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Indigenous livestock care practices in Kamlah, Mandi District, Himachal Pradesh: A preserving heritage

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ABSTRACT

Cattle production has been an important source of livelihood for the rural communities. Current study aimed to documenting the indigenous traditional knowledge and practices related to livestock health care system among the people of Kamlah region of Sandhol tehsil of district Mandi (Himachal Pradesh). Reconnaissance surveys were conducted in this region from 2021 to 2022. A total of 65 informants (35 males & 30 females) were interviewed. Ethnoveterinary data was collected through semi-structured interviews and group discussions with elderly people, women, farmers and local herbal healers. In this study, 28 plant species belonging to 23 families were identified; in which herb (57%) were the maximum used life forms and leaves (43%) were the commonly used plant parts. The highest number of species recorded in families were Asparagaceae and Fabaceae (3 species each). A wide range of diseases or disorders of cattle such as bone fracture, eye infection, fever, heat stroke, insect bite, prolapsed uterus, skin disorders and stomach disorders are treated by the people of study area with the help of indigenous medicinal plants. The data was analysed using three ethnobotanical indices i.e., use value (UV), fidelity level (FL) and informant consensus factor (ICF). According to quantitative analysis, plant species with high UV values for curing live stock were *Mentha spicata* L. (0.92), *Cassia fistula* L. (0.77) and *Stephania rotunda* Lour. (0.77). FL% values ranged from 25 to 100% and ICF values ranged between 0.97 to 1.00. These findings were at primary level and provide basic information to the researchers for carrying out phytochemical and pharmacological investigations, to create more effective veterinary drugs.

Introduction

Nature harbours a wide range of biodiversity. Medicinal plants play an important role in biodiversity conservation and research (Kumari *et al.,*2022). Since the time of civilization, medicinal plants have been widely used to cure human as well as animal diseases (Thakur *et al.,*2021). A great proportion of people in developing countries like India, are majorly rely on medicinal plants for their ethnoveterinary practices especially in rural areas. Ethnoveterinary practices is a branch of science, that is based on folk belief, traditional knowledge, methods, skills, procedures and practices used for curing diseases and maintaining animal health (Tabuti*et al.,* 2003). Livestock is considered as one of the important sources of livelihood mainly in mountainous and high elevation areas. Here people depend on cattle for food, local economies, social security and cattle strength, which represents a symbol of stature (Moyo and Swanepoel, 2010; Abbasi *et al.,* 2013). Plants are great source to create wide range of modern drugs for the treatment of livestock diseases. Medicinal plants have various secondary metabolites which are biologically active compounds (Prakash *et al.,* 2021). Ethnoveterinary practices have attained significance over the years due to their low side effects. Indigenous

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ethnobotanical knowledge has been passed down from one generation to other orally. Currently such indigenous knowledge is held by the older people of community due to rapid migration of younger generation to the cities for various purposes. This cause loss of traditional knowledge among them. The people of Himachal, one of the largest states of Western Himalayan region in India, rely primarily on traditional ethnoveterinary expertise to treat livestock diseases. Various ethnoveterinary studies have been carried in Himachal Pradesh (Singh & kaushal, 2000; Singh & Misri, 2006; Sehgal & Sood, 2013; Shrivastava *et al.,* 2017; Kumar & Chander, 2018; Prakash *et al.,* 2021; Bishist *et al.,* 2022). However, ethnoveterinary plant of Kamlah region of Sandhol Tehsil of mandi district of Himachal Pradesh has not explored. The aim of our study is to conduct ethnoveterinary surveys in unexplored regions to document the ethnoveterinary knowledge.

Material and Methods

Study Area

The study was carried out in Kamlah region of Sandhol tehsil of Mandi district. Kamlah is a rural area in Sandhol tehsil inhabited by religious and spiritual community. In the17th century, the famous Kamlah fort was built by Raja Suraj Sen of Mandi in this area.

Methodology

To collect the indigenous ethnoveterinary information from the study site field surveys were done in March 2021 – April 2022 by visiting ethnic communities in Sandhol tehsil. As per questionnaire, information was gathered through group discussions and semi-structured interviews adapted from Jain and Goel (1995) with local people about the indigenous applications of plant. A total of 65 informants (35 males and 30 females) of different age group (21-80 years) were interviewed. The residents of the study area played an important role in the collection and local identification of plant species. The ethnoveterinary significance of the collected plant species contains the information about their vernacular names, part/s used to treat various ailments, method of drug preparation and mode of administration. All collected plants were dried, pressed, preserved and mounted on herbarium sheets by using method adapted from Singh and Subramaniam (2008).

Data analysis

The information or data collected by interviewing the locals and traditional healers was analysed by different quantitative indices such as use value (UV), fidelity level (FL %) and informant consensus factor (FIC).

Use Value Index:

Use value indices were calculated by using the quantitative method adapted by Leonti (2022). It is used to evaluate the relative importance of plant species known to the informants. The use-value calculated as:

$$UV = \frac{\sum U}{N}$$

In the above equation, U is the number of usage reports cited by each informant for a specific plant species, and N is the total number of informants selected for interview. High UV value describes many use-reports for a plant implying its importance to the locals. Low UV describes few reports related to its use and plant is not much important.

Fidelity Level

This method is used to identify the most preferred species among many plant species used to cure specific ailments (Leonti, 2022).

$$FL\% = \frac{Np}{N} \times 100$$

In the following equation, Np is the number of use reports cited for a given species for the treatment of a particular ailments and N is the total number of use reports cited for any given species (Bhatia *et al.,* 2014). If FL value is higher (100%) for plant species, it means that almost all usage reports pertain to the same way of using it, whereas, if a low FL percent value is produced, then that plant might be used for various different purposes or ailments (Musa *et al.,* 2011).

Informant Consensus Factor

Informant consensus factor was calculated using the following formula (Heinrich *et al.,* 1998; Rana *et al.,* 2019)

$$FIC = Nur - Nt/Nur - 1$$

Where Nur refers to the total no. of use reports for each ailment category, Nt refers to the total number of plant species used for that category. This formula was calculated to measure the homogeneity in the ethnomedicinal information documented from the traditional informants.

Results and Discussion

Socio-demographic characteristics

A total of 65 informants are selected and categorised into three groups according to their age. Majority of informants belong to the age group of 41-60 (30), subsequently followed by 61-80 (20) and 21-40 (15) years old (Table 1). The ethnoveterinary data was collected from the study site through open discussion and semi-structured interviews. People of the study area depend largely on traditional plants for maintaining their cattle health. They followed ancient method such as plant-based medication to treat their livestock. Even govt. employees of the area have considerable knowledge regarding the ethnoveterinary practices. Maximum informants (about 70%) have gained information about the medicinal plants from their elder family members (parents & grand-parents) and local herbal healers. It is evident from the study that older informants have diverse traditional ethnoveterinary information in comparison to younger people. Various research found that young generation are not interested in ancient system of treatment (Kapoor, 2017). This indigenous traditional knowledge is at the verge of extinction due to modernization and rapid cultural change (Kubkomawa *et al.,* 2013). Therefore, there is a need to encourage young generation to take interest in ethnoveterinary practices to preserve this knowledge.

Table 1: Demographic details of the informants in the study area

Variables	Category of informants	Number of Informants	Percentage (%)
Gender	Male	35	53.85
	Female	30	46.15
Age group	21-40	15	23.08
	41-60	30	46.15
	61-80	20	30.77
Education level	Illiterate	10	15.39
	1^{st}-5^{th} class	15	23.08
	6^{th}-10^{th} class	23	35.38
	Above 10^{th} class	17	26.15
Occupation	Farmers	25	38.46
	Govt. Employees	15	23.08
	Others	25	38.46

Diversity of recorded ethnoveterinary plants

The data collected from the study site was arranged systematically in tubular form that includes scientific name, local name, family, habit, part/s used, route used, ailment treated and mode of administration (Table 2). Information of 28 plant species used in ethnoveterinary practices collected from 65 informants. These plants are distributed among 23 families, 28 genera and 28 species. Maximum plant species collected were herb (57%) followed by shrubs (21%), tree (18%) and climber (4%) respectively (Fig. 1). Knowledge of the people regarding the application of plants varies greatly from one area to other. In the present study, herbs were the most used life form. Many previous studies shown the similar results in which herbs were the

Table 2: Plant species used to treat different livestock ailments/disorders by the people of Kamlah region of Sandhol tehsil of Mandi district of Himachal Pradesh

Scientific Name	Local Name	Family	Habit	Ailments /Treatment	Part/s Used	Route used	Mode of Administration	UV
Agave cantala (Haw) Roxb. ex Salm-Dyck	Banskora	Asparagaceae	Herb	Worm infection	Leaves	Topical	Leaves extract is directly applied to the worm infected area.	0.46
Ageratum conyzoides L.	Fulnu	Asteraceae	Herb	Wound	Leaves	Topical	After washing the body parts, leaf extract is applied properly on the wound.	0.38
Aloe vera (L.) Burm.f.	Aloe vera, Daware	Asparagaceae	Herb	Appetizer, stomach disorder	Leaves	Oral	Decoction of leaves (200ml) is given to the cattle as appetizer and to treat stomach disorders.	0.54
Arisaema tortuosum (Wall.) Schott	Sarpchllii	Araceae	Herb	Prolapsed uterus	Fruit	Oral	Extract of fruit mixed with fodder is given to cure prolapsed uterus in cattle.	0.26
Asparagus adscendens Roxb.	Sanspaien	Asparagaceae	Shrub	Heat stroke	Root	Oral	Root powder mixed (50g) with fodder is given to treat heatstroke.	0.35
Berberis lycium Royle	Kashmal, Rashonth	Berberidaceae	Shrub	Eye disorder, Fever	Root	Oral, topical	Root extract is poured in eyes of animal to reduce redness and discharge. Decoction of roots is given to treat fever.	0.60
Brassica compestris L.	Saron, Sarson	Brassicaceae	Herb	Constipation, skin disorder	Seed	Oral, topical	1/2 L seed oil is given orally to the animal to treat constipation. Seed oil by adding small amount of salt is applied topically to treat skin infections.	0.69
Carissa spinarum L.	Garne, Garnu	Apocynaceae	Shrub	Heat stroke	Leaves	Topical	Paste of the leaves applied topically to treat heat stroke.	0.37
Cassia fistula L.	Aahli, Amaltas	Fabaceae	Tree	Indigestion, Skin disorder	Fruit	Oral	Decoction of pods (250 ml) mixed with jaggery (50-80 g) fed to the animals to treat indigestion. Pod extract applied topically to treat skin disorders.	0.77
Cannabis sativa L.	Bhang	Cannabaceae	Herb	Insect bite	Leaves	Topical	Leaves extract is applied to the affected area as antidote to insect bite.	0.49

Commelina benghalensis L.	Chura	Commelinaceae	Herb	Milk enhancement	Aerial parts of plant	Oral	Plant is used as fodder to enhances milk production.	0.40
Dodonaea visoca (L.) Jacq.	Mehndu	Sapindaceae	Shrub	Bone fracture	Leaves	Topical	Paste of the leaves of *Dodonaeaviscosa* (250g) and *Cuscutareflexa* (100g) is applied to the affected area to cure bone fracture.	0.51
Dysphania ambrosioides (L.) Mosyakin&Clemants	Keh-Ajawain	Amaranthaceae	Herb	Indigestion, Stomach disorder	Leaves	Oral	Decoction of leaves is used to treat indigestion and other stomach related problems.	0.69
Euphorbia heterophylla L.	Dudli	Euphorbiaceae	Herb	Milk enhancement	Aerial parts of plant	Oral	Aerial parts of the plant along with other fodder is given to the cattle to increase lactation.	0.38
Ficus auriculata Lour.	Triambal	Moraceae	Tree	Milk enhancement	Leaves	Oral	Leaves used as fodder to increase milk production.	0.54
Fumaria indica (Hausskn.) Pugsley	Pithpapra	Papaveraceae	Herb	Milk enhancement	Aerial parts of plant	Oral	Whole aerial parts of the plant are used as fodder to increase milk production.	0.46
Grewia optiva J.R.Drumm. ex Burret	Buel	Malvaceae	Tree	Milk enhancement	Leaves	Oral	Leaves mixed with other fodder to enhance milk production.	0.49
Hordeum vulgare L.	Jau	Poaceae	Herb	Milk enhancement	Seed	Oral	Crushed seed (150-250 g) is given with feed for 15-20 days to increase lactation.	0.31
Mentha spicata L.	Pundina	Lamiaceae	Herb	Fever, Indigestion, Heat stroke	Leaves	Oral	Decoction of leaves of Mentha (50g), Onion (30g) and Guava (40g) is given to the cattle to treat fever, indigestion and heat stroke.	0.92
Murraya Koenigii (L.) Spreng.	Gandhla, Gandelu	Rutaceae	Shrub	Milk enhancement, Stomach disorder	Leaves	Oral	Leaves cooked in lassi (1-2 L) fed to the cattle to enhance milk production and treat stomach disorders.	0.73
Oroxylum indicum (L.) Benth. ex Kurz	Arlu	Bignoniaceae	Tree	Indigestion, Constipation	Fruit	Oral	Decoction of uniped fruit (200g) is given to the cattle to treat indigestion and constipation.	0.66
Phyllanthus emblica L.	Ambla, Amla	Phyllanthaceae	Tree	Indigestion, Constipation	Fruit	Oral	Mixed fruit powder (equal amount) of *Phyllantus emblica*, *Terminalia*	0.54

							bellerica, *Terminalia chebula are* given orally in empty stomach for indigestion and constipation.	
Rumax hastatus D. Don	Ambi	Polygonaceae	Herb	Skin disorder, Wound	Aerial parts of plant	Topical	Paste of aerial parts (300g) is applied directly on the wound and infected skin.	0.69
Stephania rotunda Lour.	Bis-Khappar	Menispermaceae	Climber	Flatulence, Mastitis	Tuber	Oral, Topical	Small piece of tuber cooked with fodder is given to the cattle to treat flatulence. Paste of tuber (100g) is applied on the infected area to cure mastitis.	0.77
Trifolium alexandrinum L.	Barseem	Fabaceae	Herb	Milk enhancement	Aerial parts of plant	Oral	Aerial parts of the plant are used as fodder to increase lactation.	0.40
Trigonella foenum-graecum L.	Methi, Mirthe	Fabaceae	Herb	Bloating	Seed	Oral	Soaked seed mixed with fodder is given to cattle to treat bloating.	0.34
Verbascum thapsus L.	Bantambaku	Scrophulariaceae	Herb	Indigestion	Fruit	Oral	Concoction of fruit of *Verbascum Thapsus* (80g), *cassia fistula* (50g) and leaves of *Allium cepa* (30g) is given to the cattle to treat indigestion.	0.46
Zanthoxylum armatum DC.	Tirmir	Rutaceae	Shrub	Fever and digestion.	Leaves	Oral	Thick tablets made from paste of leaves of *Zanthoxylum armatum, Allium cepa* and *Centella asiatica* by adding jaggery and 2-3 chillies are given orally once in a day to the cattle to treat fever and digestion.	0.55

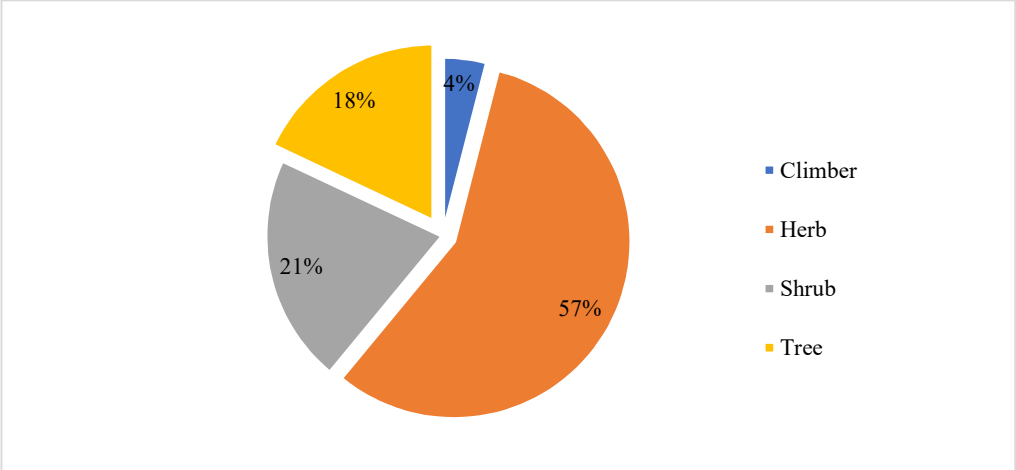

Figure 1: Pie chart showing life forms present in the study area

most commonly used life form (Sharma *et al.,* 2022; Singh *et al.,* 2022) while in some studies trees were the extensively used life form (Musa *et al.,* 2011). These plants belonged to family Amaranthaceae, Apocynaceae, Araceae (1 species each), Asparagaceae (3 species), Asteraceae, Berberidaceae, Bignoniaceae, Cannabaceae, Commelinaceae, Euphorbiaceae (1 species each), Fabaceae (3 species), Lamiaceae, Malvaceae, Menispermaceae, Moraceae, Papaveraceae, Phyllanthaceae, Poaceae, Polygonaceae (1 species each), Rutaceae (2 species), Sapindaceae, Scrophulariaceae (1 species each) (Fig. 2). among 23 families, Asparagaceae and Fabaceae (3 species each) documented with maximum number of plant species. It is evident from the comparison of current study with the previous, that plants and their parts can be used in more than one way to treat various ailments in different regions. Exact dosage of many herbal formulations is not known. Among the plant parts, leaves (43%) were found to be extensively used for the treatment of majority of diseases followed by aerial parts (18%), fruit (18%), seed (11%), root (7%) and tuber (3%) (Fig. 3).

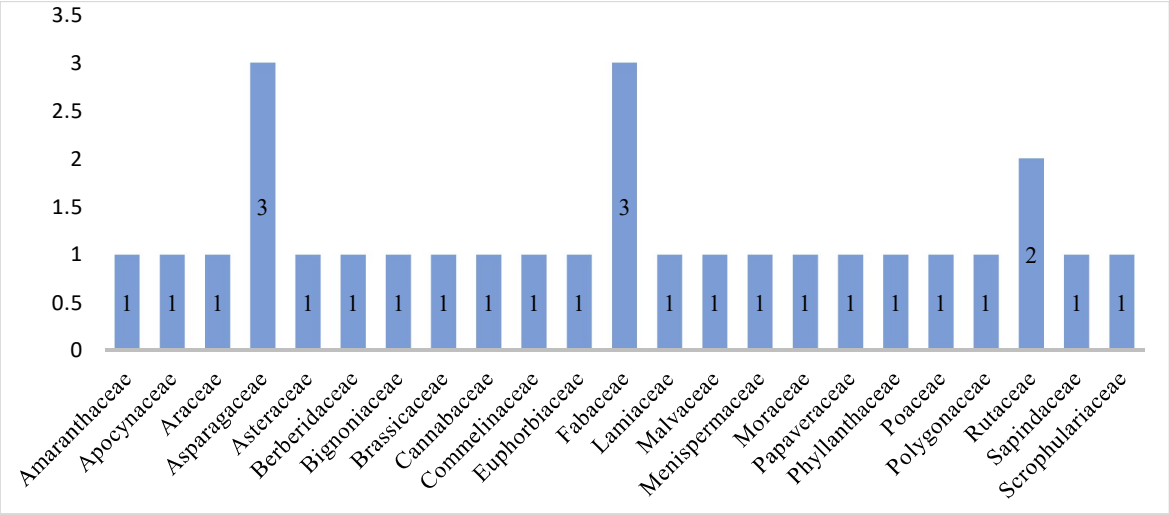

Figure 2: Graph showing the number of plant species belonging to their families

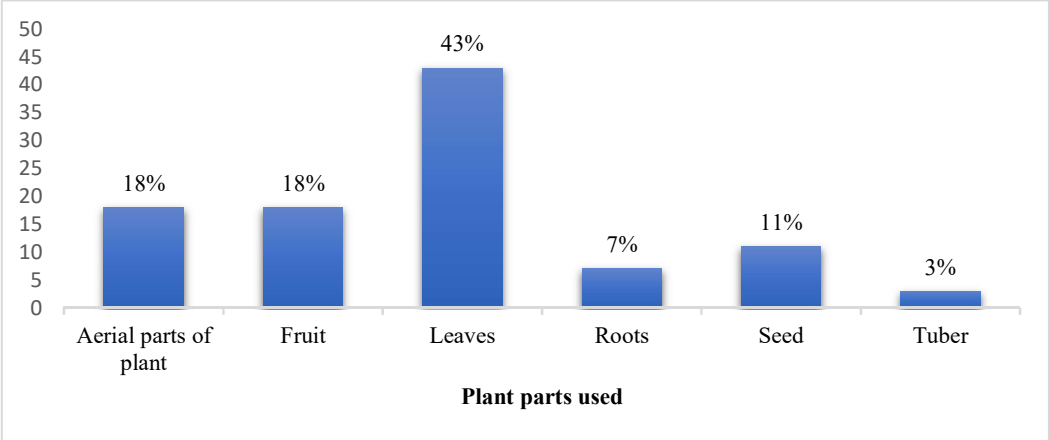

Figure 3: Showing the plant parts used in the treatment of livestock

So study reveals that herbs were the most used life forms (57%) and leaves were the frequently used plant parts (43%) for the ethno-veterinary practices. Previous researches have also documented leaves as most commonly used plant part (Prakash *et al.,* 2021; Thakur *et al.,* 2021). The present study reported using the leaves of *cannabis sativa* to treat insect bite. A previous study from Poonch district (J&k) reported the use of leaves of *cannabis sativa* to treat body pain and intestinal worms (Dutta *et al.,* 2021). Leaves of *Grewia optiva* was used as galactagogue in the study area. In contrast, crushed bark of the *G. optiva* was used to cure worm infection by the residents of Hamirpur district (Kumar & Chander, 2018). Leaves of *Murraya koenigii* were used for milk enhancement and to cure stomach disorders. Previous study reported that leaves of *M. koenigii* were used to treat dysentery (Thakur *et al.,* 2021). According to the informants of study area, root extract of *Berberis lycium* was used to cure eye infection and decoction of root is given to treat fever. In Doda district of J&K, root decoction of *B. lycium* was used to treat jaundice in cattle (Khateeb *et al.,* 2015). Paste of aerial parts of *Rumex hastatus* was given to cure wounds and infected skin in the study area, while people of Kaghan valley of Pakistan used the paste of young plant to treat cough and flu in the cattle (Shoaib *et al.,* 2021). These herbal medications successfully cure common diseases. Current investigation found 28 plant species used orally and topically to cure livestock. Table 2 described the plant species used to treat the various diseases among cattle during various field surveys. In the study area, different ailments like bone fracture, gastrointestinal disorders, insect bite, prolapsed uterus, skin disorders, worm infection etc. are treated by using traditional medicines. Maximum plant species (13) were utilized to treat gastrointestinal problems, which depict that such incidents are comparatively high in the study area. Similar results to treat gastrointestinal disease with maximum number of plant species have been reported previously (Khateeb *et al.,* 2015; Shoaib *et al.,* 2020; Singh *et al.,* 2022). Medicinal plants help in the prevention and treatment of various diseases, due to the presence of some active metabolites (Rau, 1974; Kumar *et al.,* 2021, Mekhemar *et al.,* 2021; Radha *et al.,* 2021). In current study, according to quantitative analysis, use value (UV) of each species was calculated and ranged from 0.26 to 0.92. The most important species with high UV values were *Mentha spicata* L. (0.92), *Cassia fistula* L. (0.77), *Stephania rotunda* Lour. (0.77), *Murraya koenigii* (L.) Spreng. (0.73) etc. Plant species with low UV values were *Arisaema tortuosum* (Wall.) Schott (0.26), *Asparagus adscendens* Roxb. (0.35) and *Carissa spinarum* L. (0.37). Plants with lowest use value may indicates limited traditional knowledge among the community about them or less distribution of species in the area by some environmental issues (Chaudhary *et al.* 2006, Parthiban *et al.,* 2016). The Fidelity Level (FL%) values in this study varied from 25 to 100%. Plant species with 100% Fidelity level indicated that, the plant treated in similar way by the informants. *Agave cantala*, *Ageratum conyzoides*, *Arisaema tortuosum*,

Carissa spinarum, *Commelina benghalensis*, *Dodonaean visoca*, *Euphorbia heterophylla*, *Ficus auriculata*, *Fumaria indica*, *Grewia optiva*, *Hordeum vulgare*, *Trifolium alexandrinum*, *Trigonella foenum-graecum*, *Verbascum thapsus* were the most preferred plants with 100% FL percent values (Table 3).

Table 3: FL% of plant species used for curing different ailments and disorders

Plant Species	Ailments/ Disorders	Citations	FL%
A. cantala	Worm infection	30	100
A. conyzoides	Wound	25	100
A. vera	Appetizer	15	42.86
	Stomach disorder	20	57.14
A. tortuosum	Prolapsed uterus	17	100
A. adscendens	Heatstroke	23	100
B. lycium	Eye disorder	24	61.54
	Fever	15	38.46
B. campestris	Constipation	30	66.67
	Skin disorder	15	33.33
C. spinarum	Heat stroke	24	100
C. fistula	Indigestion	35	70
	Skin disorder	15	30
C. sativa	Insect bite	32	100
C. benghalensis	Milk enhancement	26	100
D. visoca	Bone fracture	33	100
D. ambrosioides	Indigestion	20	44.44
	Stomach disorder	24	55.56
E. heterophylla	Milk enhancement	25	100
F. auriculata	Milk enhancement	35	100
F. indica	Milk enhancement	30	100
G. optiva	Milk enhancement	32	100
H. vulgare	Milk enhancement	20	100
M. spicata	Fever	20	33.33
	Heat Stroke	25	41.67
	Indigestion	15	25
M. koenigii	Milk enhancement	28	58.33
	Stomach disorder	20	41.67
O. indicum	Constipation	15	34.88
	Indigestion	20	57.14
P. emblica	Constipation	15	42.86
	Indigestion	20	57.14
R. hastatus	Skin disorder	20	44.44
	Wound	25	55.56
S. rotunda	Flatulence	20	40
	Mastitis	30	60
T. alexandrinum	Milk enhancement	26	100
T. foenum-graecum	Bloating	22	100
V. Thapsus	Indigestion	30	100
Z. armatum	Fever	15	41.67

For calculating, Informant Consensus Factor**,** all ailments were grouped into 7 categories on the basis of information provided by the informants (Table 4). In current study, value of ICF ranged from 0.97 to 1.00. Maximum plant species (13) were used to treat gastrointestinal disorders followed by galactagogue (8), dermatological disorders (7), fever (4), bone fracture (1), ophthalmic (1) and reproductive (1) (Table 4). The plant species used to cure gastrointestinal disorders in the livestock includes *Aloe vera*, *Brassica campestris*, *Cassia fistula*, *Dysphania ambrosioides*, *Mentha spicata*, *Murrayakoenigii*, *Oroxylum indicum*, *Phyllanthus emblica*, *Stephania rotunda*, *Trigonella foenum-graecum*, *Verbascum Thapsus*, *Zanthoxylum armatum.*

Table 4: ICF values of different plant species used for curing various categories of ailments & disorders

Ailment/Disorder categories	Nt	Nur	Nur-Nt	Nur-1	FIC
Bone fracture	1	33	32	32	1.00
Dermatological (insect bite, mastitis, skin disorders, wound, wound infection)	7	192	185	191	0.97
Fever (fever, heat stroke)	4	99	95	98	0.97
Galactagogue	8	222	214	221	0.97
Gastrointestinal (bloating, constipation, flatulence, indigestion, loss of appetite, stomach disorder)	13	351	338	350	0.97
Ophthalmic (eye infection)	1	24	23	23	1.00
Reproductive (prolapsed uterus)	1	17	16	16	1.00

Conclusion

The current study is an initial attempt to document the traditional ethnoveterinary knowledge of local people of Kamlah region. Many people in the study area still believe to treat their livestock with traditional medicines. With rapid cultural change and modernization, traditional knowledge among the society faded gradually. So, there is an immense need to document and conserve this valuable information for sustainability. Moreover, this study provides a base for other researchers to find out the therapeutic potential of important plants.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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