.* 2018; Irfan *et al.* 2018b).

$$\mathrm{JI} = \mathrm{c} \times 100 / (\mathrm{a} + \mathrm{b} - \mathrm{c})$$

In represented formula “a” indicating the number of taxa in the area (A) with same medicinal uses and also with different uses, while “b” denotes the number of taxa in area (B) with same uses and also with different use. Though, the “c” is indicating the commonness of a taxon in both areas in (A) and (B) of same use and with different uses.

Results

Informants’ features

A total of 76 respondents provided data on 154 different plant taxa which were used for the curing various diseases with traditional system of medicine. Among these, the percentage of male respondents was 82% while 18% were female, 31% were literate and 69% were illiterate, and 98% were Muslim while 2% Ethnic groups. However maximum source of occupation was Farmer with 61% while 11% were doing Timber cutting (Lumberjacks) and 13% were doing local bossiness. A total of 25% of respondents were having the age between 20-30 and 21% were between the ages of 31 to 40, and 16% were between the ages of 41 to 50, 19% were between the ages of 51 to 60, 15% were 61-70 and only 4% were found higher than 70 (Table 1).

Table 1. Ethnicity, source of income, age and illiteracy of respondents

Informants	%	**Source of Income**	%	**Age Group**	%
Male	82	Farmers	61	20-30	25
Female	18	Timber cutting (Lumberjack)	11	31-40	21
Literates	31	Govt. servant	8	41-50	16
Illiterates	69	Work in foreign country	2	51-60	19
Muslims	98	Local business	13	61-70	15
Ethnic group	2	Hakeems	5	>70	4

Diversity of medicinal plants

The present study ethnomedicinal uses of 154 taxa with 130 genera and distributed in 58 families were used for the treatment of different ailments (Table 2). Amongst them, the leading family was Poaceae having 14 taxa (9.09%), while the second leading family was Fabaceae having 13 taxa (8.44%), followed by Amranthaceae the third leading family with 11 taxa (7.14%), Asteraceae had 10 taxa (6.49%), followed by Solanaceae having eight taxa (5.19%), Brassicaceae having seven taxa (4.54%), Lamiaceae, Moraceae, and Malvaceae were having six taxa each (11.68%), Euphorbiaceae having five taxa (3.24%), Papaveraceae and Apiaceae were having four taxa each (5.19%), Apocynaceae, Boraginaceae, and Cucurbitaceae were having three taxa each (5.84%). The Amaryllidaceae, Aizoaceae, Convolvulaceae, Caryophyllaceae, Nyctaginaceae, Polygalaceae, Pteridaceae, Rhamnaceae, Rutaceae, Verbenaceae, and Zygophyllaceae were having 2 taxa each (14.28%). However, the rest of families the Asparagaceae, Acanthaceae, Berberidaceae, Canabaceae, Cyperaceae, Cupressaceae, Cycadaceae, Cactaceae, Datiscaceae, Equisetaceae, Ebenaceae, Juglandaceae, Lythraceae, Myrtaceae, Menispermaceae, Nitrariaceae, Oxalidaceae, Oleaceae, Phyllanthaceae, Pedaliaceae, Portulacaceae, Primulaceae, Ranunculaceae, Rosaceae, Sapindaceae, Simaroubaceae, Scrophulariaceae, Salicaceae, Tamaricaceae, Vitaceae, Xanthorrhoeaceae having only one taxon each (20.12%).

Table 2. Informant consensus factor of medicinal plants.

Disease list	Number of use reports (Nur)	Number of use plants (Nt)	ICF value
Headache	32	5	0.87
Abdominal pain	72	4	0.95
Respiratory disorder	113	13	0.89
Body cooling	58	4	0.94
Diabetes	8	5	0.42
Carminative	37	8	0.80
Hepatitis	10	7	0.33
Intestinal worms	72	2	0.98
Malaria, Fever	27	9	0.69
Urine infection	78	3	0.97
Skin infection	10	6	0.44
Pain	60	14	0.77
Wound healing	140	8	0.94
Kidney disorder	40	5	0.89

Habit and habitat

Habit wise 87 taxa (56.49%) were herbs, 38 taxa (24.67%) shrubs, and 29 taxa (18.83%) were trees (Table 2, Fig. 2). However, on the basis of habitat, 90 taxa (58.44%) were mesophytes, while 16 taxa (10.38%) sciophytes, and 48 taxa (31.16%) were xerophytes.

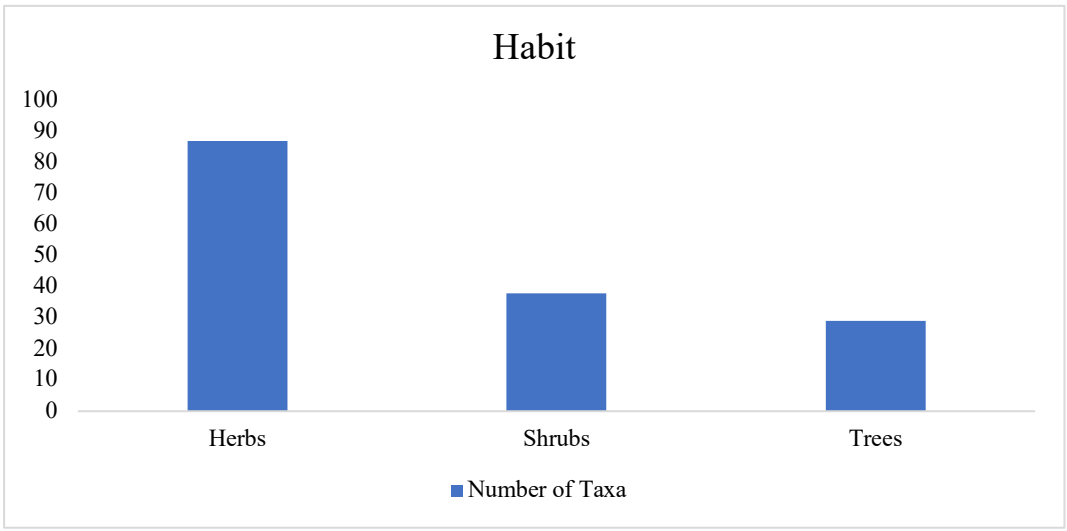

Figure 2. Habit wise distribution of the medicinal flora of district Swabi, Khyber Pakhtunkhwa, Pakistan

Abundance and parts used

Amongst the study area 92 taxa were common (59.74%), 62 taxa were rare (40.25%); while 142 (92.2%) taxa were found in the wild, while 12 taxa (7.79%) were cultivated. Different parts of the plants were used for different aliments amongst them leaves of 78 taxa (50.6%), followed by roots of 19 taxa (12.3%), fruits of 17 taxa (11%), Seeds of 15 taxa (9.74%), flowers of nine taxa (5.84%), oil of four taxa (2.59%), bark of three taxa (1.94%), gums and latex of two taxa each (1.29%), bulb and Pulp of one taxon each (0.64%) were used (Table 3, Fig. 3).

Table 3. Top five values of statistical indices.

Plant species	UV	Plant species	RFC	Plant species	FL	Plant species	RPL	Plant species	ROP
Allium jacquemontii	70	*Artemisia maritima*	0.85	*Datura innoxia*	0.77	*Cannabis sativa*	1.91	*Chenopodium album*	1.59
Cannabis sativa	0.68	*Foeniculum vulgare*	0.80	*Punica granatum*	0.75	*Phyllanthus fraternus*	1.88	*Galium aparine*	1.59
Euphorbia prostrata	0.66	*Tylophora hirsuta*	0.70	*Datura stramonium*	0.75	*Albizia julibrissin*	1.82	*Artemisia scoparia*	1.46
Artemisia maritima	0.60	*Vitex negundo*	0.70	*Tylophora hirsuta*	0.70	*Chenopodium album*	1.77	*Ricinus communis*	1.43
Justicia adhatoda	0.59	*Vitis vinifera*	0.67	*Foeniculum vulgare*	0.68	*Berberis lycium*	1.76	*Solanum surattense*	1.43
Foeniculum vulgare	0.57	*Syzygium aromaticum*	0.60	*Calotropis procera*	0.67	*Allium sativum*	1.74	*Apluda mutica*	1.30

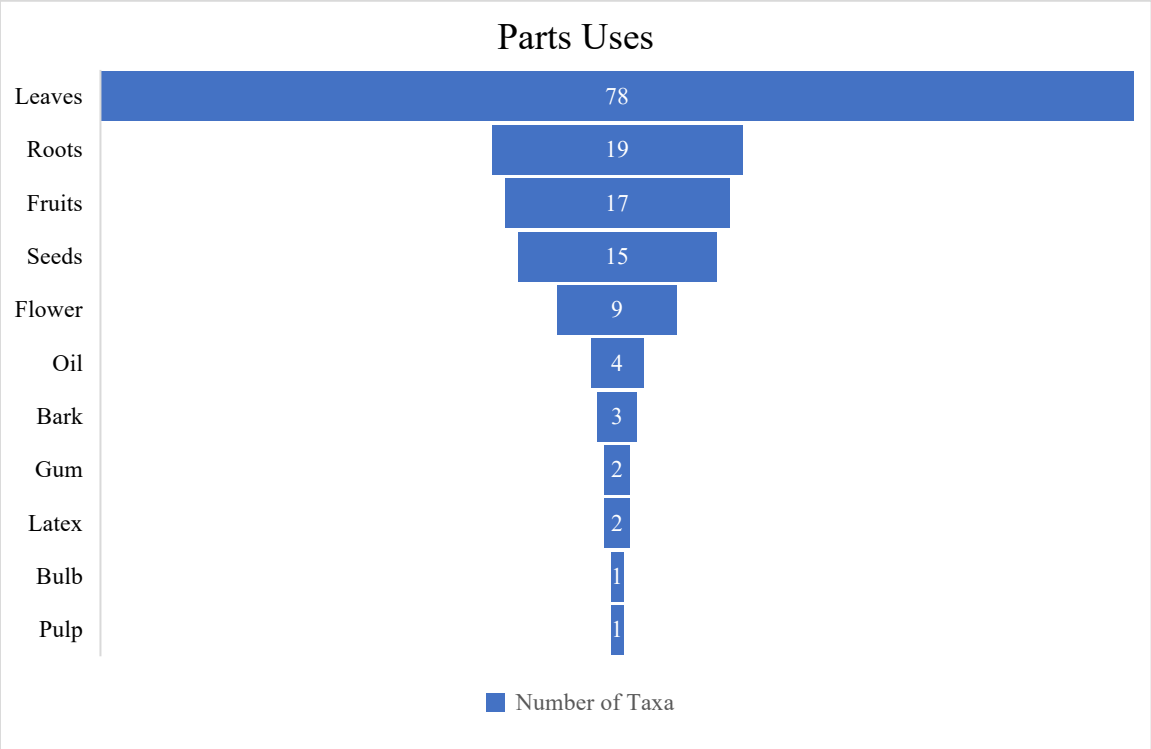

Figure 3. Plants parts used for medicinal purpose in district, Khyber Pakhtunkhwa, Pakistan

Use value (UV)

The use value of ethnomedicinal taxa ranged from (0.7) to (0.01). The highest UV were recorded for *Allium jacquemontii* (70) *Cannabis sativa* (0.68), *Euphorbia prostrata* (0.66), *Artemisia maritima* (0.60), *Justicia adhatoda* (0.59), *Foeniculum vulgare* (0.57), *Acacia nilotica* (0.55), *Ricinus communis* and *Solanum surattense* (0.53) each, *Phyllanthus fraternus* (0.50), *Tylophora hirsuta* (49). However, the top five lowest were *Bombax Ceiba* and *Portulaca oleracea* (0.01) each, *Berberis lycium* and *Convolvulus arvensis* (0.02) each, *Albizia julibrissin* and *Dactyloctenium aegyptium* (0.03), *Luffa cylindrica* (0.04), *Citrus medica* (0.05) (Table 3 and 4).

Relative frequency citation (RFC)

RFC ranged from (0.85) to (0.01), the highest RFC value was recorded for *Artemisia maritima* (0.85) followed by *Foeniculum vulgare* (0.80), *Tylophora hirsuta* and *Vitex negundo* (0.70), *Vitis vinifera* (0.67), *Syzygium aromaticum* (0.60), *Cannabis sativa* (0.56), *Trigonella foenum-graecum* (0.55), *Acacia modesta* and *Cymbopogon citratus* (0.48) each, *Emex spinosa* (0.44), *Dendrocalamus strictus* (0.41). Although the top five lowest were recorded for *Eclipta prostrata* and *Medicago minima* (0.01) each, *Cirsium arvense*, *Ficus virgata* and *Rumex crispus* (0.02) each, *Carthamus oxyacantha*, *Xanthium strumarium* and *Apluda mutica* (0.03) each, *Punica granatum, Erigeron canadensis, Euphorbia prostrata*, *Sesamum indicum* (0.04) each, *Morus nigra* and *Rosa indica* (0.05) (Table 3 and 4).

Fidelity level (FL)

The FL value recorded ranged from (0.77) to (0.09). The top value resulted for *Datura innoxia* (0.77), *Punica granatum* and *Datura stramonium* (0.75) each, *Tylophora hirsuta* (0.70), *Foeniculum vulgare* (0.68), *Calotropis procera* (0.67), *Artemisia maritima* (0.65), *Malva parviflora* (0.61), Trigonella *Foenum-graecum* and *Cynodon dactylon* (0.59), *Vitex negundo* and *Saccharum spontaneum* (0.58), *Allium jacquemontii* (0.55). The lowest value resulted from *Diospyros lotus* (0.07), *Capsella bursa-pastoris* (0.09), *Chrozophora tinctoria* and *Verbena officinalis* (0.1) each, *Fagonia cretica*, *Atriplex patula*, *Cassia fistula*, and *Syzygium aromaticum* (0.11) each, *Agave americana*, *Convolvulus arvensis*, *Opuntia dillenii* and *Oxalis corniculata* (0.12) each (Table 3 and 4).

Relative popularity level (RPL)

The highest RPL value were resulted for *Cannabis sativa* (1.91), followed by *Phyllanthus fraternus* (1.88), *Albizia julibrissin* (1.82), *Chenopodium album* and *Galium apanine* (1.77) each, *Berberis lycium* (1.76), *Allium sativum* (1.74), *Foeniculum vulgare* and *Allium jacquemontii* (1.70) each, *Calotropis procera* (1.69), *Tylophora hirsute*, *Euphorbia pilulifera* and *Solanum americanum* (1.65), *Artemisia scoparia* (1.64). The top five lowest value were resulted for *Tinospora sinensis* (0.01), *Convolvulus arvensis* (1.04), *Sisymbrium irio* (1.06), *Brassica campestris* and *Erigeron bonariensis* (1.07), *Heliotropium indicum* (1.08) and *Coriandrum sativum* and *Cordia dichotoma* (1.09) (Table 3 and 4).

Rank Order Priority (ROP)

The ROP value ranged from (1.59) to (0.03), highest value was recorded for *Chenopodium album* and *Galium aparine* (1.59), *Artemisia scoparia* (1.46), *Ricinus communis* and *Solanum surattense* (1.43), *Apluda mutica* (1.30), *Xanthium strumarium* (1.25), *Berberis lyceum* (1.23), *Acacia modesta* and *Cymbopogon citratus* (1.19), *Foeniculum vulgare*, *Euphorbia pilulifera* and *Solanum Americanum* (1.15), *Calotropis procera* (1.14), *Luffa cylindrica* (1.13). However, the lowest values were recorded for *Asphodelus tenuifolius* (0.3), *Withania somnifera* (0.6), *Celosia argentia* and *Emex spinosa* (0.7), *Tylophora hirsute*, *Oxalis corniculate* and *Verbena officinalis* (0.15), *Cupressus sempervirens* (0.21), *Adiantum incisum* (0.27) (Table 3 and 4).

Informant consensus factor (ICF)

A total of 14 diseases were recorded, amongst them the top five leading diseases was intestinal worms (0.98), followed by urine infection (0.97), abdominal pain (0.95), however body cooling and Wound healing had (0.94) each, respiratory and kidney disorders had (0.89) each, while the lowest top three ailments were hepatitis (0.33), diabetes (0.42), malarial fever with (0.69) value (Table 2).

Jaccard index (JI)

The comparison of our current data with previously published articles from different localities of Pakistan was done, JI ranged from 40.34 to 14.28. The highest JI value record was 40.34 from District Buner, Pakistan (Jan *et al.* 2020a), followed by 36.72 from Lower Dir, Pakistan (Irfan *et al.* 2023), 36.65 from District Swabi, Khyber Pakhtunkhwa, Pakistan (Mushtaq *et al.* 2017), 33.64 from district Malakand, Pakistan (Alamgeer *et al.* 2013), 27.89 from Abbottabad, Pakistan (Abbasi *et al.* 2010), 24.46 around indus river (Mussarat *et al.* 2014), 23.75 district Bhimber Azad Jammu and Kashmir, Pakistan (Mahmood *et al.* 2011), 22.75 from Buner, Pakistan (Hamayun *et al.* 2006), 20.74 from Lower Swat, Pakistan (Ali *et al.* 2023), 16.56 from Shahgram valley, district swat, Pakistan (Hassan *et al.* 2020), 15.60 from Dera Ismail Khan, Pakistan (Marwat *et al*. 2011), and 14.28 from lone valley, district Chitral, Pakistan (Ahmad *et al.* 2019) (Table 5).

Table 4. Checklist of medicinal flora of district Swabi, Khyber Pakhtunkhwa, Pakistan.

Division/Families/ Taxa name	Habitat	Habit	Spines	Abundance	Parts used	Cultivation status	Medicinal uses	UV	RFC	FL	RPL	ROP
Pteridophytes												
Pteridaceae												
Adiantum capillus-veneris L.	Sc	H	_	R	L	W	Leaves boiled in water after cooling water is used for toothache and headache.	0.09	0.15	0.35	1.37	0.479
Adiantum incisum Forssk.	Sc	H	+	R	L	W	Leaves boiled in water after cooling water is used for toothache and headache	0.10	0.22	0.18	1.5	0.27
Equisetaceae												
Equisetum ramosissimum Desf.	Sc	H	_	Co	S	W	Fresh stem was used against hepatitis in powder form.	0.8	0.5	0.14	1.9	0.266
Gymnosperms												
Cupressaceae												
Cupressus sempervirens L.	Sc	T	_	R	R	W	Dried roots were used dried form for stomach pain and toothache.	0.11	0.17	0.14	1.5	0.21
Cycadaceae												
Cycas revoluta Thunb.	Xe	S	_	R	R	W	Decoction of roots used for high blood pressure and headaches.	0.4	0.25	0.20	1.7	0.34
Angiosperms												
Amaranthaceae												
Amaranthus graecizans L.	Xe	H	_	Co	L	W	Infusion of eaves were used for inflammation.	0.12	0.10	0.23	1.2	0.276
Aerva javanica (Burm.f.) Juss	Xe	H	_	R	L	W	Leaves used as a purgative.	0.3	0.16	0.4	1.3	0.52
Atriplex patula L.	Sc	H	_	R	L	W	Young leaves were used for skin infection.	0.10	0.8	0.11	1.5	0.165

Chenopodium album L.	Xe	H	_	Co	L	W	Fresh leaves used for anthelmintic, eye infection, cardiac problem.	0.9	0.4	0.9	1.77	1.59
Celosia argentia L.	Me	S	+	R	L	W	Leaves used for eye infection and anti-diabetic	0.06	0.8	0.5	1.40	0.7
Digera muricata (L.) Mart..	Me	H	_	Co	L	W	Dried leaves Employed for kidney infection and constipation.	0.2	0.10	0.8	1.36	1.08
Achyranthes aspera L.	Me	H	+	Co	L	W	Leaves used for bronchitis and bleeding teeth.	0.6	0.9	0.18	1.28	0.230
Amaranthus spinosus L.	Me	H	_	Co	L	W	Leaves Used for pain and fever.	0.7	0.12	0.15	1.22	0.183
Amaranthus viridis L.	Xe	H	_	Co	L	W	Leaves Used as a Cathartics.	0.33	0.19	0.44	1.52	0.668
Asteraceae												
Artemisia scoparia Waldst. & Kitam.	Me	S	_	R	R	W	Root powder used to treat epilepsy, mixed with tea and used for sore throat.	0.6	0.11	0.9	1.63	1.46
Artemisia maritima L.	Xe	H	_	R	L	W	Dry leaves used as a anthelmintic	0.60	0.85	0.65	1.64	1.06
Carthamus oxyacantha M.Bieb.	Xe	S	+	Co	L	W	Leaves Used for healing of wound and for inflammatory cause.	0.8	0.03	0.45	1.42	0.504
Calendula arvensis M.Bieb.	Me	H	_	R	F	W	Fresh Flowers were Employed for wound healing.	0.3	0.13	0.1	1.27	0.127
Cirsium arvense (L.) Scop.	Me	H	+	Co	R	W	Roots in powder form were used as a diuretic.	0.4	0.02	0.6	1.33	0.798
Eclipta prostrata L.	Me	H	_	Co	L	W	Leaves Used for skin infection and gastrointestinal problem.	0.8	0.01	0.3	1.12	0.336
Erigeron bonariensis L.	Me	H	_	Co	O	W	Oils in pure form used for eye disorder.	0.29	0.20	0.2	1.07	0.214
Erigeron canadensis L.	Sc	S	_	Co	F	W	Flowers Treat lower respiratory infection.	0.35	0.04	0.33	1.43	0.471
Sonchus asper (L.) Hill	Me	H	_	Co	R	W	Roots extract Used for wound healing.	0.12	0.5	0.19	1.23	0.233
Xanthium strumarium L.	Me	S	+	Co	Fr	W	Fruits were used for headache and ulcer.	0.5	0.03	0.8	1.57	1.25
Amaryllidaceae												
Allium jacquemontii Kunth.	Me	H	_	R	R	W	Root powder used for stomach infection.	0.70	0.19	0.55	1.70	0.935

Allium sativum L.	Me	H	_	Co	B	C	Bulb Used against high blood pressure, heart problems and as a tonic for stomach problems.	0.46	0.3	0.5	1.74	0.87
Asparagaceae												
Agave americana L.	Me	S	+	R	Fr	W	Fruits Used to prevent bleeding of gums.	0.12	0.8	0.12	1.40	0.168
Apiaceae												
Anethum graveolens L.	Me	S	_	Co	Se	W	Seeds were used	0.35	0.16	0.16	1.35	0.216
Ammi visnaga (L.) Lam.	Me	H	_	Co	F	C	Flowers were used for intestinal and stomach infection.	0.4	0.4	0.24	1.11	0.266
Coriandrum sativum L.	Me	H	_	Co	L	C	Leaves Used as a flavor agent, against hypoglycemia, skin infection etc.	0.4	0.2	0.27	1.09	0.294
Foeniculum vulgare Mill.	Me	S	_	Co	Se	W	Seeds Used to expel gasses from stomach, respiratory disorder.	0.57	0.80	0.68	1.70	1.15
Apocynaceae												
Calotropis procera (Aiton) Dryand.	Xe	S	_	R	L	W	Leaves Used against snake and dog piercing. Also, for pain in body.	0.43	0.8	0.67	1.69	1.14
Tylophora hirsuta Wight	Me	S	_	R	L	W	Leaves used for the treatment of healing.	0.49	0.33	0.70	1.65	0.15
Catharanthus roseus (L.) G. Don	Me	H	_	R	R	W	Roots used for diabetes and depression.	0.2	0.26	0.6	1.55	0.93
Aizoaceae												
Trianthema portulacastrum L.	Me	H	_	R	L	W	Leaves used Laxative and for night blindness.	0.5	0.5	0.4	1.14	0.456
Acanthaceae												
Justicia adhatoda L.	Me	S	_	R	L	W	Leaves Used for respiratory infection, inhabit losing motion.	0.59	0.11	0.5	1.13	0.565
Brassicaceae												
Brassica nigra (L.) K.Koch	Me	S	_	Co	O	W	Oils are used as a cooling agent.	0.13	0.9	0.31	1.10	0.341
Brassica compestris L.	Me	H	_	Co	O	W	Oils Used for Inflammation, skin infection,	0.3	0.4	0.18	1.07	0.192
Capsella bursa-pastoris (L.) Medik.	Me	H	_	Co	L	W	Fresh leaves used as an astringent.	0.9	0.21	0.09	1.13	0.101
Lepidium didymum L.	Sc	H	_	Co	L	W	Leaf used to treat wound healing.	0.33	0.12	0.5	1.16	0.58

Nasturtium officinale R.Br.	Me	H	_	Co	L	W	Leaves used for a removal of ring worm from intestine, respiratory infection.	0.31	0.07	0.15	1.10	0.165
Sisymbrium irio L.	Xe	H	_	Co	L	W	Leaves powder used for skin infections.	0.9	0.21	0.8	1.06	0.848
Lepidium sativum L.	Xe	H	_	Co	L	W	Leaves used to prevent abdominal pain and make semisolid stools in children to relief pain.	0.35	0.07	0.25	1.10	0.275
Berberidaceae												
Berberis lycium Royle.	Me	S	+	R	R	C	Roots powder used for Hepatitis, anhydrothethics, skin infection, wound healing and relief vertebral column pain.	0.02	0.31	0.7	1.76	1.23
Boraginaceae												
Cordia myxa L.	Xe	T	_	Co	L	W	Powder of leaves employed for wound healing and laxative.	0.12	0.27	0.36	1.36	0.489
Cordia dichotoma G.Forst.	Me	T	_	Co	Ba	W	Bark powder was used for treatment of fever and headache.	0.2	0.22	0.41	1.09	0.446
Heliotropium indicum L.	Me	S	_	R	L	W	Leaves in poultice form used to treat tumor and skin infection.	0.9	0.12	0.52	1.08	0.561
Cucurbitaceae												
Citrullus colocynthis (L.) Schrad.	Me	H	_	Co	P	C	Pulp of fruits Used for respiratory disorder.	0.23	0.10	0.32	1.10	0.352
Momordica balsamina L.	Me	H	_	Co	Fr	C	Fruits used as a antioxidant in poultice form.	0.40	0.2	0.6	1.19	0.71
Luffa cylindrica (L.) M.Roem.	Xe	H	_	Co	L	W	Leaves green tea used for respiratory infections.	0.04	0.12	0.9	1.26	1.13
Canabaceae												
Cannabis sativa L.	Xe	S	_	Co	Se	W	Boiled seeds used as anodyne and analgesic.	0.68	0.56	0.19	1.91	0.362

Convolvulaceae												
Cuscuta reflexa Roxb.	Me	H	_	R	S	W	Stem powder were used for fever and pain.	0.27	0.10	0.17	1.10	0.187
Convolvulus arvensis L.	Me	H	_	R	L	W	Leaves crushed, boiled in milk, filtered and the extract administered to patients of epilepsy for ten days.	0.02	0.16	0.12	1.04	0.124
Cyperaceae												
Cyperus rotundus L.	Sc	H	_	Co	R	W	Roots powder were used for stomach disorder.	0.30	0.23	0.41	1.35	0.553
Cactaceae												
Opuntia dillenii (Ker Gawl.) Haw.	Me	S	+	R	Fr	W	Fruits in powder form used as an anti-inflammatory.	0.32	0.5	0.12	1.40	0.168
Caryophyllaceae												
Silene conoidea L.	Me	H	+	Co	R	W	Roots decoction used for respiratory disorder.	0.8	0.09	0.15	1.14	0.171
Stellaria media (L.) Vill.	Me	H	_	Co	L	W	Leaves powder used to treat various gastrointestinal disorder.	0.6	0.8	0.9	1.10	0.99
Datiscaceae												
Datisca cannabina L.	Me	H	_	R	F	W	Fresh flowers were used as a laxative.	0.21	0.9	0.48	1.16	0.556
Euphorbiaceae												
Chrozophora tinctoria (L.) A. Juss.	Xe	H	_	Co	L	W	Leaves boiled with water and then used for fever.	0.8	0.9	0.10	1.17	0.117
Euphorbia helioscopia L.	Xe	H	_	Co	Lx	W	Latex externally used in skin disorder, anthelmintics.	0.22	0.6	0.8	1.26	1.00
Euphorbia pilulifera L.	Xe	H	_	Co	Lx	W	Latex Use for respiratory infection.	0.45	0.23	0.7	1.65	1.15
Ricinus communis L.	Me	S	_	Co	O	W	Oils Used against all body pain and abdominal infection.	0.53	0.15	0.9	1.59	1.43
Euphorbia prostrata Aiton	Me	H	_	Co	R	W	Roots are purgative, relieves chronic coughing and dysentery.	0.66	0.04	0.19	1.6	0.304
Ebenaceae												
Diospyros lotus L.	Sc	T	_	R	Fr	W	Fruits Used as a tonic & nutritious	0.5	0.9	0.07	1.30	0.091
Fabaceae												
Cassia fistula L.	Xe	T	_	R	Fr	W	Fruits dried used for joint pain.	0.2	0.1	0.11	1.32	0.145

Indigofera heterantha Brandis	Xe	S	_	R	R	W	Roots Used for abdominal and headache pain.	0.33	0.6	0.71	1.10	0.781
Glycine max (L). Merr	Me	S	_	R	Se	C	Boiled seeds useful to prevent the cancer.	0.5	0.5	0.3	1.5	0.45
Lathyrus sativus L.	Me	S	_	R	Se	C	Boiled Seeds Used as an antiallergenic.	0.6	0.32	0.6	1.7	1.02
Medicago minima (L.) L.	Xe	H	_	Co	R	W	Roots decoction used to treat cancer and diabetes.	0.37	0.01	0.35	1.27	0.444
Melilotus indicus (L.) All.	Xe	H	_	Co	Se	W	Seeds Used a laxative.	0.3	0.11	0.13	1.43	0.185
Prosopis juliflora (Sw.) DC	Xe	S	+	Co	L	W	Leaves Used to treat cancer and diabetes.	0.06	0.12	0.2	1.7	0.34
Trigonella foenum-graecum L.	Xe	H	_	Co	Se	W	Powder of Seeds used as a carminative.	0.39	0.55	0.59	1.28	0.755
Acacia nilotica (L.) Delile	Me	T	+	Co	G	W	Gum used as a tonic for curing diabetes. Hepatitis C, cancer etc.	0.55	0.26	0.45	1.23	0.553
Acacia modesta Wall.	Xe	T	+	Co	G	W	Gum used for Wound healing, dysentery, backache, gum for binding tablets.	0.6	0.48	0.9	1.33	1.19
Albizia julibrissin Durazz.	Xe	T	_	R	R	W	Dried roots were used for skin infection and cancer.	0.03	0.40	0.53	1.82	0.964
Albizia procera (Roxb.) Benth.	Xe	T	_	Co	R	W	Powder of roots used to treat stomach infection.	0.2	0.09	0.34	1.48	0.503
Albizia lebbeck (L.) Benth.	Xe	T	_	Co	R	W	Dried roots Used for respiratory infection.	0.7	0.11	0.35	1.30	0.455
Juglandaceae												
juglans regia L.	Me	T	_	R	Fr	W	Fruits Used to remove ring worm, toothache, expel gases from stomach.	0.8	0.15	0.30	1.39	0.417
Lamiaceae												
Ajuga trachystemon Maxim.	Xe	H	_	Co	L	W	Leaves powder used for stomach infections.	0.10	0.17	0.2	1.32	0.264
Mentha arvensis L.	Sc	H	_	Co	L	W	Leaves green tea is made and used for nausea and vomiting.	0.3	0.32	0.48	1.34	0.643

Mentha longifolia (L.) L.	Sc	H	_	Co	L	W	Leaves Contains high number of volatile oils and is important for expelling gases from stomach.	0.6	0.22	0.46	1.40	0.644
Micromeria biflora (Buch. -Ham. ex D.Don) Benth.	Xe	H	_	R	L	W	Leaves used for relief pain in tooth and facial area.	0.18	0.22	0.47	1.34	0.629
Rydingia limbata (Benth.) Scheen & V.A.Albert	Me	S	+	R	L	W	Leaves Used for eye infection and sedative.	0.10	0.06	0.40	1.37	0.548
Vitex negundo L.	Me	T	_	R	L	W	Leaves are used as an anthelminthics and respiratory tract.	0.12	0.70	0.58	1.8	1.04
Lythraceae												
Punica granatum L.	Xe	T	_	Co	Fr	W	Fruits Used against stress, high blood pressure and sugar.	0.11	0.04	0.75	1.12	0.84
Malvaceae												
Bombax Ceiba L.	Me	T	+	R	F	C	Flowers Used to remove ring worm.	0.01	0.14	0.8	1.2	0.96
Grewia optiva J.R.Drumm. ex Burret	Me	S	_	R	L	W	Leaves used for the treatment of cough and malaria.	0.15	0.33	0.25	1.29	0.322
Grewia asiatica L.	Me	S	_	R	L	W	Fresh Leaves grinded and then used to treat fever.	0.12	0.13	0.3	1.15	0.345
Malva neglecta Wallr.	Me	H	_	Co	Se	W	Dry seeds used in respiratory disorder.	0.8	0.11	0.3	1.17	0.351
Malva parviflora L.	Me	H	_	R	L	W	Fresh leaves used for wound healing.	0.14	0.32	0.61	1.32	0.805
Hibiscus rosa-sinensis L.	Me	T	_	R	F	W	Dry flowers were Used for the treatment of cough, fever and diabetes.	0.40	0.32	0.6	1.33	0.798
Moraceae												
Morus alba L.	Me	T	_	Co	Fr	W	Fruits used to remove microorganism from intestine.	0.5	0.9	0.33	1.33	0.438
Morus nigra L.	Xe	T	_	Co	Fr	W	Fruits used to remove microorganism from intestine.	0.08	0.05	0.22	1.44	0.316
Broussonetia papyrifera (L.) L'Hér ex Vent.	Xe	T	_	Co	Ba	W	Bark Used for mouth infection.	0.07	0.8	0.9	1.25	1.12
Ficus benghalensis L.	Xe	T	_	R	L	W	Leaves Used for nervous disorder.	0.27	0.06	0.17	1.12	0.190

Ficus virgata Reinw. ex Blume	Me	T	_	R	L	W	Leaves Used to treat digestive disorder.	0.13	0.02	0.8	1.14	0.912
Ficus carica L.	Me	T	_	Co	L	W	Leaves Used against respiratory disorder, heart problems etc.	0.14	0.5	0.19	1.53	0.290
Myrtaceae												
Syzygium aromaticum (L.) Merr &L.M.Perry	Me	S	_	R	F	W	Flowers Used for vomiting and nausea.	0.37	0.60	0.11	1.40	0.154
Menispermaceae												
Tinospora sinensis (Lour.) Merr.	Me	H	_	R	R	W	Roots powder used for digestive problems.	0.43	0.3	0.6	1.02	0.612
Nyctaginaceae												
Mirabilis jalapa L.	Sc	H	_	Co	L	W	Powder of leaves Used as a purgative.	0.9	0.33	0.4	1.45	0.58
Boerhavia diffusa L.	Me	H	_	R	L	W	Fresh leaves used of urine infections.	0.2	0.10	0.7	1.18	0.826
Nitrariaceae												
Peganum harmala L.	Xe	H	_	R	Se	W	Seeds in powder form used for cardiac problems.	0.5	0.09	0.22	1.15	0.253
Oxalidaceae												
Oxalis corniculata L.	Sc	H	_	Co	L	W	Leaves in powder form used as anthelminthic, healing of wound, high blood sugar.	0.27	0.5	0.12	1.29	0.154
Oleaceae												
Jasminum officinale L.	Me	S	_	R	F	W	Infusion of flowers used for abdominal pain.	0.2	0.36	0.35	1.38	0.483
Poaceae												
Apluda mutica L.	Me	H	_	Co	L	W	In poultice form the leaves Applied for mouth infection.	0.4	0.03	0.9	1.45	1.30
Avena fatua L.	Me	S	_	Co	L	W	Fresh leaves with sugar used as a laxative.	0.9	0.70	0.6	1.47	0.882
Cynodon dactylon (L.) Pers.	Xe	H	_	Co	L	W	Leaves used for Dysentery, wounds for animals	0.39	0.5	0.59	1.28	0.755
Cymbopogon citratus (DC)Stapf.	Xe	H	_	Co	L	C	Leaves Used for fever and analgesic.	0.6	0.48	0.9	1.33	1.19

Dactyloctenium aegyptium (L. Willd.	Xe	H	_	Co	L	W	Leaves Used for wound healing and ulcer.	0.03	0.40	0.53	1.2	0.636
Desmostachya bipinnata (L.) Stapf	Xe	H	_	Co	L	W	Leaves Dried form used for diuretic.	0.2	0.09	0.5	1.48	0.74
Dendrocalamus strictus (Roxb. Nees	Sc	T	_	Co	L	W	Leaves Used for food purposes due to a lot of nutrients.	0.7	0.41	0.40	1.30	0.52
Dichanthium annulatum (Forssk. Stapf	Me	H	_	Co	L	W	Leaves Used to give relief in inflammation.	0.8	0.15	0.35	1.39	0.486
Eleusine indica (L) Gaertn.	Me	H	_	Co	L	W	Leaves Used to treat influenza.	0.09	0.15	0.35	1.37	0.479
Echinochloa crus-galli (L.) P.Beauv.	Me	H	_	Co	L	W	Young leaves were used for cancer and wound healing.	0.10	0.17	0.1	1.32	0.132
Imperata cylindrica (L.) Raeusch.	Me	H	_	R	L	W	Leaves Used to treat tubers and also protection liver.	0.6	0.22	0.46	1.40	0.644
Lolium temulentum L.	Me	H	_	Co	L	W	Leaves Used for paralysis patient.	0.10	0.22	0.48	1.34	0.643
Pennisetum glaucum (L.) R.Br.	Me	H	_	Co	L	W	Boiled leaves helpful in the treatment of cardiac problem.	0.11	0.06	0.4	1.37	0.548
Saccharum spontaneum L.	Me	S	_	Co	L	W	Leaves in dried form helpful to break the kidney stones.	0.12	0.7	0.58	1.11	0.643
Papaveraceae												
Argemone mexicana L.	Me	H	+	Co	R	W	Decoction of roots used for skin infection and malaria.	0.3	0.14	0.8	1.2	0.96
Fumaria indica (Hausskn.) Pugsley	Me	H	_	Co	L	W	Fresh leaves used for fever and pain in body.	0.15	0.33	0.25	1.29	0.322
Papaver somniferum L.	Xe	H	_	R	Se	C	Boiled seeds Used for severe pain in the body.	0.12	0.13	0.3	1.15	0.345
Papaver rhoeas Linn	Xe	H	_	Co	Se	W	Seeds in powder form used as a painkiller.	0.8	0.11	0.3	1.17	0.351
Phyllanthaceae												
Phyllanthus fraternus G.L.Webster	Me	H	_	Co	R	W	Roots decoction with sugar used to treat malaria.	0.50	0.32	0.6	1.88	1.12
Polygalaceae												
Rumex crispus L.	Xe	H	_	R	L	W	Leaves grinded in powder form and used as a carminative and laxative.	0.13	0.02	0.8	1.14	0.912
Emex spinosa (L.) Campd.	Xe	H	+	Co	L	W	Boiled leaves used as a painkiller and for wounds healings.	0.12	0.44	0.5	1.4	0.7

Pedaliaceae												
Sesamum indicum L.	Me	H	_	R	Se	W	Seeds boiled in water helpful to reduce swelling.	0.11	0.04	0.7	1.12	0.784
Portulacaceae												
Portulaca oleracea linn.	Me	H	_	R	S	W	Stem used as an antiseptic in poultice form.	0.01	0.14	0.8	1.2	0.96
Primulaceae												
Anagallis arvensis L.	Me	H	_	Co	L	W	Boiled leaves Used to treat viral infection.	0.12	0.13	0.3	1.15	0.345
Ranunculaceae												
Ranunculus sceleratus L.	Xe	H	_	Co	L	W	Decoction of Leaves and roots were used to treat mostly joint pain.	0.27	0.06	0.20	1.12	0.224
Rosaceae												
Rosa indica L.	Me	S	+	Co	Fr	W	Dried powder of fruits used for antiasthma and mouth diseases.	0.8	0.05	0.2	1.44	0.288
Rubiaceae												
Galium aparine L.	Me	H	_	R	L	W	Poultice form of leaves externally applied on pelvis region for pain relive.	0.11	0.4	0.9	1.77	1.59
Rhamnaceae												
Ziziphus nummularia (Burm.f. Wight & Arn.	Me	T	+	Co	Fr	W	Fruits Extract mixed in pomegranate juice used against Hepatitis.	0.12	0.10	0.8	1.36	1.08
Ziziphus jujuba Mill.	Xe	T	+	Co	Fr	W	Fresh fruits used as emollient and in dry cough.	0.14	0.9	0.15	1.28	0.192
Rutaceae												
Zanthoxylum armatum DC.	Xe	T	+	R	Fr	W	Dried fruits used as an anti-inflammation.	0.20	0.19	0.44	1.5	0.655
Citrus medica L.	Me	T	+	Co	Fr	C	Powder of fruits used for high blood pressure, remove spots from face, give growth to hair.	0.05	0.18	0.44	1.49	0.10
Solanaceae												
Cestrum nocturnum L.	Xe	S	_	R	L	W	Leaves in fresh form used as a analgesic.	0.32	0.32	0.44	1.30	0.572

Cestrum diurnum L.	Me	S	_	R	L	W	Leaves infusion used for the treatment of body pain.	0.33	0.22	0.42	1.29	0.541
Datura stramonium L.	Me	S	+	R	L	W	Lzeaves powder used for stimulant of central nervous system, toothache etc.	0.40	0.32	0.75	1.25	0.937
Datura innoxia Mill.	Me	H	+	R	L	W	Leaves extract used as toothache, epilepsy and headache, treatment of swollen limbs. Seeds are antipyretic and narcotic	0.14	0.32	0.77	1.28	0.985
Brugmansia arborea (L.) Steud.	Me	S	_	R	L	W	Leaves extract used for relief joint and head pain.	0.39	0.33	0.6	1.19	0.714
Solanum americanum Mill.	Me	H	_	Co	L	W	Leaves in poultice form used to treat ulcer and different skin infections.	0.45	0.23	0.7	1.65	1.15
Solanum surattense Burm. f.	Me	H	+	Co	L	W	Leaves powder used for respiratory disorder viz. asthma, cough bronchitis etc.	0.53	0.15	0.9	1.59	1.43
Withania somnifera (L.) Dunal.	Xe	S	_	R	L	W	Leaves fresh used for asthma and cancer.	0.8	0.8	0.5	1.20	0.6
Sapindaceae												
Dodonaea viscosa (L.) Jacq.	Xe	S	_	Co	Se	W	Boiled seeds used for high temperature, antimalarial etc.	0.29	0.8	0.9	1.25	1.12
Simaroubaceae								0.36	0.12	0.30	1.7	0.51
Ailanthus altissima (Mill.) Swingle	Me	T	_	Co	L	W	Fresh leaves used for cardiac and respiratory problems.	0.35	0.7	0.22	1.9	0.418
Scrophulariaceae												
Verbascum Thapsus L.	Xe	H	_	R	L	W	Dried leaves Used as a analgesic, antiasthma etc.	0.33	0.6	0.24	1.10	0.264
Salicaceae												
Populus alba L.	Me	T	_	Co	Ba	W	Bark Used for digestive disorder.	0.23	0.27	0.34	1.2	0.408
Tamaricaceae												
Tamarix aphylla (L.) H.Karst.	Me	T	_	Co	L	W	Dried leaves used as a carminative.	0.5	0.1	0.46	1.11	0.510

Verbenaceae												
Verbena officinalis L.	Me	H	_	R	F	W	Flower infusion used as Diuretic, expectorant and anti-rheumatic effects.	0.43	0.5	0.10	1.5	0.15
Lantana camara L.	Sc	S	+	Co	Se	W	Boiled seeds used for expelling gases from stomach, diaphoretic, antimalarial.	0.46	0.4	0.6	1.25	0.75
Vitaceae												
Vitis vinifera L.	Sc	S	_	R	Fr	W	Fruit and leaves used for stomach problem, Kidney disorder, astringent, demulcent, removal of bowl, heart pain, asthma.	0.33	0.67	0.45	1.23	0.553
Xanthorrhoeaceae												
Asphodelus tenuifolius cav.	Me	H	_	R	Se	W	Powder of seeds Applied for wound healing.	0.34	0.22	0.20	1.5	0.3
Zygophyllaceae												
Fagonia cretica L.	Me	H	+	Co	L	W	Make a tea from leaves Used for toothache and skin infection.	0.25	0.7	0.11	1.7	0.187
Tribulus terrestris L.	Me	H	_	R	Fr	W	Fresh fruits useful to expel stone from kidney	0.28	0.12	0.18	1.10	0.198

Legends: **Me**: Mesophytes; **Sc**: Sciophytes; **Xe**: Xerophytes; **H**: Herb; **S**: Shrub; **T**: Tree; R: Rare; **Co**: common; **L**: Leaves; **S**: Stem; **Se**: Seeds; **F**: Flower; **Fr**: Fruits; **B**: Bulb; **P**: Pulp; **Ba**: Bark; **G**: Gum; **O**: Oil; **Lx**: Latex; **W**: Wild; **C**: Cultivated.

Table 5. Analogy of our given knowledge with previously published articles

Reported area	Total no. of taxa	Taxa with same uses	Taxa with different uses	Taxa common in both area	% of taxa with same uses	% of taxa with different uses	JI	Citation
District Swabi, Khyber Pakhtunkhwa, Pakistan	66	10	4	14	12.34	4.93	36.65	Mushtaq *et al.* 2017
Lower Dir, Pakistan	147	8	3	11	9.63	3.61	36.72	Irfan *et al.* 2023
District Buner, Pakistan	60	3	12	15	3.19	12.76	40.34	Jan *et al.* 2020
Buner, NWFP, Pakistan.	72	5	3	8	11.62	6.97	22.75	Hamayun *et al*. 2006
District Malakand, Pakistan	92	4	6	10	5.47	8.21	33.64	Alamgeer *et al*. 2013
Around Indus River	70	2	10	12	4.34	21.73	24.46	Musarrat *et al.* 2014
Shahgram valley, district swat, Pakistan	90	5	8	13	17.85	28.57	16.56	Hassan *et al.* 2020
Lower Swat, Pakistan	118	4	1	5	10.25	2.56	20.74	Ali *et al.* 2023
Lone valley, district Chitral, KPK, Pakistan	35	1	3	4	4.0	12.0	14.28	Ahmad et *al.* 2019
Dera Ismail Khan, KPK, Pakistan	26	6	2	8	22.22	7.04	15.60	Marwat & Rehman, 2011
District Bhimber Azad Jammu and Kashmir, Pakistan	38	7	9	16	16.27	20.93	23.75	Mahmood *et al.* 2011
Abbottabad, Pakistan	54	10	7	17	18.86	13.20	27.89	Abbasi *et al.,* 2010

Discussion

The current ethnomedicinal study was carried on the flora of district Swabi, Khyber Pakhtunkhwa, Pakistan. A total of 154 taxa belonged to 130 genera distributed in 58 families were reported. Amongst them the leading family was Poaceae with 14 taxa, while the second leading family was Fabaceae with 13 taxa, followed by Amranthaceae with 11 taxa. The poaceae was diverse and dominant family due to easily availability and also owing to divers' vegetation (Ullah *et al.* 2014; Abdin *et al.* 2022; Rehman *et al*. 2013). However, on the basis of habitat 90 taxa (58.44%) were mesophytes, while 14 taxa (9.09%) were sciophytes, and 50 taxa (32.46%) were xerophytes. Similar previous studies of (Agbor & Naidoo, 2016; Ahmad *et al.* 2021; Khan *et al.* 2023) documented the dominancy of herbs from their studied areas and suggested them with high potential for medicinal uses.

The dominant habitat was mesophytes that showed the similarity with the work of (Ijaz *et al.* 2016; Irfan *et al.* 2018c). The 92 taxa were common (59.74%), and 62 taxa were rare, amongst them 142 taxa (92.2%) were wild, and 12 taxa (7.79%) were cultivated. Our work clarified that the area is one of the diverse hub for the medicinal plants due to the dominancy of common and wild taxa, our findings were supported by the work of (Jan *et al.* 2021b). The specific parts of the medicinal taxa have the potential to cure a disorder (Wali *et al.* 2021; Ullah *et al.* 2022). Although in our findings the leaves of 78 taxa (50.6%) were used dominantly, followed by roots of 19 taxa (12.3%), and fruits of 17 taxa (11%) which indicated that leaves and roots have greater potential for the curing of different disorders (Abbas *et al.* 2017; Hussain *et al.* 2018; Farooq *et al.* 2019). The fresh and dried leaves have most potential to work effectively (Ahmad *et al.* 2016).

Due to the easily availability of these plant and due to poverty still the maximum population of the area relied on the medicinal taxa (Jan *et al.* 2021a). The consequences of using different plant taxa were different because the inhabitants were mostly unaware about modern facilities and mostly depend upon traditional knowledge, and ancestor's instructions because due to the expensive prices of modern medicines and poverty of inhabitants their native home-made remedies and medicines were used commonly (Younis *et al.* 2018; Irfan *et al*. 2018e).

Our results were in close union with a variety of other researchers who has previously conducted their study in different parts of Pakistan viz (Akhtar *et al.* 2013; Arif *et al.* 2021). The use value of ethnomedicinal plants taxa ranged from (0.70) to (0.01) amongst them the highest UV were recorded for *Allium jacquemontii* (70) *Cannabis sativa* (0.68), *Euphorbia prostrata* (0.66) while the lowest valu was had the *Bombax Ceiba* and *Portulaca oleracea* (0.01) each, *Berberis lycium* and *Convolvulus arvensis* (0.02) each. The relative frequency citation indicating the application of taxa by the reviewing the previous reports of taxa in our results RFC indicated the range from (0.85) to (0.01) and the highest RFC value recorded for *Artemisia maritima* (0.85) followed by *Foeniculum vulgare* (0.80), *Tylophora hirsuta* and *Vitex negundo* (0.7) which were close to in similarity with the work of (Irfan *et al.* 2018g; Jan *et al.* 2020b). The FL value recorded ranged from (0.77) to (0.09). *Datura innoxia* (0.77), *Punica granatum* and *Datura stramonium* (0.75) each, *Tylophora hirsuta* (0.70) although lowest value was resulted by *Diospyros lotus* (0.07), *Capsella bursa-pastoris* (0.09), *Chrozophora tinctoria* and *Verbena officinalis* (0.10) each. The FL value predict the application of taxa by the informant of resident area numerals, these indices provide proper sight for new emerging medicinal taxa (Boesi, 2014; Batool *et al.* 2017).

The highest RPL value noted for *Cannabis sativa* (1.91), followed by *Phyllanthus fraternus* (1.88), *Albizia julibrissin* (1.82) and lowest value were resulted for *Tinospora sinensis* (0.01), *Convolvulus arvensis* (1.04), *Sisymbrium irio* (1.06). The RPL value approaching the popularity level of a particular taxa for specific disorder and same companion work was done by (Bussmann, 2006; Bhatia *et al.* 2018). The ROP value resulted by the multiplication of FL and RPL value which ranked the taxa (Zahoor *et al.* 2017; Irfan *et al.* 2017). In our work highest ROP value ranges from (1.59) to (0.03) and top value recorded for *Chenopodium album* and *Galium aparine* (1.59), *Artemisia scoparia* (1.46), *Ricinus communis* and lowest for *Asphodelus tenuifolius* (0.3), *Withania somnifera* (0.6), *Celosia argentia* and *Emex spinosa* (0.7).

The ICF value indicated the leading disorder in resident area such as Intestinal worms first dominant with value (0.98) due to suitable host in the people of area during winter, while the second dominant disease was Urine infection with (0.97) value because of unhealthy water and some local drinks, third dominant category was Abdominal pain with (0.95) were common due to the carrying the weighted luggage of wood from mountains and these were same to the previous work of (Butt *et al.* 2015; Irfan *et al.* 2018a; Shrestha and Kunwar, 2023). In union to this work the relative importance of the selected taxa were supported by the work of (Keyani *et al.* 2015; Asif *et al*. 2021; Hassan *et al.* 2022). The similarity based approached was performed using Jaccard index in current study JI ranging from 40.34 to 14.28. The highest JI value record 40.34 from District Buner, Pakistan (Jan *et al.* 2020a) followed by 36.72 from Lower Dir, Pakistan (Irfan *et al.* 2023) in union to same methodology was followed by (Ashfaq *et al.* 2019; Bahadur *et al.* 2020; Shuhaib *et al.* 2023).

Conclusion

The inhabitants of district Swabi, Khyber Pakhtunkhwa, Pakistan were involved at large scale in the uses of these valuable medicinal taxa. Usually, the taxa were used in different ailments viz. intestinal worms, urine infection, abdominal pain, body cooling, wound healing, respiratory and kidney disorders, hepatitis, diabetes, malarial fever. The sustainable use of these taxa could lead to drug discovery at the commercial level. Cultivation of these taxa at a large scale for different purposes viz. food, medicine, shelter, and ornamental purpose is greatly required. The consequences of using medicinal taxa were different because the inhabitants were mostly unaware of modern facilities and mostly depend upon traditional knowledge and ancestor's instructions. Due to the expensive prices of modern medicines and the poverty of inhabitants their native homemade medications were commonly used.

Declarations

Ethics approval: The ethical committee reviewed and approved the research entitled "Quantitatively based approaches on the medicinal Flora of district Swabi, Khyber-Pakhtunkhwa, Pakistan" conducted at Department of Botany, University of Swabi Pakistan.
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Author's contribution: FU designed the project and wrote the first draft of the manuscript; MI supervised the study; MS reviewed and revised the manuscript.

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