

PRESERVING INDIGENOUS MEDICINAL PLANTS: A STUDY OF WILD PLANT UTILIZATION AND CONSERVATION IN CHAMLA VALLEY, BUNER DISTRICT, PAKISTAN

Hashma^{1*}, Syeda Sidra¹, Mamoona Nisar¹

¹Department of Botany, Abdul Wali Khan University Mardan, 23200 KP, Pakistan

Correspondence: Hashma *

Abstract

This research had focused on the Chamla valley situated in District Buner which is a rural area in the KP province of Pakistan. The local inhabitants use the native wild plants for various purposes. To raise awareness among the local community and safeguard these plants, we have presented Standard Operating Procedures (SOPs). Following the identification of these medicinal plants, we have preserved samples of each plant in the Abdul Wali Khan University herbarium for conservation purposes. Our comprehensive report encompasses 72 plant species belonging to 44 plant families. It was observed that the local residents utilize these plants for the treatment of ailments such as dysentery, diarrhea, infectious diseases, and liver diseases. Certain plants were found to be more commonly used than others. However, during our study, we also noticed a decline in the abundance of several plant species, which are now rarely found in the Chamla valley. The knowledge of medicinal plants in the Chamla valley contributes to the rich ethnomedical practices of Buner district. Therefore, urgent measures are required to protect this valuable knowledge.

Keywords: Ethnobotanical study, Medicinal plants, Conservation, Wild plants, Chamla valley

1. Introduction

The study of the relationship between plants and humans is known as ethnobotany, combining the terms "ethno" - the study of people, and "botany" the study of plants [1]. Ethnobotany explores the use of plants in various aspects of human society, including food, medicine, distribution, architecture, tools, currency, clothing, ceremonies, and

harmony [3]. In developing countries, it is estimated that approximately 80% of the population relies on traditional medicines [4,7]. Traditional medicines have gained significant recognition, particularly in areas where modern healthcare facilities are insufficient. Safe, genuine, and culturally aware traditional medicine is increasingly accepted in both urban and rural areas [2]. The identification and validation of traditional knowledge regarding native plant species have contributed to the development of several important medicines. Currently, 25% of the pharmacopeia consists of herbal medicines, alongside synthetic medicines. Natural products have been found to play a crucial role in the discovery of new drugs [22-28]. The growing attention from researchers towards ethnomedicines is driven by the importance of medicinal plants in daily healthcare [26, 27].

Numerous researchers have conducted studies across different regions of Pakistan to identify medicinal plants and document indigenous knowledge [4][10-16]. Ethnobotanical studies serve future purposes by contributing to our understanding of plant biodiversity, as well as human awareness regarding the use, application, and conservation of natural resources [5, 24, 25]. For instance, *Solanum nigrum*L. has been reported to be used as a relaxant, diuretic, cough medicine, and purgative [12]. *Justicia adhatoda* roots are utilized for treating joint inflammation, lung infections, and as antiseptics, expectorants, anticonvulsants, and demulsifiers [5]. Additionally, *Rumex hastatus* leaves are used as a diuretic [8]. In the Chinglai Buner Valley, KP Pakistan, ethnobotanical studies have identified 80 plant species from 46 families of shrubs and herbs, many of which are used to treat various diseases [8]. *Melia azedarach* L. leaves have been found to possess antiseptic, antibiotic, anti-lice, and anti-dandruff properties, and are used as fuel [9][6]. *Nasturtium officinale* R. Br is known for its sterile properties and its use in the treatment of tetanus [19]. *Chenopodium ambrosioides* L. sprout juice is used for indigestion [12], while *Datura innoxia*L. leaves are effective against toothache, headache, and epilepsy, and the seeds have antipyretic and narcotic effects [20]. *Rumex hastatus*L. is utilized for treating stomach and digestive disorders, and *Calotropis Procera* stem bark extract exhibits anti-inflammatory and gastroprotective effects. *Rumex dentatus* L. is reported to have antiseptic properties for wounds and skin problems [8].

The documentation of medicinal plants is crucial for conservation efforts as many species have dwindled due to their use for fuel and grazing. This study focuses on

investigating the medicinal plants found in the Chamla valley of Buner, Khyber Pakhtunkhwa, where the local community, primarily engaged in agriculture and livestock farming, faces various seasonal diseases due to the lack of awareness and inadequate sanitation facilities, particularly in tehsil Khudukhel. Therefore, this research aims to record the traditional knowledge of the local community in the Buner district regarding the medicinal value and diversity of plants. This work represents the first collection and commercialization of therapeutic plants in the area, providing an initial ethnobotanical and traditional evaluation [11,14,23]. The aim of this work was to contribute to the broader understanding of ethnomedical practices and traditional knowledge related to medicinal plants in the Buner District and their significance in healthcare and cultural heritage.

2. Materials and methods

The Chamla valley is located in the tehsil Khudukhel Buner a district in Khyber Pakhtunkhwa Pakistan. This area has a rich flora, which increases the beauty of this region.

A study was carried out between August 2018 and March 2020 to identify medicinal plant species and their uses. The plant sample was identified, collected, dried, and properly preserved and also identified by the flora of Pakistan, taxonomists and from the available literature and sent to the Herbarium of Abdul Wali Khan University [5]. The medicinal plants were categorized according to their value through interviews with the local people, the trader, the firewood seller, and the farmers, but prioritization was given to the local aged people and the hakims, who were the real users with a lot of knowledge related to medicinal flora and their practices for different purposes.

We have used an appropriate method to collect plants using newspapers, press belts, notebooks, excavators and scissors, collection bottles, mercury chloride, collection bags, wax paper, and cardboard envelopes, cards, cameras, paint, charts, hand cutters, string, pencil, cutter, GPS, field printer, labels, and ethanol. People were interested in identifying, collecting, and raising awareness and in the conservation of medicinal plants.

3. Data analysis

The medicinal plant species were divided into their families, and other information, like, practices and values, were written against them into columns in table 1. The questionnaires and semi-structured interviews were conducted to obtain data using Ms-Excel from MS office 2016.

4. Quantitative ethnobotany

In this section, we present the formulations used to calculate different statistical values based on our data.

4.1 Frequency of citations (CF) and relative frequency of citations (RFC)

The frequency of citations and relevant frequency of citations are calculated as follows,

$FC = (\text{the number of times a particular species was mentioned}) / (\text{total number of mentions of all species}) \times 100.$

The RFC index is used to indicate the local meaning of each type. It was scored by dividing the number of informants who mentioned species. It is calculated as FC divided by the total number of informants who participated in the survey (N). The RFC index varies from zero when no one describes a plant as useful, and value one when all informants have described a plant as useful [13,17].

$$RFC = FC / N.$$

4.2 Use value (UV)

UV is calculated using the following formula:

$$UV = U_i / N_i,$$

where "U_i" refers to the number of uses by informants (i) for a particular species, and "N_i" is the total number of informants interviewed for a particular plant. When a plant has high UV radiation, there are many useful reports for that plant, while a low score indicates fewer reports of use mentioned by informants [18-21].

5. Results and Discussion

This study was carried out in the Chamla village of Tehsil Khudu Khel, in which 72 species belonging to 44 families from the research area were recorded. The result shows

that *Asteraceae* was the leading family in imparting nine (9) species of ethnomedical knowledge, followed by *Lamiaceae* seven (7) species, *Euphorbiaceae* four (4) species, *Solanaceae*, *Rosaceae*, *Amaranthaceae*, and *Rhamnaceae* three (3) species, *Poaceae*, *Chenopodiaceae*, *Mimosaceae*, *Ranunculaceae* each with two (2) member species. In contrast, the other families had a single species contribution (Figure 1). At the same time, the ethnomedical plant habitat includes 59.72% herbs, 20.83 % trees, and 15.27 % shrubs (See Figure 2).

Important medical data on medicinal plants were collected during fieldwork. One hundred twenty informants were interviewed with considerable knowledge of medicinal plant species. Among the total of 120 informants, 30 were men and 90 women.

In general, it has been observed that most men collect these medicinal plants, and women prepare medicinal herbs and treat their patients. Our study suggests that both men and women are more or less equally informed about the protection of medicinal plants. All documented plant species are listed in the supplementary tables 1 and 2 and contain information on their family, their local name, their native name, parts of the plant used, and the ailments treated, ethnomedical applications, Ui, Ni, UVi, FC, and RFC.

Quantitative ethnobotany

5.1. Use value (UV)

In this study, the UV of the plants (Table 2) was between 0.2 and 0.95. According to UV data, the six most commonly used ethnomedical plant species were *Berberis lyceum* Royle (0.95), *Justicia adhatoda* L. (0.93), *Mentha Spicata* L. (0.93), *Rumex dentatus* L. (0.93), and *Dodonea viscosa* (L.) Jacq. (0.9). The least used species were *Euphorbia hirta* Linn. (0.2) and *Zizyphus numularia* (Burm.f.) Wight & Am., *Fummaria indica* (Hauskn), Pugsl and *Cannabis sativa* Linn. (0.3 Each). These types have been used for various purposes, including treating skin diseases, diarrhea, piles, antiseptic, asthma, anthelmintic, antispasmodic, expectorant, carminative whereas the four types with the lowest UV radiation were used to treat diarrhea as blood cleansers, scabies and boils, respectively.

5.2. Relative Frequency of Citation (RFC)

In this study, the CFR values ranged from 0.01 to 0.37. The highest RFC was recorded for *Dodonea viscosa* (L.) Jacq. (0.37) followed by *Berberis lyceum* Royle., *Justicia adhatoda* L., *Mentha Spicata* L., and *Rumex dentatus* L. (0.35 each). Supplementary Table 2. Ethnomedical plant species with high levels of RFCs indicated the abundant use and well-known information of the native people. *Dodonea viscosa* (L.) Jacq had the highest citation frequency (FC-45), and *Berberis lyceum* Royle, and *Rumex dentatus* L (FC-43), *Mentha Spicata* L., *Justicia adhatoda* L, and *Brassica compestris* (FC-42) were abundant in the areas of study.

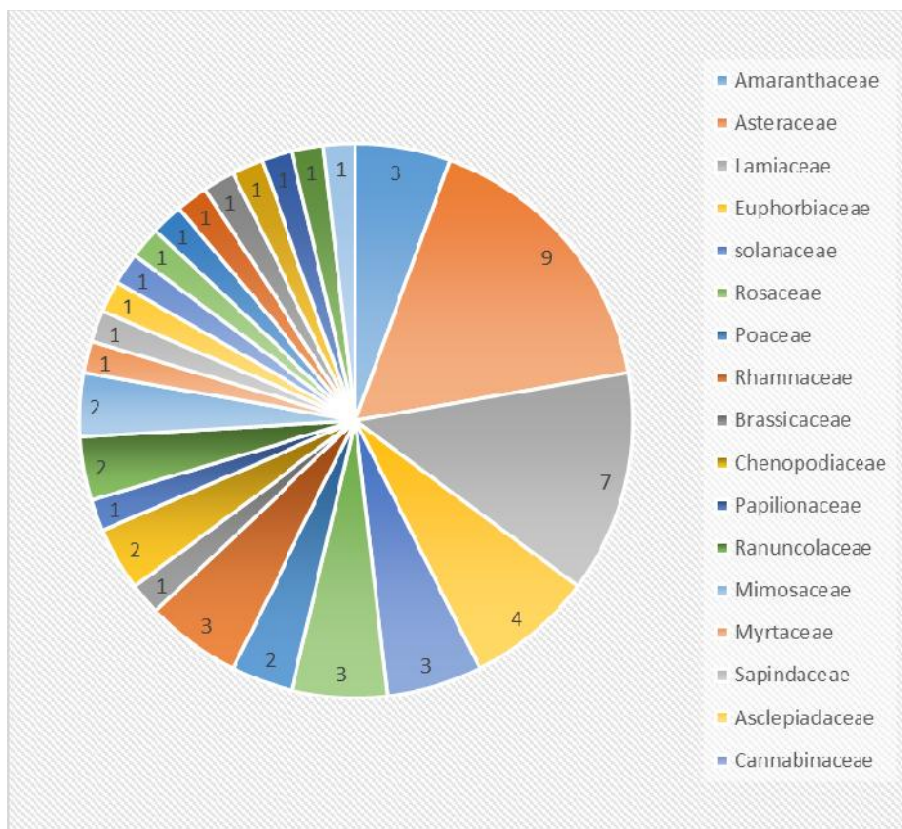


Figure 1: Medicinal plants distribution in Chamla valley district Buner

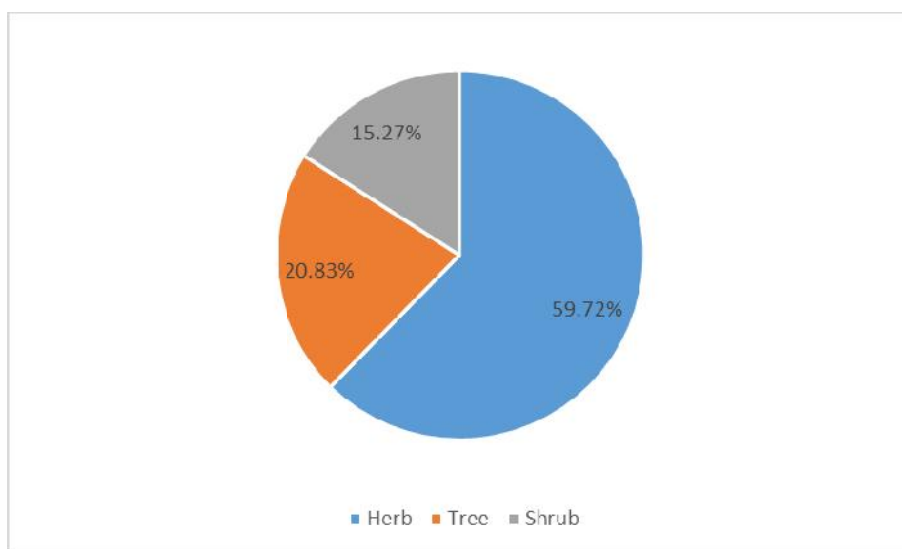


Figure 2: Medicinal plants habit in Chamla valley of district Buner, Pakistan

Table 1.Plants used for human ailments of the valley Chamla.

S.no	Scientific name	Local name	Family	Habit	Plant Part use	Ethnobotanical use
1.	<i>Adiantum capillus-veneris</i>	Sunmbal	<i>Adiantaceae</i>	Herb	Whole plant	as shampoo, antitoxin, purgative
2.	<i>Avena sativa L.</i>	Jamdar	<i>Poaceae</i>	Herb	Barbs	as nerve tonics (improve brain function) Laxative and disinfectant and is also used as silage
3.	<i>Alianthus altissima L.</i>	Pakistani bakyanrh a	<i>Simaroubaceae</i>	Tree	Wood and leaves	As firewood and fuel; Forage and also used for diarrhea.
4.	<i>Achyranthes aspera L.</i>	Spe buty	<i>Amaranthaceae</i>	Herb	leaves	As blood cleansers and for respiratory diseases.
5.	<i>Accacia nilotica (L.) Delile.</i>	Keker	<i>Mimosaceae</i>	Tree	Resin, leaves	As tonic, for cough, headache

					and bark	and tooth pain
6.	<i>Anagallis arvensis L.</i>	Udi gule	<i>Primulaceae</i>	Herb	Leaves	For skin problems, swellings, and injuries.
7.	<i>Acacia modesta Wall.</i>	Palusa	<i>Mimosaceae</i>	Tree	Resin	For impotence as it is a tonic, stimulant.
8.	<i>Artemisia vulgaris L.</i>	Tarkha	<i>Asteraceae</i>	Herb	Leaves	As a worm medicine and for skin problems.
9.	<i>Amaranthus viridis L.</i>	Saag	<i>Amaranthaceae</i>	Herb	Leaves	As palliative and as stimulant.
10.	<i>Amaranthus spinosa L.</i>	Chalwere	<i>Amaranthaceae</i>	Herb	Leaves	As purgative
11.	<i>Boerhaavia diffusa L.</i>	Ensut	<i>Nyctaginaceae</i>	Herb	roots	Used outwardly for boils.
12.	<i>Berberis lyceum Royle.</i>	Kwary	<i>Berberidaceae</i>	Shurb	Whole plant	Used for skin diseases, soothes wounds, diarrhea, hemorrhoids, and an astringent, tonic, and antiseptic. It is also used as a blood purifier, for throat infections and asthma. Plants are also used as fuel.
13.	<i>Butea monosperma (Lam.) Taub</i>	Palay	<i>Papilionaceae</i>	Tree	Seeds and flowers	used as helminthic, anti-jaundice and also used on sore areas of skin
14.	<i>Cuscuta reflexa roxb.</i>	Paaprha	<i>Cuscutaceae</i>	Herb	shoot	To prevent fertility and for skin problems, back pain, control urinary incontinence
15.	<i>Cotoneaster microphyllus Wall.Ex Lindley.</i>	Mamanrha	<i>Rosaceae</i>	Tree	Stolon's	Used as a regulatory agent
16.	<i>Cassia fistula L.</i>	Lundes	<i>Caesalpiniaeeae</i>	Tree	Flowers and	Used in the treatment of

					fruits	Chest problems, digestive problems, and illness
17.	<i>Cupressus sempervirence L.</i>	Serva	<i>Cupressaceae</i>	Tree	Fruitlet	as a potent medicine, worm medicine.
18.	<i>Convolvulus arvensis L.</i>	Prewate	<i>Convolvuaceae</i>	Herb	Leaves	Used as a laxative and as silage
19.	<i>Chenopodium ambrosioides L.</i>	Skhaboty	<i>Chenoppodiaceae</i>	Herb	shoot	used for indigestion
20.	<i>Conyza canadensis (L.) Cronquist</i>	Skhaboty	<i>Asteraceae</i>	Herb	Whole plant	Used as a cooling agent
21.	<i>Chenopodium album L.</i>	Sarmay	<i>Chenoppodiaceae</i>	Herb	leaves	used as purgative, and for stomach problems
22.	<i>Chichorium intybus Linn.</i>	Udigule	<i>Asteraceae</i>	Herb	Leaves	To treat liver diseases and as anti-inflammatory drugs
23.	<i>Calandula arvensis L.</i>	Ziyarh gule	<i>Asteraceae</i>	Herb	Leaves and flowers	as diaphoretic and antiemetic
24.	<i>Cannabis sativa Linn.</i>	Bung	<i>Cannabinaceae</i>	Herb	Whole plant	Used to relieve pain, male Impotency, flatulence, and colic pain, also used as a sedative
25.	<i>Calotropis procera (Wild) R.Brown.</i>	Spogmai	<i>Asclepiadaceae</i>	Herb	Whole plant	Used as a pain reliever, it can treat itchy skin and scabies. The bark of the root is used to treat constipation and cholera.
26.	<i>Cynodon dactylon (L.) Pers</i>	Kabal	<i>Poaceae</i>	Herb	shoots	Used as homeostatic.
27.	<i>Datura innoxia Mill.</i>	Datora	<i>Solanaceae</i>	Herb	Leaves and seeds	Used as antipyretic and narcotic, poisonous
28.	<i>Dodonea viscosa (L.) Jacq.</i>	Ghorhas ke	<i>Sapindaceae</i>	Shrub	leaves	Insect repellent and also used as

						an antipruritic
29.	<i>Eryngium campestre L.</i>	Spe boty	<i>Asteraceae</i>	Herb	Roots, shoots	As expectorant, stimulant and for cough relief
30.	<i>Euphorbia heliscopia Linn.</i>	Mandano	<i>Euphorbiaceae</i>	Herb	Seeds and latex	As laxative. Latex for skin diseases
31.	<i>Euphorbia hirta Linn.</i>	Skhaboty	<i>Euphorbiaceae</i>	Herb	Seeds	To treat diarrhea.
32.	<i>Eugenia jamblana Lam.</i>	Jaman	<i>Myrtaceae</i>	Tree	Fruit, seeds, and leaves	The fruit is edible and can cure liver disease, the seeds are used to treat diabetes, and the leaves are used for dysentery.
33.	<i>Fummaria indica(Hausskn) Pugsl</i>	Paaprha	<i>Fumariaceae</i>	Herb	Shoot	As a blood purifier for skin problems and inflammation of the palm.
34.	<i>Ficus palmate Forssk</i>	Enzar	<i>Moraceae</i>	Tree	Wood, leaves and latex	Curing wasp sting, the fruit is edible
35.	<i>Galium aparine L.</i>	Jishy	<i>Rubiaceae</i>	Climber	Whole plant	as a diuretic
36.	<i>Grewia optiva</i>	Pastoney	<i>Tiliaceae</i>	Tree	Leaves, branches and bark	Used for Roundworms, Tap worms, liver
37.	<i>Jasminum humile Linn.</i>	Rambel chambel	<i>Oleaceae</i>	Shrub	Shoots	used to make tea effective for depression and against ringworms
38.	<i>Justicia adhatoda L.</i>	Bekarh	<i>Acanthaceae</i>	Shrub	Leaves and roots	as an antispasmodic, expectorant, abortifacient.
39.	<i>Lamium amplexicaule L.</i>	Saag	<i>Lamiaceae</i>	Herb	Leaves	Used for joints swellings
40.	<i>Lycopus europaeus Linn.</i>	skhaboty	<i>Lamiaceae</i>	Herb	Leaves	use as antibacterial
41.	<i>Mirabilis jalapa Linn.</i>	Guli nazak	<i>Nyctaginaceae</i>	Shrub	Leaves and roots	For cure of abscesses and also used as pain relievers and

						treat typhoid fever.
42.	<i>Mentha longifolia</i> (Linn) Huds.	Velany	Lamiaceae	Herb	leaves	as an antispasmodic, carminative, decreases acidity
43.	<i>Mallotus philippensis</i> Muell.	Kambela	Eupobiaceae	Shrub	Bark	Used as Purgative and anthelmintic, fuelwood
44.	<i>Mentha Spicata</i> L.	Podina	Lamiaceae	Herb	Leaves	Stimulant, aromatic, carminative
45.	<i>Mentha arvensis</i> L.	Podina	Lamiaceae	Herb	Leaves	Reduce gastric acidity, use as an antispasmodic, flavor enhancer, and relieve abdominal pain
46.	<i>Melia azedarach</i> L.	Bekyanrha	Meliaceae	Tree	Leaves	used as antibacterial, antibiotic, antilice, and for dandruff
47.	<i>Nasturtium officinale</i> R.Br.	Talmera	Brassicaceae	Herb	Whole plant	use in tetanus
48.	<i>Opuntia dillenii</i> Haw.	Khatme wa	Cactaceae	Herb	Flower	Used as a tonic, for guinea worms, demulcent, expectorant, abortion
49.	<i>Ocimum basilicum</i> L.	Kashmal o	Lamiaceae	Herb	Leaves and seeds	For coughs and infection, and the seeds are used for cold drinks.
50.	<i>Portulaca oleracea</i> L.	Wurkharhe	Portulacaceae	Herb	shoots	Demulcent
51.	<i>Pteridium equilinium</i> L.	Kunje	Pteridaceae	Herb	Fronds	Used as a digestive vegetable, thatching material
52.	<i>Pinus roxburghii</i> Sargent.	Nakhtar	Pinaceae	Tree	Gum	as an insect repellent and as a fuel.
53.	<i>Rumex dentatus</i> L.	Shalkhe	Polygonaceae	Herb	Leaves	As an astringent, to relieve allergies and irritations.

54.	<i>Ricinus communis</i> L.	Arandha	<i>Euphorbiaceae</i>	Tree	Leaves	as a purgative to cure bloating and constipation, and also as an antidote for poisoning and also used to relieve coughs, fever, and headaches.
55.	<i>Ranunculus muricatus</i> L.	Ziarh gule	<i>Ranunculaceae</i>	Herb	Leaves	Used to cure sciatic pain, jaundice, dysentery, diarrhea, and urinary infections
56.	<i>Rosa sericea</i> Lindley.	Zangali gulab	<i>Rosaceae</i>	Shrub	Flowers and branches	Used for treatment of piles
57.	<i>Rubus ulmifolium</i> Schott.	Guraj	<i>Rosaceae</i>	Shrub	Leaves	Used as carminative
58.	<i>Ranunculus sceleratus</i> L.	Jaghagha	<i>Ranunculaceae</i>	Herb	Leaves	used as purgative, also poisonous
59.	<i>Sonchus asper</i> L.	Shudape	<i>Asteraceae</i>	Herb	Leaves	used to cure fever and constipation
60.	<i>Solanum nigrum</i> L.	Kachmacho	<i>Solanaceae</i>	Herb	Leaves	used to treat skin problems, testicular pain and swelling.
61.	<i>Silybum marianum</i> (L.) Gaertn.	Wrujake	<i>Asteraceae</i>	Herb	Flowers	treating tuberculosis and jaundice
62.	<i>Tribulus terrestris</i> L.	Makondai	<i>Zygophyllaceae</i>	Herb	Seeds	Used for diseases of the urinary system, as a general tonic.
63.	<i>Taraxacum officinale</i> Webber.	Ziarh gule	<i>Asteraceae</i>	Herb	roots	To treat diabetes and relieve abdominal pain.
64.	<i>Urtica dioica</i> Linn.	Sezonke	<i>Urticaceae</i>	Herb	Whole plant	as a coolant and for icterus
65.	<i>Verbascum Thapsus</i> L.	Skhaboty	<i>Scrophulariaceae</i>	Herb	Leaves	Pain relieve
66.	<i>Vitex negundo</i> L.		<i>Lamiaceae</i>	Shrub	leaves	to cure duodenal problems

67.	<i>Withania somnifera (L.) Dunal</i>	Kotilal	<i>Solanaceae</i>	Herb	Root, bark	Used as a tonic, galactagocic and for back pain.
68.	<i>Xanthium stramarium Linn.</i>	Gheshke	<i>Asteraceae</i>	Woody herb	Leaves	To cure asthma, and the ashes from the stalk are used as pain relievers.
69.	<i>Zanthoxylum armatum DC.</i>	Dambra	<i>Rutaceae</i>	Shrub	Fruits	to cure stomach ailments such and also used as spices
70.	<i>Zizyphus oxyphyla Edgew</i>	Elane	<i>Rhamnaceae</i>	Tree	leaves	Used as antibiotic, antidiabetic, heart tonic for hepatitis
71.	<i>Zizyphus numularia (Burm.f.) Wight &Am.</i>	Bera	<i>Rhamnaceae</i>	Shrub	leaves	used in scabies and boils
72.	<i>Zizyphus jujube Mill.</i>	Bera	<i>Rhamnaceae</i>	Tree	leaves	Used as fodder, fuel, hair wash, for bronchitis, diarrhea, and dysentery

Table.2Quantitative analysis of our data related to medicinal plants in terms of UV, FC, and RFC values.

	Scientific name	Ui	Ni	FC	UVi	RFCs
1.	<i>Adiantum capillus-veneris</i>	2	5	2	0.4	0.01
2.	<i>Avena sativa L.</i>	22	30	22	0.73	0.18
3.	<i>Alianthus altissima L.</i>	20	30	20	0.66	0.16
4.	<i>Achyranthes aspera L.</i>	18	25	18	0.72	0.15
5.	<i>Accacia nilotica (L.) Delile.</i>	32	40	32	0.8	0.26
6.	<i>Anagallis arvensis L.</i>	11	20	11	0.55	0.09
7.	<i>Acacia modesta Wall.</i>	25	35	25	0.71	0.20
8.	<i>Artemisia vulgaris L.</i>	13	20	13	0.65	0.10
9.	<i>Amaranthus viridis L.</i>	30	45	30	0.66	0.25
10.	<i>Amaranthus spinosa L.</i>	25	45	25	0.55	0.20
11.	<i>Boerhaavia diffusa L.</i>	14	20	14	0.7	0.11
12.	<i>Berberis lyceum Royle.</i>	43	45	43	0.95	0.35

13.	<i>Butea monosperma (Lam.) Taub</i>	34	40	34	0.85	0.28
14.	<i>Cassia fistula L.</i>	12	20	12	0.6	0.1
15.	<i>Cupressus sempervirence L.</i>	10	18	10	0.55	0.08
16.	<i>Convolvulus arvensis L.</i>	25	40	25	0.62	0.20
17.	<i>Cotoneaster microphyllus Wall.Ex Lindley.</i>	20	45	20	0.44	0.16
18.	<i>Chenopodium ambrosioides L.</i>	10	20	10	0.5	0.08
19.	<i>Conyza canadensis (L.) Cronquist</i>	9	25	9	0.36	0.07
20.	<i>Chenopodium album L.</i>	15	45	15	0.33	0.12
21.	<i>Chichorium intybus Linn.</i>	8	15	8	0.53	0.06
22.	<i>Calandula arvensis L.</i>	9	20	9	0.45	0.07
23.	<i>Cannabis sativa Linn.</i>	15	50	15	0.3	0.12
24.	<i>Calotropis procera (Wild) R.Brown.</i>	30	45	30	0.66	0.25
25.	<i>Cuscuta reflexa roxb.</i>	8	15	8	0.53	0.06
26.	<i>Cynodon dactylon (L.) Pers</i>	23	40	23	0.57	0.19
27.	<i>Datura innoxia Mill.</i>	22	45	22	0.48	0.18
28.	<i>Dodonea viscosa (L.) Jacq.</i>	45	50	45	0.9	0.37
29.	<i>Euphorbia heliscopia Linn.</i>	10	20	10	0.5	0.08
30.	<i>Euphorbia hirta Linn.</i>	3	15	3	0.2	0.02
31.	<i>Eryngium compestre L.</i>	9	20	9	0.45	0.07
32.	<i>Eugenia jambлана Lam.</i>	23	45	23	0.51	0.19
33.	<i>Fummaria indica(Hausskn) Pugsl</i>	6	20	6	0.3	0.05
34.	<i>Ficus palmate Forssk</i>	14	25	14	0.56	0.11
35.	<i>Galium aparine L.</i>	8	16	8	0.5	0.06
36.	<i>Grewia optiva</i>	33	45	33	0.73	0.27
37.	<i>Jasminum humile Linn.</i>	20	33	20	0.60	0.16
38.	<i>Justicia adhatoda L.</i>	42	45	42	0.93	0.35
39.	<i>Lamium amplexicaule L.</i>	29	46	29	0.63	0.24
40.	<i>Lycopus europaeus Linn.</i>	4	12	4	0.33	0.03
41.	<i>Mirabilis jalapa Linn.</i>	18	44	18	0.40	0.15
42.	<i>Mentha longifolia (Linn) Huds.</i>	20	48	20	0.41	0.16

43.	<i>Mallotus philippensis</i> Muell.	17	30	17	0.56	0.14
44.	<i>Mentha Spicata</i> L.	42	45	42	0.93	0.35
45.	<i>Mentha arvensis</i> L.	42	47	42	0.89	0.35
46.	<i>Melia azedarach</i> L.	35	40	35	0.87	0.29
47.	<i>Nasturtium officinale</i> R.Br.	33	45	33	0.73	0.27
48.	<i>Opuntia dillenii</i> Haw.	25	47	25	0.53	0.20
49.	<i>Ocimum basilicum</i> L.	12	34	12	0.35	0.1
50.	<i>Portulaca oleracea</i> L.	14	42	14	0.33	0.11
51.	<i>Pteridium equilinum</i> L.	11	23	11	0.47	0.09
52.	<i>Rumex dentatus</i> L.	43	46	43	0.93	0.35
53.	<i>Ricinus communis</i> L.	30	43	30	0.69	0.25
54.	<i>Ranunculus muricatus</i> L.	4	12	4	0.33	0.03
55.	<i>Rosa sericea</i> Lindley.	12	25	12	0.48	0.1
56.	<i>Rubus ulmifolium</i> Schott.	11	22	11	0.5	0.09
57.	<i>Ranunculus sceleratus</i> L.	3	10	3	0.3	0.02
58.	<i>Sonchus asper</i> L.	6	24	6	0.25	0.05
59.	<i>Solanum nigrum</i> L.	9	20	9	0.45	0.07
60.	<i>Silybum marianum</i> (L.) Gaertn.	12	36	12	0.33	0.1
61.	<i>Tribulus terrestris</i> L.	8	16	8	0.5	0.06
62.	<i>Taraxacum officinale</i> Webber.	10	22	10	0.45	0.08
63.	<i>Urtica dioica</i> Linn.	9	18	9	0.5	0.07
64.	<i>Verbascum Thapsus</i> L.	9	23	9	0.39	0.07
65.	<i>Vitex negundo</i> L.	19	30	19	0.63	0.15
66.	<i>Withania somnifera</i> (L.) Dunal	6	15	6	0.4	0.05
67.	<i>Xanthium stramarium</i> Linn.	20	44	20	0.45	0.16
68.	<i>Zanthoxylum armatum</i> DC.	19	35	19	0.54	0.15
69.	<i>Zizyphus oxyphyla</i> Edgew	19	45	19	0.42	0.15
70.	<i>Zizyphus numularia</i> (Burm.f.) Wight & Am.	15	50	15	0.3	0.12
71.	<i>Zizyphus jujube</i> Mill.	16	50	16	0.32	0.13
72.	<i>Pinus roxburghii</i> sargent.	26	30	26	0.86	0.21

6. Conclusion

The survey carried out in this paper will stimulate interest in the protection and conservation of medicinally essential plants in the village of Chamla Buner district. It is observed that pansaries (sellers of local medicinal plants), herbalists (hakims), are slow and unwilling to prescribe medical information to the native people. The current study in Chamla valley has shown that people use medicinal plants for sicknesses such as diarrhea, diabetes, fever, breathing disease. Our results provide useful information, which will help the local people of Chamla to conserve their medicinal flora and continue the wise use of medicinal plants like other developing countries. It is recommended that more tests (biochemical tests) be developed to study plants and to improve certain drugs using chromatographic practices—improvement of protection approaches for the maintenance of the flora of medicinal importance in Chamla valley is needed.

Author's contribution

All author's contributed equally to this project

References

1. Choudhary, K., Singh, M., & Pillai, U. (2008). Ethnobotanical survey of Rajasthan-An update. *American-Eurasian Journal of Botany*, 1(2), 38-45.
2. Katewa, S. S., Chaudhary, B. L., & Jain, A. (2004). Folk herbal medicines from tribal area of Rajasthan, India. *Journal of Ethnopharmacology*, 92(1), 41-46.
3. Selin, H. (Ed.). (2013). *Encyclopaedia of the history of science, technology, and medicine in non-western cultures*. Springer Science & Business Media.
4. Umair, M., Altaf, M., & Abbasi, A. M. (2017). An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. *PloS one*, 12(6), e0177912.
5. Ahmad, I., Ibrar, M., & Ali, N. (2011). Ethnobotanical study of tehsil kabal, swat district, KPK, Pakistan. *Journal of Botany*, 2011.

6. Ibrar, M., Hussain, F., & Sultan, A. (2007). Ethnobotanical studies on plant resources of Ranyal hills, District Shangla, Pakistan. *Pakistan Journal of Botany*, 39(2), 329.
7. Ullah, M., Khan, M. U., Mahmood, A., Malik, R. N., Hussain, M., Wazir, S. M., ... & Shinwari, Z. K. (2013). An ethnobotanical survey of indigenous medicinal plants in Wana district south Waziristan agency, Pakistan. *Journal of Ethnopharmacology*, 150(3), 918-924.
8. Jan, H. A., 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.
9. Hamayun, M., Khan, A., Afzal, S., & Khan, M. A. (2006). Study on traditional knowledge and utility of medicinal herbs of district Buner, NWFP, Pakistan.
10. Khan, K., Rahman, I. U., Calixto, E. S., Ali, N., & Ijaz, F. (2019). Ethnoveterinary Therapeutic Practices and Conservation Status of the Medicinal Flora of Chamla Valley, Khyber Pakhtunkhwa, Pakistan. *Frontiers in Veterinary Science*, 6, 122.
11. Ali, S., Perveen, A., & Qaiser, M. U. H. A. M. M. A. D. (2015). Vegetation structure, edaphology and ethnobotany of Mahaban and Malka (district Buner) KPK, Pakistan. *Pakistan Journal of Botany*, 47, 15-22.
12. Sher, Z., Khan, Z., & Hussain, F. (2011). Ethnobotanical studies of some plants of Chagharzai valley, district Buner, Pakistan. *Pak J Bot*, 43(3), 1445-1452.
13. Alam, N., Shinwari, Z. K., Ilyas, M., & Ullah, Z. (2011). Indigenous knowledge of medicinal plants of Chagharzai valley, District Buner, Pakistan. *Pak J Bot*, 43(2), 773-780.
14. Khan, A., Gilani, S. S., Hussain, F., & Durrani, M. J. (2003). Ethnobotany of gokand valley, district buner, Pakistan. *Pak J Biol Sci*, 6(362), 9.
15. Hamayun, M. (2003). Ethnobotanical studies of some useful shrubs and trees of District Buner, NWFP, Pakistan. *Ethnobotanical Leaflets*, 2003(1), 12.
16. Barkatullah, I.M., Rauf, A., Hadda, T.B., Mubarak, M.S. and Patel, S., 2015. Quantitative ethnobotanical survey of medicinal flora thriving in Malkand Pass Hills, Khyber PakhtunKhwa Pakistan. *Journal of Ethnopharmacology*, 169, pp.335-346.

17. 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.
18. Phillips, O., Gentry, A. H., Reynel, C., Wilkin, P., & Gálvez Durand B, C. (1994). Quantitative ethnobotany and Amazonian conservation. *Conservation biology*, 8(1), 225-248.
19. Abbasi, A. M., Khan, M. A., Shah, M. H., Shah, M. M., Pervez, A., & Ahmad, M. (2013). Ethnobotanical appraisal and cultural values of medicinally important wild edible vegetables of Lesser Himalayas-Pakistan. *Journal of ethnobiology and ethnomedicine*, 9(1), 66.
20. Shinwari, Z. K., Gilani, S. S., & Shoukat, M. (2002, May). Ethnobotanical resources and implications for curriculum. In *Proceedings of workshop on curriculum development in applied ethnobotany*. May (pp. 2-4).
21. Faruque, M. O., Uddin, S. B., Barlow, J. W., Hu, S., Dong, S., Cai, Q., ... & Hu, X. (2018). Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban District of Bangladesh. *Frontiers in pharmacology*, 9, 40.
22. Mahmood, A., Mahmood, A., Shaheen, H., Qureshi, R. A., Sangi, Y., & Gilani, S. A. (2011). Ethno medicinal survey of plants from district Bhimber Azad Jammu and Kashmir, Pakistan. *Journal of Medicinal Plants Research*, 5(11), 2348-2360.
23. Qureshi, R. A., Ahmed, I., & Ishtiaq, M. (2006). Ethnobotanical and phytosociological studies of tehsil Gujar Khan district Rawalpindi. *Asian J Plant Sci*, 5(5), 890-893.
24. Rahman, K. R., Faruque, M. O., Uddin, S. B., & Hossen, I. (2016). Ethnomedicinal knowledge among the local community of Atwari Upazilla of Panchagarh District, Bangladesh. *Int J Trop Agric*, 34, 1323-35.
25. Balick, M. J. (1996). Transforming ethnobotany for the new millennium. *Annals of the Missouri Botanical Garden*, 58-66.
26. Pei, S. J., & Sajise, P. (1995). Regional study on biodiversity: concepts, frameworks and methods.

27. Balée, W. (1989). Nomenclatural patterns in Ka'apor ethnobotany. *Journal of Ethnobiology*, 9(1), 1-24.
28. Fabricant, D. S., & Farnsworth, N. R. (2001). The value of plants used in traditional medicine for drug discovery. *Environmental health perspectives*, 109(suppl 1), 69-75.