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Medicinal plants used for veterinary diseases by the local inhabitants of the Teshil Tangi, District Charsadda, Pakistan

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Therapeutic plants ethnically utilized for the cure of various aliments of animals have an important part in the rural veterinary healthcare system because allopathic medicines remain inaccessible, particularly in the third world countries. This work was carried out in Teshil Tangi District Charsadda, Pakistan, in 2016-18, aiming for conserving the ethnic medicinal plants knowledge about veterinary illnesses. Information was collected from older people, herbalists and *pansaris* (herbal sellers) via semi-structured questionnaire and open ended interviews. Quantification of the result was done by Relative Frequency Citation (RFC) and Use Value (UV).The result of current study comprises of the 118 therapeutic plant species' collection which belong to forty-six families by interviewing 233 native informants. Among the 46 botanical families, Leguminosae with 14 species was the leading family. The most dominant growth habit was herbs constituted (68%). Leaves (42%) were the main morphological parts used for ethnoveterinary medicine. The highest UV was obtained for 0.52 for *Silybum marianum* (L.) and RFC (0.33) for *Silybum marianum* (L.). Most of the therapeutic plants have been utilized for curing digestive illnesses, followed by promote lactation and wounds healing. Due to the dense and diverse vegetation, the study area is rich in ethnobotanical knowledge and the people still use medicinal plants to cure animal diseases.

Keywords: District Charsadda, Medicinal plants, Pakistan, Tehsil Tangi, Veterinary diseases

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Therapeutic plants ethnically utilized to cure various ailments of animals have played a key part in the indigenous healthcare systems. Specially, plants' resources commonly indicate the most important form of treatment in the veterinary healthcare system of rural areas because allopathic medicines remain inaccessible, principally in countries of the third world. The oral transmission of ethnic medicinal plants' knowledge is endangered and insubstantial, and needs priority base attention for being documented and recorded[1]. Majority of the rural livestock holders stated that they commonly use the plants' extracts obtained from flower, bark, latex, leaf, seed, tuber and root for medicinal purposes, which are used in different methods and administered to livestock for a variety of ailments[2].

Collection and utilization of the aromatic and medicinal plants' for treatment of human and veterinary diseases is centuries old practice and utilized almost in all cultures[3]. Not only in the third world countries medicinal plants are commonly used to cure various diseases but also in the developed countries medicinal plants are nowadays used extensively for the cure of various diseases[4]. Besides, in these societies, the use of therapeutic plants have become more common to cure minor disorders, due to the perception that they are secure, and also due to the rapidly increasing cost of personal healthcare[5].

At present livestock representing almost 70% of the animals are cured by therapeutic plants.

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Utilization of therapeutic plants has now become a science and an art, used according to the observation, disease theory, experiences and tradition of the healers[6]. Plants having therapeutic properties are enjoying the highest attention of the indigenous herbal medicines systems world widely. This is principally factual in the third world countries, where medicines are very expensive as well as unreachable from most of the population[7].

As an agriculture country, about 80% population of Pakistan is reliant on livestock and agriculture[9]. According to an estimate there are 4 million asses, 27 million buffaloes, 1 million camels, 30 million cattle, 54 million goats, 0.3 million horses, 0.2 million mules, 74 million poultry and 27 million sheep populations in Pakistan[10]. Because of the modern medicines' high prices, the poor farmers are paying attention to the phytomedicines. The local population utilizes therapeutic plants and they have the opinion that the ethnoveterinary medicines are the only easily available as well as economic source to cure different ailments of animals. As a result, the local people highly depend on herbal remedies to treat many acute and chronic diseases. In rural areas for livestock's ailments, traditional indigenous medicine is still practiced regardless of the development of clinical agents and development of pharmaceutical industry. The disadvantages of modern veterinary medicines comprise chemo-resistance development in cattle, doubtful quality of medicines as well as user inauspicious effects like high doses anti-biotic as well as hormones minimizes the production of milk and other animals' products. An initiative has been taken over the past few decades, for the documentation of the threatened ethno-veterinary medicines practices in different areas of Pakistan because it is declining due to many factors like rapid socio-economic environmental and technological changes[11]. Present survey was carried-out with the aim to collect and conserve local therapeutic plants and the ethnic knowledge of the collected therapeutic plants for various illnesses of animals.

Materials and Methods

Area of study

The study area is located in the North-West of Charsadda district with main elevations around 300 m asl. The area is located on 34°18'0N 71°39'14E (Fig. 1). According to the 2017 census the population of the area is about 428239[12]. The climate of the area is temperate with four seasons i.e. spring, summer, autumn and winter[13]. The coolest month of the year is January with mean temperature of about 4°C and in June temperature reaches up to 44°C. The average rainfall is 460 mm. The soil of the study area is sandy loam, with thick vegetation[14]. The Tehsil Tangi has 12 Union Councils, i.e., Abazai, Dakki, Ghan Dheri, Harichand, Hisara Nehri, Koz Behramm Dheri, Mandani, Mirzadher, Sherpao, Shodag, Tangi MC and Ziam[15]. The local people of the area mainly relay on agriculture. The literacy rate is 56.9%[16].

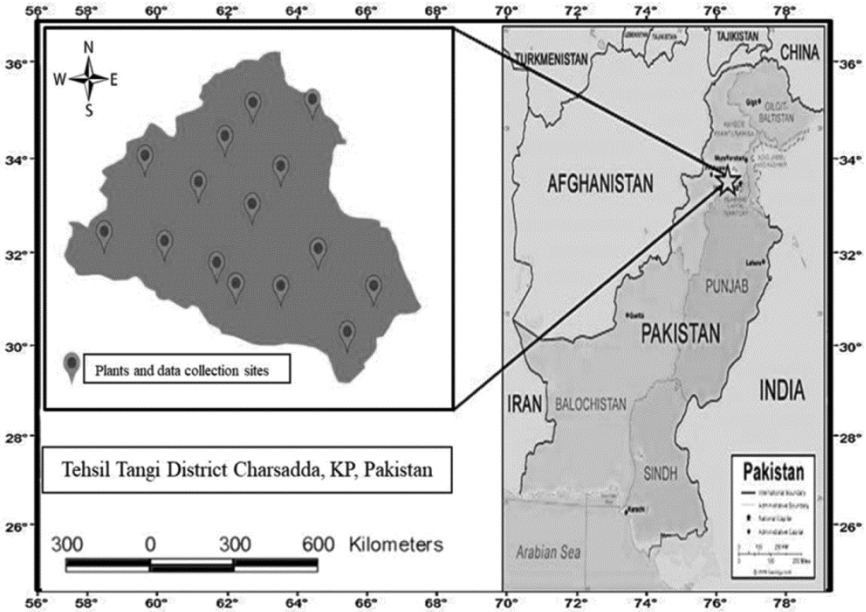

Fig. 1 — Map of the study area (Source: The map is made through ACR-GIS software by the Principal Author)

Field survey, informant interviews and ethnoveterinary data collection

The ethnobotanical data documentation was done by visiting frequently various parts of all the 12 union councils (Abazai, Dakki, Ghan Dheri, Harichand, Hisara Nehri, Koz Behramm Dheri, Mandani, Mirzadher, Sherpao, Shodag, Tangi MC and Ziam) of the Tehsil Tangi. Ethnobotanical information was recorded according to the technique of Jan *et al.*[17] from the native populations, comprises of farmers, *Hakeems*, *Pansaries* and other plant seller. This study has been carried out in different seasons during 2016-18. Weekly basis field trips have been conducted for the investigation and collection medicinally significant plants and documentation of ethnoveterinary knowledge. A total of 233 informants have been interrogated after getting Prior Informed Consent from each respondent, which included 22 *Pansaris*, 85 people (comprising both males as well as females with age 50 years or above), 102 with age ranges between 35-49 years and 24 young in the age of 25-34 as shown in Table 1.

Plants' collection, identification and preservation

All the therapeutic plants have been collected according to the techniques followed by Langshiang *et al.*[18] and Jan *et al.*[17]. The collection place, local name, habit and habitat of the plants were also documented for prospect correspondence. Identification of plants was done according to the techniques of Devi *et al.*[19] and was confirmed by Dr. Sher Wali, Department of Botany, Islamia College Peshawar and Dr. Siraj ud Din Department of Botany, University of Peshawar. To authenticate the correct names of the plants the online "Flora of Pakistan"[20] was used. After collection and drying the specimens were glued on the standard herbarium sheets and were conceded to the Herbarium of Botany Department, Islamia College Peshawar.

Table 1 — Demographic profile of the study area

Informants Interviewed

Gender	No. Informants
Male	150
Female	83

Traditional Knowledge of Medicinal Plants

Age Group	No. Informants	Medicinal Plants Reported
50 and above	85	90
35-49	102	73
25-34	24	29
Total Informants	233	

Literacy Data of Informants

Age Group	No. Informants	% age
50 and above	12/85	14.11
35-49	59/102	57.84
25-34	15/24	62.50
Total	86/233	36.91

Quantitative ethnobotany

Collected ethnoveterinary data has been evaluated through ethno-botanical indexes such as relative frequency of citation (RFC) and use value (UV).

Relative Frequency Citation (RFC)

This index has been applied for finding out the indigenous position of each medicinal plant in the local community via., the below formula;

$$RFC = FC/N$$

Where, FC is the respondents' numbers citing a single therapeutic plant and N is the overall respondents' number. The RFC value varies between zero (no single informant cited the plant as significant) and one (all informants cited the plant for medicinal use)[21].

Use Value (UV)

This index revealed the comparative medicinal significance of plants known locally for medicinal uses. It has been calculated through the subsequent formula[22].

$$UV = \sum Ui/N$$

Where Ui is the medicinal uses of a plant stated by respondents and N is the overall informants' number.

Results and Discussion

Socio-demographic data

To collect the ethnoveterinary data from the indigenous population 233 informants were interrogated, which comprised 22 *Pansaris*, 85 community persons (comprising both males as well as females having ages 50 years), 102 in the age range of 35-49 years and 24 young in the age range 25-34 as shown in Table 1. The ages of the people interviewed were between 25 to 93 years.

It was noted that people with age 45 years or above were more knowledgeable; our findings are in accordance with the other researchers from surrounding areas and around the globe[1,23-26]. Furthermore, it was observed that females have more ethnomedicinal knowledge than males and similar results were reported by other authors[24,27]. According to Howard[28] this is

because women have key role in the daily life activities like providence of food, preparing herbal medicines and care of family members. Similarly elder people of the society have more traditional knowledge because of their vast experiences[1,22-26,29,30]. In this study we interviewed only 83 women, this is due to the cultural restriction in the study area[30].

Species' diversity, status, and life form

Result of the present work is shown in Table 2 which has plants' botanical names organized in ascending alphabetic order in conjunction to their indigenous name (s), parts used, application, preparation, ethnoveterinary use (s) and respondents' number (s). The leading family is Leguminosae (14 sp.), followed by Asteraceae, Poaceae and Amaranthaceae (Fig. 2). The dominance of these families is widely seen as effect of their wide distribution of the species of these families not only the study area but all over the Pakistan[31-33].

Herbs were the principal form of life (68%) followed by shrubs (24%) and trees (10%) (Fig. 3). The common use of herbs as medicines has been interpreted as effect of them having high amounts of bio-active compounds[34-36], also herbs grow more commonly in nature[36-40], thus being easily accessible.

Table 2 — The details of Ethnoveterinary medicinal plants used by the local inhabitants in the district Charsadda

Scientific name - Voucher no.	Local name	Status[a]	Growth form	Part used[b]	Veterinary uses	Mode of preparation	Route of application	UV[c]	FC[d]	RFC[e]
Acanthaceae										
Justicia adhatoda L. - ICPH-101	Baikar	W	Shrub	LV	Anti-inflammatory	Decoction	Oral	0.23	45	0.19
Aizoaceae										
Trianthema portulacastrum L. - ICPH-185	Da jowaro insat	W	Herb	AP	Skin Sores	Paste	External	0.04	12	0.05
Alismataceae										
Sagittaria latifolia Willd. - ICPH-161	Mamana	W	Herb	LV	Skin diseases	Paste	External	0.04	11	0.05
Amaranthaceae										
Achyranthes aspera L. - ICPH-6	Wara guhsky	W	Herb	LV	Indigestion	Direct	Oral	0.23	45	0.19
Aerva javanica (Burm.f.) Juss. ex Schult. - ICPH-9	Speen boty	W	Herb	WP	Purgative in cattle's	Decoction	Oral	0.13	24	0.10
Alternanthera sessilis (L.) R. Br. ex DC. - ICPH-14	Shna	W	Herb	LV	Mastitis in dairy cattle	Direct	Oral	0.03	15	0.06
Amaranthus albus L. - ICPH-15	Sarmay	W	Herb	AP	Warmness in cattle after birth	Direct	Oral	0.10	26	0.11
Amaranthius spinosus L. - ICPH-17	chorlaye	W	Herb	LV	Increase lactation, dog bite	Direct	External,	0.23	38	0.16
Chenopodium ambrosioides L. - ICPH-49	Skha boty	W	Herb	LV	Anthelmintic in horses	Direct	Oral	0.07	19	0.08
Chenopodium botrys L. - ICPH-50	Narry sarmay	W	Herb	AP	Digestive tract infection	Decoction	Oral	0.04	16	0.06
Apiaceae										
Ammi visnaga (L.) Lam. - ICPH-19		W	Herb	LV	Abdominal pain	Direct	Oral	0.27	19	0.08
Anethum graveolens L. - ICPH-21	Sovaa	W	Herb	WP	Indigestion	Direct	Oral	0.33	44	0.18
Apocynaceae										
Calotropis procera (Aiton) Dryand. - ICPH-37	Spalmay	W	Herb	LV	Cough and cold in cows, goats and buffalo	Decoction	Oral	0.24	43	0.18
Nerium oleander L. - ICPH-125	Gander	C/W	Shrub	LV	Ulcer	Decoction	Oral	0.10	39	0.17
Rhazya stricta Decne. - ICPH-154	Gandaray	W	Herb	LV	Anti-maggots	Paste	Oral	0.30	28	0.12
Araceae										
Pistia stratiotes L. - ICPH-142		W	Herb	LV	Gastroenteritis in bulls	Decoction	Oral	0.16	34	0.15
Arecaceae										
Nannorrhops ritchieana (Griff.) Aitch. - ICPH-123	Mazari	C	Herb	LV	Mouth and foot diseases	Powder	Oral	0.16	26	0.11
					Purgative	Paste	External			

(*Contd*.)

Table 2 — The details of Ethnoveterinary medicinal plants used by the local inhabitants in the district Charsadda (*Contd*.)

Scientific name - Voucher no.	Local name	Status[a]	Growth form	Part used[b]	Veterinary uses	Mode of preparation	Route of application	UV[c]	FC[d]	RFC[e]
Phoenix dactylifera L. - ICPH-136	Zangali Kajoor	W	Tree	FR	Infertility in cattle	Direct	Oral	0.07	18	0.08
Asteraceae										
Artemisia vulgaris L. - ICPH-25	Turkhaa	W	Shrub	LV	Treat endoparasites, and as tonic	Decoction	Oral	0.20	30	0.13
Carthamus arborescens L. - ICPH-42		W	Herb	AP	Wound healing	Paste	External	0.20	31	0.12
Cichorium intybus L. - ICPH-52	Zangali shawtal	W	Herb	LV	Digestive disorders	Decoction	Oral	0.05	12	0.05
Cirsium arvense (L.) Scop. - ICPH-54	Asghaki	W	Herb	LV	Treat endoparasites in rabbits	Decoction	Oral	0.32	20	0.09
Erigeron canadensis L. - ICPH-72	-	W	Herb	LV	Laxative in goats and sheep	Powder	Oral	0.06	14	0.06
Echinops echinatus Roxb. - ICPH-75	-	W	Herb	LV	Wound healing	Paste	External	0.28	38	0.16
Eclipta prostrata (L.) L. - ICPH-76	-	W	Herb	LV	Wound healing	Paste	External	0.02	9	0.03
Lactuca serriola L. - ICPH-102	Showdafy	W	Herb	AP	Lactation	Decoction	Oral	0.12	18	0.08
Launaea nudicaulis (L.) Hook.f. - ICPH-104	-	W	Herb	WP	skin infections	Poultice	External	0.13	21	0.09
Silybum marianum (L.) Gaertn. - ICPH-170	Ghata Ghana	W	Herb	AP, SE	Kidney and liver disorder in cattle	Powder	Oral	0.52	78	0.33
Sonchus asper (L.) Hill - ICPH-174	-	W	Herb	AP	Abscesses, to increase klactation	Direct	Oral	0.20	28	0.12
Sonchus oleraceus (L.) L. - ICPH-175	Shoda paye	W	Herb	AP	Increase lactation	Direct	Oral	0.10	17	0.07
Taraxacum campylodes G.E. Haglund - ICPH-181	Ziyar guly	W	Herb	AP	Treatment of udder tumors in cows	Direct	Oral	0.03	19	0.08
Brassicaceae										
Brassica campestris L. - ICPH-34	Sharsham	C	Herb	LV, SE	Broken horns	Paste	External	0.28	45	0.19
					Tonsillitis in hens	Direct	Oral			
Eruca sativa Mill. - ICPH-82	Jamama	C/W	Herb	LV	Lice infestation in cattle	Paste	External	0.28	44	0.19
Nasturtium officinale R.Br. - ICPH-124	Tarmera	W	Herb	WP	As a Tonic for horses	Direct	Oral	0.30	38	0.16
Cactaceae										
Opuntia dillenii (Ker Gawl.) Haw. - ICPH-127	Zaqqum	W	Herb	AP	Lactation	Direct	Oral	0.21	41	0.18
Cannabaceae										
Cannabis sativa L. - ICPH-39	Bang	W	Herb	WP	Mouth diseases, piles, retention of the placenta	Decoction	Oral	0.15	39	0.17
Capparaceae										
Capparis decidua (Forssk.) Edgew. - ICPH-40	Kerrla	W	Shrub	Bk, FR	Anti-diarrheal	Decoction	Oral	0.32	49	0.23
Capparis spinosa L. - ICPH-41	Da ghar prewatai	W	Shrub	LV	Respiratory problems	Direct	Oral	0.13	23	0.10
Cleomaceae										
Cleome viscosa L. – ICPH-56	Sakha Bhutay	W	Herb	SE	Anti-maggots	Paste	External	0.10	20	0.09
Convolvulaceae										
Cuscuta reflexa Roxb. - ICPH-62	Maraz boty	W	Herb	AP	Anti-lice	Paste	External	0.07	16	0.07
Ipomoea carnea Jacq. - ICPH-100	Ghat gulabasi	W	Shrub	LV	Wounds healing	Paste	External	0.17	36	0.15
Cyperaceae										
Cyperus laevigatus L. - ICPH-65	Dela	W	Herb	AP	Arthritis	Paste	External	0.02	13	0.06

(*Contd*.)

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Scientific name - Voucher no.	Local name	Status[a]	Growth form	Part used[b]	Veterinary uses	Mode of preparation	Route of application	UV[c]	FC[d]	RFC[e]
Cucurbitaceae										
Citrullus colocynthis (L.) Schrad. - ICPH-55	karkondi	W	Herb	LV, FR	Abdominal pain	Direct	Oral	0.07	19	0.08
Euphorbiaceae										
Chrozophora tinctoria (L.) A. Juss. - ICPH-51	Lengattty	W	Herb	LV, FR	Skin problems	Paste	External	0.12	23	0.10
Euphorbia hirta L. - ICPH-86	Jaghje	W	Herb	LV	Increase lactation, appetite stimulant	Powder	Oral	0.10	18	0.08
Euphorbia helioscopia L. - ICPH-85	Mandalroo	W	Herb	AP	Anthelmintic in ruminants	Decoction	Oral	0.03	11	0.05
Euphorbia prostrata Aiton - - ICPH-87		W	Herb	AP	Antipyretic in buffaloes, rheumatism	Decoction	Oral	0.10	17	0.07
Ricinus communis L. - ICPH-155	Aranda	W	Shrub	LA	Constipation,	Powder	Oral	0.07	15	0.06
Lamiaceae										
Colebrookea oppositifolia Sm. - ICPH-58	Dhurseli	W	Shrub	LV, INF	Anti-maggots	Paste	Oral	0.15	24	0.10
Mentha spicata L. - ICPH-116	Podena	W	Herb	WP	Respiratory disorders	Direct	Oral	0.14	47	0.20
Salvia acerifolia B.L. Turner - ICPH-163		W	Herb	LV	Anti-lice in cattle	Paste	External	0.12	27	0.11
Vitex negundo L. - ICPH-194		W	Shrub	LV	Foot and Mouth disease	Direct	Oral	0.11	19	0.08
Leguminosae										
Acacia catechu (L.f.) Willd. - ICPH-2	Angrezy kikar	W	Shrub	LV	Cure of injured horns in cattle	Poultice	External	0.06	13	0.06
Acacia farnesiana (L.) Willd. - ICPH-3	Kikar	W	Shrub	LV, SE	Eye infections	Eyedrops	External	0.17	27	0.12
Acacia modesta Wall. - ICPH-4	Phalosa	W	Shrub	LV, SE	To expel placenta after birth	Decoction	Oral	0.24	24	0.10
Acacia nilotica (L.) Delile - ICPH-5	Kikar	W	Shrub	LV, FR	Foot diseases	Decoction	Oral	0.10	15	0.06
Albizia lebbeck (L.) Benth - ICPH-11	Srekh	W	Tree	LV, BK	Anti-diarrheal in cows and sheep	Powder	Oral	0.30	30	0.12
Alhagi maurorum Medik. - ICPH-12	Narry	W	Shrub	LV, SE	Gastrointestinal disorders	Decoction	Oral	0.31	39	0.16
Bauhinia variegata L. - ICPH-29	Da sago wana	C	Tree	LV, SE	Anti-diarrheal	Decoction	Oral	0.07	14	0.06
Cassia fistula L. - ICPH-44	Amaltas	W	Tree	LV, FR	Stomach disorders	Powder	Oral	0.20	32	0.13
Cassia occidentalis L. - ICPH-45		W	Shrub	LV, LT	Mouth and foot disease in cattle	Decoction	Oral	0.06	13	0.06
Leucaena leucocephala (Lam.) de Wit - ICPH-107	Srekh	W	Shrub	SE	Anthelmintic in horses	Powder	Oral	0.15	23	0.09
Medicago polymorpha L. - ICPH-111	Pishtari	W	Herb	WP	For swiftness in horses	Powder	Oral	0.16	25	0.10
Parkinsonia aculeata L. - ICPH-130	Kikar	W	Shrub	LV, SE	Dog bite	Decoction	Oral	0.31	34	0.14
Trigonella corniculata (Sibth.) Sm. ICPH-187	Malhozi	W	Herb	LV, SE	Regulate fertility	Decoction	Oral	0.03	10	0.04
Lythraceae										
Woodfordia fruticosa (L.) Kurz - ICPH-196	Pallay	W	Shrub	LV	Anti-diarrheal	Direct	Oral	0.25	29	0.12
Malvaceae										
Abutilon indicum (L.) Sweet - ICPH-1	Ziar guly	W	Herb	AP	Carminative	Decoction	Oral	0.16	33	0.14
Bombax albidum Gagnep. - ICPH-32	Foomba	W	Tree	LV, SE	Treat broken horn	Paste	External	0.18	35	0.15
Malvastrum coromandelianum (L.) Garcke - ICPH-109	Jaro boty	W	Herb	AP	Anti-allergic in cattle	Paste	External	0.12	23	0.10
Moraceae										
Broussonetia papyrifera (L.) L'Hér. ex Vent. - ICPH-36	Gultooth	C	Tree	FR	Increase lactation	Direct	Oral	0.20	25	0.10

(*Contd*.)

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Scientific name - Voucher no.	Local name	Status[a]	Growth form	Part used[b]	Veterinary uses	Mode of preparation	Route of application	UV[c]	FC[d]	RFC[e]
Ficus carica L. - ICPH-89	Enzar	W	Shrub	LV, FR	Expel placenta Skin disorders	Powder Paste	Oral External	0.07	33	0.14
Ficus palmata Forssk. - ICPH-90	Zangali Enzar	W	Shrub	FR	Indigestion	Direct	Oral	0.05	7	0.05
Ficus religiosa L. - ICPH-91	Pepal	W	Tree	LV	Retention of placenta	Direct	Oral	0.01	14	0.12
Morus alba L. - ICPH-119	Speen tooth	W	Tree	FR	Constipation in cows and buffaloes	Direct	Oral	0.06	5	0.03
Morus nigra L. - ICPH-121	Toor tooth	W	Tree	FR	Cough	Powder	Oral	0.07	17	0.06
Meliaceae										
Melia volkensii Gürke - ICPH-113	Thora shunday	W	Tree	LV, BK	Anti-lice, carminative	Decoction Paste	Oral External	0.11	43	0.18
Menispermaceae										
Cocculus pendulus (J.R. Forst. & G. Forst.) Diels - ICPH-57	Chamelle	W	Shrub	LV	Carminative	Decoction	Oral	0.08	18	0.08
Nyctaginaceae										
Mirabilis jalapa L. - ICPH-117	Gul abasi	C	Herb	LV, SE	Urinary disorders	Direct	Oral	0.45	53	0.23
Oxalidaceae										
Oxalis corniculata L. - ICPH-128	Trewaky	W	Herb	AP	Abdomen pain	Direct	Oral	0.04	11	0.05
Papaveraceae										
Argemone mexicana L. - ICPH-115		W	Herb	LV, FR	Rheumatism	Paste	External	0.15	29	0.12
Fumaria indica (Hausskn.) Pugsley - ICPH-95	Papra	W	Herb	WP	Mastitis	Direct	Oral	0.06	15	0.06
Pinaceae										
Pinus roxburghii Sarg. - ICPH-141	Nakhtar	W/C	Tree	LV	Wounds healing, anti-lice	Paste	External	0.35	43	0.18
Plantaginaceae										
Plantago lanceolata L. - ICPH-143	Mansoor da jendi	W	Herb	AP	Treatment of rabies in cattle	Decoction	Oral	0.10	19	0.08
Poaceae										
Apluda mutica L. - ICPH-22	Speen wakha	W	Herb	AP	Treat Mouth sore	Poultice	External	0.14	19	0.08
Avena sativa L. - ICPH-27	Jaowdar	W	Herb	AP	Lactation, food poisoning	Direct	Oral	0.10	22	0.09
Bambusa bambos (L.) Voss - ICPH-28	Banus	W		LV, RT	Retention of placenta	Decoction	Oral	0.20	29	0.12
Brachiaria reptans (L.) C.A. Gardner & C.E. Hubb. - ICPH-33	Kurii	W	Herb	AP	Increase lactation	Direct	Oral	0.03	11	0.04
Bromus catharticus Vahl ICPH-35	Zangali jawder	W	Herb	LV	Purgative in dogs	Powder	Oral	0.03	13	0.05
Desmostachya bipinnata (L.) Stapf - ICPH-69	Pasta drab	W	Herb	LV	Urinary troubles	Decoction	Oral	0.12	20	0.09
Echinochloa crus-galli (L.) P. Beauv. - ICPH-74		W	Herb	AP	Promote lactation	Decoction	Oral	0.05	15	0.06
Eleusine indica (L.) Gaertn. ICPH-79	Pasta drab	W	Herb	LV	Anti-diarrheal in cattle	Direct	Oral	0.07	17	0.07
Imperata cylindrica (L.) Raeusch. - ICPH-99	Wakha	W	Herb	LV	Anthelmintic	Powder	Oral	0.04	14	0.06
Leptochloa chinensis (L.) Nees - ICPH-106	Shamoha	W	Herb	AP	Lactation	Decoction	Oral	0.03	13	0.05
Phragmites australis (Cav.) Trin. ex Steud. - ICPH-137	Nall	W	Herb	AP	Retain placenta	Decoction	Oral	0.12	28	0.12
Saccharum spontaneum L. - ICPH-159	Sharghashi	W	Herb	AP	Anti-allergic in cattle	Powder	Oral	0.10	31	0.13
Polygonaceae										
Polygonum persicaria L. - ICPH-146	Pholpolak	W	Herb	AP	Expel skin worms in dogs	Paste	External	0.04	20	0.09

(*Contd*.)

Table 2 — The details of Ethnoveterinary medicinal plants used by the local inhabitants in the district Charsadda (*Contd*.)

Scientific name - Voucher no.	Local name	Status[a]	Growth form	Part used[b]	Veterinary uses	Mode of preparation	Route of application	UV[c]	FC[d]	RFC[e]
Rumex dentatus L. - ICPH-158	Shulkhay	W	Herb	AP	Anti-diarrheal	Direct	Oral	0.05	24	0.10
Primulaceae										
Anagallis arvensis L. - ICPH-20	Mashkanry	W	Herb	WP	Leech expelling	Paste	External	0.05	11	0.05
Pontederiaceae										
Eichhornia crassipes (Mart.) Solms - ICPH-77		W	Herb	RT, LV	Skin rashes in horses	Paste	External	0.15	26	0.11
Pteridaceae										
Adiantum capillus-veneris L. - ICPH-7/	Sumbal	W	Herb	WP	Vermifuge	Direct	Oral	0.10	17	0.07
Ranunculaceae										
Ranunculus aberdaricus Ulbr. - ICPH-152	Chaghna	W	Herb	AP	Skin disorders	Paste	External	0.04	12	0.05
Rhamnaceae										
Ziziphus jujuba Mill. - ICPH-199	Markhanary	W	Tree	LV, FR	Foot and mouth diseases	Direct	Oral	0.12	16	0.07
Ziziphus nummularia (Burm. f.) Wight & Arn. - ICPH-200	Kurkanda	W	Shrub	LV, FR	Used as Anthelmintic	Direct	Oral	0.25	51	0.22
Rosaceae										
Rosa brunonii Lindl. - ICPH-156	Zangali gulab	W	Shrub	LV	Anti-diarrheal	Decoction	Oral	0.03	12	0.05
Rosa webbiana Wall. ex Royle - ICPH-157	Khwraluch	W	Shrub	LV	Anti-diarrheal in chicken	Decoction	Oral	0.04	16	0.06
Rubiaceae										
Galium aparine L. – ICPH-96	Gashky	W	Herb	AP	Maintain pregnancy in cattle	Direct	Oral	0.02	15	0.06
Phyla nodiflora (L.) Green - ICPH-138		W	Herb	AP	Indigestion in cattle	Direct	Oral	0.05	13	0.05
Verbena officinalis L. - ICPH-192	Jaro boty	W	Herb	AP	Digestive disorders	Direct	Oral	0.02	9	0.03
Sapindaceae										
Dodonaea viscosa (L.) Jacq. - ICPH-71	Ghwarlaskai	W	Shrub	LV, SE	Rheumatism in goats	Paste	External	0.25	40	0.17
Scrophulariaceae										
Verbascum thapsus L. - ICPH-191	Khar ghwag	W	Herb	LV	Carminative	Decoction	Oral	0.40	11	0.05
Simaroubaceae										
Ailanthus altissima (Mill.) Swingle - ICPH-10	Shundai	C	Tree	BK	Laxative for sheep	Decoction	Oral	0.37	40	0.17
Solanaceae										
Solanum nigrum L. - ICPH-172	Kach macho	W	Herb	LV, FR	Urinary troubles	Direct	Oral	0.10	18	0.08
Withania somnifera (L.) Dunal - ICPH-	Kotilal	W	Herb	LV, SE	Treatment of arthritis	Direct	Oral	0.15	17	0.07
Tamaricaceae										
Tamarix aphylla (L.) H. Karst - ICPH-180	Ghuz	W	Shrub	LV, BK	Dermatitis	Paste	External	0.30	37	0.16
Xanthorrhoeaceae										
Aloe vera (L.) Burm. f. - ICPH-13	Kamal panra	C	Herb	LV	Scabies	Paste	External	0.31	47	0.20
Zygophyllaceae										
Fagonia indica Burm. f. - ICPH-88		W	Herb	AP	Appetite stimulant, indigestion	Powder	Oral	0.36	58	0.25
Tribulus terrestris L. - ICPH-186	Markonday	W	Herb	LV, FR	Retain placenta	Decoction	Oral	0.35	40	0.17

[a]*W: Wild, C: Cultivated;
[b]*RT: Root, LV: Leaves, SE: Seed, FR; Fruit, AP: Above-ground plant parts, BK: Bark, WP: Whole plant, LT: Latex, INF: Inflorescence, BK: Bark
[c]*UV: Use Value;
[d*]FC: Frequency of citation;
[e]*RFC: Relative frequency of Citation.

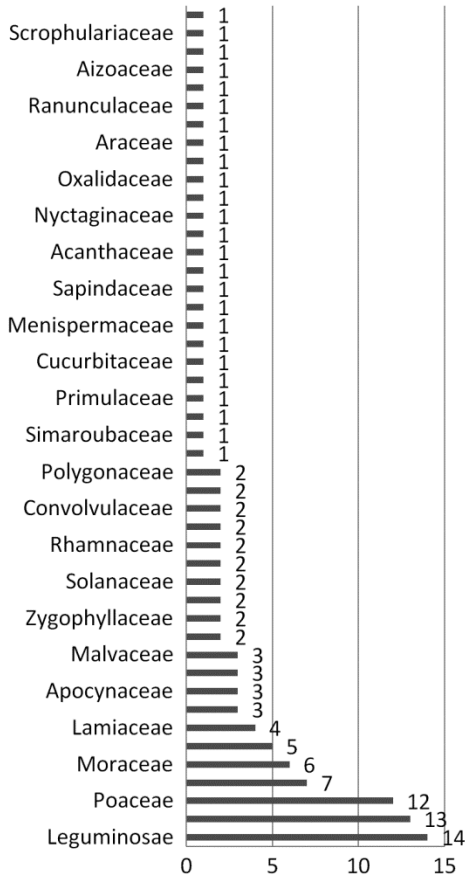

Fig. 2 — Number of ethnoveterinary plant species in different families

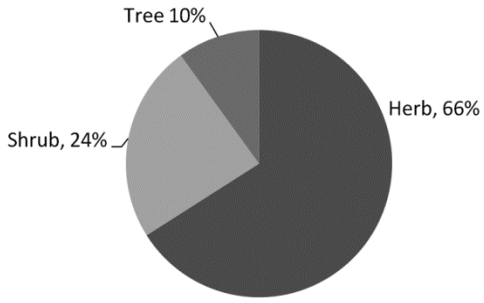

Fig. 3 — Life form of ethnoveterinary plants in the study area

Parts used, methodology of herbal formulation, and administration

In current survey, different morphological parts of therapeutic plants have been utilized for the different ethnoveterinary illnesses. Leaves (42%) were the main morphological parts, followed by aerial parts (24%), and fruits (8%) (Table 2, Fig. 4). In most of the herbal preparation, the common utilization of leaves is because of easily available in naturally habitats[41]. Leaves are the principal photosynthetic organs as well as contain lots of metabolites[42].

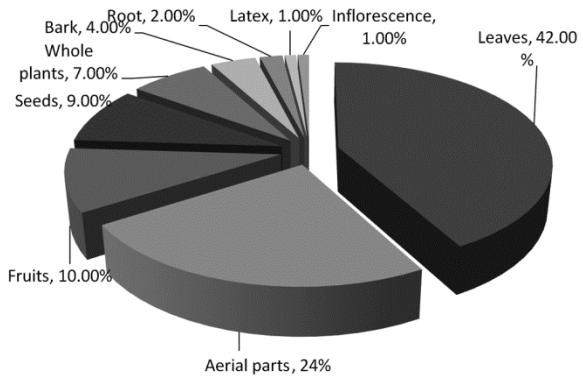

Fig. 4 — Percentage of different morphological parts used for ethnoveterinary medicine

Furthermore, the use of leaf and aerial parts are regarded as safe mode of administration as well as sustainable[43].

The key mode of the herbal preparation was direct utilization of the therapeutic plants (32%), shadowed by decoction (28%), paste (23%), and powder (6%), while poultice and bandage represented the least used herbal preparation methods (Table 2). In our study, both external and internal modes of administration have been assumed to cure various domesticated animal illnesses. In most cases, the recipes were orally administered.

Qualitative study

Use Value (UV)

The calculated UV for every therapeutic plant species is given in Table 2. These quantitative techniques are commonly practiced to find out the comparative significance of each therapeutic plant. If the value is near to one then the plant is considered to be more medicinally important and if it is close to those plants have few remedial uses (approach to 0) as compared to the informants' numbers. In this work, UV ranged from 0.52 for *Silybum marianum* (L.) to 0.01 for *Ficus religiosa* L. Based on UV values we have grouped all documented plants in three classes to analyze data. The classes along with number of sp. and their UV range are: 1st class includes 17 sp. (0.52-0.30); 2nd class 59 sp. (0.29-0.10); 3rd having 42 sp. (0.09-0.01). The first class may be considered as more significant than other and consists of *Silybum marianum* (L.), *Verbascum thapsus* L., *Cirsium arvense* (L.) Scop., *Alhagi maurorum* Medik., *Albizia lebbeck (L.)* Benth, *Fagonia indica* Burm.f, *Capparis decidua* (Forssk.) Edgew., *Tribulus terrestris* L., *Anethum graveolens* L., *Ailanthus altissima* (Mill.) Swingle, *Mirabilis jalapa* L., *Pinus roxburghii* Sarg.,

Z. nummularia (Burm.f.) Wight & Arn, *Aloe vera* (L.) Burm.f. and *Mentha spicata* L., *Nasturtium officinale* R.Br., *Rhazya stricta* Decne. and *Tamarix aphylla* (L.) H. Karst. The low UV is may be due less knowledge about the plant with informants or may be uncommonness of the plant in study area[44].

Relative Frequency Citation (RFC)

On the bases of RFC values, the most consumed therapeutic plant species comprises *Silybum marianum* (L.) (0.33), *Fagonia indica* Burm.f (0.25), *Capparis decidua* (Forssk.) Edgew. And *Mirabilis jalapa* L. (0.23), *Z. nummularia* (Burm.f.) Wight & Arn (0.22), *Aloe vera* (L.) Burm.f. and *Mentha spicata* L. (0.20), (Table 2). Least values of RFC were represented by *Eclipta prostrata* (L.) L, *Morus alba* L., and *Verbena officinalis* L. (0.03), *Brachiaria reptans* (L.) C.A. Gardner & C.E.Hubb. and *Trigonella corniculata* Sibth. & Sm. (0.04), *Anagallis arvensis* L., *Bromus catharticus* Vahl., *Cichorium intybus* L., *E. helioscopia* L., *F. palmata* Forssk., *Leptochloa chinensis* (L.) Nees., *Oxalis corniculata* L., *Phyla nodiflora* (L.) Greene, *Rosa brunonii* Lindl., *Ranunculus aberdaricus* Ulbr., *Sagittaria latifolia* Willd., *Trianthema portulacastrum* L. and *Verbascum thapsus* L. (0.05). The plants having high RFC values narrate the fact that the majority of the informers have ethnomedicinal knowledge about these therapeutic plant species. Furthermore, to discover new drugs, phytochemical and pharmaceutical assessment of the plants having high RFC should be carried out[45].

Conclusions

It is evident from the result that the ethnoveterinary knowledge is still alive in the study area as the people still use phytomedicines for the various illnesses of the animals. A total of 118 medicinal plants were collected used for ethnoveterinary diseases. The principal life form for medicine was herb and leaf was the principal plant part used. Furthermore, the most common treated diseases group was digestive disorders. The highest use value was obtained for *Silybum marianum* (L.). Similarly the highest RFC was recorded for *Acacia modesta* Wall. It is also evident from the results that there is a great risk to the progressive loss of traditional knowledge. The plants reported in this study give leads for further phytochemical and pharmacological studies.

Data and materials accessibility

The raw data without the names of informants can be provided by authors.

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Ethical approval

The current work has been permitted by the ethical committee of the Botany Department of Islamia College Peshawar and Biodiversity Action Plan (BAP-2010-2020) for Pakistan. Prior consent has been obtained from all participants before conducting interviews. This study has been conducted under the provisions of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity.

Map Discalimer

Authors declare that the map has no disputed area. The boundaries and names shown, and designations used on this map do not imply official endorsement or view point of IJTK, its Editorial Board or its Publisher. IJTK neither has a position with regard to any jurisdictional claims that might be inferred from the maps, nor does IJTK have any vested interest in the details of the jurisdictional boundaries depicted.

Conflict of Interests

No competing interest and conflict of interest for this article.

Authors' Contributions

HAJ and SJ deliberate this work; the field work was conducted by HAJ, LA, IA and SW, HAJ, the main statistical analysis were performed by SMH and RB, HAJ and RB wrote the manuscript, the revision of the data analysis and manuscript was done by HAJ, RB and MR; all authors read, corrected and approved the manuscript.

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