



Ethnobotanical appraisal and medicinal use of plants of district Nushki Balochistan, Pakistan

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Abstract

Traditional herbal medicine is a valuable resource for the treatment of many ailments by utilizing the indigenous knowledge for modern drug development. The present investigation aimed to document the ethnobotanical knowledge of medicinally important wild plants in Desert of Nushki, Balochistan, Pakistan. The ethnobotanical appraisal was based on quantitative information on medicinal plant diversity. The information was collected through semi-structured interviews and Participatory Rural Appraisal (PRA) tools. Data were analyzed using quantitative indices for Information Consent Factor (ICF), Fidelity level (FL), Use Value (UV), Frequency Citation (FC) and Relative Frequency Citation (RFC). Sixty (60) plant species belonging to 29 families were reported for medicinal purposes. Asteraceae was found to be a dominant family in terms of species in the area. The whole plant and leaves were noted as the most frequently used parts (31%). The highest ICF (1.00) value was obtained for diseases related to Skeleto-muscular ailments SMA and the least one (0.5) was associated with Dermatological ailments. Respiratory ailments ICF value were (0.84) the second highest. The area is rich in medicinal plants and these plants are still commonly used for medicinal purposes among the people in their daily lives. The plants used as antidiabetic and anti-inflammatory are highly important and need to be investigated further for their phytochemical constituents. Furthermore, few studied plants are also valuable resource for the livestock of the region.

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Introduction

Ethnobotany is the study of the relationship between plants and people. The use of plant species has long been practiced by different indigenous communities. The focus now is on how plants have been or are used, managed and perceived in human societies, including plants used for food, medicine, divination, cosmetics, dyeing, textiles, for building, tools, currency, clothing, rituals and social life (Rahman, 2013). Also, around 80% of the world population depends on the traditional herbal system to cure their health disorders (Hazrat *et al.*, 2011). People living in villages have been using indigenous plants as medicines for ages because this knowledge transfers from generation to generation and is based on lifelong experiences. Besides, the villages are far away from cities and mostly lack proper health facilities (Shinwari and Khan, 2000). This field is well established and a lot of work has been done worldwide. Recently, many countries have made considerable efforts in the study of medicinal plants. The development of new herbal medicaments requires the integration of several sciences such as chemistry, pharmacology and botany (Benarba, 2016). Ethnobotanical surveys and ethno pharmacological studies are effective methods in identifying and documenting medicinal plants (Mahwasane *et al.*, 2013; Idm'hand *et al.*, 2020). Medicinal plants also serve as a big source of secondary metabolites which are valuable for the pharmaceutical industry and drug discovery. In developed countries, 25% of drugs are based on plants and their derivatives (Bodeker and Burford, 2007). Moreover, in recent times, people from developed countries increased their interest in drugs of plant origin as alternative therapies, because conventional medicine is often ineffective and the use of synthetic drugs can cause many side effects and other problems (Rates, 2001).

Pakistan is comprised of various climatic zones with unique biodiversity and consists of 6000 plant species, of which approximately 400–600 species are considered to be medicinally important (Hamayun *et al.*, 2003). Earlier (Sher *et al.*, 2000) reported that

the plant kingdom had immensely contributed to the health needs of man when no synthetic medicines were available and when no concept of surgical management existed. Even today almost 25% of all prescribed medicines in the developed world contain ingredients derived from medicinal plants. (Shinwari and Khan, 2000) described 50 herbs belonging to 27 families which are being used medicinally by the local inhabitants of Margalla Hills National Park, Islamabad, Pakistan. In the country, several studies have reported the medicinal uses of plant resources and knowledge on traditional herbal remedies usually transferred from one generation to another generation through oral way (Aziz *et al.*, 2017, Aziz *et al.*, 2018).

Balochistan is the largest province comprising 44% of the total area of Pakistan. The geographical region comprised of arid to semi-arid structure ranging from cool temperate to coastal tropics. The diverse ecological conditions have an impact on the diversity of flora found. Local communities utilize wild plants as folk medicines in large amounts. Most of the semiarid areas of Balochistan, including the studied district, Nushki is blessed with botanical diversity and endemism (Ahmed *et al.*, 2020). The area is situated 144 Kilometer south-west of Quetta with a Latitude 29.5514° N and longitude 66.0107° E. The total area of District Nushki is 7597 Sq. Km, 172000 Sq. hectares and altitude are 2900 ft a.s.l. The climate of the area is arid to semiarid due to irregular and scanty rainfalls in winter, the weather is mostly hot and seldom cold. The population of District Nushki is 178796. The type of forest found in the district is Dry Tropical Forest and covers both Tropical Thorn Forest and Sand Dunes Desert Forest sub-zones. Nushki is one of the remote tribal areas of Balochistan province, Pakistan. The majority of the population resides in the rural areas and mostly comprised of three major ethnic groups viz., Pashtun, Baloch and Brauhvi. The major languages spoken are Pashto, Balochi, Brauhvi and Urdu. Tribal people of the area have sufficient traditional knowledge. The primary health care system depends upon their ethnobotanical knowledge. The study aimed to

identify, investigate and documentation of medicinal plants available in the study area and extent of utilization by the tribal and local people.

The present study is the first attempt to document the medicinally important plants as well as other plants used traditionally in the area. Few plants were ethnobotanical unexplored previously, this study documents and found few new or rare uses of medicinal plants in the area. Our findings will make it possible to discover some pharmacologically active constituents from these medicinal plants in the future.

Materials and methods

Field visits and surveys were carried out in the year 2018-19. Plants were collected from different sites of Nushki (Fig. 1) including Keshangi, Khaisar, Ahmed wal, Mull, and Bhuto. The plant samples were collected, pressed and mounted on herbarium sheets. All taxa were identified and submitted to Eco-taxonomy lab Herbarium, Department of the Botany University of Balochistan Quetta.

Data analysis

Data were analyzed using modern statistical method. The use report (UR), fidelity level (FL), frequency citation (FC), relative frequency citation (RFC), family importance value (FIV) of species determined and the informant consensus factor (ICF) was also calculated.

Relative frequency citation (RFC)

Data were subjected to calculate RFC by dividing the number of informants that mention a useful species, by the total number of informants (N). Its value ranges from 0 (Not useful) to 1 (very useful) by (Tardio and Pardo-de Santayana, 2008).

$$RFCs = \frac{FCs}{N} \dots\dots\dots (1)$$

Use value (UV)

The UV indicates the relative importance of the local plants calculated by

$$UV = \frac{U_i}{N} \dots\dots\dots (2)$$

Relative importance (RI)

The RI of plant species cited by the informants is calculated as follows (Kadir *et al.*, 2012)

$$RI = PP + AC \dots\dots\dots (3)$$

The PP = the number of pharmacological properties divided by the maximum number of properties attributed to the most useful species. AC = the number of ailment categories treated by a given species divided by the maximum number of ailment categories treated by the most useful species. 2 is the highest possible value (RI) indicating the most versatile species with the greatest number of medicinal properties (Oliveira *et al.*, 2010).

Informant consensus factor

The informant consensus factor (ICF) indicates if there was an agreement in the use of plants in the ailment categories between the plant users in the study area. The ICF was calculated using the following formula (Heinrich *et al.*, 1998)

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

Nur refers to the number of use-reports for a particular ailment category and Nt refers to the number of taxa used for a particular ailment category by all informants.

The product of this factor ranges from 0 to 1. A high value (close to 1.0) indicates that relatively few taxa are used by a large proportion of the informants. A low value indicates that the informants disagree on the taxa to be used for curing particular illnesses.

Results and discussion

The present study has revealed valuable ethnomedicinal knowledge; data was collected by using PRA tools including surveys, semi-structured interviews and direct observation.

A hundred informants participated during the survey including males and females of various age groups. Data also collected with direct observation during the

market survey from Pansars, Hakeems, and Traditional Healers. Women were also experts in the local medicinal use of plants. Most of the information

received from the 46 to 70 age group informants (Table 1) and were grouped into the literate category (Table 2).

Table 1. Informant's age group interviewed.

S. No	Age range	No. of Male informants	No of female informants
1	20-30	04	02
2	30-40	06	08
3	40-50	10	10
4	50-60	10	10
5	60-70	10	10
6	70-80	08	07
7	80-90	02	03

A total of sixty traditionally used plants were reported in the study to belong to 27 angiosperm families and 01 Gymnospermae (Fig. 2).

The dominant family was Asteraceae (10 species) followed by Solanaceae (5 species), Zygophyllaceae (5 species), Lamiaceae (4 species), and others. Plants were mainly herbs, shrubs, creepers and few were trees shown in Fig. 3. An inventory was made for the

ethnobotanical uses given in Table 3. The result indicates *Artemisia maritima*, *Hertia intermedia*, *Berberis baluchistanica*, *Fagonia olivieri*, *Citrullus colocynthis*, *Withania coagulans* were used for multiple ailment categories. Our findings are in line with the ethnobotanical studies carried out by (Badshah and Hussain, 2011, Khan *et al.*, 2011, Adnan *et al.*, 2014) who also reported various medicinal uses for the aforementioned plants.

Table 2. Education of informants interviewed.

Male (50)		Female (50)	
Literate =	34	Literate =	27
Illiterate =	16	Illiterate =	23

The multiple uses for each plant serve as a strong indicator of the natural availability of a variety of therapeutic phytochemicals within the plants, and such findings may prompt further research into their medicinal application.

All parts of medicinal plants including the leaves, stem, flower, roots, fruits and seeds are used by traditional healers and local people, but the part of the plant collected for each specific purpose depends on the requirements of the user and type of plant. Fig. 4 shows that 31% of plants were used for their leaves in the making of various medicinal preparations, which is easy to process into a digestible paste and have less conservational issues than the collection of

roots, bark, stem or the whole plant (Adnan *et al.*, 2014) and similar results have been reported from other areas of Pakistan (Khan *et al.*, 2011, Murad *et al.*, 2013).

Livestock

Different plants were also used in livestock like *Lyceum shawii*, *Saccharum griffithii*, *Chenopodium album*, *Periploca aphylla* (Fig. 5t) and *Haloxylon persicum* used as a fodder for animals. *Tamarix aphylla* is used to treat animal fever. *Euphorbia prostrata* used as fodder as well as for wound healing of animals and human beings. *Hertia intermedia* used in animal complexity, *Ephedra intermedia* used for tanning of animal leather. In

Pakistan, rural areas livestock depends upon the use of traditional plants. *Berberis pseudumbellata* and *Morus alba* reported being used for livestock (Khan and Khatoon, 2007). Traditional plants were being

utilized as a primary source of medicine for livestock besides their use as food and fodder (Qasim *et al.*, 2010).

Table 3. List of plants used by local people of Nushki with local name, uses, and part use and usage type.

S.No	Plant Name	Local name	Family	Use	Part used	Usage type	UV	RFC	RI
1.	<i>Artemisia maritima</i> L.	Jir	Asteraceae	Fever, stomach infection, problems	WP	Decoction	0.53	0.43	0.5
2.	<i>Achillea wilhelmsi</i> K. Koch	Boemadran	=	GIT problems, fever	WP	Decoction	0.77	0.58	0.75
3.	<i>Iphiona aucheri</i> (Boiss.) Anderb.	Kolbor/Karwankush	=	A poisonous plant used for fuel	WP	Dried	0.21	0.14	0.5
4.	<i>Hertia intermedia</i> Kuntze	Manguli	=	Animal complexity, fever, coolant for stomach and general body	L & R	Powder and decoction	0.44	0.34	0.25
5.	<i>Sonchus maritimus</i> L.	Sheergo	=	Wound healing	L	Fresh and dried	0.33	0.24	0.25
6.	<i>Pulicaria arabica</i> (L.) Cass.	Rambava	=	Applied on wounds and swelling to control infections, also effective as an antioxidant	L & flowers		0.47	0.23	0.75
7.	<i>Matricaria lasiocarpa</i> Boiss.	Piunpuli	=	Fever specially typhoid, stomach problems	Flowers and L	Dried, Decoction	0.70	0.47	0.5
8.	<i>Tragopogon gracilis</i> D. Don.	Talkha	=	Used as a wounds healer	L & Flowers	Fresh and dried	0.64	0.14	0.25
9.	<i>Centaurea iberica</i> Trevir. ex Spreng.	Pith booti	=	Used as a fuel and coolant	WP	Dried	0.17	0.35	0.5
10.	<i>Lasiopogon muscoides</i> (Desf.) DC.	Phutiwal	=	Cooling agent and fever	WP	Fresh	0.60	0.23	0.5
11.	<i>Berberis baluchistanica</i> Ahrendt	Zarch/Zaralg	Berberidaceae	Good for Kidney problems, stones and reduce hair fall,	R, flower	Fresh, dried	0.67	0.53	0.75
12.	<i>Solanum nigrum</i> L.	Tolangur	Solanaceae	Extract is effective for reducing the Fever and jaundice	Fruit	Powder, Decoction	0.40	0.32	0.25
13.	<i>S. surattense</i> Burm. f.	Danthanshan	=	A tonic for Toothache	Fruit and seeds	Powder, dried seeds	0.53	0.28	0.25
14.	<i>S. elaeagnifolium</i> Cav.	Booti, weed	=	As a fuel	WP	Dried	0.57	0.21	0.25
15.	<i>Lycium shawii</i> Roem. & Schult.	Jarokh	=	Used as a Fodder for animals	WP	Fresh	0.33	0.03	0.25
16.	<i>Physalis alkekengi</i> L.	Chinese bladder cherry	=	Fuel, stomach burn	WP & Frt.	Dried	0.41	0.12	0.5
17.	<i>Cardaria chalepensis</i> (L.) Hand.-Mazz..	Bushki, magher	Brassicaceae	Commonly taken as a food	L	Fresh	0.52	0.34	0.75
18.	<i>Malcolmia africana</i> (L.) W.T. Aiton	Chammar	=	Taken as a Food. a stimulator of blood production	L	Fresh	0.37	0.35	0.5
19.	<i>Fagonia olivieri</i> Boiss.	Karkawa	Zygophyllaceae	It cures Diabetes and also beneficial as a blood purifier. Liver problems are also healed.	Fruit, L	Dried, powder	0.53	0.45	0.25
20.	<i>F. bruguieri</i> DC.	Karkawa	=	Very impressive and widely used plant diabetes, blood purification	Fruits	Powder	0.33	0.36	0.5
21.	<i>Zygophyllum megacarpum</i>	Alonj	=	Very effective to control	Flowers	Dried, Powder	0.40	0.54	0.75

Boriss.			Fever						
22.	<i>Peganum harmala</i> L.	Kisankoor	=	A strong and suitable remedy for Diabetes and fever	SD	Powder	0.20	0.43	1.00
23.	<i>Tribulus terrestris</i> L.	Gurgandak	=	Fever, stomach coolant	FR, L	Dried, powder	0.25	0.32	0.5
24.	<i>Nerium oleander</i> L.	Jaur	Oleaceae	Fencing, latex for mixing in medicines	L	Fresh, Dried	0.41	0.24	0.5
25.	<i>Plantago amplexicaulis</i> Cav.	Piddari	Plantaginaceae	Constipation, Stomach burn	FR & SD (husk)	Fresh and dried	0.17	0.45	0.75
26.	<i>P. lanceolata</i> L.	Piddari	=	Stomach disorders	FR & SD (husk)	Fresh and dried	0.16	0.31	0.5
27.	<i>Tamarix aphylla</i> (L.) Warb.	Kirri	Tamaraceae	Fuel, animal fever	L	Ash, dried	0.65	0.41	0.5
28.	<i>Alhagi maurorum</i> Medik.	Shinz	Fabaceae	Removes skin rash and reduce body heat	L	Fresh and dried	0.56	0.25	0.5
29.	<i>Zataria multiflora</i> Boiss.	Izghand	=	Stomach burn, whole, powder and decoction	L	Dried, Fresh	0.42	0.35	0.25
30.	<i>Malva neglecta</i> Wallr.	Pochko	Malvaceae	Used as a source of Food and controls fever	FR & L	Fresh	0.26	0.26	0.25
31.	<i>Prosopis juliflora</i> (Sw.) DC.	Babur	Mimosaceae	Hair tonic, shade and fencing	GM & L	Fresh and dried	0.34	0.35	0.5
32.	<i>P. glandulosa</i> Torr	Babur	=	Hair fall	GM	Dried	0.68	0.45	0.25
33.	<i>Saccharum griffithii</i> Munro ex Boiss., Fl. Or	Kashum	Poaceae	Animal fodder, broom making	L	Fresh, Dried	0.64	0.31	0.25
34.	<i>Rhazya stricta</i> Decne. in Ann. Nat. Sci. Ser.	Aishark	Apocynaceae	Body heat and inflammation	L	Fresh	0.40	0.42	1.00
35.	<i>Rumex vesicarius</i> L.	Thrushag	Rumaceae	A good source of mineral Food,	WP	Fresh	0.29	0.31	0.25
36.	<i>Salsola kali</i> L.	Morpuzho	Chenopodaceae	Removes Body inflammation and provide feelings of coolness	WP	Fresh and dried	0.44	0.34	0.5
37.	<i>Chenopodium album</i> L.	Sarmey	=	A plant uses as animal fodder and as a fuel	WP	Fresh and dried	0.4	0.35	0.5
38.	<i>Ziziphora tenuior</i> L.	Poorhcheenk	Lamiaceae	Undiagnosed Fever and typhoid	WP	Dried	0.28	0.21	0.25
39.	<i>Nepeta praetervisa</i> Rech. f.	Simsok	=	Cough, cold	WP	Dried powder	0.45	0.42	1.00
40.	<i>Salvia cabulica</i> Benth.	Matetave	=	Body heat	L & flower	Powder	0.29	0.37	0.75
41.	<i>S. santolinifolia</i> Boiss.	Puzho	=	Effective for fever and heat remover	WP	Fresh and dried	0.30	0.42	0.75
42.	<i>Citrullus colocynthis</i> (L.) Schrad.	Kulkushta	Cucurbitaceae	As cooling agent, purgative, good for ruptured heals	Fruits/Seeds	Fresh, powder	0.52	0.25	0.5
43.	<i>Calotropis procera</i> (Aiton) W.T. Aiton	Aak	Asclepidaceae	Hepatitis, Antibiotic	L & latex	Fresh and dried	0.28	0.35	0.75
44.	<i>Scorzonera mollis</i> M. Bieb.		Lilaceae	Mineral supplement, food	L & R	Fresh leaves and roots	0.33	0.24	0.75
45.	<i>Tulipa stellata</i> Hook.	Guarhikh	=	As a food and remedy for fever and wounds	Bulb, Flowers	Fresh and dried	0.14	0.35	0.25
46.	<i>Polygonum sp.</i> L.		Polygonaceae	Fuel	WP	Dried	0.71	0.21	0.25
47.	<i>Ephedra intermedia</i> Schrenk ex C.A. Mey.	Narom/Oman	Ephedraceae	Used for tanning of animal leather and curing the such as Cough and asthma	Branches	Powder, pulp	0.22	0.36	1.00
48.	<i>Zosima absinthifolia</i> (Vent.) E.S. Link	Gwathak	Apiaceae	Anti-inflammatory and antimicrobial on wounds and effects	Seeds	Powder and decoction	0.29	0.37	0.5

49.	<i>Withania coagulans</i> (Stocks) Dunal	Paneerbad	=	Used for cheese formation, also used for diabetes, Some uses include skin cure treatment	Flowers/se eds/ fruit	Decoction and powder	0.28	0.42	0.5
50.	<i>Psammogeton biternatum</i> Edgew.	Izbothk	Apiaceae	Typhoid fever	L	Powder	0.20	0.34	0.75
51.	<i>Stocksia brahuica</i> Benth.	Kotor	Sapindaceae	A shrub usually used as a fuel and Grazed by camels	L & BR	Fresh	0.26	0.23	0.25
52.	<i>Capparis spinosa</i> L.	Khawarg,	Capparidaceae	A plant used for diabetes, diuretic and expectorant use in some cases. Also used as a vesconstrictive, fuel	FR & SD	Powder and decoction	0.35	0.34	0.75
53.	<i>Ficus carica</i> L.	Anjeer	Moraceae	Fever and stomach problems	FR	Fresh	0.84	0.45	0.75
54.	<i>Pistacia atlantica</i> Desf.	Gwan	Anacardiaceae	Food, used for stomach problems	FR & GM	Fresh	0.25	0.32	0.5
55.	<i>Euphorbia prostrata</i> Aiton		Euphorbiaceae	Fodder for animals and as a Wound healer	WP	Dried	0.46	0.32	0.25
56.	<i>Douepia tortuosa</i> Camb. in Jacquem.,Voy.Ind.		Brassicaceae	Fuel	WP	Dried	0.44	0.27	0.5
57.	<i>Taverniera glabra</i> Boiss.		Fabaceae	As a sedative and analgesic	L & FR	Dried	0.29	0.34	0.75
58.	<i>Periploca aphylla</i> Decne.	Humm/ barara	Asclepiadaceae	A fodder for camels and other cattle, as a fuel	WP	Dried	0.66	0.12	0.25
59.	<i>Haloxylon persicum</i> Bunge ex Boiss. & Buhse	Taghaz	Amaranthaceae	Fodder for camels/ fuelwood	WP	Dried	0.38	0.34	0.5
60.	<i>Calligonum polygonoides</i> L.	Phok	Polygonaceae	Cold / cough/ asthma and as a fuel	FL/BD	Dried	0.31	0.32	0.5

Whole Plant=WP, Leaves=L, Roots=R, Fruits=FR, Flowers=FL, Bud=BD, Gum=GM, Seeds=SD, Branches=BR.

Table 4. Informant consensus factor of ailments reported.

S. No	Ailment categories	Number of use reports. Nur	Number of taxa. Nt	Informant consensus factor. ICF
1	Gastro-intestinal diseases:	35	12	0.67
2	Cold / cough/ asthma:	26	5	0.84
3	Fever	18	8	0.58
4	Kidney disorders:	15	04	0.78
5	Skin allergies and antimicrobial	05	03	0.5
6	Skeleto-muscular	06	1	1.00
7	Anti-inflammatory and Antidiabetic	25	06	0.79

Gastro-intestinal diseases

Different gastro diseases were treated with different plants such as *Artemisia maritima*, *Hertia intermedia*, *Physalis alkekengi*, *Tribulus terrestris*, *Plantago amplexicaulis*, *P. lanceolate*, *Ficus carica*, *Pistacia atlantic*, *Matricaria lasiocarpa* and *Zataria multiflora*. Gastrointestinal problems include stomach, constipations and stomach burnings, diarrhea, intestinal worms, indigestion, etc. Gastrointestinal problems are the most common problem observed in the study area, the same

observations were earlier documented for the whole country by (Adnan *et al.*, 2014).

Earlier different plants reported treating gastro issues other than the present study. *Mentha spicata* and *Rumex hastatus* (Fig. 5s) being used for gastrointestinal ailments (Rokaya *et al.*, 2010). A total of 25 plant species were presented to cure 14 types of gastrointestinal ailments by (Saxena *et al.*, 2014). Seventeen plants were reported by (Murad *et al.*, 2013) for the treatment of gastro diseases.

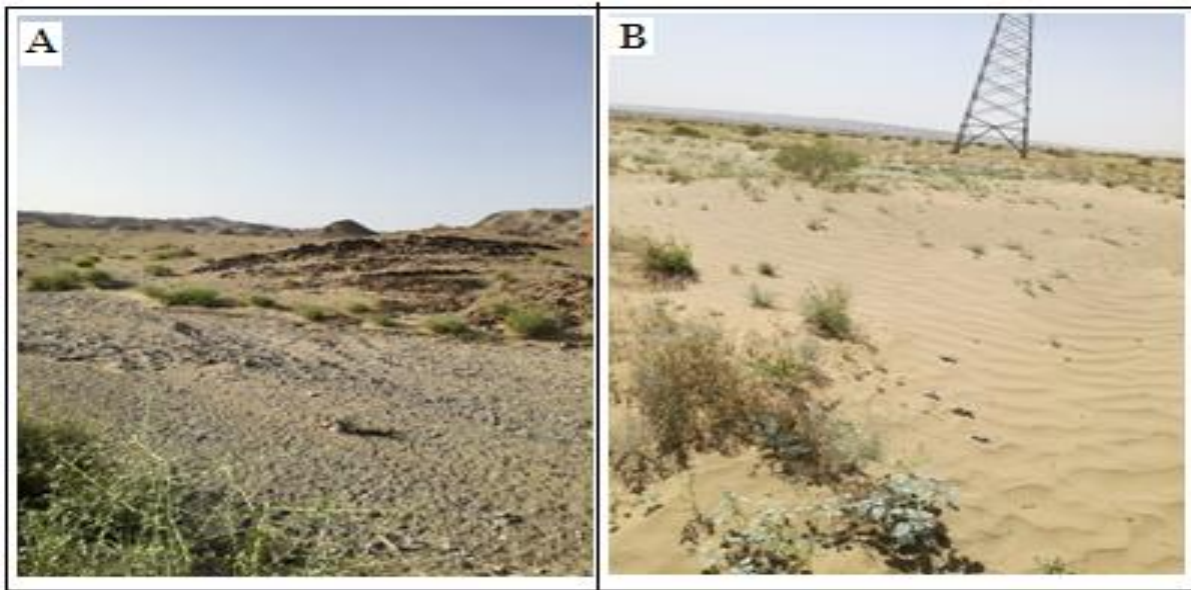


Fig. 1. Sites of study area, Desert of Nushki.

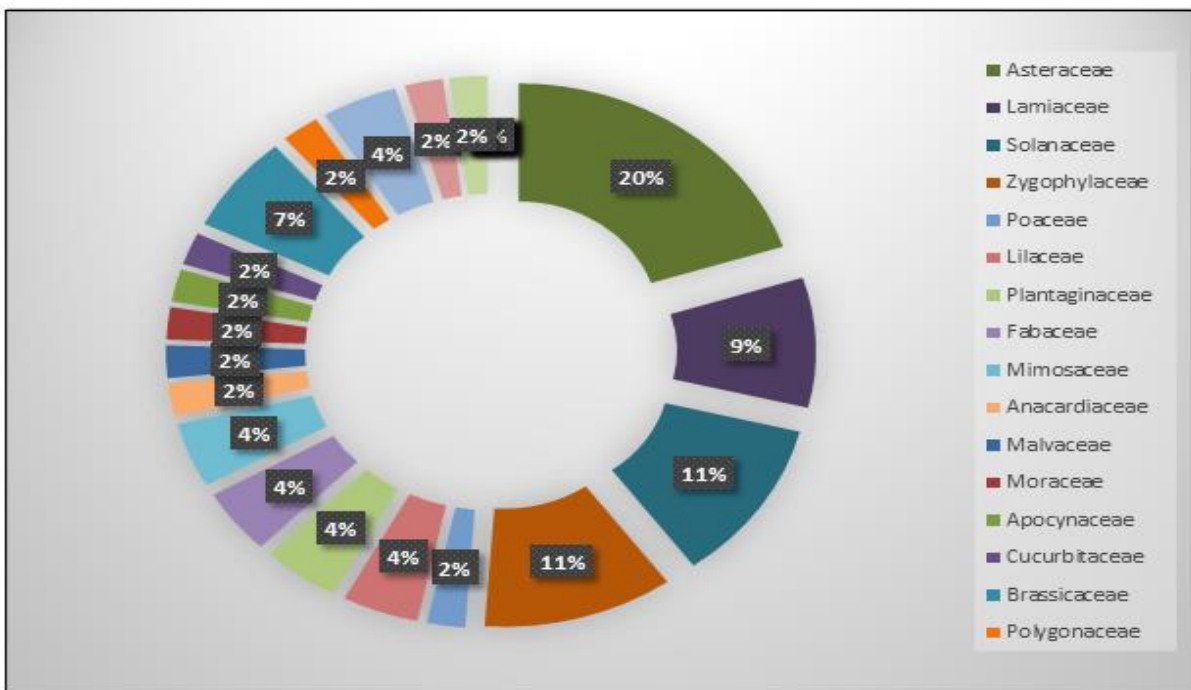


Fig. 2. Reported plants families from the study site.

Fever

Different types of fevers were also treated with several plants in a variety of ways by the local inhabitants of the region. *Matricaria lasiocarpa* is used to treat fever especially typhoid. *Artemisia maritima*, *Achillea wilhelmsii*, *Hertia intermedia*, *Zygophyllum megacarpum* reported for treating fever by the community. *Solanum nigrum* extract is effective for reducing the fever in jaundice.

Psammogeton biternatum is used to treat typhoid fever. *S. nigrum* earlier reported by (Qureshi *et al.*, 2009) for the treatment of fever in agreement with our findings. These findings are also running parallel with the findings of other researchers in which the same ailments were treated by the different plants but instead of our listed plants. Earlier (Aziz *et al.*, 2016) documented seven different plants to cure fever.

Cold / cough/ asthma

Few plants were recorded for ailments cold, cough and asthma such as *Nepeta praetervisa*, *Ephedra intermedia*, *Calligonum polygonoides*, *N. cataria*, *Marubium vulgare* and *Teucrium stocksianum* earlier listed for the treatment of cold and fever (Aziz *et al.*, 2016). Few plants use for the treatment of cold, cough and asthma also reported by (Saranzai *et al.*, 2013) including *E. intermedia* is in agreement with our findings. Ephedrine was first isolated in 1987 from the Chinese species *Ephedra sinica* (Stapf.) and at present it is widely used in medical practice (Gazaliev *et al.*, 1989). Different species of *Ephedra* from the study sites are being used in pharmaceutical industries for the isolation of Ephedrine.

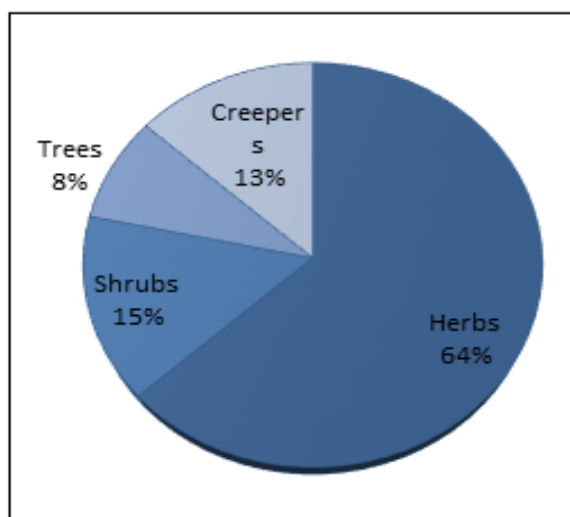


Fig. 3. Habit of the studied plants.

Kidney disorders

Different ailments of the kidney are also treated with different plants by the local community of Nushki such as *Berberis baluchistanica* and *Tribulus terrestris*. Earlier various reports were found in agreement with our result of the use of *T. terrestris* as a diuretic, removal of kidney stone, sexual disorders, etc. (Hamed *et al.*, 2004, Semerdjieva Ivanka 2011, Hashim *et al.*, 2014, Patil *et al.*, 2014, Semerdjieva and Zheljzkov, 2019). Our results agree with the presence of the nephroprotective effect of *B. baluchistanica* (Pervez *et al.*, 2018). Phytochemical screening also goes parallel with our results in the assessment of analgesic properties of *B. baluchistanica* (Zarga *et al.*, 1982, Siddiqui *et al.*, 2017).

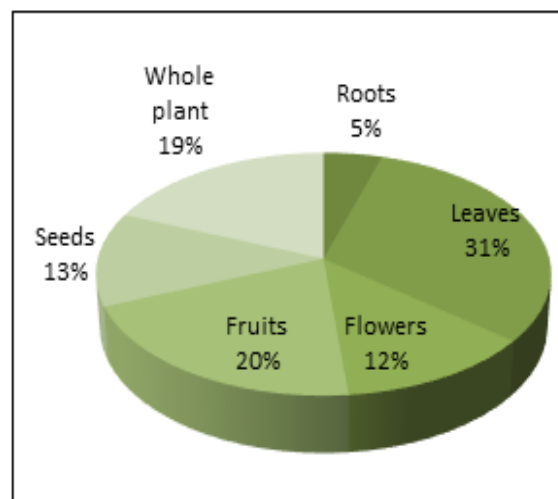


Fig. 4. Parts of medicinal plants used by informants.

Anti-diabetics

Some of the plants are also used to treat diabetes by the community. Anti-diabetic plant includes *Fagonia olivieri*, *F. bruguieri* and *Peganum harmala*. Earlier many plants were reported from different regions of Pakistan being used as antidiabetic (Yaseen *et al.*, 2015). *Caralluma tuberculata* and *Zizyphus sativa* reported earlier for the treatment of diabetes by local people of Malakand Agency, Pakistan (Zabihullah *et al.*, 2006). The use of *F. arabica* for the treatment of diabetes and other ailments is in agreement with our results (Prasad *et al.*, 2007, Rawal *et al.*, 2009).

Quantitative analysis

THE highest UV was reported for *Ficus carica* (0.84) second highest was for *Achillea wilhelmsi* (0.77) shown in Table 3. The highest RI was reported 1.00 in *Peganum harmala*, *Rhazya stricta*, *Nepeta praetervisa* and *Ephedra intermedia* shown in Table 3. The highest ICF (1.00) value was obtained for diseases related to Skeleto-muscular ailments (Table 4). SMA and the least one (0.5) were associated with Dermatological ailments. Respiratory ailments ICF value were (0.84) the second highest. Our results were reported differently as compared to other quantitative analyses of ethnobotanical studies as this is the first quantitative analysis of ethnobotanical studies of the region Nushki. That may be due to different ecological zone studies and different plant species reported earlier.



Fig. 5. Studied plants from the field of Nushki district *a:Malcolmia africana*,*b:Lasiopogon muscoides*, *c: Iphiona aucheri*, *d:Citrus colocynthes*, *e:Euphorbia prostrata*, *f:Peganum harmala*, *g:Pulicaria undulata*, *h: Alhagi maurorum*, *i: Matricaria lasiocarpa*, *j:Solanum surretense*, *k:Tribulus terrestris*, *l:Ephedra intermedia*, *m:Lycium shawii*, *n:Saccharum griffithii*, *o:Calligonum polygonoides*, *p:Rhazya stricta*, *q:Physalis alkekengi*, *r:Capparis spinosa*, *s:Rumex vesicarius*, *t:Periploca aphylla*, *u:Nerium oleander*.

Our findings revealed that ethnobotanical knowledge is now limited to only elders. Hakeem's and Pensaries also have information about the plants and frequently using these plants in their daily life whereas the young generation is unaware of this knowledge our findings agreement with (Shah *et al.*, 2013). The area is rich in medicinal plants and these plants are still commonly used for medicinal purposes among the people in their daily lives. The plants used as antidiabetics and anti-inflammatory highly important and need to be further investigated for their phytochemical constituents. Also, the uses of plants are valuable for the livestock of the area. Furthermore, research on these plants can help in taxonomic identification of these valued plants. The phytochemical investigation will help in drug discoveries and pharmacology.

Conclusion

The area, Nushki Balochistan, has plenty of medicinal plants used to treat a wide spectrum of human ailments by the local population and healers. The documented plant belongs to families Asteraceae, Lamiaceae, Solanaceae and Zygophyllaceae are the most used families in the area. The leaves are the most used part of local healers. To validate the use of these plants phytochemical investigation and analysis of biological activities (*in vivo/in vitro*) are recommended.

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References

Adnan M, Ullah I, Tariq A, Murad W, Azizullah A, Khan AL, Ali N. 2014. Ethnomedicine use in the war affected region of northwest Pakistan. *Journal of Ethnobiology and Ethnomedicine* **10**, 16.

Ahmed A, Hameed A, Saeed S. 2020. Ecological distribution, morphological and molecular characterization of Zygophyllaceae from diverse

ecological zones of balochistan, pakistan. *applied ecology and environmental research* **18**, 2445-2462.

Aziz MA, Khan AH, Adnan M, Izatullah I. 2017. Traditional uses of medicinal plants reported by the indigenous communities and local herbal practitioners of Bajaur Agency, Federally Administrated Tribal Areas, Pakistan. *Journal of ethnopharmacology* **198**, 268-281.

Aziz MA, Adnan M, Khan AH, Rehman AU, Jan R, Khan J. 2016. Ethno-medicinal survey of important plants practiced by indigenous community at Ladha subdivision, South Waziristan agency, Pakistan. *Journal of ethnobiology and ethnomedicine* **12**, 53.

Aziz MA, Adnan M, Khan AH, Shahat AA, Al-Said MS, Ullah R. 2018. Traditional uses of medicinal plants practiced by the indigenous communities at Mohmand Agency, FATA, Pakistan. *Journal of ethnobiology and ethnomedicine* **14**, 2.

Badshah L, Hussain F. 2011. People preferences and use of local medicinal flora in District Tank, Pakistan. *Journal of Medicinal Plants Research* **5**, 22-29.

Benarba B. 2016. Medicinal plants used by traditional healers from South-West Algeria: An ethnobotanical study. *Journal of Intercultural ethnopharmacology* **5**, 320.

Bodeker G, Burford G. 2007. Traditional, complementary and alternative medicine: policy and public health perspectives: World Scientific.

Gazaliev A, Zhurinov MZ, Fazylov S, Balitskii S. 1989. Isolation, analysis, and synthesis of ephedrine and its derivatives. *Chemistry of Natural Compounds* **25**, 261-271.

Hamayun M, Khan MA, Begum S. 2003. Marketing of medicinal plants of Utror-Gabral valleys, Swat, Pakistan. *Ethnobotanical Leaflets*

2005, 44.

Hamed AI, Oleszek W, Stochmal A, Pizza C, Piacente S. 2004. Steroidal saponins from the aerial parts of *Tribulus pentandrus* Forssk. *Phytochemistry* **65**, 2935-2945.

Hashim S, Bakht T, Marwat KB, Jan A. 2014. Medicinal properties, phytochemistry and pharmacology of *Tribulus terrestris* L.(Zygophyllaceae). *Pakistan Journal of Botany* **46**, 399-404.

Hazrat A, Shah J, Nisar M. 2011. Medicinal plants of Sheringal Valley, Dir Upper, KPK, Pakistan. *FUUAST Journal of Biology* **1**, 131-133.

Idm'hand E, Msanda F, Cherifi K. 2020. Ethnobotanical study and biodiversity of medicinal plants used in the Tarfaya Province, Morocco. *Acta Ecologica Sinica*.

Khan N, Ahmed M, Ahmed A, Shaukat S, Wahab M, Ajaib M, Siddiqui MF, Nasir M. 2011. Important medicinal plants of chitral gol National park (cgnp) Pakistan. *Pakistan Journal of Botany* **43**, 797-809.

Khan SW, Khatoon S. 2007. Ethnobotanical studies on useful trees and shrubs of Haramosh and Bugrote valleys in Gilgit northern areas of Pakistan. *Pakistan Journal of Botany* **39**, 699-710.

Mahwasane S, Middleton L, Boaduo N. 2013. An ethnobotanical survey of indigenous knowledge on medicinal plants used by the traditional healers of the Lwamondo area, Limpopo province, South Africa. *South African Journal of Botany* **88**, 69-75.

Murad W, Azizullah A, Adnan M, Tariq A, Khan KU, Waheed S, Ahmad A. 2013. Ethnobotanical assessment of plant resources of Banda Daud Shah, District Karak, Pakistan. *Journal of ethnobiology and ethnomedicine* **9**, 77.

Patil B, Patel B, Harisha C, Parmar N, Save A. 2014. Variants of *Tribulus* species-a scientific study through DNA RAPD-molecular characterization. *Indian Journal of Pharmaceutical and Biological Research* **2**, 15.

Pervez S, Saeed M, Khan H, Shahid M, Ullah I. 2018. Nephroprotective effect of *Berberis baluchistanica* against gentamicin-induced nephrotoxicity in rabbit. *Bangladesh Journal of Pharmacology* **13**, 222-230.

Prasad S, Kashyap RS, Deopujari JY, Purohit HJ, Taori GM, Daginawala HF. 2007. Effect of *Fagonia arabica* (Dhamasa) on in vitro thrombolysis. *BMC Complementary and Alternative Medicine* **7**, 36.

Qasim M, Gulzar S, Shinwari ZK, Aziz I, Khan MA. 2010. Traditional ethnobotanical uses of halophytes from Hub, Balochistan. *Pakistan Journal of Botany* **42**, 1543-1551.

Qureshi R, Waheed A, Arshad M, Umbreen T. 2009. Medico-ethnobotanical inventory of tehsil Chakwal, Pakistan. *Pakistan Journal of Botany* **41**, 529-538.

Rahman A. 2013. An Ethno-botanical investigation on Asteraceae family at Rajshahi, Bangladesh. *Academia Journal of Medicinal Plants* **1**, 92-100.

Rates SMK. 2001. Plants as source of drugs. *Toxicon* **39**, 603-613.

Rawal A, Nath D, Yadav N, Pande S, Meshram S, Biswas S. 2009. *Rubia cordifolia*, *Fagonia cretica* linn and *Tinospora cordifolia* exert anti-inflammatory properties by modulating platelet aggregation and VEGF, COX-2 and VCAM gene expressions in rat hippocampal slices subjected to ischemic reperfusion injury. *Int J Appl Res Nat Prod* **2**, 19-26.

Rokaya MB, Münzbergová Z, Timsina B. 2010. Ethnobotanical study of medicinal plants from the Humla district of western Nepal. *Journal of*

Ethnopharmacology **130**, 485-504.

Sarangzai AM, Ahmed A, Laghari SK. 2013. Traditional uses of some useful medicinal plants of Ziarat District Balochistan, Pakistan. FUUAST Journal of Biology **3**, 101-107.

Saxena N, Yadav V, Verma R. 2014. Traditional knowledge of medicinal plants used to cure gastro intestinal problems in Jalaun district of Uttar Pradesh, India. Journal of Medicinal Plants Studies **2**, 24-28.

Semerdjieva I. 2011. Studies on leaf anatomy of *Tribulus terrestris* L.(Zygophyllaceae) in populations from the Thracian floristic region. Biotechnology & Biotechnological Equipment **25**, 2373-2378.

Semerdjieva IB, Zheljaskov VD. 2019. Chemical Constituents, Biological Properties, and Uses of *Tribulus terrestris*: A Review. Natural Product Communications **14**, 1934578X19868394.

Shah A, Marwat SK, Gohar F, Khan A, Bhatti KH, Amin M, Din NU, Ahmad M, Zafar M. 2013. Ethnobotanical study of medicinal plants of semi-tribal area of Makerwal & Gulla Khel (lying between Khyber Pakhtunkhwa and Punjab Provinces), Pakistan.

Sher H, Ahmad M, Iqbal C. 2000. Market survey of medicinal plants in major cities of Pakistan, their use and future prospects: Swiss Purred. Development Cooperation. Berne. Switzerland.

Shinwari MI, Khan MA. 2000. Folk use of medicinal herbs of Margalla hills national park, Islamabad. Journal of ethnopharmacology **69**, 45-56.

Siddiqui FA, Ahmad M, Jahan N, Sajid MI. 2017. Phytochemical screening and assessment of analgesic, Anti-inflammatory and hematological properties of the fruit of *Berberis baluchistanica*. Pakistan journal of pharmaceutical sciences **30**.

Yaseen G, Ahmad M, Zafar M, Sultana S, Kayani S, Cetto AA, Shaheen S. 2015. Traditional management of diabetes in Pakistan: ethnobotanical investigation from traditional health practitioners. Journal of ethnopharmacology **174**, 91-117.

Zabihullah Q, Rashid A, Akhtar N. 2006. Ethnobotanical survey in kot Manzaray Baba valley Malakand agency, Pakistan. Pakistan journal of plant sciences **12**, 115-121.

Zarga MA, Miana G, Shamma M. 1982. Gandharamine-A New Benzylisoquinoline alkaloid from *Berberis baluchistanica*. Heterocycles **18**, 63-65.