Quantitative ethnobotanical appraisal of medicinal plants used by indigenous communities of District Malakand, Pakistan

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Databases and Inventories

Abstract

Background: Medicinal plants are the only possible solution to facilitate and treat different complications of human beings. The local residents of District Malakand are dependent on medicinal plants for their primary healthcare. The aim of this study was to document medicinal plants and associated traditional knowledge of District Malakand, Khyber Pakhtunkhwa.

Methods: The area was frequently visited from March to August in 2018-2019, during the peak flowering season for the collection of specimens and semi-structured interviews on the uses of medicinal plants. A total of 150 participants selected randomly and the demographic information (age, gender) and status of conservation was aggregated using a semi-structured questionnaire collected from each site. Informants were interviewed in their local language (Pashto).

Results: A total of 62 ethno-medicinal plant species belonging to 37 families were recorded. A considerable proportion of the ethno-medicinal plant species were used for gastro-intestinal disorders. Relative Frequency of Citation (RFC) ranged from 0.48 to 0.3. The highest RFC value was registered for *Jasminum officinale* 0.48. Similarly, the UV (Use Value) range from 0.92 to 0.35, with highest values for *Citrus medica* (0.92), *Lagenaria siceraria* (0.55), and *Lycopersicum esculentum* (0.5). Older participants from 55-70 years of age showed higher knowledge about plants, followed by the age group 45–55.

Conclusion: In the present study, some plants were of key importance i.e., *Citrus medica, Lagenaria siceraria, Lycopersicum esculentum, Lactuca sativa* and *Brassica rapa.* This documentation of medicinal plants and their uses shows the rich tradition in ethno-medicinal knowledge of the District Malakand, Pakistan.

Keywords: Indigenous community, Quantitative ethnobotany, medicinal plants, Malakand, Pakistan

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Background

Plants have been used as source of medicines for the treatment of different diseases for millennia (Hussain *et al.* 2018; Zaman *et al.* 2013). Approximately 80% of the world population still utilizes medicinal plants at least partly for their primary health care needs (Khan *et al.* 2021; Nadeem *et al.* 2013; WHO, 2020; Wang *et al.* 2021). The 1978 Alma-Ata declaration supports and encourages local community participations, sustainable, self-reliance and integrated methods for the improvement of basic health care (WHO, 2020). However, the rise in availability of allopathic drugs has significant effective role than the phytomedicines (Vítor & Vale, 2011), despite often higher side effects (Sng & Wang, 2015). In the remote study area the majority of local residents are poor, often illiterate, and deprived of modern facilities including education and healthcare (Khan *et al.* 2021; Abebe, 2011). The local inhabitant's area mostly relying on plants and plants-based drugs for their daily life (Murad *et al.*, 2011, 2012, 2013; Kamal *et al.* 2016).

Medicinal plants contain a large diversity of bioactive compounds (Akkol *et al.* 2021; Hayat *et al.* 2021) that might help in the treatment of a wide variety of diseases in humans and animals (Ahmad *et al.* 2020; Silva *et al.* 2020) and the development of herbal drugs (Murad *et al.* 2012). The related traditional knowledge has been transferred mostly orally from generation to generations (Zeleke, 2016), and is still important for mental, physical and social benefits (Jan *et al.* 2011). According to the World Health Organization, about 4 billion people in emerging countries trust and consistently use the benefits of herbal remedies (Khan *et al.* 2021). The use of ethnomedicine assessment of therapeutic plant species is essential for conservation, assurance and is valuable for the production of medicinal plants. Although modern medicine may be increasingly accessible in these countries, herbal remedies often maintain their importance (Shinwari, *et al.* 2013; Ahmad, 2016).

There are more than 6,000 higher plant species in Pakistan and approximately 12% are used as source of medicines (Bano *et al.* 2014) and used for a wide range of human diseases (Ozkan *et al.* 2016; Jima & Megersa, 2018). In most cases, certain plants species are considered to be special for a particular disease, but sometimes species have multiple uses (Hamayun *et al.* 2005). According to the Export Promotion Agency (EPA) Pakistan is one of the top eight countries exporting medicinal plants, worldwide (Umair *et al.* 2017). In 1999, more than 8,500 tons of herbs with a value of $6 million were exported (Kier *et al.* 2009). In most cases, herb collectors are uneducated or illiterate, and women followed by children are often the main collectors of herbs (Sodhi *et al*, 2004). A number of plant species have already become extinct in Pakistan due to over-exploitation (Rahman *et al.* 2018). Information related to medicinal species is still passed on verbally from generation to generation (Jan *et al.* 2011; Murad *et al.* 2011). The traditional knowledge of the research area is still not well documented. The aim of this study was to document medicinal plants and associated traditional knowledge of District Malakand, Khyber Pakhtunkhwa.

Materials and Methods

Study area

District Malakand has a population of 720,295 (2018) and total area of 952 km^2. The study lies at the 34°25'31.0"N and 71°49'09.8"E in the Northern part of Khyber Pakhtunkhwa, Pakistan. The climate of the study area is very varied due to its peculiar position. Summers (May-September) are sweltering and clear and the winters (December-March) are mostly cold and partly cloudy. Throughout the year the average temperature varies from 3.8 to 44°*C*, however, the temperature sometimes falls to 1°*C or rises above 48°C, respectively.*

Ethnobotanical fieldwork

Research was conducted from June 2018 to September 2019. The first stage included field trips for interviews on plants in terms of local name, part used, method of administration and disease used (Hassan *et al.* 2014). Participants were interviewed in their local language (Pashto) after giving their oral prior informed consent, using semi-structured interviews. The data were collected from farmers, shopkeepers, housewives. In the second phase plant collections were carried out (Khan *et al.* 2012, 2021). All plants of ethnomedicinal values were collected, and specimens were properly collected, pressed, dried, poisoned and mounted on herbarium sheets and identified by using available literature (Khan *et al.* 2021) and kept in the Herbarium of the Botany Department Abdul Wali Khan University Mardan, Pakistan

Quantitative data documentations and analysis

RFC (Relative Frequency of Citation)

The RFC was calculated following (Ahmad et al., 2016) as RFC =FC/N

UV (Use Value)

UV was calculated following (Holley *et al.* 2005) as Used value= Quantity of Utilization/N.
Where N represent the total number of respondents and U represent the amount of utilization average.

MUV (Medicinal Use Value)

Medicinal Use Value shows related therapeutic significance of known plants. The medicinal use value was calculated using (Murad *et al.* 2011):
Medicinal used value ¼ × MUi=N
MUi represents the known medicinal uses by every informant for a specific plant and N is the cumulative number participants.

Results

Informant's demographics

In the recent survey a total of 150 participants including domestic people (35, 23%) and Traditional health practitioner (THPs) (30, 20%) were interviewed in the field, homes, religious sites and working places. A total of 66 (44%) interviewees were women and 35 (23%) were men, respectively (Table 1). The participants between 65–85years held more knowledge followed by the age group 55–65 years old. Participants without formal education (20%) held also more knowledge.

Table 1. Demographic data of participants.

Variables	Categories	No. of persons	Percentage
Informant category	Traditional health practitioner	30	20%
	Indigenous people	35	23%
Gender	Female	66	44%
	Male	19	12%
Age	20-35 years	20	13%
	35-50 years	27	18%
	50-65 years	50	33%
	65-80 years	50	33%
	80 years and above	3	2%
Educational background	Illiterate	100	66%
	Primary	55	36%
	Middle	25	16%
	Matric	10	6%

Diversity of medicinal plants

A total of 62 species of medicinal plants (Voucher No. AWK0519- AWK0581) belonging to 33 families have been recorded (Table 2). Among them, Asteraceae was the most dominant family (7 species), followed by Solanaceae, and Fabaceae contributing 5 and 4 species, respectively (Figure 1).

Habits of plants and parts used

In this study most of the species were herbs (37%), followed by shrubs (26%), trees (20%), climber (10%), and underground (7%) (Figure 2). The most commonly used plant parts were leaves (24%), followed by fruits and the whole plant (20%), stem (95), seeds (7%), bulbs and roots (6% each), flowers (4%), and bark, petals, tubers and rhizomes 81% each) (Figure 3).

Preparation methods

The most used preparation method was powder (29%), followed by decoction (23%), paste (21%) and juice (18%) (Figure 4).

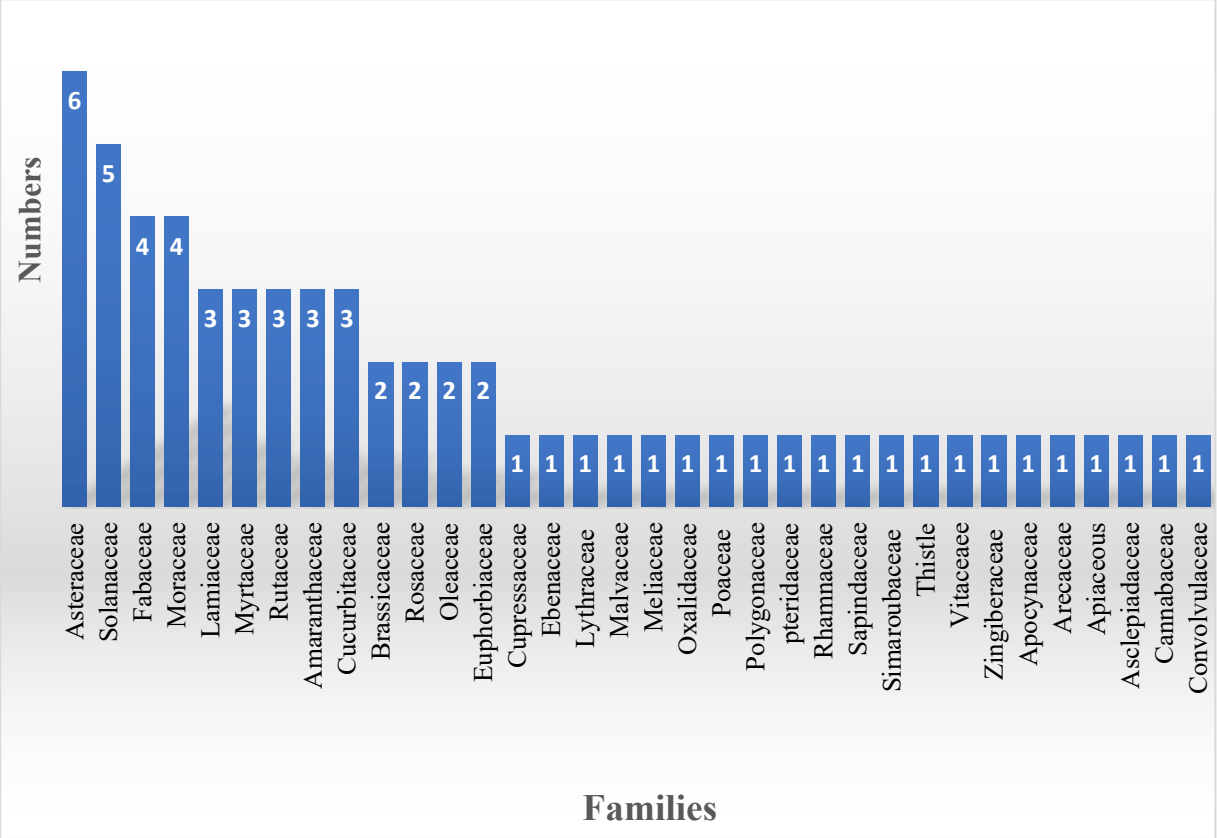

Figure 1. Number of species per family.

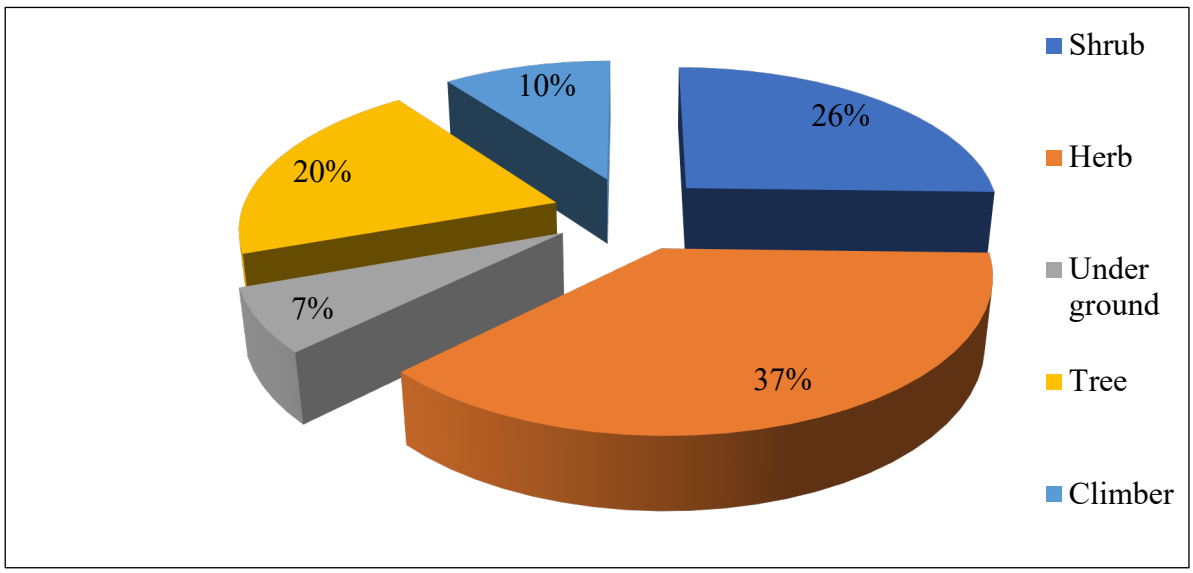

Figure 2. Habit of medicinal plants reported in the current study.

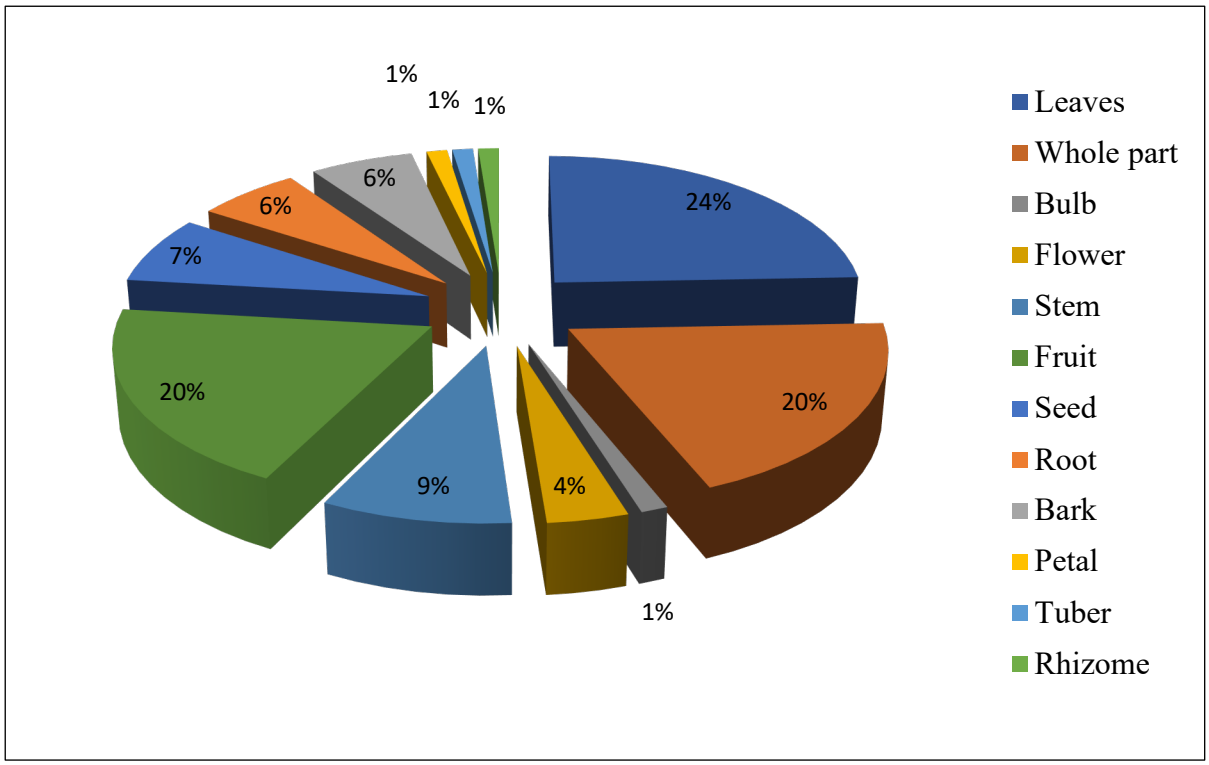

Figure 3. Plant parts used for the traditional medicines.

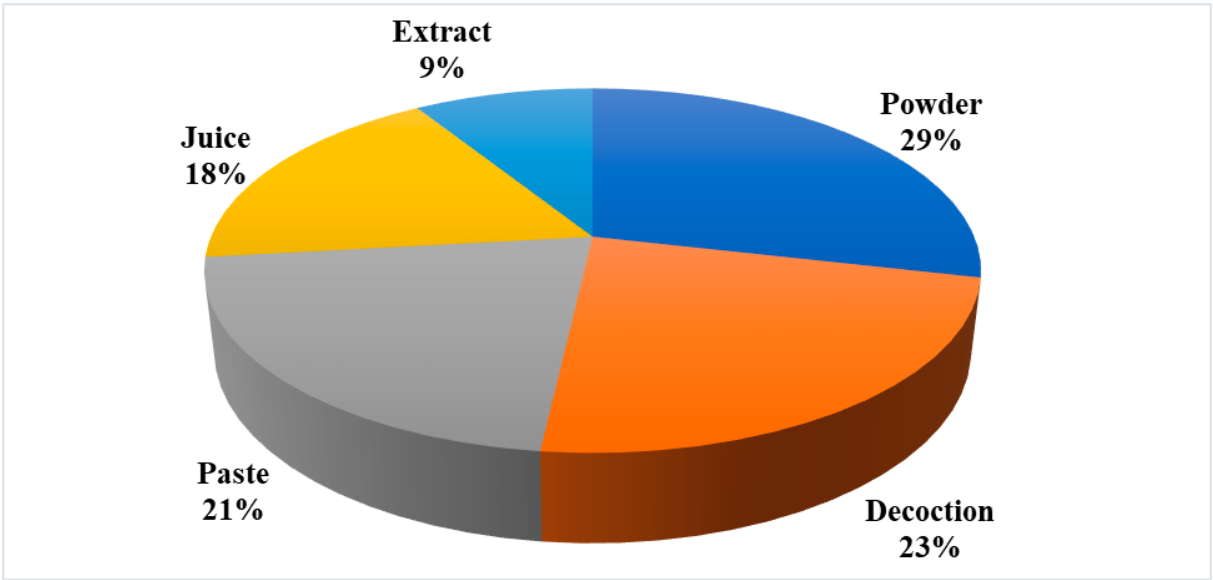

Figure 4. Traditional administration forms of medicinal plants in the study area.

Relative frequency of citation (RFC)

The range of RFC was from 0.48 to 0.3. The highest value of RFC was found for 0.48 for *Caralluma tuberculata* used for cough, abdominal pain, skin disease, throat infections and stomach diseases, followed by *Cestrum nocturnum* (0.44), *Jasminum officinale* (0.44), *Mentha arvensis* (0.41) and *Solanum nigrum* (0.38) respectively (Figure 5).

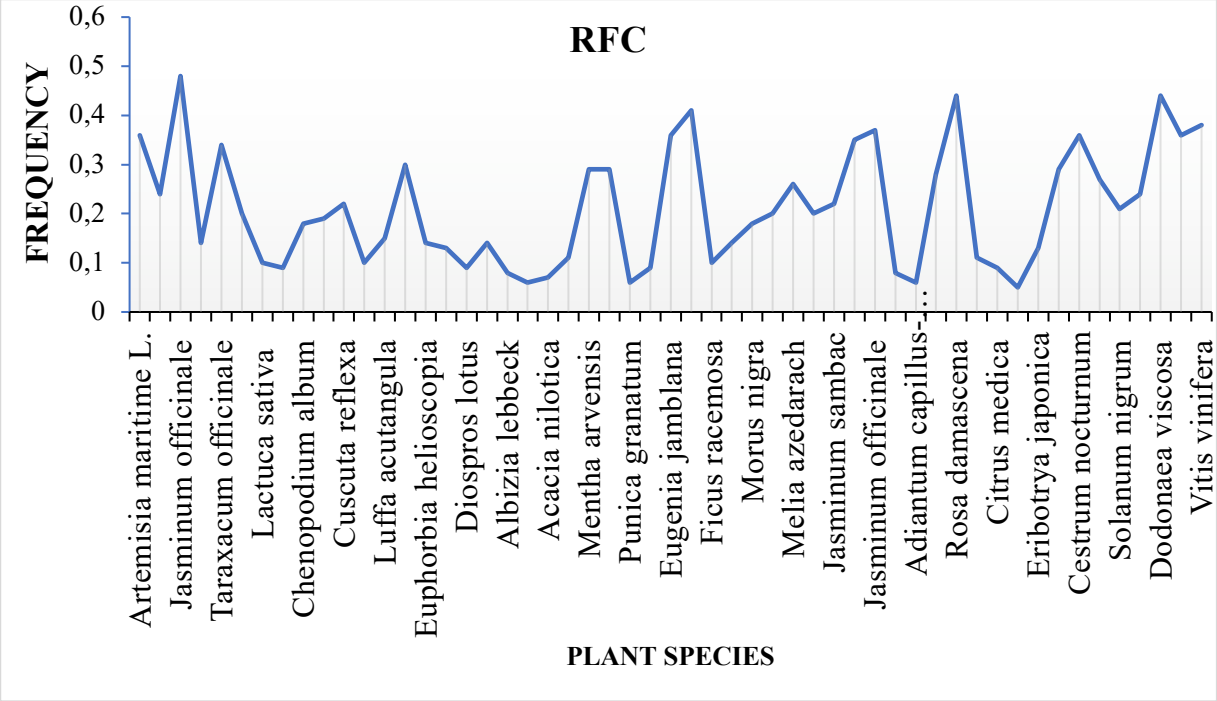

Figure 5. Relative frequency of citation (RFC) of medicinal plants.

Use value (UV)

UV ranged from 0.92 to 0.55, and species having highest use value were *Cucuta reflexa* (0.92), followed by *Acacia modesta* (0.55), *Acacia nilotica* (0.55), *Allium sativum* (0.43) and *Cynodon dactylon* (0.37) (Figure 6).

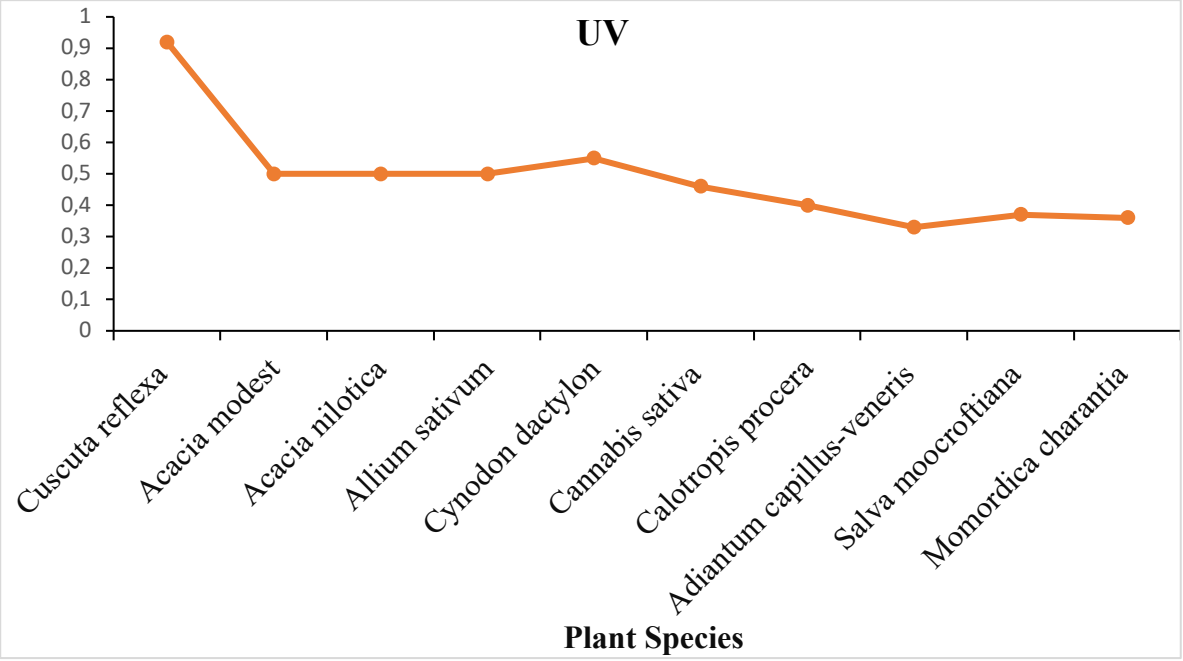

Figure 6. Use value (UV) give complete name/sentence/caption.

Table 3. Medicinal uses of wild and cultivated plants of District Malakand Khyber Pakhtunkhwa with Relative Frequency of Citation, Use Values, Use Reports, Frequency of Citation.

Family	Botanical Name	Local name	Habit	Part used	Route of administration	Medicinal uses	Voucher number	FC	UR	UV	RFC
Amaranthaceae	*Chenopodium album* Bose.	Sarmai sag	Herb	Leaves and stem	Oral	Laxative, anthelmintic, spleen, intestinal ulcer and burns.	AWK0519	14	**7**	0.5	0.09
Amaryllidaceae	*Allium cepa* (L.) Mill.	Piaz	Herb	Bulb	Oral	Diuretic, carminative, whooping cough, expectorant, and bronchodilators	AWK0520	37	8	0.21	0.24
Amaryllidaceae	*Allium sativum* L.	Oga	Herb	Whole plant	Oral	Anti-microbial, anti-bacterial, bronchodilator,	AWK0521	16	7	0.43	0.1
Apiaceae	*Coriandrum sativum* L.	Denyah	Herb	Whole plant	Oral	Treat digestive problem, measles, stomach pain, carminative, diuretic and antispasmodic.	AWK0523	22	6	0.27	0.14
Apocynaceae	*Calotropis procera* Aiton.	Spalmi	Shrub	Whole plant	Oral	Anti-tumor, antiseptic, sting, purgative, anti-coagulant and anticancer	AWK0524	33	11	0.33	0.22
Arecaceae	*Phoenix dactylifera* L.	Kajor	Tree	Fruit	Oral	Anti-cancer, diarrhea, anti-allergic, and weight loss.	AWK0525	29	6	0.2	0.19
Asclepiadaceae	*Caralluma tuberculata* N.E. Br.	Pamankai	Herb	Whole plant	Oral	Anti-diabetic, stomach and peptic ulcer.	AWK0526	24	2	0.08	0.48
Asteraceae	*Artemisia maritima* L.	Phespuk	Shrub	Whole part	Oral	Stomach, vomiting and liver problem	AWK0527	55	2	0.03	0.36
Asteraceae	*Calendula officinalis* L.	Ziarguly	Herb	Flower head	Oral	Treat hepatitis, healing wound and ulcer.	AWK0528	22	3	0.13	0.14
Asteraceae	*Taraxacum officinale* F.H. Wigg.	Ziarguly	Herb	Leaves, stem and fruit	Oral	Stress relief, constipation, anti-diabetic, diuretic and liver tonic.	AWK0529	52	5	0.09	0.34
Asteraceae	*Lactuca sativa* L.	Salad	Herb	Leaves	Oral	Stomach disorder and used as vegetable/salad	AWK0530	31	2	0.06	0.2
Asteraceae	*Helianthus annuus* L.	Nar paras	Shrub	Seed	Oral	Heart disease	AWK0531	16	1	0.06	0.1

Asteraceae	*Xanthium strumarium* L.	Ghiskay	Shrub	Root, leaves, fruit	Oral	Anti-cancer, urinary stone, anti-inflammatory, antifungal, antimalarial and antibacterial.	AWK0532	27	6	0.22	0.18
Asteraceae	*Carthamus oxycantha* M. Bieb.	Karena	Shrub	Seed	Oral	Blood pressure and stomachic.	AWK0533	28	3	0.1	0.18
Brassicaceae	*Brassica rapa* L	Taper	Herb	Seed and root	Oral	Skin disease and narcotic poisoning	AWK0534	23	3	0.13	0.15
Brassicaceae	*Capsella bursa-pastoris* Raf.	Bambaisa	Shrub	Whole plant	Oral	Wounds, stimulate kidney and urinary tract reliever and control hemorrhages	AWK0535	46	6	0.13	0.3
Cannabaceae	*Cannabis sativa* L.	Bhang	Shrub	Whole plant	Oral	Estrogenic, antipyretic, anti-inflammatory, diuretic and antiemetic	AWK0536	21	5	0.23	0.14
Convolvulaceae	*Cuscuta reflexa* Roxb.	Akash bail	Climber	Leaves	Oral	Rheumatic pain and digestion disorder	AWK0537	14	13	0.92	0.09
Cucurbitaceae	*Lagenaria siceraria* (Molina) Standle.	Kadu	Climber	Leaves and fruit	Oral	Cough, heart disease, diabetes, ulcer, blandness, urinary disorder, brain tonic and skin disease.	AWK0538	20	8	0.4	0.13
Cucurbitaceae	*Momordica charantia* Descourt.	Karela	Climber	Whole plant	Oral	Anti-diabetic	AWK0539	21	1	0.04	0.14
Cucurbitaceae	*Luffa acutangula* (L.) Roxb.	Tori	Climber	Fruit	Oral	Lung problems, uterine bleeding hemorrhoids and pain killer	AWK0540	12	4	0.33	0.08
Cupressaceae	*Juniperus communis* Thunb.	Shawah	Tree, Shrub	Seed and leaves	Oral	Join pain, snakebite, urinary tract infection, and gallbladder stone.	AWK0541	10	4	0.4	0.06
Ebenaceae	*Diospros lotus* L.	Amlook	Tree	Fruit	Oral	Sedative	AWK0542	17	2	0.11	0.11
Euphorbiaceae	*Euphorbia helioscopia* L	Mandano	Herb	Stem	Oral	Anthelmintic, febrifuge and fever	AWK0543	11	3	0.27	0.07
Euphorbiaceae	*Euphorbia hirta* L.	Pao booty	Herb	Whole plant	Oral	Diarrhea, lungs disease , pimple, intestinal and anti-cancer	AWK0544	19	6	0.31	0.12
Fabaceae	*Medicago sativa* L.	Peshtary	Herb	Leaves and stem	Oral	Kidney pain, anti-inflammatory, antioxidant and anti-diabetic.	AWK0545	44	2	0.04	0.29

Fabaceae	*Albizia lebbeck* Benth.	Sreek	*Tree*	Whole plant	Oral	Astringent, blood purification , tonic , treat impotency	AWK0546	44	4	0.09	0.29
Fabaceae	*Acacia modesta* Wall.	Palosa	Tree	Bark, flower, seed, gum	Oral	Used in pain, leprosy, dysentery and cleaning teeth.	AWK0547	9	5	0.55	0.06
Fabaceae	*Acacia nilotica* Wall.	Kikar	Tree	Leaves and gum,	Oral	Anti-cancer, smallpox, skin diseases, dysentery and leprosy.	AWK0548	13	6	0.46	0.08
Lamiaceae	*Mentha longifolia* L.	Enallay	Herb	Whole plant	Oral	Anthelminthic, antiseptic, stimulate digestion, abdomen pain, diarrhea and carminative	AWK0549	54	5	0.09	0.36
Lamiaceae	*Mentha arvensis* L.	Pudina	Tree	Whole plant	Oral	Treat stomach pain, fever, gastric acidity, antidiabetic, carminative, vomiting and abdominal pain.	AWK0550	62	7	0.11	0.41
Lamiaceae	*Salva moocroftiana* Wall ex Benth.	Khar govg	Shrub	Whole plant	Oral	Dysentery, remedy for guinea-worm and cough.	AWK0551	15	3	0.2	0.1
Lythraceae	*Punica granatum* L.	Anar	Tree	Fruit and leaves	Oral	Anti-oxidant, digestive problem and urinary infection.	AWK0552	22	8	0.36	0.14
Malvaceae	*Hibiscus esculentus* L.	Beandy	shrub	Whole plant	Oral	Stomachic, anti-diabetics, and ulcer.	AWK0553	33	4	0.12	0.22
Meliaceae	*Melia azedarach* L.	Tora shandai	Tree	Fruit, seed and barks	Oral	Anti-biotic, antiseptic, blood purifier, fever, cardio tonic and gas trouble.	AWK0554	56	8	0.14	0.37
Moraceae	*Ficus palmata* Forssk.	Warokyinzer	Tree	Milk juice, fruit	Oral	Asthma, anti-diabetics, dysentery, carminative and laxative constipation	AWK0555	40	7	0.17	0.26
Moraceae	*Ficus racemosa* L.	Anzer	Tree	Milk juice, fruit	Oral	Dysentery, carminative and laxative	AWK0556	31	3	0.09	0.2
Moraceae	*Morus nigra* L.	Tor toot	Tree	Fruit	Oral	Blood purification and anemia.	AWK0557	34	2	0.05	0.22
Moraceae	*Morus alba* L.	Speen toot	Tree	Fruit and leaves	Oral	Insect repellent, antibiotic and respiratory infection	AWK0558	53	3	0.05	0.35

Myrtaceae	*Eucalyptus camaldulensis* Dehnh.	Lachi	Tree	Leaves and seed	Oral	Wound healings, asthma, antiseptic and antiperiodic.	AWK0559	28	6	0.21	0.18
Myrtaceae	*Eugenia jamblana* Lam.	Jaman	Tree	Whole plant	Oral	Blood purification, carminative, and liver problem	AWK0560	30	7	0.23	0.2
Myrtaceae	*Psidum guajava* L.	Amrood	Tree	Fruit, leaves and bark	Oral	Diarrhea, lung disease, dysentery, ulcer, digestive disorder, astringent.	AWK0561	12	6	0.5	0.08
Oleaceae	*Jasminum sambac* (L.) Aiton.	Cambial	Shrub	Leaves and flower	Oral	Fever, vomiting, wound healing and skin diseases.	AWK0562	10	5	0.5	0.06
Oleaceae	*Jasminum officinale* L.	Rambailcham bail	Climber	Root	Oral	Expel roundworm	AWK0563	66	1	0.01	0.44
Oxalidaceae	*Oxalis corniculata* L.	Threwakey	Herb	Leaves and stem	Oral	Poisonous snake bite, antioxidant, anthelmintic, anti-analgesic, antifungal and influenza.	AWK0564	43	7	0.16	0.28
Poaceae	*Cynodon dactylon* (L.) Pers.	Kabal	Herb	Whole plant	Oral	Laxative and diuretic	AWK0565	8	3	0.37	0.05
Polygonaceae	*Rumex dentatus* L.	Shalkay	Herb	Leaves	Oral	Diarrhea, cold, heard diseases, stomach pain, wound healing and used as a vegetable.	AWK0566	17	6	0.35	0.11
Pteridaceae	*Adiantum capillus-veneris* L.	Bibi Aishapaiz	Herb	Whole plant	Oral	Diarrhea, cholera, skin diseases and stop hair fall	AWK0567	14	4	0.28	0.09
Rhamnaceae	*Zizyphus jujuba* Mill.	Brah Bera	Shrub	Fruit	Oral	Blood purification, digestion and ulcer.	AWK0568	41	3	0.07	0.27
Rosaceae	*Rosa damascena* Miller.	Gulab	Shrub	Petals	Oral	Astringent and aperients	AWK0569	20	2	0.1	0.13
Rosaceae	*Eribotrya japonica* Thunb.	Loquat	Tree	Leaves and fruit	Oral	Reduce thirst, constipation, maintain body temperature and sedative.	AWK0570	32	4	0.12	0.21
Rutaceae	*Citrus sinensis* Pers.	Malta	Tree	Fruit	Oral	Used in diarrhea, dysentery and digestive disorder and treat heart disease	AWK0571	44	4	0.09	0.29

Rutaceae	*Citrus medica* L.	Narang	Shrub	Fruit	Oral	Treat skin problems, laxative and appetite stimulate	AWK0572	55	4	0.07	0.36
Sapindaceae	*Dodonaea viscosa* L.	Ghwara sky	Tree, Shrub	Whole plant	Oral	Sore throat, wound healing, cold, swelling , burn and expel round worm	AWK0573	33	7	0.21	0.22
Simaroubaceae	*Ailanthus altissima* Wingle.	Spina shandai	Tree	Leaves and bark	Oral	Anthelmintic, dysentery and diarrhea.	AWK0574	29	4	0.13	0.19
Solanaceae	*Capsicum annum* L.	Ghate Machaky	Herb	Leaves and fruit	Oral	Digestion, Anti-diabetic and heard disease	AWK0575	37	4	0.1	0.24
Solanaceae	*Cestrum nocturnum* L.	Rat ki rani	Shrub	Whole part	Oral	Heart diseases and blood purification	AWK0576	67	3	0.04	0.44
Solanaceae	*Lycopersicum esculentum* Mill.	Tomato	Shrub	Fruit	Oral	Anti-diabetic, heart disease and as a vegetable	AWK0577	51	3	0.05	0.34
Solanaceae	*Solanum nigrum* L.	Kachmachu	Shrub	Leaves and root	Oral	Liver problem, spleen, heart disease, hepatitis, diuretic, sedative, skin disease and Carminative.	AWK0578	57	9	0.15	0.38
Solanaceae	*Solanum tuberosum* Poepp.	Alu	Herb	Tuber	Oral	Intestinal disorder, digestion disorder and used as a vegetable	AWK0579	31	3	0.09	0.2
Vitaceaee	*Vitis vinifera* L.	Angoor	Climber	Fruit, and leaves	Oral	Wound healing, stomach pain, heart disease and hepatitis.	AWK0580	30	4	0.13	0.2
Zingiberaceae	*Zingiber officinale* Roscoe	Adrak	Herb	Rhizome	Oral	Sore throat, cough, cold, fever, vomiting, heart diseases and blood purification.	AWK0581	19	2	0.1	0.12

Abbreviations; N (Number of Informers), AWK (Abdul Wali Khan), RFC (Relative Frequency of Citation), UV (Use Values), FC (Frequency Citations) and UR (Use Reports)

Discussion

The current study found that the residents of the study area hold a very rich cultural tradition of medicinal plant use The degree of ethnobotanical richness in the study area is directly accredited to its diverse flora. In the same way, many studies highlighted similar cultural utilizations of plants from Khyber Pakhtunkhwa. Khan *et al.* (2021) reported a total of 157 plants. Similarly, Murad *et al.* (2011 & 2012) found a total of 75 medicinal plants for human use and 20 medicinal plants for veterinary uses in District Malakand. The occurrence of a higher number of plants in the study area reflects its biodiverse flora similar to Haider & Qaiser (2009), who reported 83 medicinal plants species from the Chatral valley.

The prevalence of certain plant families in the current findings are in line with the previous reports (Ahmad *et al.* 2016; Akhtar *et al.* 2018; Khan *et al.* 2021). The widespread utilization of medicinal plant species from these families might be the main reason of diverse active phytochemicals in the form of alkaloids, terpenoids, flavonoids and phenols (Jan *et al.* 2011).

It was taken under considerations that the most common life form of medicinal plants in the current study were herbs (37%), followed by shrubs (26%) and trees (20%), in line with earlier findings (e.g., Khan *et al.* 2021; Ullah *et al.* 2018).

The most common method for the administration of traditional herbal recipes in the current study was powder (29%) and followed by decoction (23%) and juice (18%). This is in contrast to the findings of (Khan *et al.* 2021; Murad *et al.* 2013), who reported decoction as the preferred way of remedy preparation. Powder might have the potential of easy and maximum efficacy, due to its very high solubilizing affinity (Hamayun *et al.* 2005).

Local peoples of the area usually used every part of the plant, but leaves were found the most commonly used part in this study, likely due to easy collectability and compound content. Our findings are similar to the reports of (Khan *et al.* 2021; Hamayun *et al.* 2005; Jan *et al.* 2011) who confirmed that leaves were the common part of the plants used in the Khyber Pakhtunkhwa.

Conclusions

Western medicines have become commonly available in the study area, but due to their cost and temporal un-accessibility, local people of District Malakand are still largely relying on medical plants for the treatment of their diseases. Some of the common ailments treated traditionally included colds, fevers, bites, headaches and skin diseases. In the current study, some plant species with high useful value (UV), relative frequency (RFC) and utilization rate (UR) were used in the form of powders and juices to treat skin diseases, erythematic, kidney stones, gastritis, wound healing, arthritis, vomiting, diarrhea, cough, constipation, painful urination and snakebite. Research is needed to investigate such medicinal plants for novel bio-active chemical compounds further development potential.

Declarations

Ethics statement: Prior to the survey, we obtained oral informed consent from each participant.
Consent to publish: Any persons shown in images agreed to having their image published.
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Author's contribution: Nazli and Hassan Ara Begum designed the project and collected the data and wrote the first draft of the manuscript, Muhammad Hamayun and Tabassum Yaseen arranged and analyzed the data, Asif Khan, Waheed Murad and Rainer W. Bussmann revised the draft manuscript. All authors approved the final manuscript for publication.

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