USE OF ETHNOVETERINARY MEDICINES BY THE PEOPLE LIVING NEAR PAK-AFGHAN BORDER REGION

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Summary: Ethnoveterinary practices have recently gained importance due to their strong efficacy and fewer side effects on animals system as compared to conventional drugs. The present study was designed to document indigenous knowledge on ethnoveterinary medicines in an unexplored remote Hangu region of Pakistan situated near Pak-Afghan border. Interviews were conducted using semi-structured questionnaires. Data analysis was done using percentage statistics and descriptive statistical indices. Hangu region of Pakistan comprises 24 ethnoveterinary plants belonging to 19 families. Solanaceae, Rhamnaceae, Alliaceae and Euphorbiaceae were found to be the most widely used plant families (2 plant species each) in the studied region. Leaves (13 plant species) were found to be the most frequent plant part used in ethnoveterinary recipes. Total 19 plant species were found to be used against different ailments of cows followed by 12 plant species against buffaloe ailments. Most of plant remedies (9 plant species) were prepared in the form of decoction. The majority of the recipes (71 %) were given to the livestock orally, while 21 % in a topical manner. Gastrointestinal and wound infections were found most frequently in domestic animals and the total of 5 plant species were used against them. Informant consensus results also showed high degree of consensus for gastrointestinal (0.93) and wound healing (0.95) potential of plants. *Withania somnifera* ranked first with FL value (100 %), *Anagallis arvensis* ranked second with FL value (93 %) and *Euphorbia heliscopia* ranked third with FL value (92 %). DMR results showed that *Dalbergia sisso* ranked first, *Morus nigra* and *Melia azedarach* ranked second and *Zizyphus nummularia* ranked third. The present results also showed that these medicinal plants were more often/frequently exploited for medicinal, fuelwood and agricultural purposes. Plants with high Fic and FL value should be subjected to further *in-vitro* phytochemical and pharmacological investigation and protection should be given to multipurpose plant species by providing modern fuel resources and placing restriction on overgrazing.

Key words: traditional practices; livestock ailments; medicinal plants; Pakistan

Introduction

Ethnoveterinary medicines are an important part of the traditional knowledge system of the rural people all over the world. These practices are very useful for keeping the livestock healthy and productive and to treat different ailments of livestock (1). Interests in ethnoveterinary practices have developed recently due to their fewer side effects on the animal system as compared to the western pharmaceuticaly prepared drugs.

According to the World health organization total 80 % people of developing world relies on traditional practices for the control of diseases affecting both animals and human (2). The reason of using alternative and complementary medicines is due to no access to veterinary services and high cost of modern veterinary drugs (3).

In developing countries like Pakistan farmers of rural areas mostly have inadequate access to the modern veterinary services and drugs either due to their unavailability or high expenses (4). Majority of the Pakistani farmers are poor and own 5-6 animals per family (5). The farmers of Pakistan

are greatly dependent on livestock for agricultural purposes and for improving their livelihood. Rural population of Pakistan, especially people of northern areas, have tremendous ethnoveterinary knowledge as majority of medicinal plants are confined to the northern areas due to the presence of Himalayas, Karakoram, Sulaiman, and Hindu Kush mountain ranges (6) that lie in association with Pak-Afghan border. Pakistan and Afghanistan share their boundary of almost 2,500 kilometers called Durand Line separated in 1893 due to synchronization between the Afghan king and British Empire (7). This bordered line demarcates Pashtun ethnic group in the Pak-Afghan border areas. Majority of the population of Afghanistan belongs to Pashtun culture and also have considerable population in Pakistan (8). The majority of the population of northwest region of Pakistan living near border region is rural in nature and relies on their livestock for agricultural purposes and for the future generation.

Tremendous work has been done worldwide on ethnoveterinary practices but very few studies have been conducted in Pakistan so far. The present study was therefore designed to document ethnoveterinary knowledge of an unexplored rural area of Pakistan lying near the proximity of Durand line where locals and farmers are heavily dependent on their livestock and have sound indigenous knowledge regarding their treatment. The present study was designed with the aims i) to identify ethnoveterinary plants of the region, ii) to document ethnoveterinary practices in the region, iii) to provide information on candidate medicinal plants for further *in-vitro* phytochemical and pharmacological investigation, iv) to identify multipurpose ethnoveterinary plants and threats to their extinction and v) to conserve ethnoveterinary knowledge of investigated region before its extinction.

Material and methods

Study area

The present study was carried out in Hangu district located in province Khyber Pakhtunkhwa, Pakistan, near the border region with Afghanistan (Figure 1). Hangu district is located at 33.53 North latitude, 71.06 East longitude, and 858 m above the sea level. Hangu region comprises total area of 1,097 km^2 with total population of 314,529 (9).

Hangu region is the area with warm summer season with the mean highest temperature 8.8 °C and the mean lowest temperature 7 °C in December and January (10). Livestock raring and agriculture are the common practices in the region and the major crops are wheat and maize. Due to low literacy rate and financial status local people are heavily dependent on medicinal plants for the treatment of themselves and their livestock as well.

Data collection

Data collection was carried out from March to September 2014. Prior to data collection a detailed meeting was held with the local administrator officers and representatives of the communities in order to tell them about the main theme of the study and to get their consent for data collection and publication. Total 50 informants were selected on the basis of information provided by representatives of the communities. Selected informants were natives of the regions mostly farmers and some were migrants (Afghan refugees). Semi-structured questionnaires were designed for data collection. Informants were interviewed individually in their local language (Pashto). Informants were asked about the type of animals they rear, number of plants they use to treat their livestock, types of livestock ailments they treat, plant parts used, recipe formulation, vehicles used and mode of administration of ethnoveterinary recipes.

Data quality assurance

During data collection each respondent was visited or contacted at least three times for the validity of information provided by them. In case of any deviation of respondent idea from the original information provided, it was rejected and considered irrelevant. Only relevant information was subjected to further analysis process. Further data quality was ensured through proper training of data collectors, pointing out missing information, duplication of material and careful analysis.

Plant collection and preservation

Field visits were made with local informants for identification and collection of documented plants by the informants. Collected medicinal

plants were brought to the laboratory of Kohat University of Science and Technology (KUST), Kohat, Pakistan for further processing. Plant identification was done by the expert taxonomists of Botany Department of KUST. Dried plants were pressed on herbarium sheets and deposited at the Herbarium of Department of Botany KUST, Kohat, Pakistan.

Data organization

All the collected data from informants were organized using Microsoft Word 2007 and Microsoft Excel 2007. All the plants were organized according to their respective families. Growth form of plants were divided into three categories i.e. herbs, shrubs and trees. Plant parts were divided into different categories i.e. leaves, fruits, seeds, stems, roots and whole plants. Livestock ailments were categorized into 9 major disease categories i.e. gastrointestinal, dermatological, antipyretic, wound healing, respiratory, reproductive problems, mastitis, parasitic and rheumatism. Ethnoveterinary recipes were classified into different classes like decoction, powder, paste, infusion, juice, concoction, grinding and extract. Routes of administration of recipes were divided into three categories i.e. oral, topical and both oral and topical.

Data Analysis

Informant consensus (Fic)

Fic is used to recognize widely used medicinal plants for the treatment of species ailments. Prior applying Fic all the animal ailments were classified into 9 major disease categories. Fic value is always high when one or a few plant species are documented by a large number of informants for a specific ailments, while low Fic value means that informants do not agree upon which plant to use. Fic values help to identify plants for further phytochemical and pharmacological investigation (11). Formula used for Fic calculation is as follows:

$$Fic = nur - nt / nur-1$$

Fic = Informants consensus factor
nur = number of used citation in each category
nt = number of species used

Fidelity level (FL)

FL is helpful for identification of ideal plants use against specific ailment by the informants. Highly favored plants always score high FL values in comparison with those that are less preferred (12).

Formula used to calculate FL value is as follow:

$$FL = Ip / Iu \times 100$$

FL = Fidelity level
Ip = number of respondents who reported the utilization of a medicinal plants for a specific main ailment
Iu = total number of respondents who mentioned the same plant for any ailment

It is understood that plant with high FL value are more likely to be biologically active than those having less FL value (13).

Direct matrix ranking (DMR)

Data on the use of diversity of multipurpose medicinal plants were gathered using DMR practice (14). Total 15 key informants were selected on the basis of their strong traditional knowledge regarding medicinal plants (15). Informants selected for DMR were asked to give values (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used, and 0 = not used) to each species for its usage as fodder, fuel or construction timber, in agricultural purposes, or for medicinal recipes. The values (average scores) given to each medicinal plant were summed up and ranked.

Results

In Hangu region of Pakistan the total of 24 plant species belonging to 19 families were used to treat different livestock ailments (Table 1). Solanaceae, Rhamnaceae and Euphorbiaceae were found to be most widely used plant families (2 plants each) in the studied region. Local inhabitants of the region mostly used herbs (50 %) followed by shrubs and trees (25 % each) for the preparation of ethnoveterinary medicines (Table 1). Different plant parts were used for treatment of livestock, however leaves (13 plants species) were found to be the most frequently used plant part followed by whole plant and seeds (6 plants each) (Figure 2). Local people used these ethnomedicines to treat

Figure 1:
Map of the study area

different types of domestic animals such as cows, buffaloes, goats and sheep. Total 19 plant species were found to be used against different ailments of cows followed by 12 plant species against buffalo diseases (Figure 3). Most plant remedies (9 plant species) were prepared in the form of decoction followed by powder (6 plant species) (Figure 4). Traditional people used different types of vehicles in ethnoveterinary medicines, like salt, sugar, milk, water, vegetable oil, etc (Table 1). The majority of the recipes (71 %) were given to the livestock in oral manner while (21 %) in topical manner. Different types of livestock ailments, categorized into 9 major categories, were treated in the region. Gastrointestinal and wound infections were found as the most common in domestic animals and 5 plant species were used against them. Informant

consensus results also showed high degree of consensus for gastrointestinal (0.93) and wound healing (0.95) potential of plants (Table 2). Plant species used against dermatological infections, respiratory infections and as antipyretics also scored higher citation (0.97, 0.96 and 0.93 respectively). The present study revealed 9 plant species with highest FL value (Table 3). *Withania somnifera* ranked first with FL value (100%), *Anagallis arvensis* ranked second with FL value (93 %), *Euphorbia heliscopia* ranked third with FL value (92 %) and *Aloe barbadensis* ranked fourth (89 %). DMR exercised on six medicinal plants showed which medicinal plants are more threatened in the study area. According to the results *Dalbergia sisso* ranked first, *Morus nigra* and *Melia azedarach* ranked second and *Zizyphus*

Table 1: Ethnoveterinary medicines used in Hangu region, Pakistan

| Families	Plants	Local names	Habit	Part used	Animal	Medicinal use	Recipe	Vehicles	Route
Alliaceae	*Allium cepa* L.	Pyaaz	Herb	Leaves	Buffaloes, cows	External parasites	Poultice		Topical
Amaryllidaceae	*Allium sativum* L.	Ugga	Herb	Leaves	Cows, buffaloes, goats	Mastitis	Crushed	Butter	Oral
Apiaceae	*Foeniculum vulgare* Mill.	Soonphf	Herb	Seeds	Cows, buffaloes, goats	Mastitis	Powder	Vegetable oil	Oral
Asclepiadaceae	*Caralluma tuberculata* N.E.Br.	Pawany	Shrub	Whole plant	Sheep, goats, cows	Removal of placenta	Decoction	Honey	Oral
Arecaceae	*Nannorrhops ritchiana* (Griff.) Aitch.	Mazzari	Shrub	Leaves	Goats, sheep, cows, buffaloes	Gastrointestinal	Decoction	Sugar	Oral
Asteraceae	*Carthamus oxyacantha* M. Bieb.	Speena zgaai	Herb	Seeds oil	Sheep	Wound healing	Powder	Flour	Oral
Cannabaceae	*Cannabis sativa* L.	Bhaang	Herb	Leaves, seeds	Cows	Mastitis	Decoction	Sugar	Oral
Convolvulaceae	*Cuscuta reflexa* Roxb.	Chum bud	Herb	Stem and seeds	Buffaloes and cow	External parasites	Paste		Topical
Euphorbiaceae	*Euphorbia helioscopia* L.	Katta saarai	Herb	Leaves	Buffaloes, cows, sheep	Febrifuge	Concoction	Water	Oral
	Ricinus communis L.	Raanda	Shrub	Seeds, leaves	Cows, buffaloes	Gastrointestinal	Extract	Salt	Oral
Fabaceae	*Dalbergia sisso* Roxb. ex DC.	Shawa	Tree	Whole plant	Cows, goats	Removal of placenta	Crushed	Milk	Oral
Lamiaceae	*Mentha arvensis* L.	Podeena.	Herb	Leaves	Cows and buffaloes	External parasites	Decoction	Sugar	Oral
	Vitex negundo L.	Marmandi	Shrub	Seeds, leaves	Cows, goats, sheep	Wounds, Rheumatism	Infusion, Paste		Topical
Meliaceae	*Melia azedarach* L.	Tora Draka	Tree	Leaves, fruit	Goats, sheep	External parasites, gastrointestinal, fever	Decoction, Juice	Sugar	Oral, Topical
Moraceae	*Ficus carica* L.	Inzeer	Tree	Fruit	Cows	Skin infection	Juice		Topical
	Morus nigra L.	Tor Toot	Tree	Fruit	Cows, buffaloes	Skin infections	Juice	Water	Oral
Myrtaceae	*Eucalyptus lanceolatus* Dehnh.	Lachi	Tree	Whole plant	Goats	Delivery	Decoction	Sugar	Oral
Papaveraceae	*Fumaria indica* Pugsley	Khatee	Herb	Whole plant	Cows, sheep, goats	Antipyretic, wound healing	Powder, decoction, paste	Vegetable oil	Oral, Topical
Primulaceae	*Anagallis arvensis* L.	Dhabbar	Herb	Whole plant	Goats	Chronic cough	Powder	Water	Oral
Rhamnaceae	*Ziziphus mauritiana* Lam.	Bera	Tree	Fruit, leaves	Goats, cows	Fever, wound healing, chronic cough	Powder, crushed	Milk	Oral
	Ziziphus nummularia Aubrév.	Karkata	Shrub	Leaves	Cows, buffaloes, goats	Wounds	Paste		Topical
Solanaceae	*Solanum incanum* L.	Tarkha Mowtngee	Shrub	Roots, leaves	Cows	Mastitis	Powder	Salt	Oral
	Withania somnifera (L.) Dunal	Kapyanga	Herb	Whole plant	Cows, Buffaloes, goats, sheep	Gastrointestinal	Decoction	Honey	Oral
Xanthorrhoeaceae	*Aloe barbadensis* Mill.	Zarpati	Herb	Leaves	Buffaloes	Gastrointestinal	Decoction	Salt	Oral
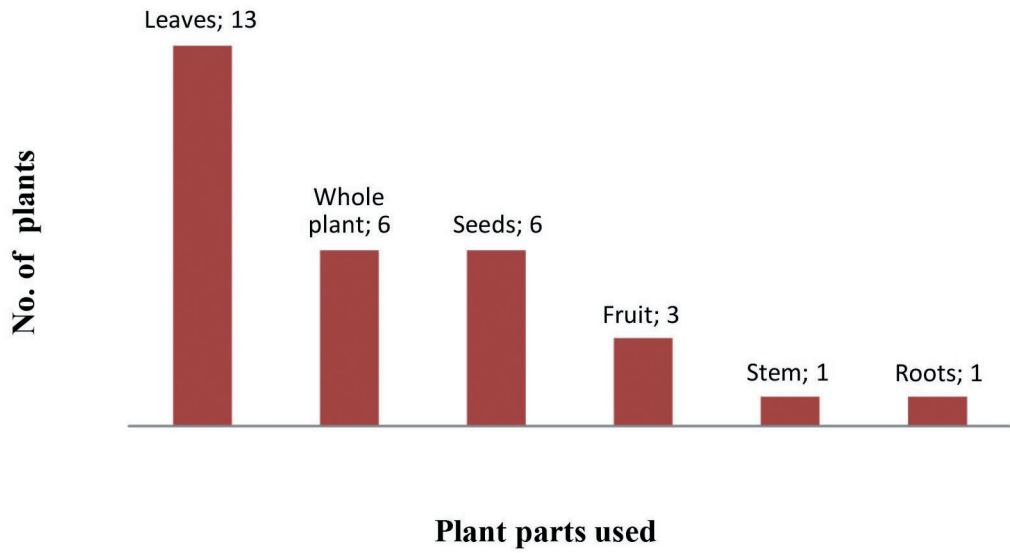
Figure 2: No. of plants part used to treat different livestock ailments
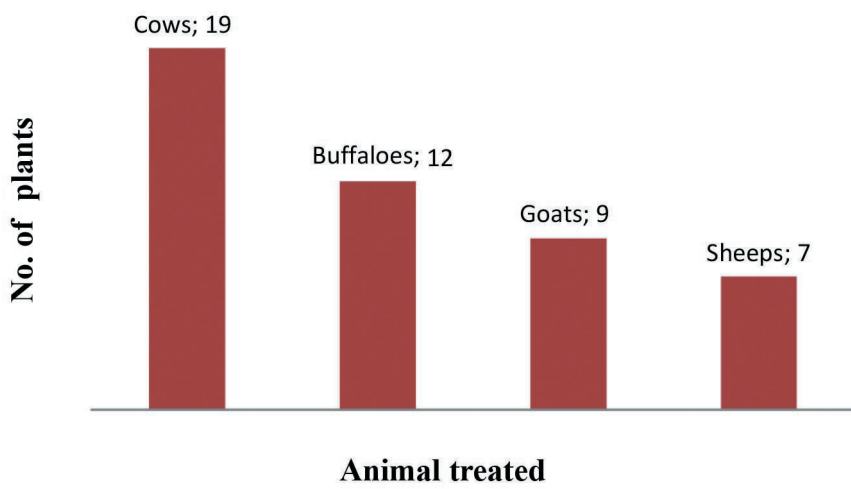

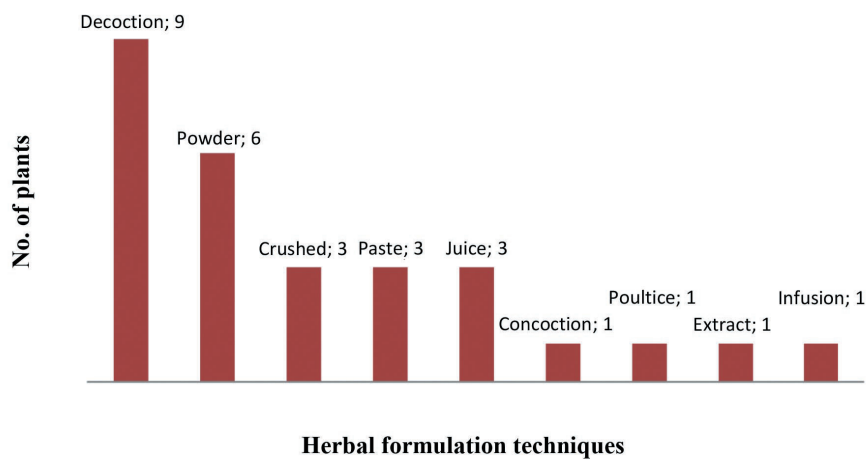**Figure 3:** No. of plants species used to treat different types of animal

Figure 4: No. of plants species used to prepared different recipes

Table 2: Informant consensus

Disease category	Nur	Nt	Fic
Gastrointestinal	60	05	0.93
Dermatological	42	02	0.97
Respiratory	31	02	0.96
Reproductive problems	18	03	0.88
Parasitic	12	04	0.77
Wound healing	97	05	0.95
Rheumatism	16	01	1.00
Antipyretic	47	04	0.93
Mastitis	09	04	0.62

Table 3: Fidelity level

Number	Plant species	Disease category	Ip	Iu	FL %
01	*Aloe barbadensis*	Gastrointestinal	17	19	89
02	*Caralluma tuberculata*	Reproductive problems	11	14	78
03	*Euphorbia helioscopia*	Antipyretic	24	26	92
04	*Morus nigra* L.	Dermatological	19	25	76
05	*Anagallis arvensis*	Respiratory	14	15	93
06	*Withania somnifera*	Gastrointestinal	23	23	100
07	*Ficus carica*	Dermatological	13	17	76
08	*Carthamus oxycantha*	Antipyretic	20	23	86
09	*Nannorrhops ritchiana*	Gastrointestinal	11	15	73

Figure 4: No. of plants species used to prepared different recipes

Use diversity	*M. nigra*	*D. sisso*	*Z. nummularia*	*Z. mauritiana*	*M. azedarach*	*S. incanum*	Total	Rank
Fodder	4	4	2	2	4	4	20	4
Fuel	5	5	4	3	4	3	24	2
Construction	3	5	3	3	3	2	19	5
Agriculture	4	4	4	4	4	2	22	3
Medicinal	4	5	4	4	5	5	27	1
Total	20	23	17	16	20	16		
Rank	2	1	3	4	2	4		

nummularia ranked third (Table 4). The present results also showed that these medicinal plants were more often exploited for medicinal, fuelwood and agricultural purposes (Table 4).

Discussion

Medicinal plants and their growth form

The present study revealed that locals of the region use 24 medicinal plants for the treatment of livestock ailments. Similar results have also been documented from the other regions of Pakistan (5, 16). Investigate region has rich diversity of medicinal plants (9) and provide conducive habitat for the growth of these medicinal plants as shown by the occurrence of 24 plant species used against livestock treatments. The present area is rural in nature and inhabitants of the region are very much dependent on plant resources for the treatment of their own health as well as their livestock due to their low financial status and literacy rate in the region (9). People of the region mostly used herbs for the preparation of ethnoveterinary medicines. The possible reason behind using higher proportion of herbs might be associated with their ease of finding, their efficacy and easy harvesting. The present findings are in line with the studies conducted in different parts of the world where there is more utilization of herbs for recipes formulation (17, 18).

Plant families used against livestock ailments

Solanaceae, Rhamnaceae and Euphorbiaceae families are highly utilized plant families in the studied region. The highest use of the plants of these families might be due to their higher abundance in the study area or it might be associated with their high bioactivity. The present findings are in contradiction with other studies conducted in different parts of the world (15, 19) which found the use of Asteraceae and Fabaceae families as the highest. These differences might be related to different dominant vegetations of the areas and traditional beliefs of different cultures to utilize specific plants for livestock ailments.

Plant parts used

The local people use different plant parts for ethnoveterinary recipes like leaves, seeds, fruits, stems, roots and whole plants. In comparison the other parts of the plant, leaves are the most frequently used plant part in the Hangu region due to their easy harvesting. Leaves are not only the preferred part in studied region but the majority of the ethnoveterinary and ethnomedicinal studies have proved that leaves are widely used plant parts (4, 20, 21). Leaves are the main sites of photosynthesis and other physiological process that results in the production of different types of secondary metabolites. Wider utilization and high efficacy of leaves might be due to the presence of great accumulation of these secondary metabolites in the leaves as compared to other plant parts. The second most widely used form in the studied region is the whole plant. Collecting whole plants is not a sustainable type of harvesting as compared to leaves. Leaves harvesting does not pose any great damage to the plant life cycle as compared to the whole plant which results in the rapid decline in the population of these species. The present results are in the contradiction with studies conducted elsewhere where roots are widely used plant part for ethnoveterinary medicines (22, 23).

Animals treated in the region

Due to low literacy rate and nature of the region the people are greatly dependent upon livestock for agricultural purposes and for improving their livelihood. Mostly the inhabitants rear cows, buffaloes, goats and sheep. Majority of the plants are used to treat cow's infections followed by buffaloes and goats. Local people do not rear dogs, horses, donkeys or camels which might be due to the fact that these animals do not produce any valuable edible products, while cows, buffaloes, goats and sheep are involved in dairy and meat production which is a part of the monthly income. Similar results have also been conducted by Merwe et al. (24) and Benitez et al. (17).

Types of ailments treated in the region

It was found during research investigation that gastrointestinal infections are more frequent in the studied region. It has also been found that

gastrointestinal infections are more common in lactating animals due to the poor quality of fodder and drinking sources (18). The same number of plant species is also used for wound healing purposes of livestock in the studied area. The reason behind using high number of plant species for wound healing might be associated with the fact that animals usually get injured during food competition or might be due to different parasitic infections. After wound healing and gastrointestinal infections most of the plants are used against fever and mastitis that leads toward increasing the quality of milk production and improving their monthly income. Informant consensus results also showed highest informant citation for gastrointestinal, wound healing, antipyretic, dermatological problems etc. These results give an indication about the bioactivity of medicinal plants used to treat these ailments. According to Heinrich et al. (25), high Fic values are very useful in the selection of specific plants for further search of bioactive compounds. Rheumatism scored 1.00 Fic value because only single species (*Vitex negundo*) was found to be used against arthritis. This indicates that species should be subjected to further in-vitro screening that could lead toward the extraction of some novel compounds against rheumatic problems. Extensively used medicinal plants for specific ailments always score highest fidelity level. Present study determined different plants like *Withania somnifera, Anagallis arvensis, Euphorbia helioscopia, Aloe barbadensis* etc scored highest fidelity value and could be further search for their *in-vitro* investigation and efficacy.

Ethnoveterinary medicines preparation

Ethnoveterinary medicines formulation techniques vary from individual to individual because same plant can be prepared in different manner by different traditional veterinary healers. In the studied region the most common type of formulation technique is decoction and powdering of plants. It has already been found that powdering and decoction are the most common methods of drug extraction (4). Present results are in line with study conducted in the Malakand valley of Pakistan (5) while contradictory with the study conducted in other parts of the world (2, 26). The majority of the ethnoveterinary recipes in the studied region are prepared by using single species (*Euphorbia he-*

lioscopia). The recipes were found to be prepared in concoction form and it is generally believed that potency of the drugs can be enhanced when used in concoction form (27). The most preferred route of administration is orally while some of the recipes were applied topically. Oral mode of administration is due to that most of the ailments in the region are internal. These ethnoveterinary medicines are given to the livestock along with different types of vehicles like sugar, salt, milk, honey, water, vegetable oil etc. Similar findings are also reported from the other regions of the world (15, 28). It has already been reported that the use of vehicles is necessary in order to reduce the adstringent effect of herbal formulation and to avoid vomiting. It was noted that there was no uniformity for the dose of ethnoveterinary recipe that might be due to that dose might be increased or decreased depending on the disease severity. Informants reported that the recovery of animals is usually estimated when animals restart their proper feeding and daily activities normally. Similar findings are also reported by other ethnoveterinary studies conducted elsewhere (5, 19).

Multipurpose ethnoveterinary plants and threats to their extinction

DMR results enabled us to recognize highly used medicinal plants in the study area and threats to their extinction. According to the present results *Dalbergia sisso* ranked first, *Morus nigra, Melia azedarach* ranked second in the study area. These highly utilized species are trees therefore more exploited in the region for variety of the purposes. After medicinal purposes these species are more harvested for fuel wood, fodder, agriculture and construction purposes. It has already been stated that wood of *Dalbergia sisso* is highly preferred for fuelwood and timber purposes (29). The locals selected for DMR also showed that most of the people of the region are also engaged in exporting timber of *Dalbergia sisso* to the industries located in other regions of Pakistan for generating their income apart from their domestic use as furniture and fuel wood because eighty percent of industrial furniture in Pakistan is being made from *Dalbergia sisso* (30). Other species like *Morus nigra, Melia azedarach, Zizyphus nummularia* etc are also highly exploited for their fuelwood for different purposes. The high use of fuelwood in the study area is associated with the deficiency of

modern fuel sources in the region. Our findings are also in line with the study by Barkat et al. (31) carried out in district Malakand. He found that in the absence of gas supply and other fuel types in the area, the local people extensively use tree species as fuelwood. Agriculture and livestock raring in the study area are common activities also to support rural livelihood. Therefore grazing is posing another pressure on the flora of the region. The trampling of livestock makes the soil compact resulting in reducing seed germination chances (32). Therefore, there is a dire need to take necessary steps for the conservation of these highly utilized ethnoveterinary medicinal plants before their extinction.

Conclusions

Local farmers and Afghan migrants of the studied region utilize different medicinal plants for the treatment of livestock due to their low income status and high expenses of western drugs. Traditional healers possess tremendous expertise in preparing herbal formulations of medicinal plants. Gastrointestinal and wound infections were most common in the studied region and these disease categories also scored high informant citation. Therefore attention should be given on those plants that are being used against these infection couple with other plants having FL value for further *in-vitro* investigation for their phytochemical analysis and pharmacological activities. Good quality fodder and pure drinking water should be provided to the livestock for decreasing gastrointestinal infections. Multipurpose species especially *Dalbergia sisso* should be given focus from conservation point of view. Modern fuel facilities and control grazing should be promoted in the region in order to conserve these valuable ethnoveterinary plants.

Acknowledgement

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UPORABA ETNOVETERINARSKIH ZDRAVIL PRI LJUDJEH, ŽIVEČIH V PAKISTANSKO-AFGANISTANSKEM OBMEJNEM OBMOČJU

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Povzetek: Etnoveterinarske prakse so pred kratkim postale pomembnejše zaradi svoje možne učinkovitosti in manjšega števila stranskih učinkov pri živalih v primerjavi s konvencionalnimi zdravili. Študija je bila zasnovana na podlagi dokumentiranja domačega znanja o etnoveterinarskih zdravilih v neraziskani oddaljeni regiji Hangu v Pakistanu, ki leži v bližini pakistansko-afganistanske meje. Opravljeni so bili razgovori s pomočjo polstrukturiranih vprašalnikov. Analiza podatkov je bila opravljena s pomočjo statistike odstotkov in opisom statističnih indeksov. V območju Hangu v Pakistanu uporabljajo 24 etnoveterinarskih rastlin, ki pripadajo 19 družinam. Družine *Solanaceae*, *Rhamnaceae*, *Alliaceae* in *Euphorbiaceae* so najpogosteje uporabljene v obravnavanem območju, saj se uporabljata po dve rastlini iz vsake od naštetih družin. Najpogosteje uporabljani deli rastlin so listi, in sicer od 13 ratlinskih vrst. Največ, 19 rastlinskih vrst, se uporablja pri različnih boleznih goved. Večina rastlinskih sredstev (9 rastlinskih vrst) je bila pripravljena v obliki izvlečka. Kar 71 % jih dajejo živalim oralno, 21 % pa topikalno. Okužbe prebavil in ran so bile najpogostejše težave pri domačih živalih. Skupno 5 rastlinskih vrst je bilo uporabljenih za njihovo zdravljenje. Neformalni rezultati so pokazali visoko stopnjo dopustnega potenciala rastlin za prebavila (0,93) in celjenje ran (0.95). *Withania somnifera* je bila na prvem mestu po vrednosti FL (100 %), *Anagallis* arvensis na drugem mestu z vrednostjo FL (93 %), *Euphorbia heliscopia* pa na tretjem z vrednostjo FL (92 %). Rezultati DMR so pokazali, da se je *Dalbergia sisso* uvrstila na prvo mesto, *Morus nigra* in *Melia azedarach* na drugo, *Zizyphus nummularia* pa na tretje mesto. Dosedanji rezultati so tudi pokazali, da so bile omenjene zdravilne rastline pogosteje uporabljene za zdravila, kurivo in v druge kmetijske namene. Za rastline z visoko vrednostjo FIC in FL bi bilo dobro, da bi jih vključili v nadaljnje fitokemijske in farmakološke raziskave. Te večnamenske potencialno pomembne rastlinske vrste bi bilo potrebno tudi zaščiti z zagotavljanjem sodobnega vira kuriv in omejitvijo pretirane paše.

Ključne besede: tradicionalne prakse; zdravstvene težave živine; zdravilne rastline; Pakistan