Ethnomedicinal plant use value in Lower Swat, Pakistan

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Databases and Inventories

Abstract

Background: Plant-based traditional or folk medicines hold a great deal of promise as the foundation for medications for different diseases. Hence, the purpose of the present study is to document and preserve traditional knowledge among the people of Lower Swat.

Methods: The field survey was conducted in 2018–2021, and 90 participants were interviewed using a semi-structured questionnaire. Information was collected predominantly from traditional practitioners, who are thought to have comparatively more knowledge and experience of using herbal medicine. During the discussions, notes were taken on the participants' demographics, plant names, plant parts used, and methods of herbal preparation. The collected data were analyzed through statistical indices in Microsoft Excel (2016).

Results: It was found that 118 species represented by 107 genera and 62 different families were used for various medicinal purposes. Our findings depicted that herbs (57.5%) were the most commonly used as compared to trees and shrubs, while leaves (37.06%) were commonly used plant part for therapeutic purposes. Lamiaceae (16 species) was the most important family, followed by Rosaceae and Asteraceae (7 species each). Among the modes of preparation, decoction, drying, heating, and infusion were the applied approaches. The data was also analyzed by using qualitative indices such as relative frequency of citation (RFC), use report (UR), fidelity level (FL) and use value (UV). The highest RFC (0.96) was recorded for *Mentha spicata* and *Foeniculum vulgare* while the highest FL for *Berberis lycium* (78%) and, *Ajuga bracteosa* (70%). The highest UR (4) was recorded for *Ajuga parviflora, Pinus roxburghii* and *Pinus wallichiana.* The highest UV (0.50) was recorded for *Ziziphus oxyphylla*.

Conclusions: The results of the present study reflect that medicinal plants are the most important source of health care in lower Swat. But in the absence of understanding and intuitive collective approaches, mainly therapeutic plants are overexploited in the area. There is a dire need for awareness about sustainable use of medicinal plants and threatened species in particular.

Keywords: Lower Swat, ethnobotany, medicinal plants, traditional knowledge, mode of preparation, aliments.

Background

In ethnomedicinal terms, the relationship between humans and plants is very interesting and requires significant documentation from cultural communities. Historically, herbal preparation-based therapies have played an important role in many countries' healthcare system (Shah *et al.* 2016). Harshburger coined the term "ethnobotany" in 1896 to describe the study of the interactions between plants and humans in general. According to some estimates, the world's plant species number between 350,000 and 400,000 (Bussmann *et al.* 2008, 2007; Paton *et al.* 2008; Joppa *et al.* 2010; Abbasi *et al.* 2010). According to the World Health Organization (WHO), herbal treatments are used as the primary health care system by 80 % of the world's population. The use of medicinal plants is a very old belief (Meaza *et al.* 2015; Odhiambo *et al.* 2011), as they provide a large number of medicines (Farnsworth and Soejarto, 1991; Newman and Cragg, 2012). Because of their easy accessibility and low cost, medicinal plants are used by more than 70% of rural residents (Ekor, 2013). Residents from various regions of the globe developed their own unique knowledge of plant resources, applications, natural resource organization, and preservation (Cotton, 1996). Several studies on the medical properties of plant taxa by various local societies have been published all around world (Kargoglu *et al.* 2008; Ratnam and Raju, 2008; Jamila and Mostafa, 2014).

Pakistan is located in a floristically diverse region of the world. Remarkably, its residents have been using plants for both personal healthcare and ethnoveterinary purposes (Ismail and Nisar, 2010). Around 6000 flowering plants have been identified by researchers in Pakistan and Kashmir (Jamal *et al.* 2012). However, estimates of the number of medicinal plants range from 400 to 2000. Plants provide a large number of modern medicines (Kayani *et al.* 2014). Plants have long been used by indigenous peoples in the country to treat a variety of conditions, including gastrointestinal disorders, wounds, and injuries (Ali *et al.* 2018). Individuals who live in rural or distant areas of the country have a profound understanding of medicinal plants because they are more readily available than expensive pharmaceuticals (Qureshi, 2004).

Pakistan has a wide range of ecological and climatic conditions however; its northern areas are renowned for their medicinal plant richness. Plants, on the other hand, are an element of the area's natural and cultural heritage (Akhtar *et al.* 2013). Unfortunately, this has a considerable influence on species conservation because some endangered species, as well as those that are required in large amounts for local consumption and trade, are threatened by population reduction. Nonetheless, the traditional knowledge of medicinal plants use is passed down from generation to generation (Shinwari, 2010). With the passage of time, ethnobotany in Pakistan has advanced with respect to expansion of the study areas, methods of documentation, statistical inference and quality of publications. Numerous ethno-medicinal studies from various parts of the country have been documented (e.g., Bhatti *et al.* 2001; Qureshi, 2002; Khan and Khatoon, 2004; Qurashi *et al.* 2012; Bahadur, 2012, Abbasi, *et al.*2013; Ahmad *et al.* 2014).

Swat is a district of Pakistan's Khyber Pakhtunkhwa (KP), which is one of the country's five provinces. Swat features remarkable climatic conditions, a diverse ecology, and a unique human-plant relationship. The mountains of Swat have a wide range of elevations, ranging from 600 meters in the south to more than 6000 meters in the north, with Falak Sair, at 6261 meters, being the highest peak (Ali *et al.* 2012). Over 1550 flowering plants have been identified in Swat (Stewart, 1967), with nearly 500 of them being used as traditional medicine, whereas 87 being threatened (Shinwari, 2010). Over a 100 species have been exported to the local and international market. It is estimated that 8% of the population is associated with herbal trade profession (Ali *et al.*2012).

Furthermore, residents of Swat possess rich knowledge of traditional herbal medicine. A number of studies have documented traditional medicinal plant knowledge from various administrative units and valleys (e.g., Iqbal and Hamayun, 2004; Hamayun, 2005; Sahibzada *et al.* 2006; Hamayun et al., 2006; Ali *et al.* 2011; Ahmad *et al.* 2013; Ilyas *et al.* 2013; Ahmad *et al.* 2014). However, ethnomedicinal surveys are required in important areas with significantly differing flora and ethnic communities. Lower Swat is another one of those areas where ethnomedical knowledge has yet to be documented. According to the elders of the community, the people of Lower Swat have lived here for several decades and hence possess rich ethnomedicinal knowledge. However, because the area is undergoing significant change due to growing constructing industry, urbanization, conversion of forest into cultivated land and settlements, overgrazing, and other factors, the medicinal flora along with the associated traditional knowledge are gradually disappearing. Furthermore, because of the presence of a flourishing contemporary health system (Private medical clinics) in the area, the majority of plant knowledge is preserved by the elder member, while on the contrary, younger generation are unaware.

As a result, the current study aims to document indigenous traditional ethnomedicinal knowledge in Lower Swat and quantify it statistically so that the most important ones may be identified for further advanced research. The local peoples are generally dependent on agriculture, cattle and their product (Milk, Cheese, Curd, Yogurt and Ghee) and also associated with forest and their product. The people of Tehsil Kabal have rare health services, particularly in the upper region (Mountainous parts) having only one governmental hospital (Imtiaz *et al.* 2011).

Materials and Methods

The study area

The Lower Swat was selected as the study area for this study. Swat is a district in Pakistan's KP province with a large number of villages. Villages were selected for documentation based on past explorations, population, flora, and accessibility. This study excluded communities that had been previously explored, did not have substantial populations, did not have different floristic elements, and were inaccessible. Data were documented from 27 different villages viz., Kanju, Township, Kabal, Dagai, Kotlay, Sirsinai, Totanubandai, Qalagai, Manja, Sirkhazani, Teghako, Galoch, Kalakaly, Maloch, Gerband, Mahak, Nasrat, Tarkany, Taghma, Deolai, Shaderai, Manrahy, Khazano, Maloka, Segram, Bandai, Derai, and Nangwaly etc. District Swat is located at 35.22 27° North, 72.42 58° East with an average altitude of 980 meters. Swat is bordered on the west by Chitral, Upper Dir, and Lower Dir, on the north by Gilt-Baltistan, and on the east and southeast by Kohistan, Buner, and Shangla.

Swat has a variety of altitudinal zones, including a high range of mountains in the Kohistan zone that are covered in snow all year. In the winter, the temperature in this portion of the district drops to -25°C.The lower Swat is drier and warmer, with temperatures reaching up to 40°C in the summer (Henry 1874). Swat has a rich diversity of angiosperms, gymnosperms, and pteridophyte plants from a floristic standpoint. The key floristic elements of the forest are *Abies pindrow* (Royle ex D. Don) Royle*, Cedrus deodara* (Roxb. ex D. Don) G. Don, *Pinus roxburghii* Sarg., *Pinus wallichiana* A.B. Jacks., and *Taxus wallichiana* Zucc.

Data collection

The field survey was conducted during 2018-2021. Participants were interviewed using a semi-structured questionnaire. About 90 individuals were interviewed. Information was collected predominantly from traditional practitioners who are thought to have comparatively more knowledge and experience of using herbal medicine. During the discussions, notes were taken on the participants' demographics, plant names, plant parts used, and methods of herbal preparations. A total of 118 medicinal plants were collected. The plants were pressed in the field and prepared for herbarium preservation. Plants were identified using the floras of Pakistan. A comprehensive checklist of the area was compiled along with the associated field data. Accepted plant names were retrieved from Tropicos (https://www.tropicos.org/home).

Data analysis

The data collected were analyzed statistically using various quantitative indices: Medicinal Use Value (MUV), Fidelity Level (FL) and Relative Frequency of Citation (RFC).

Medicinal Use Value (MUV)

The Use Value is used to show the comparative value of each plant utilized by the native people. It is calculated as

$$MUV = \Sigma Ui/N \quad (1)$$

where Ui is the number of uses described by each respondent for a given species while N determine the total number of people concerned in the study (Phillips and Gentry, 1993).

Fidelity level (FL)

Fidelity level (FL) index was deliberated by using the formula that was described by (Friedman et al., 1986) to determine the most preferred species used in the treatment of a particular ailment as more than one plant species are used in the treatment in the same category:

$$FL = Np/N \times 100 \quad (2)$$

Where Np is the number of informants mentioned the usage of the plant for a specific diseases and N is the total number of informants mentioned the species for any diseases. High FL value showed high frequency of usage of the plant species for cure of a specific diseases category by the informants of the study area.

Relative frequency of citation (RFC)
RFC is of the most utilized plant taxon by the native people (Tardi and Pardo-de-Santayana, 2008). It was determined by using the formula:

$$RFC = FC/N$$

where ($0 < RFC < 1$), FC is the 'Number of informants citing a useful species' and N is the 'total number of informants' in the survey.

Results

This study investigates the extremely inhabited region of Swat which is not well explored in the previous work. This is the first documentation of medicinal plants from people who inhabit in lower Swat.

Demographic characteristics
The demographic characteristics of the study contributors were given in Table (1). Contributors who took part in the questionnaire, 3 were below the age of 30, 6 were between the ages of 31 to 40, 11 were between the ages of 41 to 50, 30 were between the ages of 51 to 60 and 40 were over the age of 61. The contributors were living in the area for a long time. In the survey, it was found that mostly male contributors (68.88%) have more respondents than female (31.11%). The main reason is that females in rural areas are shy and less educated as compared to male.

Table 1. Demographic characteristics.

Demographic characteristics	Number	Percentage (%)
Age		
25 to 49	20	22.22
50 and above	70	77.77
Sex		
Male	62	68.88
Female	28	31.11
Residential status		
Villages	75	83.33
Township	15	16.66
Educational Status		
Matriculate	13	14.44
University Graduate	5	5.55
Farmer (uneducated)	72	80.00

Medicinal plants diversity of the study area and ailments treated
The study area is bestowed with rich medicinal flora (118 species) which is indicate broad number of families (62) and genera (107), lower number of species per genus and diverse life forms. About (69) herb species were widely used for therapeutic purposes, followed by (29) tree species and (20) shrub species. Among them angiosperm were (92.5%), gymnosperms were (3.3%), and species pteridophytes were (2.5%) as shown in (Fig. 1). While the most important families were Lamiaceae (16 species), Rosaceae (7 species), Asteraceae (7), and Brassicaceae (6 species) as shown in (Table 2).

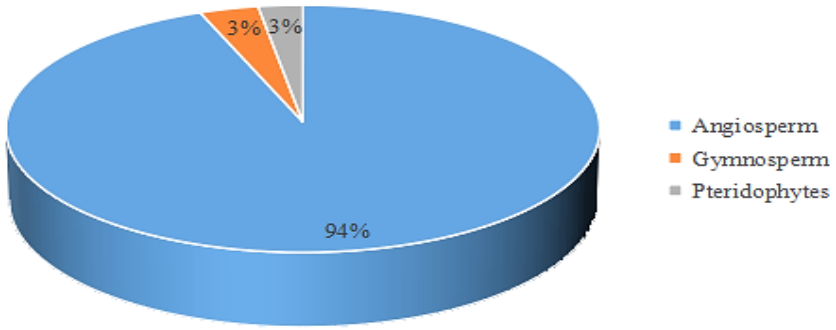

Figure 1. Forms of Plants.

Table 2. Most used Plant Families in the study area

Family	Number of Genera	Number of Species	Total %
Lamiaceae	14	16	13.33
Rosaceae	6	7	5.83
Asteraceae	7	7	5.83
Brassicaceae	6	6	5
Fabaceae	4	5	4.16
Amaranthaceae	4	4	3.33
Amaryllidaceae	2	4	3.33
Apiaceae	4	4	3.33
Solanaceae	3	4	3.33
Myrtaceae	3	3	2.5
Pinaceae	1	3	2.5
Asclepiadaceae	2	2	1.66
Buxaceae	1	2	1.66
Meliaceae	2	2	1.66
Moraceae	1	2	1.66
Sapindaceae	2	2	1.66
Other families	43	43	35.83
Combined families	4	4	3.27
Total Families 62	Total No. of Genera 107	Total No. of Species 118	100%

Plant parts used and types of herbal preparations

According to indigenous people that either individual or multiple parts of the native flora were utilized in herbal recipes. It is also valuable remark that various parts of plants may be utilized for various diseases or there may be individual curative essential plant part that is why it is essential to assert the plant part alongside the diseases treated. However, we documented about (90) reports for the usage of (9) various plant parts for (118) species. Leaf (37.6%) was the ascendant part utilized in herbal medicine. So, there was various approach of herbal preparations were recorded, each of which may showed antithetic outcomes against antithetic diseases (Fig. 2).

Thus, it is essential to remark herbal formulation form such decoction (28), drying (26), heated (5), infusion (25), latex collection (5), fruits are crushed (21), the bulb crushed, and Gum (5) as shown in (Fig. 3). In order to take medicinal plants in impelling mode, it is ever in demand to have all the auxiliary info. Complete herbal recipes could be the foremost prime in this respect. In this paper we have reported about (30) herbal recipes for (118) plants that were common exclusively and native to the indigenous people of the study area indicating the diversity of medicinal plants cognition in the survey region.

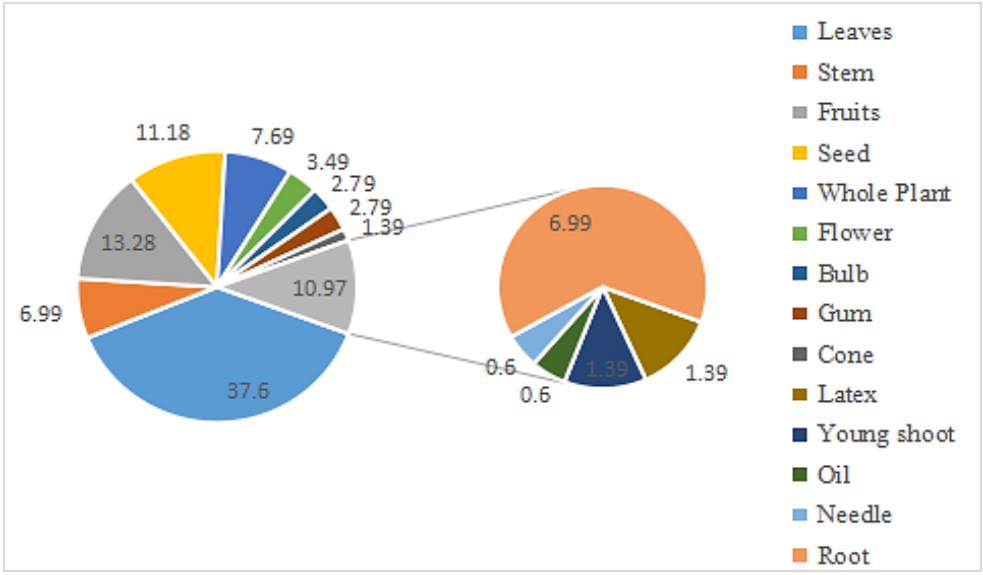

Figure 2. Uses of plant parts

Use of quantitative indices

Measuring the value of plants in a community is a key interest in quantitative ethnobotany. In our survey use value (MUV)was used and for different plants recorded, MUVs range between (0.012 and 0.6). According to MUV analysis, *Papaver pavoninum* and *Zizyhus oxyphyla* showed highest MUV (0.5) respectively, followed by *Myrsine africana* (0.37), *Gentiana kurroo* (0.37) *Cotoneaster microphyllus* (0.3), *Ajuga parviflora* (0.3), *Aesculus indica* (0.25), *Eucalyptus globulus* (0.22) as shown in (Table 4). The mean and median of all The RFC showed how the individuals normally referred a plant for different diseases. To cognize the popularity of a species in the native community, relative frequency citation (RFC) was deliberated. The RFC value index in our study ranges from (0.05 to 1.52).

However, the highest RFC value was shown by *Mentha spicata* (0.96), followedby *Ajuga bracteosa* (0.94), *Mentha longifolia* (0.91), *Salvia moorcroftiana* (0.88), *Malva neglecta* (0.87), *Cedrus deodara* (0.87), *Ficus carica* (0.86), as shown in (Table 4) reflected the most common utilization of these species by the indigenous. It was also determined that various species have the same MUV were utilized against a different number of aliments. For example *Asparagus officinalis* young stem was used for Urticarial, fruits used for face beauty and face herpes and *Atropa acuminata* was used for piles and skin infection. This indicator showed a plant desired in herbal recipes. The UV index further displays that various plant species are comparatively effective among a wide number of diligent and seemingly without staid effect.

Therefore, the native community expressed the usage of plants to other peoples for a remedy. Realizable reason for this may be the variation in altitude and culture of the region, and season of availability of the plants. Although, *Juglans regia* belong to family *Juglandaceae* is a well-known dry fruits plant but largely used for medicinal purposes in homes. *Mentha spicata* is also usually distributed and best-known therapeutic plant which usually cultivated has been determined here to play a important role in cure of stomach ailments. In this work, none of the species possess 100% FL. It instead expressed a wide range (78%). Highest FL were represented by *Berberis lycium* (78%), *Ajuga bracteosa* (70%), *Artemisia scoparia* (65%), *Cichorium intybus* L. (60%), *Fumaria indica* (58%) that used for hepatitis, diabetics, pain, cough, fever, blood purification respectively, proposing that these are the most health diseases of the study region, and these plants show a significant role in cure of them. While on the other-hand stomach ailments were mainly treated with 15 plants, followed by pain (15), diabetes (13) Hepatitis (11), fever and cough (9), urinary problems and blood purification (8) respectively as shown in Table (3).

Table 3. List of ethno-medicinal plants applied with different diseases.

Name of Aliments	No. of Used plants	Plant species used
Stomach	15	*Ficus carica, Zingiber officinale, Origanum vulgare, Teucrium stocksianum, Berberis lycium, Nerium oleander, Nasturtium officinale, Zanthoxylum armatum, Achyranthes aspera, Eucalyptus globulus, Viola canescens, Mentha spicata, Foeniculum vulgare, Mentha spicata, Mentha arvensis*
Belly or Body Pain	15	*Pinus roxburghii, Mentha longifolia, Olea ferruginea, Artemisia scoparia, Lepidium campestre, Sisymbrium irio, Capsella bursa-pastoris, Indigofera gerardiana, Withania somnifera, Salix acmophylla, Ficus palmata, Ranunculus muricatus, Solanum surattense, Brassica juncea, Acacia modesta.*
Diabetes mellitus	13	*Cichorium intybus, Caralluma tuberculata, Acacia nilotica, Zea mays., Cucurbita texana, Robinia pseudoacacia, Vitex negundo, Melia azedarach , Calotropis procera, Picea smithiana, Malva neglecta , Plectranthus rugosus, Fumaria indica,*
Hepatitis	11	*Myrsine africana, Equisetum arvense, Zizyphus oxyphylla, Cedrela serrata, Rubus Fruticosus, Cotoneaster microphyllus, Adiantum capillus-veneris, Cotoneaster nummularia, Berberis lycium, Cedrela serrata, Viola Canescens,*
Fever	9	*Cuscuta reflexa, Micromeria biflora, Origanum vulgare, Allium cepa, Cichorium intybus, Origanum vulgare, Tribulus terrestris, Ricinus communis, Ocimum basilicum*
Cough	9	*Heracleum candicans, Myrtus communis, Psidium guajava , Allium sativum, Ocimum basilicum, Ricinus communis, Mentha spicata, Calotropis procera, Allium sativum*
Urine problem	8	*Picea smithiana, Tribulus terrestris., Carthamus oxyacantha, Punica granatum , Urtica dioica, Quercus dilatata, Allium cernuum, Portulaca oleracea*
Blood Purification	8	*Myrsine Africana, Amaranthus viridis, Carum carvi, Melia azedarach, Ajuga bracteosa, Avena sativa, Fumaria indica, Ajuga nipponensis*
Pesticide (Human Pest)	6	*Myrsine Africana, Malva neglecta, Dodonaea viscosa, Daphne macronata, Buxus wallichiana, Juglans regia*
Fracture	6	*Salvia moorcroftiana, Pinus roxburghii, Mirabilis jalapa, Salvia moorcroftiana, Berberis Lycium, Cannabis sativa,*
Piles and Herpes	6	*Amaranthus viridis, Atropa acuminata, Nerium oleander, Asparagus officinalis, Alisma plantago-aquatica, Suaeda fruticosa*
Tonic	5	*Avena sativa, Solanum surattense, Ziziphus mauritiana, Origanum vulgare, Gentiana kurroo,*
Asthma	4	*Xanthium strumarium,Eriobotrya japonica, Carum carvi, Melia azedarach, Ajuga bracteosa*
Blood Pressure	4	*Allium sativum, Carum carvi. Melia azedarach, Ajuga bracteosa*
Vomiting	4	*Micromeria biflora, Otostegia limbata, Equisetum arvense, Foeniculum vulgare*
Warm body	3	*Berberis Lycium, Cedrela serrata, Equisetum arvense*
Brain	3	*Pinus roxburghii, Cuminum cyminum, Avena sativa*
Face pimple	3	*Trifolium repens , Carum carvi , Pinus wallichiana,*
Urticaria	3	*Justicia adhatoda, Isatis tinctoria, Asparagus officinalis*
Pregnancy	3	*Artemisia dubia, Aesculus indica, Cupressus sempervirens.*
Purgatives	2	*Buxus wallichiana, Onosma hispidum*
Male impotency	2	*Acacia modesta, Gymnosporia royleana*
Cancer	2	*Micromeria biflora, Carthamus oxyacantha*
Kidney	2	*Portulaca oleracea, Duchesnea indica*
Poxes	2	*Picea smithiana, Dodonaea viscosa*

Table 4. Ethno-medicinal uses of medicinal plants. (*) indicate that medicinal usage of the taxon has been given for the first time in this study.

Family	Botanical Name of Plants	Local Name	Habitat	Used Part of Plants	Mode of Preparation	Uses for aliments	RFC	MUV	FL
Acanthaceae	*Justicia adhatoda* L.	Baykanr	Shrub	Leaves	Infusion or drying	Used for purification of blood and Urticaria	0.36	0.060	49
Alliaceae	*Allium sativum* L.	Oga	Herb	Bulb	Bulb crushed	Used to control high blood pressure, also used for Cough	0.73	0.030	35
Alliaceae	*Allium sativum* L.	Ogakay	Herbs	Leaves	Direct Use	Used for cough and Difficulties in breath	0.52	0.042	30
Amaranthaceae	*Achyranthes aspera* L.	Jeshkay Botay	Herb	Root	Decoction	Used for stomach Inflammation	0.16	0.06	20
Amaranthaceae	*Amaranthus spinosus* L.	Ganrhar	Herb	Leaves	Infusion	Used for piles	0.22	0.050	40
Amaranthaceae	*Amaranthus viridis* L.	Chalway	Herb	Aerial part	Decoction	Leaves used as diuretic, blood purifier and antispasmodic	0.32	0.10	40
Amaranthaceae	*Suaeda fruticosa* (L.) Forssk.	Sakha Kharwa	Herb	Leaves	Infusion	Leaves juice use for skin contagions	0.42	0.026	12
Amaryllidaceae	*Allium cepa* L.	Pyaaz	Herb	Bulb	Direct	Used for fever and to control snake poison	0.62	0.033	17
Amaryllidaceae	*Allium filidens* Regel	Chaghandi	Herb	Fruit	Drying	Used for urine sweltering	0.12	0.090	8
Amaryllidaceae	*Narcissus poeticus* L.	Guli Nargas	Herb	Bulb	Decoction	Used for Baby Abortion	0.38	0.028	11
Apiaceae	*Carum carvi* L.	Zankay	Herb	Leaves, Bark	Drying	Used for asthma, digestion, blood pressure and gas	0.63	0.052	22
Apiaceae	*Cuminum cyminum* L	Kwanzali	Herb	Fruits or Seed	Fruits crushed	Used for brain refreshment and increasing brain gaining power	0.23	0.095	15
Apiaceae	*Foeniculum vulgare* Mill.	Kagaynalay	Herb	Seed	Fruits Crushed	Used for vomiting and stomach digestion	0.96	0.022	55
Apiaceae	*Heracleum candicans* Wall.ex DC.	Da Sapo zankay	Herb	Seed	Fruits crushed	Used for cough	0.28	0.038	11
Apocynaceae	*Nerum oleander* L.	Ghandera	Shrub	Latex	Extract Latex	Used for Skin Herpes	0.16	0.066	39
Asclepiadaceae	*Caralluma tuberculata* N.E.Br.	Pamankay	Herb	Leaves	Decoction	Used for Diabetes	0.55	0.020	50
Asclepiadaceae	*Periploca aphylla* Decne.	Baraha	Herb	Stem	Drying	Use for fever	0.10	0.11	24
Asparagaceae	*Asparagus officinalis* L.	Kanta	Shrub	Fruits and young shoot	Infusion	Young stem Used for Urticarial, fruits used for face beauty and face herpes	0.2	0.16	34
Asteraceae	*Artemisia dubia* L.	Dada Tarkha	Shrub	Leaves	Drying	Used for Female pregnancy	0.38	0.028	45
Asteraceae	*Artemisia scoparia* Waldst. & Kitam.	Jaowkay	Herb	Root	Drying	Used for abdomen pains, and joint pain	0.85	0.025	65

Asteraceae	*Carthamus oxyacantha* M.Bieb.	Kareeza	Herb	Seed & Stem	Fruits crashed	Used for control of urination and also as an anti-cancer	0.70	0.031	50
Asteraceae	*Cichorium intybus* L.	Haan	Herb	Whole Plant	Decoction	Cooked root and leaves used for fever, Sugar	0.81	0.027	60
Asteraceae	*Silybum marianum* (L.)	Wrejakay	Herb	Fruits and flowers	Fruits crushed	Used for TB	0.41	0.027	29
Asteraceae	*Sonchus oleraceus* L.	Showdapay	Herb	Whole Plant	Direct Use as Fodder	Used for cattle to increase Milk production	0.77	0.014	54
Asteraceae	*Xanthium strumarium.* Linn.	Jishkaay	Herb	Leaves	Infusion or drying	Used for asthma	0.21	0.052	13
Berberidaceae	*Berberis lycium* Royle	Kawary	Shrub	Root & shoot	Drying	Used for peripheral fracture , hepatitis, stomach infection, roasting in body	0.88	0.050	78
Boraginaceae	*Onosma hispida* Wall	Abay Pay	Herb	Root	Decoction	Used as a purgative	0.12	0.090	12
Brassicaceae	*Brassica juncea* (L.) Coss.	Jawawa	Herb	Leaves	Leaves crushed	Used for body soreness	0.17	0.062	55
Brassicaceae	*Capsella bursa-pastoris* Moench	Kamasal Alam	Herb	Seed	Fruit crushed	Used for babies belly pain	0.76	0.014	56
Brassicaceae	*Isatis tinctoria* L.	Nelaowro	Herb	Leaves	Drying and infusion	Used for Urticaria	0.12	0.090	20
Brassicaceae	*Lepidium* sp.	Malghwazy	Herb	Seed and leaves	Fruits crushed or infusion	Used as a hair tonic and also used for abdomen pain	0.86	0.025	31
Brassicaceae	*Nasturtium officinale* W.T. Aiton	Termera	Herb	Leaves	Decoction	Used for stomach burning	0.71	0.015	55
Brassicaceae	*Sisymbrium irio* L.	Kamasal Awray	Herb	Seed	Fruits crushed	Used for babies abdomen pain	0.66	0.016	56
Buxaceae	*Buxus papillosa* C.K. Schneid	Shamshad	Shrub	Leaves	Decoction	Used as a purgative	0.30	0.037	11
Buxaceae	*Buxus wallichiana* Baill	NA	Tree	Fruits	Extract Juice	Used for human pests	0.21	0.052	11
Buxaceae	*Sarcococca saligna* (D.Don)	Landanr	Shrub	Leaves	Leaves roasted	Used for digestive disorder	0.20	0.055	37
Cannabaceae	*Cannabis sativa* L..	Bhang	Herb	Leaves	Drying and heated	Used for outer fracture and dry leaves used to protect from evil eyes	0.83	0.026	53
Celastraceae	*Gymnosporia royleana* (Wall) Lawson.	Soor Azghay	Shrub	Fruit	Fruits crushed	Used for male impotency	0.18	0.058	15
Convolvulaceae	*Cuscuta reflexa* Roxb.	Zeela botaay	Parasitic herb	Whole Plant	Drying	Used for fever	0.30	0.037	23
Cucurbitaceae	*Citrullus colocynthis* (L) Schrad	Karkondai	Herb	Fruits	Fruits Crushed	Used for diabetes	0.14	0.076	12
Cupressaceae	*Cupressus sempervirens* L.	Sarva	Tree	Cone	Drying	Used for pregnancy	0.73	0.015	25

Ebenaceae	*Diospyros lotus* L.	Toor Amlook	Tree	Fruits	Fruits Crushed	Used for diarrhea	0.42	0.026	37
Equisetaceae	*Equisetum arvense* L.	Bandakay	Herb	Whole Plant	Decoction	Used for all form of hepatitis	0.71	0.046	18
Equisetaceae & Lamiaceae	*Otostegia limbata* (Benth.) Boiss	Azghakay and Bandakay	Shrub and Herb	Stem	Boiled *Otostegia limbata* with *Equisetum arvense* and make decoction	Used for roasting of body and also for vomiting	0.07	0.28	15
Euphorbiaceae	*Ricinus communis* L.	Arhanda	Tree	Seed	Fruits crushed	Used for cough, fever, and headache.	0.24	0.12	34
Fabaceae	*Acacia nilotica* (L.) Willd. ex Delile	Kekar	Tree	Flower	Infusion	Used for Diabetes	0.13	0.083	5
Fabaceae	*Indigofera gerardiana* Baker	Ghwareja	Shrub	Leaves	Fruits crushed	Used for Belly pain	0.41	0.027	19
Fabaceae	*Quercus dilatata* Lindl. Ex Royle.	Baanj	Tree	Fruit	Fruits Crushed or Drying	Used for urine tube inflammations	0.90	0.012	55
Fabaceae	*Robinia pseudoacacia* L.	Kikar	Tree	Flowers	Infusion	Used for sugar	0.028	0.038	8
Fabaceae.	*Acacia modesta* Wall.	Palowsa	Tree	Gum	Extract Gums	Gums with water for body Joint soreness and also use for male impotency	0.18	0.11	10
Fumariaceae	*Fumaria indica* (Hausskn.) Pugsley	Krachay	Herb	Whole Plant	Infusion	Used for blood purification and sugar	0.23	0.095	41
Gentianaceae	*Gentiana kurroo* Royle	Sheen Gulay	Herbs	Leaves	Infusion	Tonic, antispasmodic, febrifuge	0.08	0.37	9
Juglandaceae	*Juglans regia* Linn.	Ghooz	Tree	Root & Leaves	Infusion	Used for teeth cleanness and also used for Human pest	0.88	0.025	57
Lamiaceae	*Ajuga bracteosa* Wall. ex Benth.	Booty	Herb	whole plant	Drying	Used for blood purification and sore throat	0.94	0.023	70
Lamiaceae	*Ajuga parviflora* Benth.	Booty	Herb	Whole plant	Drying	Used for blood purity, Sore Throat and antifungal	0.14	0.30	50
Lamiaceae	*Calotropis procera* (Aiton) R. Br	Spelmay	Herb	Leaves	Drying and infusion	Used for Sugar, and dry leaves use for Cough	0.61	0.036	54
Lamiaceae	*Mentha longifolia* (L.) L.	Vellany	Herb	Leaves	Drying	Leaves used for belly pain	0.91	0.012	54
Lamiaceae	*Mentha spicata* L.	Podena	Herb	Leaves	Infusion or Drying	Used for stomach Ulcer and also used for Cough	0.96	0.022	51
Lamiaceae	*Micromeria biflora* Benth.	Shamakay	Herb	Leaves and Seed	Drying or fruits crushed	Used for Fever , Cancer and vomiting	0.47	0.069	42

Lamiaceae	*Ocimum basilicum* L.	Kashmaly	Herb	Leaves and Seed	Drying and fruits crushed	Used for Cough and fever	0.13	0.16	53
Lamiaceae	*Origanum vulgare* L.	Sperkay Cultivated	Herb	Seed	Fruits crushed and fruits roasted	Use for fever and stomach	0.77	0.028	23
Lamiaceae	*Otostegia limbata* (Benth.) Boiss	Azghakay	Shrub	Thorn	Decoction	Used for Cough with Black tea	0.51	0.021	
Lamiaceae	*Plectranthus rugosus* Wall.	Sperkay	Herb	Leaves and Flower	Drying and infusion	Used for eyes infections and Diabetes	0.14	0.15	42
Lamiaceae	*Prunella vulgaris* L		Shrub	Leaves	Extract leaves Juice	Used as an anti-allergic	0.08	0.12	9
Lamiaceae	*Salvia moorcroftiana* Wall.	Kharghawag	Herb	Leaves	Heated	Used for external Fracture	0.88	0.012	26
Lamiaceae	*Salvia nubicola* Wall. ex Sweet	Khardag	Herb	Leaves	Drying and Heated	Dry leaves use for diaper rash and green warm leaves use for external fracture	0.64	0.034	26
Lamiaceae	*Teucrium stocksianum* Boiss	Kondy Bota	Herb	Leaves	Drying and decoction	Used for abdomen and Stomach Gas	0.46	0.047	22
Lamiaceae	*Thymus linearis* Benth.	Wild speerkay	Herb	Leaves and fruit	Drying and fruits crushed	Used for fever and hair fall	0.45	0.048	43
Lamiaceae	*Vitex negundo* L.	Marwandaii	Shrub	Leaves	Infusion	Used for Sugar	0.15	0.071	19
Malvaceae	*Malva neglecta* Wallr.	Panerak	Herb	Leaves and root	Decoction	Leaves Used for diabetes and root used to eradicate Animal pest	0.87	0.025	30
Meliaceae	*Cedrela serrata* Royle.	Shanay	Shrub	Stem bark	Decoction	Used for roasting in body and hepatitis	0.27	0.080	35
Meliaceae and Lamiaceae	*Melia azedarach* L**.**	Toora Bekankra and Booty	Herb & Tree	Leaves and stem bark	*Melia azedarach* boiled with *Ajuga* and make decoction	Used for asthma, High Blood pressure and Digestion	0.05	0.60	10
Meliaceae	*Melia azedarach* L.	Toora Bekanra	Tree	Stem bark	Decoction	Used for sugar	0.17	0.062	16
Moraceae	*Ficus carica* Czern. And Rav.	Enzar	Tree	Fruit & latex	Latex Extract and Latex	Fruits Used for heart, stomach diseases and latex used for removal of thorn form the body	0.86	0.038	53
Moraceae	*Ficus palmata* Forssk.	Enzaar	Tree	Fruits	Fruits Crushed	Used for pain and also for removing spines	0.48	0.045	42

Myrsinaceae	*Myrsine africana* L.	Manargawya	Shrub	Fruits and Leaves	Fruits crushed and infusion	Fruits used for Pest of Human, Leaves used as blood purifier and for Hepatitis	0.08	0.37	31
Myrtaceae	*Eucalyptus globulus* Labill.	Laychii	Tree	Leaves and stem Bark	Infusion	Used for stomach inflammation and Ulcer	0.10	0.22	29
Myrtaceae	*Myrtus communis* L.	Manroo	Shrub	Leaves	Decoction	Used for cough	0.28	0.038	13
Myrtaceae	*Psidium guajava* L.	Amrood	Tree	Leaves	Decoction	Used for cough	0.55	0.02	23
Nyctaginaceae	*Mirabilis jalapa* Linn.	Gulibadi	Herb	Leaves and Seed	Heated and Fruits Crushed	Leaves used for fracture and seed use for fever	0.27	0.080	39
Oleaceae	*Olea ferrginea* Royle.	Khoona	Tree	Leaves	Infusion	Used for teeth pain and babies belly purity	0.57	0.038	24
Papaveraceae	*Papaver pavoninum* C.A. Mey	Sur Gulay	Herb	Flower	Infusion	Used as a sedative	0.022	0.50	32
Papilionaceae	*Trifolium repens* L.	Showtaal	Herb	Seed	Fruits crushed	Used for face pimple	0.72	0.015	42
Pinaceae	*Cedrus deodara* Roxb. ex Lamb	Ranzraha	Tree	Oil	Extract Oil	Used for babies Scared and abdomen gas	0.87	0.025	51
Pinaceae	*Picea smithiana* (Wall.) Boiss		Tree	Needle, Leaves, Gum and Bark	Extract Gum and Decoction	Leaves use for sugar and children poxes, Gum used for poxes and stem bark used for Urine problem	0.33	0.13	12
Pinaceae	*Pinus roxburghii* Sargent.	Nakhtar	Tree	Leaves air, cone, gum	Extract Gum and Decoction	its leaves air for psychiatric patient , Gum use for fracture, and immature cone use for joint and Muscle pain	0.27	0.16	23
Plantaginaceae	*Alisma plantago-aquatica* L.	Jaabye	Herb	Leaves	Infusion	Used for Skin diseases	0.41	0.027	30
Plumbaginaceae	*Limonium cabulicum* (Boiss.) Kuntze	Jaabai Boty	Herb	Leaves	Drying	Used for stomach ulcer and digestion	0.11	0.20	10
Poaceae	*Avena sativa* L.	Jawandara	Herb	Seed and Stem	Drying	Used for blood purification and seed used as a nerve tonic	0.26	0.083	48
Poaceae	*Cynodon dactylon* (L.) Pers.	Kabal	Herb	Leaves	Drying	Used as a hemostatic	0.36	0.030	33
Poaceae	*Zea mays* L.	Jowaar	Herb	Fruits stamens	Decoction	Used for Diabetes	0.30	0.037	22
Portulacaceae	*Portulaca oleracea* L	warkharay	Herb	Whole Plant	Decoction	Used for control of urine and kidney stones	0.21	0.10	24
Pteridaceae	*Adiantum capillus-veneris* L.	Sumbal	Fern	whole plant	Decoction	Used for hepatitis	0.24	0.045	18
Punicaceae	*Punica granatum* L.	Angora	Tree	Fruits	Drying	Used for urine problem	0.81	0.013	51
Ranunculaceae	*Ranunculus muricatus* L.	Zair Gulay	Herb	Leaves	Cooked	Used for sciatica pain	0.10	0.11	

Rhamnaceae	*Ziziphus mauritiana* Lam.	Beera	Tree	Leaves	Infusion	Used for hair falling and leaves juice used for sugar	0.47	0.046	38
Rhamnaceae	*Zizyphus oxyphylla* Edgew	Enalay and Shanay	Shrub and Tree	Root and Stem Bark	Boiled *Zizyphus oxyphylla* with *Cedrela serrata* and decoction	Used for all forms of hepatitis	0.06	0.50	5
Rosaceae	*Cotoneaster microphyllus* Wall. ex Lindl.	Mamanra	Shrub	Root	Decoction	Used for all form of hepatitis	0.11	0.30	46
Rosaceae	*Cotoneaster nummularia* Fisch & Mey	Kharawa	Shrub	Root	Decoction	Used for hepatitis	0.11	0.1	46
Rosaceae	*Duchesnea indica* (Jacks.) Focke	Zamakii Tooth	Herb	Fruit	Fruits crushed	Used for kidney stones	0.43	0.025	44
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.	Alocaat	Tree	Leaves	Decoction	Used for Asthma	0.16	0.066	14
Rosaceae	*Prunus persica* (L.) Batsch	Shaltalo	Tree	Leaves	Infusion	Used as insecticide for lice	0.14	0.070	7
Rosaceae	*Pyrus pashia* Buch.-Ham. ex D.Don	Tangay	Tree	Leaves	Infusion	Used as a hair color	0.05	0.20	31
Rosaceae	*Rubus fruticosus* G.N.Jones	Karwara	Shrub	Root, Fruits	Decoction and fruits crushed	Used for all form of hepatitis	0.37	0.088	19
Rutaceae	*Zanthoxylum armatum* DC.	Dambara	Tree	Fruits	Fruits crushed	Used for stomach disorder	0.44	0.025	
Salicaceae	*Salix acmophylla* L.	Wala	Tree	Leaves	Heated	Used for pain	0.12	0.090	18
Sapindaceae	*Aesculus indica* (Wall. ex Cambess.) Hook	Jawaz	Tree	Fruits	Drying	Used for female pregnancy	0.43	0.25	25
Sapindaceae	*Dodonaea viscosa* (L.) Jacq.	Ghowaraskay	Shrub	Leaves	Heated and Infusion	Used for Pest & poxes	0.52	0.042	52
Simaroubaceae.	*Ailanthus altissima* L.	Speena Bekanra	Tree	Gum	Extract Gum	Used for hair removing	0.2	0.055	10
Solanaceae	*Atropa acuminata* Royle ex Lindl.	Dewaan Bang	Herb	Leaves	Infusion	Used for piles and skin infection	0.13	0.16	50
Solanaceae	*Solanum nigrum* L.	Kachmachu	Herb	Fruits	Fruits crushed	Used for liver problem	0.56	0.019	36
Solanaceae	*Solanum surattense* Burm.f.	Maraghoonay	Herb	Seed	Fruits crushed	Used for treatment of migraine. Ash of plant is used as tonic and pain killer	0.34	0.096	27
Solanaceae	*Withania somnifera* (L.) Dunal	Koty laal	Herb	Whole Plant	Decoction	Used for body pain	0.35	0.031	45

Thymelaeaceae	*Daphne macronata* Royle.	Leghunay	Shrub	Leaves	Infusion	Used for Human Pest	0.34	0.032	44
Urticaceae	*Urtica dioica* Linn.	Seezonkay	Herb	Whole Plant	Infusion	Whole plant used for urine problem and also used in jaundice	0.25	0.086	34
Violaceae	*Viola Canescens* Wall.	Banafsha	Herb	Leaves	Decoction	Used for Stomach problem and Hepatitis	0.47	0.046	41
Vitaceae	*Mentha arvensis* L.	Enalay	Shrub	Leaves	Decoction	Used for the treatment of hepatitis	0.32	0.034	
Zingiberaceae	*Zingiber officinale* Roscoe	Adraak	Herb	Bulb	Bulb crushed	Use for cough and stomach problem	0.82	0.027	
Zygophyllaceae	*Tribulus terrestris* L.	Markonday	Herb	Seed	Fruits crushed	Use for urine burning	0.26	0.041	20

RFC= Relative Frequency of Citation, UR= Use report, UV= Use Value

New medicinal uses

Some of the medicinal plants given in (Table 4)are best-known and mentioned in numerous studies with antithetic ethnomedicinal purpose. Although, (13) plants species are already known medicinal plants listed new usage as shown (Table 4). Majority of the plants recorded single additive usage in comparison to previously published literature. Trend of maximum new utilization with minimum number of plant species were determined. Although, 3 species (*Buxus papillosa*, *Cuminum cyminum*, *Suaeda fruticosa*) were somewhat out of the prevailing trend and documented maximum new uses. *Citrullus colocynthis* usedfor example against diabetes and use of *Gentiana kurroo* as tonic, antispasmodic, febrifuge, these uses are documented for the first time. In addition to the new uses recorded here for the certain species, *Isatis tinctoria , Limonium cabulicum, Prunella vulgaris* are documented for the first time as medicinal plant. The amount of curative utilization given in (Table 4) reflects two assert (1) the previously recorded medicinal usage are also known from other cultures indicate the authenticity of these medicinal plants (2) the new usage for the known medicinal plants are either unique to our study area or they are still not explored from other cultures. Therefore, there is a need to scientifically validate the fresh ethnomedicinal uses documented here.

Discussion

Swat is a rich spot of ethnomedicinal plant species. The native people particular traditional healers and old experienced people have vast traditional knowledge about the uses of the plants for treatment of a broad range of diseases. Medicinal plants have been used for treatment of various diseases since the immemorial period. However, we documented about (118) vascular plant species that belong to 62 different families. Various therapeutic plants as given in (Table 4) are familiar and recognized in several studies along with disparate medicinal usage. The major uses seem to be the utilization of medicinal species in local health care system. Our study showed that mostly women, children, shepherds and Gujjars were involved in the collection of plants when they graze their cattle or visited forest or open grazing areas. Similar result also obtained by (Hazrat *et al.* 2007).

During field survey local people stated that plants were used from centuries for curative purposes by traditional ways. So our statement supported by (Hazrat *et al.* 2007). People of lower Swat still used plants for medicinal purposes for several diseases in the area (Qureshi *et al.* 2005) supported our statement. Numerous plant species have been identified in mountainous and hilly parts of Pakistan (Geng *et al.* 2016) which support the findings of the current study as medicinal plants and their traditional uses of local plants of lower Swat. Our study indicated that higher number of plants being used as medicinal from Lamiaceae family in the area due to its synthesized volatile aroma over all the aerial parts which dominantly used for various diseases. This finding is supported by (Shah *et al.* 2016, Sher and Hussain 2009).

Many local plants were used to cure numerous diseases such as pregnancy, urticaria, purgatives, male impotency, cancer , kidney, poxes, Asthma, blood Pressure, vomiting, brain weakness, stomach problems, diabetes mellitus, hepatitis, urine problem and blood purification. Similar uses of medicinal plants has also been reported from other parts of Swat and our findings agree with (Ali *et al.* 2011, Ilyas *et al.* 2015, Ibrar *et al.* 2011, Khan *et al.* 2015, Shah et al., 2016, Kishwar *et al.* 2018, Mushtaq *et al.* 2014 and 2015, Abbasi *et al.* 2013, Shah *et al.* 2016).

This survey revealed that some plants in the area were used singly while many others were used in combination with other plants or items such as dasi ghee or milk, yogurt etc. (Shah *et al.* 2016, Sher and Hussain 2009) support our statement. Likewise, several curative plants were considered to used just in one particular aliments while some used to treat multiple diseases (Sher and Hussain 2009) support our statement. In the study area mostly people used leaves in herbal remedies about (37%), in this finding (Akhtar *et al.* 2013) support our statement. It was determined that man generally cod traditional plants and women explicate herbal recipes and treat the sick individual proposing that both genders are much or little as known with herbal drug (Ahmad *et al.* 2014a) supported our finding.

Swat is the region of diverse medicinal flora. Various researchers conducted studies from the regions and reported many plants as medicinally important. Our study documented about (118) plants from the area. Out of them 105 plants were also reported by (Ali *et al.* 2011, Ilyas *et al.* 2015, Ibrar et Al., 2011, Khan *et al.* 2015, Shah *et al.* 2016, Kishwar *et al.* 2018, Mushtaq *et al.* 2014 and 2015, Abbasi *et al.* 2013, Shah *et al.* 2016) with same or different uses. Our study revealed that uses of various plants were different from previous such as *Narcissus poeticus, Brassica juncea, Capsella bursa-pastoris, Cupressus sempervirence, Equisetum arvense, Malva neglecta, Melia azedarach*, *Myrsine africana*, *Otostegia limbata*, *Pinus roxburghii, Plectranthus rugosus, Prunus persica, Psidium guajava, Rubus fruticosus, Teucrium stocksianum, Zea mays, Aesculus indica, Alianthus altissima, Asparagus officinalis* were used for various diseases that were not documented in the previous studies as shown in Table 4.

No similar uses of these plants from the area were found in literature. The data of these particular plants were gathered from those people who had used these plants experimentally on themself. The data were collected within the scope of ethnobotany while there was some similarity in the use of native names between lower Swat and other areas of Swat and KP.

Literature indication showed that *Berberis lycium, Olea ferruginea and Cichorium intybus* are the most cited from the region reported by about eight studies followed by *Solanum nigrum, Mentha longifolia, Punica granatum* and *Nasturtium officinale* reported by six studies from the area while *Calotropis procera* reported by four studies from the area as shown in the Table 5.

Table 5. Most cited plants from the area.

Name of Plant	TR	Cited by
Berberis lycium	8	Ali *et al.* 2011; Ilyas *et al.* 2015; Imtiaz *et Al.* 2011; Khan *et al.* 2015; Shah *et al.* 2016; Kishwar *et al.* 2018; Mushtaq *et al.* 2014 and 2015
Solanum nigrum	6	Ilyas *et al.* 2015; Imtiaz *et al.* 2011; Khan *et al.* 2015; Ali *et al.* 2011; Akhtar et al., 2013; Abbasi et al 2013
Olea ferrginea	8	Imtiaz *et al.* 2011; Shah *et al.* 2016; Ali *et al.* 2011; Kishwar *et al.* 2018; Hamayun *et al.* 2004, Mushtaq *et al.* 2014 and 2015; Abbasi *et al.* 2013
Mentha longifolia	6	Ilyas *et al.* 2015; Imtiaz *et al.* 2011; Shah et al., 2016; Ali *et al.* 2011; Kishwar *et al.* 2018, Mushtaq *et al.*2014
Ficus carica	6	Ilyas *et al.* 2015; Khan *et al.* 2015; Shah *et al.*2016; Hamayun *et al.*2004; Abbasi *et al.* 2013; Mushtaq *et al.* 2015
Melia azedarach	5	Imtiaz *et al.* 2011; Shah *et al.*, 2016; Kishwar *et al.* 2018; Akhtar *et al.* 2013; Mushtaq *et al.* 2014
Punica granatum	6	Imtiaz *et al.* 2011; Shah *et al.* 2016; Kishwar *et al.* 2018; Akhtar *et al.* 2013; Hamayun *et al.* 2004, Mushtaq *et al.* 2015
Cichorium intybus	8	Ilyas *et al.* 2015; Imtiaz *et al.* 2011; Khan *et al.* 2015; Shah *et al.*2016; Ali *et al.* 2011; Kishwar *et al.* 2018; Akhtar *et al.* 2013; Abbasi *et al.*2013
Nasturtium officinale	6	Ilyas *et al.* 2015; Imtiaz *et al.,* 2011; Khan *et al.* 2015; Shah *et al.* 2016; Ali *et al.* 2011; Kishwar *et al.* 2018
Calotropis procera	4	Imtiaz *et al.* 2011; Khan *et al.* 2015; Shah *et al.* 2016; Mushtaq *et al.* 2014

Disappearance of Plants and Information

Medicinal plants have been employed for treating diseases since ancient times. Unfortunately, the current knowledge on healing plants has been threatened because of certain elements. One of the primary reasons is the utilization of allopathic medication by educating individuals since they can afford to purchase these prescriptions. Additionally, the current information is being lost because of senior individuals from the local area biting the dust and at the current time, there is no interest among the youths to get information on restorative plants from their older folks. Besides, it was additionally observed that elderly folk's individuals have more data about the restorative plants than youthful local areas since they enjoyed a long time with their predecessors and involved these plants for treating disease (Shah *et al.* 2016).

Insecticides and herbicides are being used in agriculture to expand efficiency, but these synthetic compounds pollute the environment. Also, natural disaster events (such as windstorms, floods, thunderstorms, landslides) altogether affect the plant's diversity of regions. Nearby people in our review region have been utilizing a wide assortment of home-grown remedies to treat a wide range of ailments for ages, as proven by our information. Swat is Pakistan's most preferred place for medicinal plants diversity and trade. Lower Swat needs to work with both authoritative and non-managerial state-run administrations to keep the customary information and remedial plant species alive for people in the future.

Conclusion

The current study established ethno-medicinal plants of lower Swat and documented 118 plants that have been used by the native people for 36 different diseases. The majority of people used local plants to cure variety of diseases because plants are easy to collect, cheap and nontoxic for treating chronic diseases. This exploration work will give the foundation linkage among local botanists and researchers on the grounds that it might lead towards finding novel medications. It is highly required by local people, to promote the vulnerable natural flora and the most common medicinal plants with multiple uses. Local traditional healers are familiar with proper collection and

use of medicinal plants, and they should be involved in efforts of conservation and sustainable use of ethnomedicinal plant resources.

Recommendations

Following points proposed for future research: (a) to record and protect conventional ethnomedicines of the region in catalogue form, (ii) to do further ethnopharmacological research on plants with high RFC to identify novel drugs (iii) to recommend therapeutic plants of the area by utilizing devoted approaches including native individuals of the area, (iv) to take practical measures to for management of wild natural resources (v) to recommend herbal drugs to treat new emerging diseases such as COVID-19, which is responsible for causing huge loss of lives all over the planet.

Declarations

Ethics approval and consent to participate: Informed prior consent was obtained from all respondents before commencement of the interview. Data were collected with respect to confidentiality, anonymity and consent.

Consent for publication: All persons shown in images agreed to have their pictures taken and published, all participants agreed on publication.

Competing interests: The authors declare that they are the sole authors and have no conflict of interest.

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Author contributions: Shujat Ali carried out field work, compiled the data. Shujat Ali and Sayed Afzal Shah prepared the draft of the manuscript. Dr. Sayed Afzal Shah supervised all the stages of this research and provided technical inputs. Dr. Javed Iqbal, Shumaila Ijaz and Mehmooda Munazir carried out the statistical analysis. Dr. Rida Fatima Saeed contributed in write-up.

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Different ecosystems of the study area

Some remedies are prepared from plants

Traditionally prepared medicines from plants