Ethnomedicinal and Traditional uses of the Flora of District Lower Dir, Khyber Pakhtunkhwa, Pakistan

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Research

Abstract

Background: The present study aimed to assess the traditional knowledge and uses of ethnomedicinal plants to cure different disorders. The local inhabitants of district Lower Dir, Pakistan was relied on medicinal plants for their fundamental medical requirements.

Methods: The ethnomedicinal and traditional knowledge was approached by using the questionnaire and random interviews. Mostly old people were approached for the collection of information regarding the traditional uses of medicinal plant. The data were analyzed with the help of various statistical indices such as fidelity level (FL), use value (UV), relative popularity level (RPL), relative order priority (ROP), relative frequency citation (RFC) and jaccard index (JI).

Results: A total of 147 taxa belonged to 106 genera and 57 families were reported. The dominant family was Lamiaceae with 18 taxa (12.24%), Asteraceae was the second largest family with 12 taxa (8.16%), Rosaceae was the third largest family with 9 taxa (6.12%), Solanaceae and Brassicaceae with 6 taxa each (8.16%), Amarantheaceae, Brassicaceae, Berberidaceae and Rutaceae with 5 taxa each (13.6%), Violaceae with 4 taxa (2.72%), Apiaceae, Apocynaceae, Cucurbitaceae, Euphorbiaceace, Plantaginaceae, Polygonaceae, and Ranunculaceace with 3 taxa each (14.28%), followed by Acanthaceae, Amaryllidaceae, Fagaceae, Mimosaceae, Moraceae, Myrtaceae, Pinnaceae, Rhamnaceae, Saxifragaceae, Scrophulariacea, Thymelaeaceae, and Verbrnaceae with 2 taxa each (16.32%), while the remaining families contained one taxon each (18.4%). Regarding the parts used mostly leaves of 67 taxa (45.57%), followed by fruits of 25 taxa (17%), roots of 20 taxa (13.60%), seeds of 11 taxa (7.48%), whole plant of 9 taxa (6.12%), bark of 7 taxa (4.76%), oils extracted from seeds and gums of 4 taxa each (5.44%) were used.

Conclusion: The current study provided useful knowledge about ancient using of therapeutic plants species that were utilized by the local inhabitants for curving of various disorders. The inhabitants of the area have diverse knowledge about the remedies of medication for effective work against ailments.

Keywords: Ethnomedicine, Fidelity level, Jaccard index, Lower Dir, Pakistan, Use value.

Background

Ethnomedicine is the knowledge of medicinal plants that originated from the interaction of human, that were used by the local inhabitants for the treatment of different ailments. Those plants that have an active ingredient and specificity to cure various ailments these plants are termed medicinally vital plants (Ali *et al.* 2017; Jan *et al.* 2020a). To realize the importance of plants ethnomedicine has become an important part of our society for the curing of various ailments. Previous suggested studies exposed that Pakistan has diverse flora amongst them six hundred plants are used for medicinal purposes (Ahmad *et al.* 2016; Shinwari *et al.* 2017; Ullah *et al.* 2018).

There are various methods of cultivation and extraction used by the local peoples the increasing the yield of medicinal plants, and their derived medications (Irfan *et al.* 2017, 2018a; Iftikhar *et al.* 2019). The area is correlated with the production of disease-resistant plants which are made vital for the production of medicinal plants (Musa *et al.* 2022; Sher *et al.* 2022). Factuality showed that synthetic and chemically produced medicines have the potential to cause side effects on the body, therefore people prefer the naturally obtained constituents due to fewer lateral effects (Ajaib *et al.* 2010; Abdin *et al.* 2022; Jan *et al.* 2021). Owing to the usage of therapeutic plants by the local Hakeem and due to the efficiency of curing the disease pharmaceutical companies are emerging to obtain certain active potential from the plant, to convert them into modern filed (Tareen *et al.* 2010; Ahmad *et al.* 2021; Ali *et al.* 2023; Sher *et al*. 2023).

The dependency on medicinal plants since the creation of humans and becomes the top-ranked in utilization day by day. However, for preservation these medicinal plants were cultivating by the ancient people in specific fields with proper care, and then these medicinal plants were used by Hakeem for various disorders (Kumar *et al.* 2013; Asif *et al*. 2021; Jan *et al.* 2022; Ullah et al. 2022a). The tribal people of Pakistan still have a dependency on medicinal plants and by the documentation, this knowledge can be preserved. The collection of this traditional knowledge could lead to the discovery of new medicinal plants. The herbal drugs occupy separate position precise from the present day to the primitive period and have the best active ingredients in them. Overall eighty percent of peoples in the overall world have a correlation and dependency on therapeutic plants and native use of the plants (Hamayun, 2003; Rahman *et al*. 2016; Ullah *et al.* 2021). New plant specimens are emerging in pharmaceutical fields by suggesting the local native of the resident areas (Ali *et al.* 2017; Jan *et al.* 2020b; Irfan *et al.* 2018f). The region of the southern Himalayas in Pakistan was diverse due to indigenous plants used by the housewives for medicinal purposes (Qureshi *et al.* 2009; Irfan *et al.* 2018e). Due to their low cost and easy availability, the resident people typically relies on medicinal plants, the local people of the northern areas of Pakistan usually use these medicinal plants for the curing of different diseases (Shuaib *et al.* 2021). Previous suggested studies of district Lower Dir showed the diversity of medicinal plants (Irfan *et al.* 2016; Jan *et al.* 2021b, 2022a; Ullah *et al.* 2022b).

Adjacent to our studied area, previously a study had been assessed from Sheringal Valley, district Upper Dir and documented 62 medicinal plants belonged to 34 families (Hazrat *et al.* 2020). The number of medicinal plants decreased due to the high marketing rate, unwanted uses, and also dependency on medicinal plants. But in spite of that still, district Lower Dir has a rich diversity of medicinal plant (Irfan *et al.* 2017b; Khan *et al*. 2023; Irfan *et al.* 2018d).

In the northern areas of Pakistan people have frequent knowledge about the folk medicines and their recipes for effective work, and their people are expert in making the folk medicines. The district Lower Dir is also part of the northern areas of Pakistan, and due to people correlation with traditional knowledge, they have expertise in plants made recipes for increasing the healing potential (Muhammad *et al.* 2021; Ali *et al.* 2023; Jan *et al.* 2017). Unfortunately, the medicinal plants of the area need proper conservation, to avoid unwanted use of medicinal plants, overgrazing, and deforestation of the area. The present study would be helpful in the near future for the world to access easily the medicinal flora of district Lower Dir, Khyber Pakhtunkhwa, Pakistan. The study also aimed to point out the new emerging medicinal plants through statistical analysis and to provide an enthusiastic report regarding the Flora of district Lower Dir, Khyber Pakhtunkhwa, Pakistan.

Materials and Methods

Study area

Lower Dir is situated in Northwestern Khyber Pakhtunkhwa, Pakistan that covers an area of 300km^2 situated between 34°50'43.19" N latitude and 71°54'16.43"E longitude with 1.436 million population. Most of the people of the area had associated with farming, grazing of cattle's, agriculture, horticulture and sericulture. The summer season is moderately hot; June and July are the hottest months and in June maximum temperature had been recorded as 32.5°c. The large population of lower Dir speaks Pashto and it was understood and spoken by majority of the people. English and Urdu generally used in the education and in offices. The winter season is cold and severe the temperature rapidly decreases from November and

onwards, December, January and February are the coldest months and the temperature falls below the zero degree centigrade (Fig. 1).

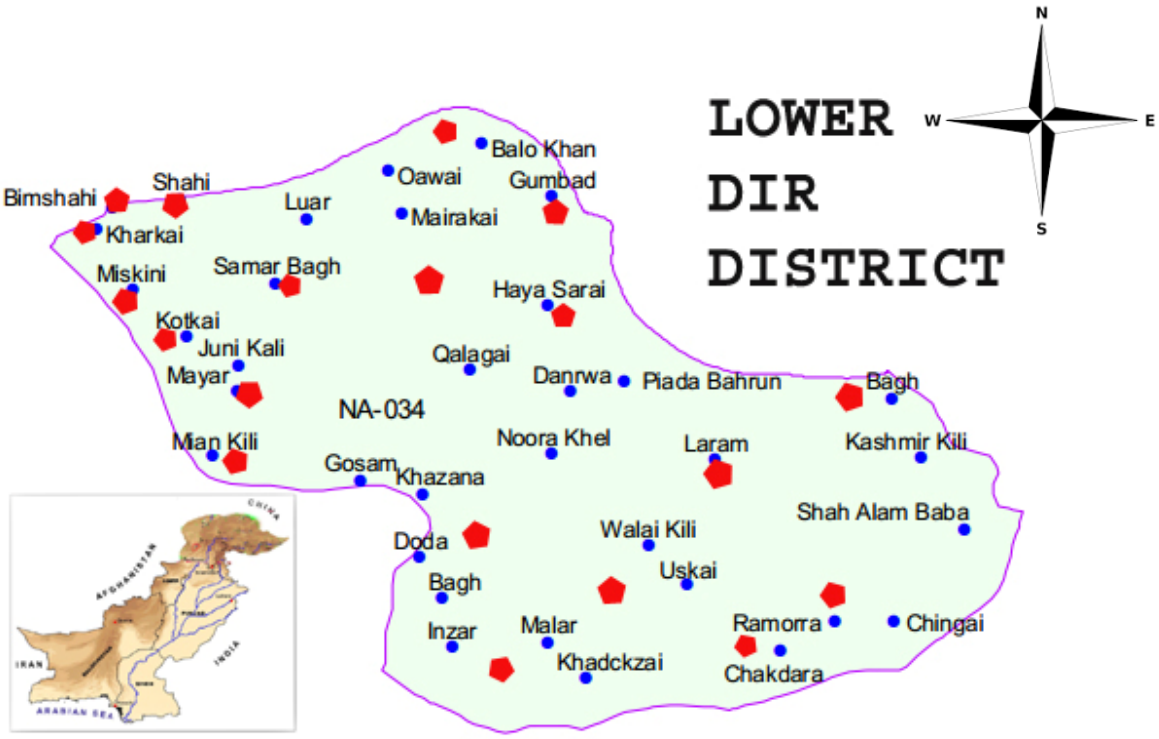

Figure 1. Map of District Lower Dir, Khyber Pakhtunkhwa, Pakistan

Data Collection

The traditional knowledge of medicinal plants has been transferred orally from generation to generation by the people of district Lower Dir, Khyber Pakhtunkhwa, Pakistan, therefore the area was enriched with traditional knowledge. The present study was based on the traditional knowledge of therapeutic plants species of the area. The Presented study was conducted from 2020 to 2022 and the areas were investigated based on the localities viz. Adenzai, Khaal, Munda, Laal qilla, Maidan valley and Samar Bagh. All the informants were randomly interviewed with the help of questionnaire and data was analyzed based on statistical indices. During data collection, mostly the preference was given to older people, Hakeem, women, and farmers because they had the diverse knowledge. The plants were collected, and the photographs were captured at the sites of their natural habitat, then preserved in the dried form on the herbarium sheets and identified with the help of plant taxonomists and also with the Flora of Pakistan. For the future reference, the accession numbers were allotted to each specimen and shifted to the herbarium of the University of Swabi, Khyber Pakhtunkhwa, Pakistan [UOS].

Quantitative data analysis

The collected data were statistically analyzed using various indices using the informants of the residential area and previous citation, the indices showed homogeneity of data and their particular usage for a particular disease.

Use value (UV)

UV classifies the virtual significance of each medicinal taxa with the help of informants reporting frequencies. UV was calculated by using the formula (Gairola *et al.* 2013; Savikin *et al*. 2013).

$$UV = \sum Ui / N$$

Where, Ui is the entire sum of use reports of each therapeutic taxa; N indicating sum of informants cited for a specific therapeutic plant.

Fidelity level (FL)

FL index were used for calculating the percentage of the informants of a particular therapeutic taxon to a specific disease. FL was determined by using formula of (Wali *et al.* 2021).

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

Where Np is the entire sum of all informants quoting the specific species for a particular disorder, and N is the quantity of cited plants for any ailments (Leto *et al.* 2013; Bradacs *et al.* 2011).

Relative Frequency of Citations (RFCs)

RPL value is indexed for pointing the resident important of each taxon based on the informants and previous citation. The value was determined with the formula of (Tardìo and Pardo-De-Santayana, 2008; Vitalini *et al.* 2013; Kayani *et al.* 2014).

$$RFC = Fc/N$$

"RFC" indicate the number of informants who cited the use of each medicinal plant. "N" represents the number of medicinal plants in the given area.

Rank order priority (ROP)

ROP is indexed from the origination FL and RPL values and approaching the ranking of the therapeutic plant. The frequencies resulted by the using below formula (Belayneh *et al.*2014; Vijayakumar *et al.* 2015).

$$ROP = FL \times RPL$$

Relative popularity Level (RPL)

RPL indexed the ratio among the aliments which treated by specific therapeutic plant, and with the sum of all the frequency of informants. Relative popularity level resulted values between the '1' and '0' with complete popularity level and the zero value indicated no ailments which treat by plants (Kadir *et al.* 2012; Ahmad *et al.* 2014).

Informant's Consensus Factor (ICF)

Informant consensus factor had used to determine the consensus and numbers of informants reported the plants for various ailments. ICF was calculated with the suggested formula (Trotter and Logan 1986; Heinrich *et al.* 1998).

$$ICF = (Nur - Nt) / (Nur - 1)$$

Where "Nur" refers to the total number of use reports for separately each ailment category and "Nt" indicates the number of taxa which used in that category. The ICF index results the frequency range from zero to one.

The high frequency indicating the well adopted classes of taxa which curing a specific category of ailments and low frequency close to zero indicating disagreement of informants over the taxon use for specific ailment category (Gazzaneo *et al.* 2005)**.**

Jaccard index (JI)

For the comparison of published literature with our findings was assessed to examine the correlation between the data from published literature and with the present study. For the comparison of data, JI frequency was indexed using the following formula (González-Tejero *et al*. 2008).

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

In formula "a" represents the number of taxa in the area (A) with same use and also with different use, while "b" represents the number of taxa in area (B) with same use and also with different use. However, the "c" is indicating the commonness of a taxon in both areas in (A) and (B) of same use and with different uses.

Results

Demographic Features of Informants

A total of 36 participants were interviewed and the contributed informants had age ranged from 35 to 66 years old. Amongst them 23 were men (63.89%) and 13 (36.11%) were women participants (Table 1). In 13 women the 7 (19.44%) were housewives, while 2 (5.55%) were Midwives, and 4 women (11.11%) were pregnant. According to qualification the maximum number 19 (52.77%) informants were illiterate, while 6 (16.66%) had primary education. The 8 informants (22.22%) had Matric and the 3 informants (8.33%) had the higher secondary qualification. Major occupations of them 13 informants (36.11%) were hakeems and 14 (38.88%) were farmers, while 7 informants (19.44%) as above mentioned were housewives and 2 informants (5.55%) were job holders. The survey also had the informants from ethnic groups of which 21 informants (58.33%) were cows grazers and 15 informants (41.66%) were goats grazers interviewed (Table 1). A similar way of methodology was previously assessed by (Gedif and Hahn, 2003; Giday *et al*. 2009) (Table 1).

Table 1. Demographic features of the informants of district Lower Dir, Pakistan

Informants	Demographic information	Total	Percentage
Gender	Men	23	63.88%
	Women	13	36.11%
Categories	Traditional healers	19	52.77%
	Indigenous people	11	30.55%
	Pregnant women	4	11.11%
	Midwives	2	5.55%
Age groups	35-45	8	22.22%
	46-55	16	44.44%
	56-65	7	19.44%
	66 and above	5	13.88%
Educational qualification	Illiterate	19	52.77%
	Primary	6	16.66%
	Metric	8	22.22%
	Secondary	3	8.33%
Occupation	Hakeems	13	36.11%
	Farmers	14	38.88%
	Housewives	7	19.44%
	Job holders	2	5.55%
Religion	Muslim	35	97.22%
	Sikh	1	2.77%
Ethnic group	Cows grazer	21	58.33%
	Goats grazer	15	41.66%

Diversity of Medicinal Plants in study area

The ethnomedicinal and traditional uses of 147 taxa belonged to 106 genera and 57 families were utilized for the treatment of different ailments (Figs. 2, 3; Table 2). Amongst them 142 taxa (95.59%) were Angiosperms, of which 133 taxa were Dicotyledonous, followed by Monocotyledonous with 9 taxa, 3 taxa (2.04%) were Gymnosperms, 2 taxa (1.36%) were Pteridophytes, and 1 taxon (0.68%) were Fungi. The leading family were Lamiaceae with 18 taxa (12.24%), Asteraceae were the second largest family with 12 taxa (8.16%), Rosaceae were the third largest family with 9 taxa (6.12%), Solanaceae and Brassicaceae with 6 taxa (8.16%) each, Amarantheaceae, Brassicaceae, Berberidaceae and Rutaceae with 5 taxa each (13.6%), Violaceae with 4 taxa (2.72%), Apiaceae, Apocynaceae, Cucurbitaceae, Euphorbiaceace, Plantaginaceae, Polygonaceae, Ranunculaceace with 3 taxa each (14.28%), followed by Acanthaceae, Amaryllidaceae, Fagaceae, Mimosaceae, Moraceae, Myrtaceae, Pinnaceae, Rhamnaceae, Saxifragaceae, Scrophulariacea, Thymelaeaceae, and Verbrnaceae with 2 taxa each (16.32%), while the rest of all the families have only 1 taxon each (18.4%). In current assessment maximum number of 133 taxa (90.48%) taxa were found in the wild, while 14 taxa (9.52%) were cultivated.

In our findings, some medicinal taxa were specified for one ailment, whereas several taxa have potential to cure multiple disorders. Different parts of the plants were utilized by the local inhabitants amongst them leaves were used of 67 taxa (45.57%), followed by fruits of 25 taxa (17%), roots of 20 taxa (13.60%), seeds of 11 taxa (7.48%), whole plant of 9 taxa (6.12%), bark of 7 taxa (4.76%), oil extracted from seeds of 4 taxa (2.72%), and gums of 4 taxa (2.72%) were used (Table 4, Fig. 4).

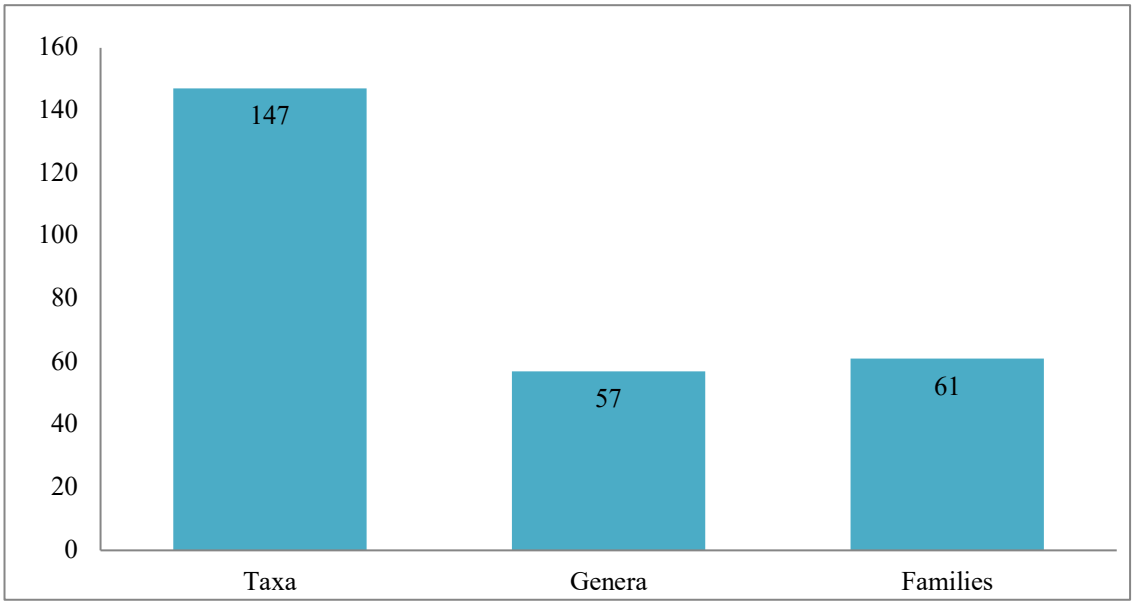

Figure 2 Number of Taxa, genera and families in Lower Dir, Pakistan

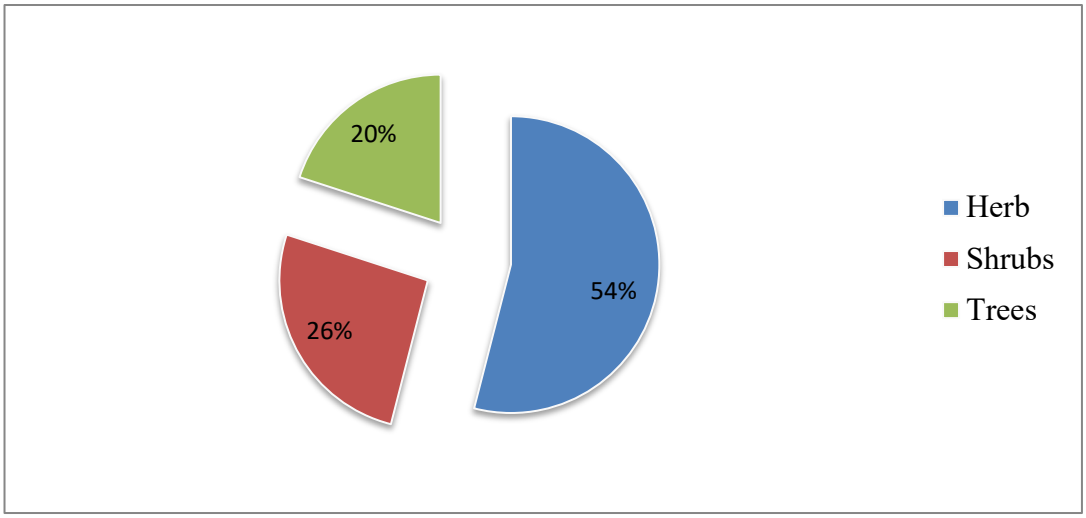

Figure 3Medicinal plants life form of the study area.

Table 2. Informant consensus factor of medicinal plants of district Lower Dir, Pakistan

Disease list	Number of use reports	Number of use plants	ICF value
Abdominal pain	72	3	0.97
Respiratory disorder	113	20	0.85
Body cooling	78	6	0.93
Cough	178	17	0.90
Diabetes	8	5	0.42
Carminative	37	9	0.77
Hepatitis	10	7	0.33
Intestinal worms	78	1	1
Malaria, Fewer	27	9	0.69
Urine infection	178	10	0.94
Skin infection	10	6	0.44
Pain	60	14	0.77
Wound	140	7	0.95

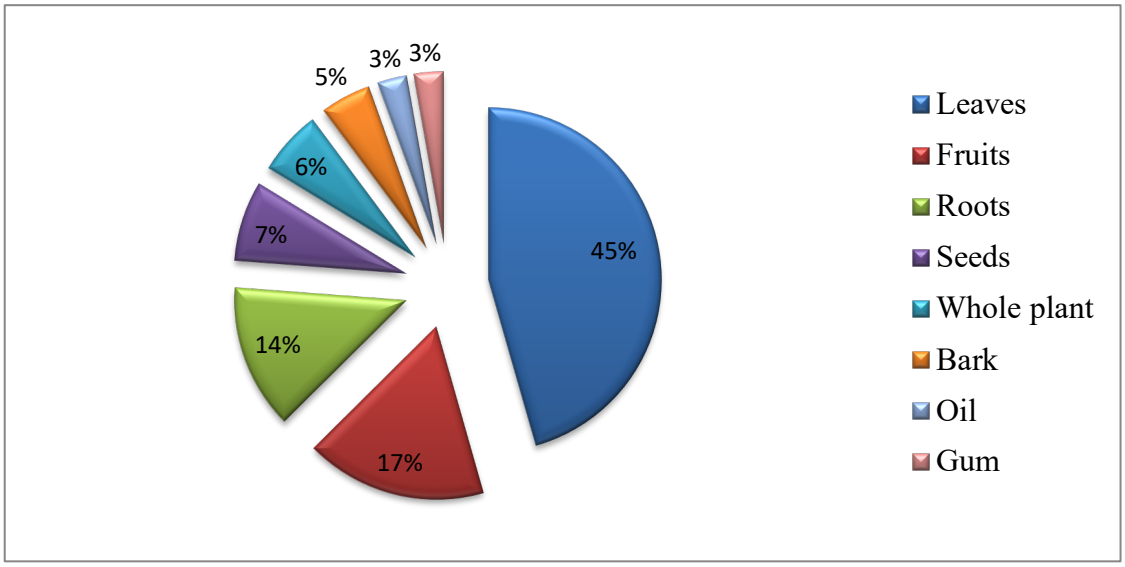

Figure 4Plants parts used for medicinal purpose in district Lower Dir, Pakistan

Table 3. Analogy of our given knowledge with previously published articles

Reported Area	Total no. of taxa	Specie with same uses	Specie with different uses	Specie common in both area(C)	% of taxa with same uses	% of taxa with different uses	JI	Citation
North Waziristan, Pakistan	56	8	18	26	14.2	32.1	16.57	Rahman *et al.* (2023)
Gujranwala, Pakistan	71	16	7	23	22.5	9.85	11.73	Rahman (2013)
Lakki Marwat, Pakistan	62	7	12	19	11.2	19.3	9.94	Ullah *et al.* (2014)
Sarban Hills, Abbottabad, Pakistan	74	6	11	17	8.10	14.8	8.29	Ijaz *et al.* (2015)
Swat, Pakistan	106	9	7	16	8.49	6.60	6.72	Akhter *et al.* (2013)
Golen valley, Chitral, Pakistan	36	5	10	15	13.8	27.7	8.87	Jan *et al.* (2017)
Northern, Pakistan	62	2	3	5	3.22	4.83	30.2	Butt *et al.* (2015)
Samar Bagh valley, Lower Dir, Pakistan	65	27	13	40	41.5	20.0	37.5	Irfan *et al.* (2018a)
Adenzai, Lower Dir, Pakistan	60	26	32	58	43.3	53.3	40.0	Irfan *et al.* (2018d)
Khaal, Lower Dir, Pakistan	65	41	19	60	63.0	29.2	42.4	Irfan *et al.* (2018g)

Use Value (UV)

Use value was used to recognize the plants that were widely used amongst indigenous communities for various ailments. In the present study use value (UV) of ethnomedicinal plants species ranged from (0.85) to (0.001); the highest value reported were of *Punica granatum* and *Vitis vinifera* each (0.85), followed by *Ammi visnaga* (0.8), *Berberis vulgaris* (0.75), *Citrus aurantium* (0.76), *Prunus armeniaca* and *Rosa indica* each (0.6), *Berberis calliobotrys* (0.55), *Rosa webbiana* (0.56), *Plantago major* (0.40), *Papaver somniferum* (0.20), *Plectranthus rugosus* (0.33), Citrus *medica* and *Pistacia integerrima* each (0.25). The species with the lowest values were *Querus incana* (0.001), *Rheum austral* (0.003), *Digitalis purprea* (0.01), *Morchella esculenta* (0.02), *Ajuga bracteosa*, *Eucalyptus globulus* and *Lepidium sativum* each with (0.03) (Table 4).

Table 4. List of the Ethnomedicinal and Traditional uses of the flora of District Lower Dir, Khyber Pakhtunkhwa, Pakistan

Voucher No.	Botanical names	Family	Local Name	Part/s used	Habit	Disease cured	FL	ROP	RFC	RPL	UV
UOS-BOT-101	*Acacia modesta* Wall.	Mimosaceae	Palusa	Gum	T	Gum extracted used for healing of wound and dysentery.	0.1	0.5	0.25	1.5	0.5
UOS-BOT-102	*Acacia nilotica* (L.) Willd. ex Delile	Mimosaceae	Kekar	Gum	T	Gum used against diabetes, Hepatitis and cancer Bronchitis.	0.05	0.5	0.15	1.5	0.3
UOS-BOT-103	*Aconitum heterophyllum* Wall. ex Royle	Ranunculaceace	Sarbawali	Rhizome	H	Rhizomes are dried and used with water as a carminative, astringent and stomach pain.	0.2	0.22	0.35	1.3	0.7
UOS-BOT-104	*Achyranthes aspera* L.	Amaranthaceae	Geshy	Leaves	H	Leaves were ground up and are used for bleeding of gum.	0.33	0.9	0.01	1.2	0.09
UOS-BOT-105	*Achillea millefolium* L.	Asteraceae	Ashaan	Leaves	H	Decoction of young leaves treat hepatitis.	0.11	0.17	0.37	1.21	0.9
UOS-BOT-106	*Acanthus ilicifolius* L.	Acanthaceae	Beakar	Leaves	S	Leaves were crushed and boil in water after cooling filter water were used for respiratory problems.	0.04	0.96	0.19	1.6	0.35
UOS-BOT-107	*Adiantum capillus-veneris*L.	Pteridaceae	Sanra	Leaves	H	Leaves powder are used for toothache and headache.	0.4	0.4	0.46	1.5	0.1
UOS-BOT-108	*Ajuga bracteosa* Wall.ex Benth.	Lamiaceae	Gooti	Young leaves	H	Powder of young leaves used for abdominal and stomach pain.	0.7	0.13	0.23	1.2	0.03
UOS-BOT-109	*Aloe vera* (L.) Burm.f.	Asphodelaceae	Kamal Panra	Gum	H	Gum is used for cellulitis, diabetes.	0.06	0.62	0.5	1.5	0.14
UOS-BOT-110	*Allium cepa* L.	Amaryllidaceae	Pyoz	Bulb	H	Bulb treats to expel gases from stomach.	0.85	0.50	0.9	1.07	0.2
UOS-BOT-111	*Allium sativum* L.	Amaryllidaceae	Oogha	Bulb	H	Bulb used for stomach and cardiac disorder.	0.7	0.50	0.85	1.7	0.4
UOS-BOT-112	*Amaranthus viridis* L.	Amaranthaceae	Ganhar	Leaves	H	Powder of leaves used for Cathartics.	0.8	0.3	0.45	1.08	0.1
UOS-BOT-113	*Ammi visnaga* (L.) Lam.	Apiaceae	Khellabaldi	Seeds	H	Seeds powder was used to treat gastrointestinal infection.	0.11	0.45	0.49	1.11	0.8
UOS-BOT-114	*Alnus nitida* Endl.	Betulaceae	Geiray	Bark	T	Decoctions of bark are used for cough and sedative.	0.2	0.12	0.2	1.12	0.1
UOS-BOT-115	*Artemisia maritima* L.	Asteraceae	Jau, Tarkha	Flowers	T	Flowers were boiling in water and filter water used for anthelmintic.	0.25	0.70	0.03	1.14	0.6
UOS-BOT-116	*Artemisia scoparia* Waldst. & Kitam	Asteraceae	Jaaukay	Root	H	Root powder mixed with tea to treat epilepsy and sore throat.	0.35	0.21	0.03	1.16	0.1

UOS-BOT-117	*Artemisia cina* O. Berg	Asteraceae	Kirmala	Leaves	H	Leaves decoction used as anthelmintic for children.	0.2	0.70	0.03	1.22	0.9
UOS-BOT-118	*Artemisia kurramensis* L.	Asteraceae	Kirmala	Leaves	H	Decoction leaves used as anthelmintic for children.	0.25	0.30	0.03	1.13	0.5
UOS-BOT-119	*Artemisia rutifolia* Stephan ex Spreng.	Asteraceae	Efsantee	Flowers	S	Decoction were used for anthelmintic.	0.6	0.34	0.03	1.19	0.05
UOS-BOT-120	*Artemisia vulgaris* L.	Asteraceae	Terkha	Leaves	H	Powder of leaves used for irritation of skin.	0.13	0.31	0.03	1.18	0.7
UOS-BOT-121	*Berberis lycium* L.	Berberidaceae	Kawary	Bark & Roots	S	Powder were used for wound healing and myalgia.	0.53	0.90	0.70	1.36	0.1
UOS-BOT-122	*Berberis nervosa* Roof	Berberidaceae	Kashml	Stem & root	S	Powders were used for stomach and mouth infection.	0.4	0.45	0.30	1.28	0.5
UOS-BOT-123	*Berberis calliobotrys* Bien. ex Koehne	Berberidaceae	Qwarray	Rhizome	S	Powder of rhizome is used with milk to treat fever and lumber region.	0.4	0.56	0.03	1.45	0.55
UOS-BOT-124	*Berberis vulgaris* L.	Berberidaceae	Qwarray	Roots	S	Dry roots powders are used with milk to treat fever and lumber region.	0.9	0.23	0.20	1.47	0.75
UOS-BOT-125	*Bergenia ciliata* (Haw.) Sternab.	Saxifragaceae	Zakhmehayat	Roots	H	Decoction of roots was used for kidney disorders.	0.15	0.4	0.05	1.18	0.06
UOS-BOT-126	*Boerhavia diffusa* L.	Nyctaginaceae	Prata betai	Roots	H	Decoction of root induce the urine from urinary bladder.	0.21	0.15	0.06	1.34	0.05
UOS-BOT-127	*Brassica campestris* L.	Brassicaceae	Ghundal	Seed oil	H	Oil extract from seed used for body massage and inflammation.	0.39	0.59	0.55	1.28	0.13
UOS-BOT-128	*Cannabis sativa* L.	Cannabaceae	Bang	Leaves, flower	H	Seeds used as anodyne and analgesic.	0.55	0.45	0.26	1.87	0.1
UOS-BOT-129	*Calendula officinalis* L.	Asteraceae	Ziarguli	Flower	H	Decoction of flowers was used for breast cancer.	0.6	0.9	0.48	1.33	0.4
UOS-BOT-130	*Calotropis procera* L.	Apocynaceae	Spulmai	Leaves	H	Leaves grind up their paste were used as a antiseptic for biting of snake and dog.	0.03	0.53	0.40	1.82	0.3
UOS-BOT-131	*Carthamus oxyacantha* Bieb.	Asteraceae	Kareeza	Leaves	H	Leaves were crushed and then used for wound healing.	0.2	0.5	0.09	1.48	0.9
UOS-BOT-132	*Cedrus deodara* (Roxb. ex D. Don) G.Don	Pinnaceae	Ranzrah	Bark	T	Bark powder were used dermatosis and physical ache etc.	0.7	0.40	0.41	1.30	0.2
UOS-BOT-133	*Chenopodium album* L.	Amaranthaceae	Bathu	Seeds	H	Seed decoctions were used as a anthelmintic and cardiac problems.	0.2	0.35	0.15	1.38	0.6
UOS-BOT-134	*Chenopodium foliosum* Asch.	Amaranthaceae	Chalware	Fruit	H	Extractions of fruits were used to cure conjunctivitis.	0.8	0.35	0.5	1.39	0.7
UOS-BOT-135	*Chenopodium murale* L.	Amaranthaceae	Chelwaii	Young Leaves	H	Leaves were cooked used as a vegetable for stomachache.	0.09	0.35	0.10	1.37	0.2

UOS-BOT-136	*Chrysanthemum cinerariaefolium* Trev.	Asteraceae	Gul-e-dawoode	Leaves	H	Leaves decoctions were used for hypertension and diabetes.	0.1	0.1	0.17	1.32	0.04
UOS-BOT-137	*Citrus medica* L.	Rutaceae	Nimboo	Pulp & Fruit	S	Fruit pulp was used for hair growth and to remove spots from face.	0.3	0.48	0.22	1.34	0.25
UOS-BOT-138	*Citrus limon* (L.) Burm.f.	Rutaceae	Nimboo	Fruit	S	Fruits pulps were utilized to treat gum bleeding and kidney stones.	0.6	0.48	0.22	1.40	0.10
UOS-BOT-139	*Citrus aurantium* L.	Rutaceae	Malta	Fruit	T	Fruits pulps were utilized to treat wound healing and gum bleeding.	0.1	0.48	0.22	1.34	0.76
UOS-BOT-140	*Clematis orientalis* L.	Ranunculaceace	Ashand	Root & leaves	H	Powders forms were used for used as analgesic.	0.1	0.4	0.06	1.37	0.7
UOS-BOT-141	*Coriandrum sativum* L.	Apiaceae	Dhania	Leave &Seeds	H	Decoction of seeds and leaves were utilized for hypoglycemia and skin infection.	0.12	0.58	0.70	1.84	0.4
UOS-BOT-142	*Cotoneaster nummularia* Fisah & Mey.	Rosaceae	Mumanra	Roots	S	Decoction of roots mixed with pomegranate juice used in Hepatitis and cooling agent.	0.14	0.19	0.5	1.53	0.04
UOS-BOT-143	*Colchicum luteum* Baker.	Colchicaceae	Ziarh-Guly	Rhizome	H	Rhizome decoction used for blood purification and anticancer.	0.11	0.75	0.04	1.12	0.05
UOS-BOT-144	*Convolvulus arvensis* L.	Convolvulaceae	Priwathai	Leaves	H	15-20 g leaves were crushed decoction were used for epilepsy patients.	0.13	0.8	0.02	1.14	0.6
UOS-BOT-145	*Cucurbita maxima* L.	Cucurbitaceae	Peta Kadoo	Seeds & fruit	S	Seeds powder was used as a anthelmintic and stomach infection.	0.01	0.8	0.14	1.2	0.01
UOS-BOT-146	*Cynodon dactylon* (L.) Pers.	Poaceae	Kabal	Leaves	H	Leaves powders were used for dysentery.	0.15	0.25	0.33	1.29	0.7
UOS-BOT-147	*Daphne oleoides* Schreb.	Thymelaeaceae	Anaghonai	Root	S	Root powders were used for stomach infection.	0.12	0.3	0.13	1.15	0.09
UOS-BOT-148	*Daphne mucronata* Royle.	Thymelaeaceae	Laighonai	Root	S	Powders of root were employed for skeleton muscles problems.	0.8	0.3	0.11	1.17	0.3
UOS-BOT-149	*Datura innoxia* Mill.	Solanaceae	Baturra	Whole plant	S	Whole plant was employed for epilepsy patient.	0.14	0.61	0.32	1.88	0.6
UOS-BOT-150	*Datura alba* F. Muell.	Solanaceae	Datura	Whole plant	H	Extractions of leaves were treating epilepsy patient and facial pain while Seeds were used narcotic.	0.50	0.41	0.32	1.38	0.5
UOS-BOT-151	*Datura stramonium* L.	Solanaceae	Beturra	Seeds & Leaves	S	Seeds powders were used as a stimulant of central nervous system and wound healing.	0.40	0.221	0.32	1.48	0.6
UOS-BOT-152	*Delphinium nordhagenii* Wendelbo.	Ranunculaceace	Cheyychag	Flowers	H	Flowers decoction were used for growth hair.	0.27	0.1	0.06	1.12	0.25
UOS-BOT-153	*Digitalis purpurea* L.	Plantaginaceae	Barg-e lefe	Leaves	H	10-12 g leaves were boiled in water, filtered water were administrated to epilepsy patient.	0.5	0.3	0.9	1.33	0.01
UOS-BOT-154	*Diospyros lotus* L.	Ebenaceae	Amlook	Fruits	T	Fruits pulp were used as a tonic &nutritious.	0.08	0.2	0.05	1.44	0.9

UOS-BOT-155	*Dodonaea viscosa* L.	Sapindaceae	Jarkey	Seed & leaves	T	Seeds powders were used for high temperature while leaves were treating antimalarial etc.	0.07	0.9	0.8	1.25	0.4
UOS-BOT-156	*Ephedra gerardiana* Wall. ex C.A. Mey.	Ephedraceae	Parwate	Stem	H	Stem powders were used against the respiratory infection.	0.09	0.9	0.4	1.77	0.8
UOS-BOT-157	*Equisetum arvense* L.	Equisetaceae	Bandakay	Whole plant	H	Extracted juice of whole plant used in urinary infections.	0.06	0.5	0.8	1.40	0.1
UOS-BOT-158	*Eruca sativa* Mill.	Brassicaceae	Salad	Leaves	S	Leaves powder were employed externally for microbial infection.	0.02	0.8	0.10	1.36	0.09
UOS-BOT-159	*Eucalyptus globulus* Labill.	Myrtaceae	Laache	Leaves, oil	T	Leaves powder were used for microbial infection and also for respiratory problems.	0.06	0.15	0.9	1.28	0.03
UOS-BOT-160	*Eucalyptus camaldulensis* Deh.	Myrtaceae	Laachi	Oil	S	Oil were used especially for massages body.	0.07	0.15	0.12	1.22	0.16
UOS-BOT-161	*Euphorbia helioscopia* L.	Euphorbiaceace	Mandaro	Roots	H	Roots are purgative, relieves chronic coughing and dysentery.	0.03	0.44	0.19	1.52	0.01
UOS-BOT-162	*Euphorbia prostrata* Aiton	Euphorbiaceace	Lewanebote	Latex	H	Latex was used to remove ring worm.	0.04	0.44	0.18	1.49	0.01
UOS-BOT-163	*Ficus carica* L.	Moraceae	Enzar	Root, leaves	S	Roots were dried, take it with water for respiratory disorder and leaves were dry used for heart problems.	0.6	0.9	0.11	1.64	0.13
UOS-BOT-164	*Foeniculum vulgare* Mill.	Apiaceae	Kago	Seed	H	Seeds were employed to expel gasses from stomach.	0.6	0.65	0.85	1.79	0.11
UOS-BOT-165	*Ferula asafoetida* H.Karst	Scrophulariaceae	Hing	Gums	H	Extracted gum applied for removal of worms.	0.8	0.1	0.03	1.42	0.14
UOS-BOT-166	*Fumaria indica* Pugsley	Papaveraceae	Paprashatra	Stem	H	Stem were used in dry form for stomach infection.	0.3	0.1	0.13	1.27	0.01
UOS-BOT-167	*Geranium wallichianum* D.Don ex Sweet.	Geraniaceae	Ratanjot	Root	H	Used against vaginal infection in form of powder with mustard oil.	0.4	0.6	0.02	1.33	0.02
UOS-BOT-168	*Hedera nepalensis* K. Koch.	Araliaceae	Pervatha	Rhizome	H	Used for pain in body orally with water.	0.8	0.3	0.01	1.12	0.04
UOS-BOT-169	*Hyoscyamus niger* L.	Solanaceae	Treehbootey	Leaves	H	Induced insomnia in decoction form, relive body pain with tea.	0.09	0.2	0.20	1.07	0.15
UOS-BOT-170	*Iberis amara* L.	Brassicaceae	Halim	Whole plant	H	Used against respiratory disorder.	0.6	0.1	0.04	1.43	0.07
UOS-BOT-171	*Indigofera articulata* Wall. ex. Brand.	Fabaceae	Ghwareja	Roots, seeds	S	Roots used as a tonic and seeds are anthelmintic.	0.12	0.19	0.5	1.23	0.11
UOS-BOT-172	*Isodon rugosus* (Wall ex Benth.) Codd.	Lamiaceae	Krchay	Leaves	S	Leaves extract in water used for blood purification.	0.5	0.8	0.03	1.57	0.1
UOS-BOT-173	*Juglans regia* L.	Juglandaceae	Ghuz	Leaves	T	Used to remove ring worm in the form of powder.	0.37	0.11	0.60	1.40	0.09

UOS-BOT-174	*Justicia adhatoda* L.	Acanthaceae	Bikar	Whole plant	S	Used for respiratory infection in the form of powder with water.	0.65	0.55	0.19	1.74	0.8
UOS-BOT-175	*Lantana camara* L.	Verbenaceae	Panchphul	Leaf, seeds	S	Used for expelling gases from stomach to used dry seed.	0.46	0.5	0.3	1.25	0.1
UOS-BOT-176	*Lagenaria vulgaris* (Molina) Standl	Cucurbitaceae	Kaddo	Fruits	H	Fruit in boiled form used for headache and also used as a tonic.	0.2	0.7	0.16	1.03	0.08
UOS-BOT-177	*Lepidium sativum* L.	Brassicaceae	Halun	Leaves	H	Leaves used to prevent abdominal pain	0.12	0.12	0.8	1.40	0.03
UOS-BOT-178	*Luffa acutangula* (L.) Roxb.	Cucurbitaceae	Thoree	Fruits	H	Fresh fruits used for Throat and lungs problems, bronchitis, asthma.	0.8	0.13	0.07	1.50	0.1
UOS-BOT-179	*Malva neglecta* Wall.	Malvaceae	Banerak	Seeds	T	Dried seeds were used for respiratory disorder.	0.35	0.16	0.16	1.35	0.1
UOS-BOT-180	*Marrubium vulgare* L.	Lamiaceae	IstoreZokho	Leaves	H	Leaves used to prevent respiratory problems especially asthma.	0.4	0.24	0.4	1.11	0.2
UOS-BOT-181	*Melia azedarach* L.	Meliaceae	Bikyana	Leaves	T	Dry leaves were used for high blood pressure and chest disorder.	0.4	0.27	0.2	1.09	0.05
UOS-BOT-182	*Mentha piperita* L.	Lamiaceae	Poodina	Leaves	H	Contains volatile oils used as carminative.	0.57	0.68	0.80	1.70	0.9
UOS-BOT-183	*Mentha royleana* Benth.	Lamiaceae	Podina	Leaves	H	Leaves were used to expelling gases from stomach.	0.61	0.28	0.15	1.12	0.10
UOS-BOT-184	*Mentha viridus* L.	Lamiaceae	Sarkorevelan	Leaves	H	Leaves boiled in green tea mixed with lemon grass used for nausea.	0.43	0.38	0.30	1.69	0.11
UOS-BOT-185	*Mentha arvensis* L.	Lamiaceae	Podina	Leaves, fruits	H	Leaves mixed with green tea used for nausea and vomiting.	0.49	0.48	0.40	1.65	0.12
UOS-BOT-186	*Mentha longifolia* L.	Lamiaceae	Velinei	Leaves	S	Dried leaves were used for expelling gases from stomach.	0.2	0.18	0.40	1.55	0.9
UOS-BOT-187	*Mentha spicata* L.	Lamiaceae	Podina	Leaf	H	Leaves used in dyspepsia and in Salad as a carminative. Leaf extract used as mouth wash.	0.6	0.32	0.50	1.50	0.15
UOS-BOT-188	*Micromeria biflora*Benth.	Lamiaceae	Kashmale	Flower & Leaves	S	Used to relief pain in tooth and facial area with poultice form externally.	0.5	0.4	0.5	1.14	0.8
UOS-BOT-189	*Micromeria parviflora*Rchb.	Lamiaceae	Naraybootay	Leaves	H	Used for relief pain in tooth and facial area.	0.51	0.1	0.08	1.15	0.5
UOS-BOT-190	*Morchella esculenta* (L. Fr.) Pers.	Morchellaceae	Gusay	Whole plants	F	It is used as a tonic having most proteins.	0.59	0.5	0.11	1.13	0.02
UOS-BOT-191	*Morus alba* L.	Moraceae	Spin tot	Fruit, root & leaves	T	Fruits were used to remove microorganism from intestine.	0.62	0.21	0.60	1.58	0.05
UOS-BOT-192	*Nasturtium officinale* W.T. Aiton	Brassicaceae	Pest boti	Leaves	H	Dry Leaves were used to remove worm from intestine.	0.13	0.31	0.9	1.10	0.6

UOS-BOT-193	*Nerium odorum* Sol.	Apocynaceae	Ganderay	Leaves	S	Fresh leaves used for body pain.	0.3	0.18	0.4	1.07	0.5
UOS-BOT-194	*Nerium oleander* L.	Apocynaceae	Gandery	Leave	S	Leaves chewed used for teeth pain and bleeding gums.	0.9	0.09	0.21	1.13	0.07
UOS-BOT-195	*Ocimum basilicum*(L.) Benth.	Lamiaceae	Kashmalo	Oil	H	Oil diuretic used for kidney disorder and also the oil use for urinal tract infection.	0.33	0.5	0.12	1.16	0.05
UOS-BOT-196	*Olea ferruginea* Wall. ex Aitch.	Oleaceae	Khona	Seeds	T	Seed in powder form externally used for teeth problem, pain in joints.	0.31	0.15	0.07	1.10	0.08
UOS-BOT-197	*Otostegia limbata* (Benth.) Boiss.	Lamiaceae	Pishkand	Leaves	H	Fresh leaves in poultice form used for Wound healing.	0.9	0.8	0.21	1.0	0.07
UOS-BOT-198	*Oxalis corniculata* L.	Oxalidaceae	Threwaky	Stem	H	Powder of stem were used for wound healing in poultice form externally.	0.33	0.1	0.07	1.10	0.05
UOS-BOT-199	*Pinus roxburghii* Sarg.	Pinaceae	Nakhtar	Resin	T	Resins with water orally were used for stomach ulcer.	0.54	0.7	0.21	1.30	0.03
UOS-BOT-200	*Pinus wallichiana* A.B. Jacks.	Pinaceae	Sarf	Resin	T	Expulsion of worms & itching	0.02	0.7	0.31	1.76	0.01
UOS-BOT-201	*Papaver somniferum* L.	Papaveraceae	Doda	Seeds, latex	H	Used for severe pain in the body.	0.66	0.25	0.86	1.90	0.2
UOS-BOT-202	*Prunus armeniaca* L.	Rosaceae	Khobanai	Fruits	T	Laxative, purgative & nutritious	0.12	0.36	0.27	1.36	0.6
UOS-BOT-203	*Pyrus pashia* Buch.-Ham. ex D.Don	Rosaceae	mahal mol	Fruits	T	Fruits were used for digestive problems.	0.2	0.41	0.22	1.09	0.11
UOS-BOT-204	*Plantago lanceolata* L.	Plantaginaceae	Satt	Leaves	H	Used as a laxative.	0.9	0.52	0.12	1.28	0.2
UOS-BOT-205	*Plantago major* L.	Plantaginaceae	Aspaghol	Seeds, Fruits	S	Used as a laxative.	0.24	0.32	0.47	1.09	0.40
UOS-BOT-206	*Platanus orientalis L.*	Plantanaceae	Aspaghol	Bark	T	Bark was dried used for severe joint pain.	0.23	0.32	0.10	1.10	0.04
UOS-BOT-207	*Plectranthus rugosus* Wall. ex Benth.	Lamiaceae	Spairkay	Seeds & Leaves	H	Sore throat, cough	0.40	0.6	0.2	1.19	0.33
UOS-BOT-208	*Paeonia emodi* Royle	Berberidaceae	Kakora	Rhizome	H	Rhizome were grind up used to relief pain from body.	0.04	0.9	0.12	1.26	0.01
UOS-BOT-209	*Pistacia chinensis* subsp. *integerrima* (J. L. Stewart ex Brandis) Rech. f.	Anacardiaceae	Sherawan	Fruits	S	Used in fever, cough vomiting, diarrhea and asthma.	0.26	0.13	0.10	1.20	0.25
UOS-BOT-210	*Punica granatum* L.	Lythraceae	Daruna	Whole plant	S	Used against stress, high blood pressure and sugar.	0.68	0.19	0.56	1.91	0.85
UOS-BOT-211	*Quercus oblongata* D.Don.	Fagaceae	Seray	Bark, fruit	T	Bark was used for bandages of cracked bones and fruits used in urinary disorder.	0.03	0.78	0.12	1.09	0.01

UOS-BOT-212	*Quercus incana* W. Bartram	Fagaceae	Seray	Bark	T	Dried bark used in kidney infection and digestion problem.	0.02	0.1	0.10	1.10	0.001
UOS-BOT-213	*Rheum australe*D.Don.	Polygonaceae	Chotyal	Roots	H	Dried roots powder used for healing of wounds.	0.02	0.12	0.16	1.04	0.003
UOS-BOT-214	*Ricinus communis* L.	Euphorbiaceace	Arinda	Fruits	T	From fruit oil was abstract used for body pain and abdominal infection.	0.01	0.4	0.67	1.71	0.15
UOS-BOT-215	*Rosa webbiana* Wall. ex Royle	Rosaceae	Thronigulab	Fruits	S	Used against eye infection, anticancer.	0.3	0.41	0.56	1.35	0.56
UOS-BOT-216	*Rosa indica* L.	Rosaceae	Gulab	Flowers	S	Flowers petals used as anti-asthma and also prevent mouth diseases, such as warts on mouth.	0.3	0.41	0.36	1.40	0.6
UOS-BOT-217	*Rubus fruticosus* L.	Rosaceae	Karwara, Baganra	Leaf, fruits	S	Leaves used for fever, cough and diarrhea. Fruit extract used as antiasthma and tonic.	0.34	0.12	0.5	1.30	0.5
UOS-BOT-218	*Rubus anatolicus* Focke	Rosaceae	Karwara	Fruits	S	Fruits were used to increases the sexuality desire and expel gases from stomach.	0.27	0.12	0.5	1.29	0.9
UOS-BOT-219	*Rubus ulmifolius* Schott	Rosaceae	Karvara	Leaves & Fruits	S	Leaves and fruits in powder form orally with water used for Diarrhea, cough, Fever & diuretic.	0.32	0.12	0.5	1.40	0.2
UOS-BOT-220	*Rumex dentatus* L.	Polygonaceae	Tarukai	Leaves	H	Dried leaves were taken with water to prevent the watery or semisolid stools.	0.5	0.22	0.09	1.15	0.19
UOS-BOT-221	*Rumex hastatus* D. Don.	Polygonaceae	Tarukai	Leaves	H	Leaves are used to regulate systolic and diastolic blood pressure.	0.8	0.15	0.09	1.14	0.1
UOS-BOT-222	*Sarcococca saligna* (D.Don) Muell.-Arg.	Buxaceae	Shenoli	Leaves	S	Leaves powder mixed in water used as cooling agent and in blood purification.	0.6	0.9	0.8	1.10	0.12
UOS-BOT-223	*Salvia moorcroftiana* Wall. ex Benth.	Lamiaceae	Plane pakhe	Seeds	S	Seeds in powder form in yoghurt used to prevent the intestine infection.	0.2	0.7	0.10	1.18	0.17
UOS-BOT-224	*Saxifraga ligulata* Wall.	Saxifragaceae	Chanta	Roots	H	Roots in powder with milk used against kidney and urine infection.	0.21	0.48	0.9	1.16	0.14
UOS-BOT-225	*Silene conoidea* L.	Caryophyllaceae	Mangooti	Seeds	H	Seeds are applied in poultice form on skin diseases as antifungal, and antibacterial.	0.43	0.6	0.3	1.09	0.15
UOS-BOT-226	*Sisymbrium irio* L.	Brassicaceae	Seesana	Seeds	H	Seed in poultice form with oil used for skin infections, as antifungal and antibacterial.	0.8	0.10	0.9	1.17	0.4
UOS-BOT-227	*Skimmia laureola* (DC.) Sieb. & Zucc. ex. Walp.	Rutaceae	Nameer	Leaves	S	Leaves used in urinary infections.	0.22	0.8	0.6	1.26	0.2
UOS-BOT-228	*Solanum nigrum* L.	Solanaceae	Kachmacho	Fruit	H	Pulps were used as a purgative and hepatitis.	0.45	0.7	0.23	1.65	0.5
UOS-BOT-229	*Solanum surattense* Burm. f.	Solanaceae	Marghona	Leaves & fruit	H	Decoction were used for respiratory disorder viz. asthma, cough bronchitis etc.	0.53	0.9	0.15	1.59	0.1
UOS-BOT-230	*Sonchus asper* (L.) Hill	Asteraceae	Shoda pai	Roots & leaves	H	Infusion was applied for the malaria.	0.66	0.1	0.04	1.6	0.06

UOS-BOT-231	*Spirea canescens* D.Don.	Rosaceae	Gul botey	Flower	S	Decoctions were used for eye disorder, stomach problem, anti-inflammation.	0.9	0.4	0.33	1.45	0.2
UOS-BOT-232	*Taraxacum officinale* L.	Asteraceae	Ziarguly	Leaves	H	Decoction were used against cancer, coughing etc.	0.5	0.07	0.9	1.30	0.2
UOS-BOT-233	*Teucrium stocksianum* Boss (Airtch & Hemsl.)	Lamiaceae	Sparabotyy	Leaves	H	Powders were used to treatment diarrhea, cough, jaundice, and abdominal pain.	0.5	0.05	0.2	1.39	0.04
UOS-BOT-234	*Thymus linearis* Benth.	Lamiaceae	Spairkai	Leaves	H	Infusions were applied for respiratory problems, carminative.	0.2	0.11	0.1	1.32	0.34
UOS-BOT-235	*Verbascum thapsus* L.	Scrophulariaceae	Khrdug	Leaves	H	Decoction were used as an analgesic, anti-asthma etc.	0.33	0.71	0.6	1.10	0.55
UOS-BOT-236	*Verbena officinalis*L.	Verbenaceae	Shamakay	Roots	H	Powders were applied for diuretic, expectorant, and anti-rheumatic effects.	0.5	0.3	0.5	1.5	0.6
UOS-BOT-237	*Viola indica* Bkr.	Violaceae	Banafsha	Leaves, flowers	H	Extract of leaves were used in wounds healing and arthritis.	0.6	0.6	0.32	1.7	0.4
UOS-BOT-238	*Viola biflora* L.	Violaceae	Banafsha	Whole plant	H	Infusions were applied for cough and sore throat.	0.03	0.2	0.12	1.26	0.01
UOS-BOT-239	*Vitis vinifera* L.	Vitaceae	Angoor	Leaf & fruits	S	Pulps were used for stomach and Kidney disorder, astringent while leaves powders were used as demulcent, cathartics, and cardiac problems.	0.37	0.35	0.01	1.27	0.85
UOS-BOT-240	*Vitex negundo* L.	Lamiaceae	Sambhaloo	Leaves	S	Leaves were boiled and their filter were used for anthelmintic and respiratory tract.	0.3	0.2	0.11	1.43	0.04
UOS-BOT-241	*Viola serpens* Wall. ex. Roxb.	Violaceae	Banafsha	Whole plant	H	Powders were used for pneumonia and sore throat infections.	0.06	0.2	0.12	1.7	0.9
UOS-BOT-842	*Viola rupestris* F.W. Schmidt	Violaceae	Banafsha	Leaves	H	Leaf infusions were used for respiratory problems and headache.	0.04	0.2	0.17	1.37	0.02
UOS-BOT-243	*Xanthium strumarium* L.	Asteraceae	Ghutghiskay	Leaves	T	Decoction were used for ulcer, arthritis.	0.10	0.4	0.25	1.13	0.01
UOS-BOT-244	*Zizyphus jujuba* Mill.	Rhamnaceae	Markhani	Fruits	S	Pulps were used as emollient and in dry cough.	0.3	0.32	0.45	1.38	0.18
UOS-BOT-245	*Ziziyphus nummularia* (Burm. f.) Wight & Arn.	Rhamnaceae	Mumanrha	Roots	S	Extract mixed in pomegranate juice used against Hepatitis.	0.2	0.32	0.45	1.72	0.14
UOS-BOT-246	Zingiber officinale Roscoe	Zingiberaceae	Adrak	Rhizome	H	Rhizome tea used for loss of weight, colic and for improving circulatory stimulant.	0.9	0.17	0.4	1.3	0.19
UOS-BOT-247	*Zanthoxylum armatum* DC.	Rutaceae	Dambara	Fruit & leaves	T	Fruits bark and leaved used for anti-inflammation.	0.23	0.3	0.2	1.13	0.16

Keys: H; Herbs: S; Shrubs: T; Trees: F; Fungus

Fidelity level (FL)

The fidelity level of ethnomedicinal plants were ranged from (0.85) to (0.01), amongst them highest fidelity level were of *Allium cepa* (0.85), followed by *Allium sativum* (0.70), *Punica granatum* (0.68), *Papaver somniferum* and *Sonchus asper* each with (0.66), *Justica adhatoda* (0.65), *Morus alba* (0.62),*Mentha royleana* (0.61), *Morchella esculenta* (0.59), *Mentha piperita* (0.57), *Cannabis sativa* (0.55), *Pinus roxburghii* (0.54), *Berberis lycium* and *Solanum surattense* each with (0.53), *Micromeria perviflora* (0.51), and *Datura alba* with (0.5). Species with the lowest fidelity level (FL) were *Cucurbita maxima*, and *Ricinus communis* each with (0.01), *Alnus nitida*, *Artemisia kuranensis*, *Carthamus oxycantha* and *Chenopodium album* each with (0.2) (Table 4).

Rank Order Priority (ROP)

Rank order priority is the originated index from the FL and RPL indices. ROP values ranged from (0.96) to (0.1). Highest value was recorded in *Acanthus ilicifolius* (0.96), followed by *Berberis lycium* (0.90), *Colchicum luteum* (0.75) *Artemisia cina* (0.7), *Datura innoxia* (0.61), *Brassica campestris* (0.59), *Mentha piperita* (0.68), while the lowest value was recorded in *Delphinium nordhagenii*, *Fumaria indica*, *Ferula asafoetida* each with (0.1), *Diospyros lotus* (0.2), *Verbena officinalis* (0.3), *Micromeria biflora* (0.4), *Lantana camara* (0.5), *Lagenaria siceraria* (0.7), *Eruca sativa* (0.8), *Dodonaea viscosa* and *Ephedra gerardiana* each with (0.9) (Table 4).

Relative frequency citation (RFC)

Relative frequency citation represents the local importance of each species in the study area. It was ranged from (0.15) to (0.90). The highest RFC value were recorded in *Allium cepa* with (0.9), followed by *Papaver somniferum* (0.86), *Foeniculum vulgare* and *Allium sativum* each with (0.85), *Mentha piperita* (0.8), *Coriandrum sativum* and *Berberis lycium* each with (0.7), *Juglans regia* and *Morus alba* each with (0.6), *Rosa indica* (0.56), *Brassica campestris* (0.55), *Aloe vera* (0.5), and *Ammi visnaga* with (0.49), while the lowest value was recorded for *Pinus wallichiana* with (0.31), *Cannabis sativa* (0.26), *Acacia modesta* 0.25), *Ajuga bracteosa* and *Solanum nigrum* each with (0.23), *Nerium oleander* and *Otostegia limbata* each with (0.21), and *Chenopodium album* with (0.15) (Table 4).

Relative popularity level (RPL)

The highest RPL value were observed in *Punica granatum* with (1.91), and *Papaver somniferum* (1.9), followed by *Datura innoxia* (1.88), *Cannabis sativa* (1.87), *Coriandrum sativum* (1.84), *Foeniculum vulgare* (1.79), *Ephedra gerardiana* (1.77), *Pinus wallichiana* (1.76), *Justicia adhatoda* (1.74), and *Solanum surattense* with (1.59), whereas the lowest value was recorded in *Oxalis corniculata* with (1.1), followed by *Pyrus pashia* (1.09), *Rheum australe* (1.04), *Cucurbita maxima* (1.2), and *Otostegia limbata* with (1.0) (Table 4).

Informant consensus factor (ICF)

The "ICF" index was categorized for the 13 disorders based on their informants reports. The highest ICF value were observed for abdominal pain with (0.97), followed by wound healing (0.95), urine infection (0.94), body cooling (0.93), respiratory disorders (0.85), Pain and carminative (0.77), malarial fever (0.69), skin infections (0.44), diabetes (0.42), and intestinal worms with (1.0) (Table 2).

Jaccard index (JI)

Comparison of the present findings with the previously published articles from different adjacent areas of Khyber Pakhtunkhwa, Pakistan was done. JI ranged from 42.4 to 6.72, The highest JI value was 42.4 from tehsil Khaal, Lower Dir, Pakistan, followed by 40 from tehsil Adenzai, Lower Dir, Pakistan, followed by 37.5 from Samar Bagh valley, Lower Dir, Pakistan (Irfan *et al.* 2017), followed by 30.2 from Northern Pakistan (Butt *et al.* 2015), 16.5 from North Waziristan (Rehman *et al.* 2023), 11.73 from Gujranwala, Pakistan (Rahman, 2013), (9.94) from Lakki Marwat, Pakistan (Ullah *et al.* 2014), 8.87 from Golen valley Chitral, Pakistan (Jan *et al.* 2017), (8.29) from Sarban hills, Abbottabed, Pakistan (Ijaz *et al.* 2015), and 6.72 from Swat, Pakistan (Akhter *et al.*2013) (Table 3).

Discussion

In the present study 147 medicinal plants taxa belonged of 106 genera and 57 families were reported from district Lower Dir, Khyber Pakhtunkhwa, Pakistan. Out of 57 families, Lamiaceae were recorded as the dominant family with 18 taxa, as previously reported from Lower Dir 46 medicinal plants belonged to 43 genera and 29 families wereereported (Ahmad *et al.* 2015). The findings of the current study showed similarities with the work of Imtiaz *et al.* (2011) based on habit wise and family dominancy from tehsil Kabal, district Swat, Khyber Pakhtunkhwa, Pakistan. Lamiaceae was the dominant with 11 species, while habit wise herbs were dominant with 76 taxa, followed by trees with 40 species, and shrubs were 17 taxa. The

approach based on the disease, our results was supported by Haq *et al.* (2011) as similar kinds of ailments were documented, such as respiratory disorders, abdominal pain, wound healing, diabetes, and diarrhea.

The district Lower Dir has a huge diversity of medicinal plants, as previously from adjacent areas various studies had been documented, viz. (Iqbal and Hamayun 2004) from Malam jabba, district Swat, Pakistan documented 187 plant taxa in which the 97 were medicinal plants. Adjacent to the area from another location from Garbal valley district Swat, Pakistan, Hammayun *et al.* (2005) documented 176 plants species in which the 133 taxa belonged to medicinal category. Based on the same pattern of exploration and collection recently same supported work had been done by Rehman *et al.* (2023), and documented 56 plant taxa used for respiratory disorders. In assessment the herbaceous life form of medicinal plants was dominant with (60%), followed by shrubs (24.6%), and trees with (14%), similarly (Giday *et al.* 2003) documented the herbs were the most leading habit in the medicinal flora, and also resulted the practitioner healers and hakims prevalently uses the herbs against diseases due to their easy availability and active constituents. Mostly the people of Pakistan are dependent on the medicinal plant due to poverty and mostly the *Berberis lyceum*, and the infusion of the *Mentha arvensis* were commonly used in the area, but these species must needs a specific recipes for proper curing (Wazir *et al.* 2004; Irfan *et al.* 2018g).

According to (Tariq *et al.* 2015) the statistical analysis in ethnomedicinal studies helped in finding the new emerging medicinal plants, in current study based on use value emerging plants species in study area were *Punica granatum* and *Vitis vinifera* (0.85) recoded, while the analysis based on the relative frequency citation (0.9) the resulted value indicated the well adopted uses based on previous citation. Previously from Mastung valley, Baluchistan, Pakistan ICF value was recorded for respiratory disorders 0.49. In our study ICF value was recorded for respiratory disorder 0.97 (Bibi *et al.* 2014). In the current study the highest similarity value was recorded (42.4) with tehsil Adenzai, Lower Dir, Pakistan (Table 2). Previously from tehsil Wari, Upper Dir, Pakistan the highest Jaccard Index were (29.8) recorded, hence our index claimed that the area was enriched with medicinal plants.

The current study various statistical analysis was performed for the first time. Previously certain study carried out in the same area by Irfan *et al.* (2017) of tehsil Lalqilla, district Lower Dir, Pakistan documented the diverse traditional knowledge of 50 taxa with 47 genera and 34 families, the Dicotyledonous were dominant with (98%) that showed the area has well adaptation in trees (Irfan *et al.* 2018c). These plants were used for various ailments, as in adjacent areas the same study was carried out by Irfan *et al.* (2018b) on local communities of tehsil Adenzai, Lower Dir, Pakistan documented 60 therapeutic plants with 57 genera and 39 families. The 58 taxa were Angiosperm amongst them 54 taxa were Dicotyledonous and 4 taxa were Monocotyledons, and the Gymnosperm with 30 taxa. The local communities of the Lower Dir were mostly dependent on the therapeutic plants and preparing the various remedies for using them as antipyretic and also using for hypertension disorders. A total 46 plant species with 43 genera and 29 families, amongst them Lamiaceae was reported as dominant family with high percentage of 7 species with (15.21%), habit wise herbs with (63.05%) and shrubs (30.43%), and tree were with (6.52%) Ahmad *et al.* (2015); Khan *et al.* (2018) also documented similar studies from Talash valley, Lower Dir, Pakistan.

The aims of the study were to collect information regarding therapeutic plants and their ethnopharmacological studies. The dependency of local inhabitants still relied on the ethnomedicinal plants of Chinglai valley, distrit Buner, Pakistan indicated that the chief source of the local people were medicinal plants (Jan *et al.* 2017).

Conclusion

District Lower Dir, Khyber Pakhtunkhwa, Pakistan has a huge diversity of medicinal plants. A total of 147 plants taxa belonged to 106 genera and 57 families. Quantitative analysis resulted that medicinal plants against abdominal pain were used excessively. There were many important plants growing in the region, but we are close to losing these natural resources due to deforestation, pollution, over usage, and human disturbances. The study provided basic information about the plant uses in a safe manner for different ailments. In addition, a nationwide survey of medicinal flora should be carried out to investigate and update the inventory of the plant resources, especially in agricultural countries such as Pakistan. In future different phytochemical analysis of these medicinal plants should be conducted to identify the active chemical constituents. Proper conservation and cultivation of these medicinal plants are strongly suggested to avoid the deforestation and unwanted use of the medicinal flora of the area.

Declarations

Ethics statement: Prior to the survey, we obtained oral informed consent from each participant.
Consent for publications: Not applicable.
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Conflicts of Interest: The authors declare that there are no conflicts of interest in this article.
Data Availability statement
The figures and tables supporting the results of this study are included in the article, and the original data sets are available from the first author upon request.
Author's contribution: MI wrote the original draft of the manuscript, FU did the statistical analysis, and IUH revised and edited the article. All the authors approved the final manuscript after revision.

Literature Cited

Abdin SZU, Khan R, Ahmad M, Jan HA, Zafar M, Shah AH. 2022. A cross-cultural Ethnobotanical knowledge comparison about local plants among Pashto, Punjabi and Saraiki communities living in Southwest Pakistan. Ethnobotany Research and Applications 23:1-16.

Ahmad I, Irfan M, Ali I, Khan J, Saeed SH, Gulfaraz A. 2016. Checklist of some medicinal plants of District Lower Dir, Pakistan. Journal of Agricultural & Bio-Chemical Science 1(1):15-22.

Ahmad L, Riaz M, Jan HA, Semotiuk AJ, Ahmad I, Khan I, Ali F, Rashid W, Bussmann RW. 2021. An Ethnobotanical survey of wild food plants used by the local communities of Kumrat valley in District Upper Dir, Pakistan. Ethnobotany Research and Applications 22:1-13.

Ahmad L, Semotiuk A, Zafar M, Ahmad M, Sultana S, Liu QR, Yaseen G. 2015. Ethnopharmacological documentation of medicinal plants used for hypertension among the local communities of Lower Dir, Pakistan. Journal of Ethnopharmacology 175:138-146.

Ahmad M, Sultana S, Fazl-i-Hadi S, Ben Hadda T, Rashid S, Zafar M, Yaseen G. 2014. An Ethnobotanical study of medicinal plants in high mountainous region of Chail valley (District Swat-Pakistan). Journal of Ethnobiology and Ethnomedicine 10:1-18.

Ajaib MZ, Khan N, Khan and Wahab M. 2010. Ethnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. Pakistan Journal of Botany 42(3):1407-1415.

Akhter S, Ahmad I, Ahmad MZ, Ramazani F, Singh A, Rahman Z, Kok RJ. 2013. Nanomedicines as cancer therapeutics: current status. Current Cancer Drug Targets 13(4):362-378.

Ali A, Jan G, Irfan M, Jan FG, Ullah F. 2023. Quantitative Ethnomedicinal study of the Flora of Tehsil Lahor, District Swabi, Khyber Pakhtunkhwa, Pakistan. Ethnobotany Research and Applications 25:64:1-21. doi: 10.32859/era.25.64.1-21

Ali A, Rashid A, Sultan A, Irfan M. 2017. *Anisochilus carnosus* (L. f.) Wall. ex Benth. (Lamiaceae) - a new generic record for Pakistan. Plant Science Today 4(3):102-105.

Ali S, Sayed AS, Saeed RF, Iqbal J, Ijaz S, Munazir M. 2023. Ethnomedicinal plant use value in Lower Swat, Pakistan. Ethnobotany Research and Applications 25:1-22.

Ali-Shtayeh MS, Yaniv Z, Mahajna J. 2000. Ethnobotanical survey in the Palestinian area: a classification of the healing potential of medicinal plants. Journal of Ethnopharmacology 73(1-2):221-232.

Asif M, Haq SM, Yaqoob U, Hassan M, Jan HA. 2021. A Preliminary Study on the Ethnotraditional medicinal Plant usage in Tehsil Karnah of District Kupwara (Jammu and Kashmir) India. Ethnobotany Research and Applications 21:1-14.

Belayneh A, Bussa NF. 2014. Ethnomedicinal plants used to treat human ailments in the prehistoric place of Harla and Dengego valleys, eastern Ethiopia. Journal of Ethnobiology and Ethnomedicine, 10(1):1-17.

Bibi T, Ahmad M, Tareen RB, Tareen NM, Jabeen R, Rehman SU, Yaseen G. 2014. Ethnobotany of medicinal plants in district Mastung of Balochistan province-Pakistan. Journal of Ethnopharmacology 157:79-89.

Bradacs G, Heilmann J, Weckerle CS. 2011. Medicinal plant use in Vanuatu: A comparative Ethnobotanical study of three islands. Journal of Ethnopharmacology, 137(1): 434-448.

Butt MA, Ahmad M, Fatima A, Sultana S, Zafar M, Yaseen G, Kayani S. 2015. Ethnomedicinal uses of plants for the treatment of snake and scorpion bite in Northern Pakistan. Journal of Ethnopharmacology 168:164-181.

Gairola S, Sharma J, Gaur RD, Siddiqi T O & Painuli RM. 2013. Plants used for treatment of dysentery and diarrhea by the Bhoxa community of district Dehradun, Uttarakhand, India. Journal of Ethnopharmacology 150(3): 989-1006.

Gazzaneo LRS, De Lucena RFP & de Albuquerque UP. 2005. Knowledge and use of medicinal plants by local specialists in a region of Atlantic Forest in the state of Pernambuco (Northeastern Brazil). Journal of Ethnobiology and Ethnomedicine 1(1):1-8.

Gedif T, Hahn HJ. 2003. The use of medicinal plants in self-care in rural central Ethiopia. Journal of Ethnopharmacology 87(2-3):155-161.

Giday M, Asfaw Z, Elmqvist T & Woldu Z. 2003. An Ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. Journal of Ethnopharmacology 85(1):43-52.

Giday M, Asfaw Z, Woldu Z. 2009. Medicinal plants of the Meinit ethnic group of Ethiopia: an ethnobotanical study. Journal of Ethnopharmacology 124(3):513-521.

González-Tejero MR, Casares-Porcel M, Sánchez-Rojas CP, Ramiro-Gutiérrez JM, Molero-Mesa J, Pieroni A & ElJohrig S. 2008. Medicinal plants in the Mediterranean area: synthesis of the results of the project Rubia. Journal of Ethnopharmacology 116(2):341-357.

Hamayun M. 2003. Ethnobotanical studies of some useful shrubs and trees of District Buner, NWFP, Pakistan. Ethnobotanical Leaflets 1:12.

Hamayun M. 2005. Ethnobotanical profile of Utror and Gabral valleys, district Swat, Pakistan. Ethnobotanical Leaflets 1:9.

Haq F, Ahmad H, Alam M. 2011. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. Journal of Medicinal Plants Research 5(1): 39-48.

Hazrat A, Nisar M, Sher K, Shah J, Jan T, Ullah A. 2020. Taxonomic and medicinal study of Papilionaceae of District Upper Dir, Khyber Pakhtunkhwa, Pakistan. Sarhad Journal of Agriculture 36(3):974-978.

Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. 1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. Journal of Social Science and Medicine 47(11):1859-1871.

Iftikhar S, Ali W, Ullah S, Khan W, Irfan M. 2019. Comparative antibacterial potential of methanolic extract of the leaves of wild and cultivated *Ficus carica* L. International Journal of Botany Studies 4(4):139-143.

Ijaz F, Iqbal Z, Alam J, Khan SM, Afzal A, Rahman IU, Sohail M. 2015. Ethnomedicinal study upon folk recipes against various human diseases in Sarban Hills, Abbottabed, Pakistan. World Journal of Zoology 10(1):41-46.

Imtiaz A, Mohammad I, Niaz A. 2011. Ethnobotanical study of Tehsil Kabal, Swat District, KPK, Pakistan. Journal of Botany.

Iqbal I & Hamayun M. 2004. Studies on the traditional uses of plants of Malam Jabba valley, District Swat, Pakistan. Ethnobotanical leaflets 1:15.

Irfan M, Ahmad I, Saeed SH. 2017a. Traditional medicinal plant knowledge of some spermatophytes of Samar Bagh Valley, Lower Dir district, Pakistan. Plant Science Today 4(4):151-153.

Irfan M, Ali, D, Jan, G, Murad, W. 2018a. Ethnobotanical survey of the flora of tehsil Balakot, District Mansehra, Khyber Pakhtunkhwa, Pakistan. Specialty Journal of Biological Sciences 4(3):7-14.

Irfan M, Ali I, Kashf RA. 2018b. Ethnobotanical survey of the flora of Maidan Valley, Lower Dir District, Khyber Pakhtunkhwa Province, Pakistan. Plant Science Today 5(2):68-71.

Irfan, M, Jan G, Jan FG, Murad W, Rauf A, Alsayari, A, Almarhoon, ZM, Mabkhot YN. 2021. Ethnomedicinal and Traditional uses of the Ferns of Khyber Pakhtunkhwa, Pakistan. Brazilian Journal of Biology 84:1-20. https://doi.org/10.1590/1519-6984.250256.

Irfan M, Khan I, Ali A, Khan R, Ali A, Jan G. 2018c. Ethnomedicinal uses of the plants of tehsil Laalqilla, district Lower Dir, Khyber Pakhtunkhwa, Pakistan. Journal of Applied Environmental and Biological Sciences 8(6):61-66.

Irfan M, Nabeela, Kamil, M, Khan NA, Ali A, Ullah Z, Ilyas M, Khan U. 2018d. Ethnomedicinal applications of plant taxa by the local communities of tehsil Adenzai, district Lower Dir, Khyber Pakhtunkhwa, Pakistan. International Journal of Biosciences 13(5):40-49.

Irfan M, Nabeela, Kamil M, Khan NA, Ilyas M, Ali A, Ullah S, Shah M, Jan G, Murad W. 2018e. Ethnomedicinal and traditional knowledge of phanerogams of tehsil Munda, district Lower Dir, Khyber Pakhtunkhwa, Pakistan. International Journal of Biosciences 13(4):208-218. doi:10.12692/ijb/13.4.208-218.

Irfan M, Nabeela, Kamil M, Khan NA, Khan H, Khalil S, Ullah S, Shah M, Jan G, Murad W. 2018f. Ethnomedicinal plants uses of tehsil Khall, district lower Dir, Khyber Pakhtunkhwa, Pakistan. International Journal of Biosciences 13(4):219-229. doi:10.12692/ijb/13.4.219-229.

Irfan M, Nabeela, Kamil M, Ullah S, Khan S, Shah M, Murad W. 2018g. Ethnobotanical Survey of the Flora of Tehsil Balakot, District Mansehra, Khyber Pakhtunkhwa, Pakistan. Journal of Applied Environmental and Biological Sciences 8(8):1-13.

Irfan M, Nabeela, Khan H, Khan S. (2019). A Review of different Phytochemicals and Pharmacological activities evaluations of *Morus alba* (L.). Specialty Journal of Chemistry 4 (2):1-9.

Jan HA, Abidin SZU, Bhatti MZ, Ahmad L, Alghamdi AK, Alkreathy HM. 2022. Medicinal plants and related Ethnomedicinal Knowledge in the Communities of Khadukhel Tehsil, Buner District, Pakistan. Sustainability 14(20):13077.

Jan HA, Ahmad L, Bussmann RW, Jan S, Wali S, Haq SM, Romman M. 2021a. Medicinal plants used for veterinary diseases by the local inhabitants of the Teshil Tangi, District Charsadda, Pakistan. Indian Journal of Traditional Knowledge 20(4):990-1001.

Jan HA, Jan S, Bussmann RW, Ahmad L, Wali S, Ahmad N. 2020a. Ethnomedicinal survey of the plants used for gynecological disorders by the indigenous community of District Buner, Pakistan. Ethnobotany Research and Applications 19:1-18.

Jan HA, Jan S, Bussmann RW, Wali S, Sisto F, Ahmad L. 2020b. Complementary and alternative medicine research, prospects and limitations in Pakistan: a literature review. Acta Ecologica Sinica 40(6):451-463.

Jan HA, Jan S, Wali S, Ahmad L, Sisto F, Bussmann RW, Romman M. 2021b. Ethnomedicinal study of medicinal plants used to cure dental diseases by the indigenous population of district Buner, Pakistan. Indian Journal of Traditional Knowledge 20(2):378-389.

Jan HA, Wali S, Ahmad L, Jan S, Ahmad N, Ullah N. 2017. Ethnomedicinal survey of medicinal plants of Chinglai Valley, Buner district, Pakistan. European Journal of Integrative Medicine 13: 64-74.

Jan M, Mir TA, Jan HA, Khare RK. 2022a. Medicinal plants diversity and their uses for Gynecological Disorders of District Baramulla, Jammu and Kashmir, India. Journal of Plant Research and Biotechnology 35(2):438-452.

Kadir MF, Sayeed MSB, Mia MMK. 2012. Ethnopharmacological survey of medicinal plants used by indigenous and tribal people in Rangamati, Bangladesh. Journal of Ethnopharmacology 144(3):627-637.

Kayani S, Ahmad M, Zafar M, Sultana S, Khan MPZ, Ashraf MA, Yaseen G. 2014. Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies-Abbottabad, Northern Pakistan. Journal of Ethnopharmacology 156:47-60.

Khan K, Jan J, Irfan M, Jan FG, Hamayun M, Ullah F, Bussmann RW. 2023. Ethnoveterinary uses of medicinal plants amongst the tribal populations of District Malakand, Khyber Pakhtunkhwa, Pakistan. Ethnobotany Research and Applications 25:42:1-24. doi: 10.32859/era.25.42.1-24

Khan MT, Ahmad L, Rashid W. 2018. Ethnobotanical documentation of traditional knowledge about medicinal plants used by indigenous people in Talash valley of Lower Dir, Northern Pakistan. Journal of Intercultural Ethnopharmacology 7(1):8-24.

Kumar A, Kumar P, Nadendla R. 2013. A review on: *Abelmoschus esculentus* (Okra). International Research Journal of Pharmaceutical and Applied Sciences 3(4):129-132.

Leto C, Tuttolomondo T, La Bella S, Licata M. 2013. Ethnobotanical study in the Madonie Regional Park (Central Sicily, Italy)—Medicinal use of wild shrub and herbaceous plant species. Journal of Ethnopharmacology 146(1):90-112.

Muhammad M, Badshah L, Shah AA, Shah MA, Abdullah A, Bussmann RW, Basit A. 2021. Ethnobotanical profile of some useful plants and fungi of district Upper Dir, Tehsil Darora, Khyber Pakhtunkhwa, Pakistan. Ethnobotany Research and Applications 21:1-15.

Musa M, Jan G, Jan FG, Hamayun M, Irfan M, Rauf A, Alsahammari A, Alharbi M, Suleria HAR, Ali, N. 2022. Pharmacological activities and gas chromatography-mass spectrometry analysis for the identification of bioactive compounds from *Justicia adhatoda* L. Frontiers in Pharmacology 13:922388. doi:10.3389/fphar.2022.922388.

Qureshi RA, Ghufran MA, Gilani SA, Yousaf Z, Abbas G, Batool A. 2009. Indigenous medicinal plants used by local women in southern Himalayan regions of Pakistan. Pakistan Journal of Botany 41:19-25.

Rahman AHMM. 2013. Ethnomedicinal investigation on ethnic community in the northern region of Bangladesh. American Journal of Life Sciences 1(2):77-81.

Rahman IU, Ijaz F, Afzal A, Iqbal Z, Ali N, Khan MA, Asif M. 2016. Graphical dataset on important medicinal plants used for curing dental issues in Manoor Valley, Mansehra, Pakistan. Data in Brief 9:1028-1033.

Rehman S, Iqbal Z, Qureshi R, Shah GM, Irfan M. 2023. Ethnomedicinal plants uses for the treatment of respiratory disorders in tribal District North Waziristan, Khyber Pakhtunkhwa, Pakistan. Ethnobotany Research and Applications 25:1-16.

Šavikin K, Zdunić G, Menković N, Živković J, Ćujić N, Tereščenko M, Bigović D. 2013. Ethnobotanical study on traditional use of medicinal plants in South-Western Serbia, Zlatibor district. Journal of Ethnopharmacology 146(3):803-810.

Sher AA, Iqbal A, Adil M, Ullah S, Bawazeer S, Binmahri MK, Zamil LZ, Irfan M. 2022. GC-MS analysis of organic fractions of *Chrozophora tinctoria* (L.) A.Juss. and their prokinetic propensity in animal models. Brazilian Journal of Biology 84:e260566. doi: 10.1590/1519-6984.260566.

Sher J, Jan G, Israr M, Irfan M, Yousuf N, Ullah F, Rauf A, Alshammari A, Alharbi M. 2023. Biological Characterization of *Polystichum lonchitis* L. for Phytochemical and Pharmacological Activities in Swiss Albino Mice Model. Plants 12:1455. https://doi.org/10.3390/ plants12071455.

Shinwari S, Ahmad M, Luo Y, Zaman W. 2017. Quantitative analyses of medicinal plants consumption among the inhabitants of Shangla-Kohistan areas in Northern-Pakistan. Pakistan Journal of Botany 49(2):725-734.

Shuaib M, Hussain F, Rauf A, Jan F, Romman M, Parvez R, Shah NA. 2021. Traditional knowledge about medicinal plant in the remote areas of Wari Tehsil, Upper Dir, Pakistan. Brazilian Journal of Biology 83:1-28.

Tardío J, Pardo-de-Santayana M. 2008. Cultural importance indices: a comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Economic Botany 62(1):24-39.

Tareen RB, Bibi T, Khan MA, Ahmad M, Zafar M. 2010. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Baluchistan, Pakistan. Pakistan Journal of Botany 42(3):1465-1485.

Tariq A, Mussarat S, Adnan M, Abd_Allah EF, Hashem A, Alqarawi AA, Ullah R. 2015. Ethnomedicinal evaluation of medicinal plants used against gastrointestinal complaints. International Journal of Biomedical Research 31:1-14.

Ullah K, Alam J, Shah GM, Gul A, Irfan M. 2022a. Ethnomedicinal and traditional uses of the Ferns of Shishikoh valley, District Chitral, Pakistan. Plant Science Today 9(3):687-692. doi: 10.14719/pst.1690

Ullah K, Shah GM, Alam J, Irfan M, Qadir G, Ullah B. 2022b. Evaluation of Ethno veterinary Medicinal Plants of Shishikoh Valley; Practices among the Local Community of District Chitral, Hindukush, Pakistan. Sylwan 166(2):102-121.

Ullah N, Siraj-Ud-Din, Rahim F, Bussmann RW, Jan HA, Wali S. 2021. A step towards the documentation of indigenous knowledge about the medicinal plants in mollagori: A tribal war affected area of Fata, Pakistan. Pakistan Journal of Botany 53(5):1779-1789.

Ullah S, Khan MR, Shah NA, Shah SA, Majid M, Farooq MA. 2014. Ethnomedicinal plant use value in the Lakki Marwat District of Pakistan. Journal of Ethnopharmacology 158:412-422.

Ullah S, Khan W, Ali W, Khan MS, Sajad MA, Nabeela, Irfan M. 2018. Antibacterial and antifungal potentials of the various solvents extracts of *Quercus incana* fruits. International Journal of Biosciences 13(5):438-447. doi:10.12692/ijb/13.5.438-447.

Vijayakumar S, Yabesh JM, Prabhu S, Manikandan R, Muralidharan B. 2015. Quantitative Ethnomedicinal study of plants used in the Nelliyampathy hills of Kerala, India. Journal of Ethnopharmacology 161:238-254.

Vitalini S, Iriti M, Puricelli C, Ciuchi D, Segale A, Fico G. 2013. Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy) An alpine Ethnobotanical study. Journal of Ethnopharmacology 145(2):517-529.

Wali S, Jan HA, Haq SM, Yaqoob U, Bussmann RW, Rahim F. 2021. The Traditional phyto-recipes used to cure various ailments by the local people of Shishi Koh valley, Chitral, Pakistan. Ethnobotany Research and Applications 22:1-32.

Wazir SM, Dasti AA, Shah J. 2004. Common medicinal plants of Chapursan Valley, Gojal II, Gilgit, Pakistan. Journal of Scientific Research. Bahauddin Zakariya University, Multan, Pakistan 15:41-43.