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Documenting Traditional Wisdom before They Are Forgotten: A Study on the Ethnoveterinary Uses of Mountain Plants among the Trans-Himalayan Migratory Shepherds in the Kinnaur District of Himachal Pradesh, India

Radha [1,] *, Sunil Puri [1] and Somidh Saha [2,*]

[1]School of Biological and Environmental Sciences, Shoolini University of Biotechnology and Management Sciences, Solan (H.P.) – 173229, India

[2] Research Group Sylvanus, Institute for Technology Assessment and System Analysis, Karlsruhe Institute of Technology, Karlstr. 11, D-76133 Karlsruhe, Germany (somidh.saha@kit.edu)

* Correspondences: SS: somidh.saha@kit.edu; R: radhuchauhan7002@gmail.com;Sunilpuri@shooliniuniversity.com

Abstract: The Himalayas are known for high floristic diversity and rich ethnobotanical practices. However, not all parts of the Himalayan regions are thoroughly studied. The present study aims to document the ethnoveterinary medicines used by migratory shepherds in Trans-Himalayan Rakchham-Chitkul Wildlife Sanctuary,Baspa (Sangla) valley of the Kinnaur district in Himachal Pradesh. The shepherds are very close to nature as they spend most of their time in forests with their livestock. Shepherding depends more on traditional healthcare practices based on local medicinal plants. In this study, we are reporting for the first time commonly used ethnoveterinary medicines in Rakchham and Chitkul Wildlife Sanctuary and their application, procedures of preparation, as well as listing 51 plant species. Such documentations are done first time in the Himachal Pradesh region of India as per our information. Our research emphasizes the urgent need to document traditional medicine preparation procedures from migratory shepherds. The required information on various ethnoveterinary medicines used by migratory shepherds was collected through personal field visits, participatory observations, interview and using a pretested questionnaire. It was observed that in all 51 species of ethnoveterinary were used by shepherds in Trans-Himalayan Rakchham-Chitkul Wildlife Sanctuary in Baspa (Sangla) valley of Kinnaur district. The results of this survey show that shepherds in tribal areas are highly dependent on ethnoveterinary remedies for their livestock which evolved over generations of practices for healthcare. There is an urgent need to document this vast knowledge of migratory shepherds concerning the use of ethnoveterinary remedies for animal health care in the regions of the Himalayas.

Keywords: ethnoveterinary medicines; Kinnaur; traditional knowledge; livestock; Sanctuary; shepherds; mountain people; aboriginal; tribal; herbalism; ritualism

1. Introduction

Indian Himalayan Region (IHR) possesses varieties of wild medicinal plants and is known as one of the mega biodiversity hotspots in the World [1]. The Himalayas are one of the newest mountain ecosystems on the Earth, which possess different types of flora and fauna [2]. Himachal Pradesh, a northern Indian state, is located in the western Himalayan has a rich biotic component. Conservation of biodiversity is one of the most important concerns, and the state ranks third in the country in terms of the percentage of the whole region under protected area coverage [3]. The tribal people of the states closely depend on the traditional knowledge for a variety of reasons related to the

economy, social order, healthcare, shelter and food etc. The studies that focus on connections between the plants and people come under the scope of ethnobotany. Such studies include not only documentation and collection of native used species but also information on their ecology, economy, public health, pharmacology, and bioprospecting [4]. Indian tribal people also depend mainly on native herbal resources for curing different diseases [5-7].

The state of Himachal Pradesh is home to a sizeable tribal population like the Kinnauras, Gaddis, Bhots, Lahulis, Gujjar's, and Pangwals. Nomadic communities use sub-alpine and alpine pastures for rearing their livestock due to the increasing demand for animal products now exerting pressure on these meadows. Nomadic tribes rearing sheep and goats move their livestock throughout the year in search of green meadows and fodder, high hills to low hills and vice versa, leaving for low hills and plains with the commencement of winter season and returning to their villages in the summer season. Every year the movement of migratory shepherds is in the early morning [8]. Although it is challenging to make an exact estimate of the migratory goats and sheep population in the state of Himachal Pradesh, it has been reported that these constitute about 70% of the total sheep and goats [9]. The nomadic herders in recent trends settling in hospitable environments have brought agriculture and other occupations to front and shepherding taken the secondary position [10].

Ethnoveterinary medicine includes all the approaches applied by humans to improve their livestock production, like breeding practices, herbalism, animal feed, ritualism, ethno-epidemiological, and spiritualism knowledge on livestock diseases. Ethnoveterinary knowledge reflects people's experience in life and is believed to be the property of a specific community/family. Migratory shepherds have a long history of the use of traditional wild medicines and they have good knowledge of their environment [11]. The relationship between the indigenous people and their surroundings forms the subject of ethnobotany dealing with the study of plants used by people for medicine, clothing and food etc [12]. Across the IHR the diversity of plant species used in various ailments [13-14]. Due to ethnic diversity and culture in different biogeographic provinces of the region, the knowledge base differs considerably [15-17]. The majority of ethnobotanical surveys and reviews focus on medicinal plants. Native knowledge of wild plants is essential for the sustained utilization of these ethnoveterinary medicines [18-19]. However, there is still paucity detailed information and documentation of ethnoveterinary medicines in India and Himachal Pradesh is no exception to this.

In the recent past, the prominence of wild ethnoveterinary medicines uses has gained importance, and, as a result, there is huge enormous pressure on these plant resources. Extraction of these wild plants (like *Asparagus filcinus, Abies spectabilis, Adhatoda vasica, Dioscorea deltidea, Ephedra gerrardiana, Gentiana kurroa, Junniperus communis, Picrorhiza kurroa, Sasurrea obvalata* and *Trillium govanianum*) is already popular even amongst urban people. This is now putting increased market pressures on these species as the rural people also realizing the supplementary income generation and nutritional potential of these plants [20]. Many researchers have discovered the loss of valuable medical plants due to deforestation, population pressure and agricultural expansion [21-22]. Therefore, there has been a revival of interest in survey, identification and documentation of wild ethnoveterinary medicinal plants during the last few decades.

Furthermore, the migratory shepherds who are always on the move throughout the year and are mostly dependent upon the wild ethnoveterinary medicines available. As they move from high hills to low hills, it is difficult to document the use of wild plants as ethnoveterinary medicines by these migratory shepherds in Himachal Pradesh due to harsh environmental conditions. With this aim, the present study was conducted to know the wild ethnoveterinary medicines practiced by shepherds during migration. In recent years, attention in herbal medicines has greater than before as they are believed to less toxic and easy to available without any cost. However, if attention is not made with immediate effect, the rich traditional knowledge possessed by tribal communities would diminish soon. This calls for an urgent need to document ethnoveterinary medicines. Therefore, the

present study is an attempt to document ethnoveterinary medicines used by shepherds in Trans-Himalayan Rakchham-Chhitkul Wildlife Sanctuary in Baspa (Sangla) Valley of Kinnaur district. There is no proper record available on the subject of ethnoveterinary medicines used by migratory shepherds for their livestock in Trans-Himalayan Rakchham-Chitkul Wildlife Sanctuary in Baspa (Sangla) Valley of Kinnaur district.

Documentations of traditional ethnoveterinary medicines know-hows are necessary for the preservation of traditional knowledge of Himalayan tribal migratory shepherds. Such documentation could create interest among professional pharmacologists for the search of new medicines and motivate ethnologists to study the high cultural diversity of the western Himalayas of India. Those were the main motivations to carry out this research. Thus, the ethnoveterinary information on medicinal plants of this area expected to provide new dimensions for the expanding pharmaceutical industry.

2. Results

In this study, we documented and described ethnoveterinary uses of medicinal plants by migratory shepherds in Trans-Himalayan Rakchham-Chitkul Wildlife Sanctuary in Baspa (Sangla) Valley of Kinnaur district (Table 1). These medicinal plants were most used to heal a wide range of ailments described in Fig. 1.

It was observed that shepherds used 51 species of ethnoveterinary medicines for their livestock (Herb 29, Tree 9, Fern 1, Climber 2, Shrub 9, Grass 1) in Trans-Himalayan Rakchham-Chitkul Wildlife Sanctuary in Baspa (Sangla) Valley of Kinnaur district (Fig. 1).

The collection of several medicinal plants and plant parts varied from plant to plant, depending upon their availability. During their seasonal migration, the shepherds are much dependent on forest products for their requirements of shelter, fruits, vegetables and medicines etc. Interestingly, the shepherds informed that their preference for ethnoveterinary medicine was *Asparagus filcinus, Adhatoda vasica, Berginia ciliata, Betula utilis, Cynodon dactylon, Chenopodium album, Cannabis sativa, Picrorhiza kurroa, Trillium govanianum, Urtica dioica* and *Urtica palviflora* (Fig. 1). These species are also used for curing ailments among humans in Himachal Pradesh [23].

The shepherd migrates as there is a deficiency of fodder for their animals; and for this they explore adjoining areas, mainly degraded lands. It was interesting to note that their migration patterns closely mirror the seasonal availability of fodder [24]. During seasonal migration of shepherds, they face constraints like fodder, food, veterinary facilities, water, predators, wild animals, and sometimes road accidents of their livestock. Such constraints have also been reported in several previous studies [25-26].

3. Discussion

Medicinal plants have a long history of using traditional health care systems and many cultures around the world still depend on plants for their health care system. Since the advent of civilization people have used herbal medicines for curing different diseases in their domesticated animals. This ethnoveterinary drug is centered on traditional knowledge, folk beliefs, skills and approaches used for maintaining the health of livestock. A large number of rural societies use local herbal medicines for the treatment of domestic animals [27].

It is observed that compared to the new generation aged, people have good sound traditional knowledge about the use of plants in treating illnesses in livestock. The older persons and traditional healers have better knowledge about traditional medicines than younger people [28]. It is believed that more pharmacological and ethnoveterinary studies must be carried out to develop a better understanding of traditional practices in improving the livelihood and lives of pastoralists [29-30]. Himalayan people have a very close connection with nature. Generally, they have faith in that

diseases are caused by the supernatural powers and they treat them through natural products like plants, herbs, shrubs, trees, climbers and ferns and soil etc. The livelihood of shepherds and their families is met through the selling of meat (goat and sheep) and dairy products. Wool is also sold but its contribution to livelihood is meager. Deforestation and the altering climatic conditions have reduced the availability of medicinal plant species during seasonal migration. Wild plants play an essential role in the lives of these tribal migratory shepherds. Several workers have initiated the documentation of traditional knowledge on the utilization of Ethnoveterinary medicines during the last few years [31-32]. The cultural diversity in the tribal areas of Himachal Pradesh is closely linked to biodiversity, as there is a symbiotic relationship between habitat and cultures and between ecosystem and cultural identity.

It was observed that most of the plants were used as a single medicinal preparation. In common, the younger generation lacks interest in traditional beliefs. Preservation and documentation of this information is thus a serious matter, or else it is believed that the traditional information associated with ethnoveterinary practices will fade into extinction. On the other hand, this valuable native knowledge has turned progressively fragile and susceptible to fast erosion with the spreading out of biomedical paradigms and replacement of traditional resources with modern schemes. Preservation and documentation of this information is thus a serious matter. In-depth studies are necessary to define how the economic potential of ethnoveterinary practices can be the greatest used.

Table 1: Ethnoveterinary medicines used by shepherds in Trans-Himalayan Rakchham Chitkul Wildlife Sanctuary in Baspa valley of Kinnaur district

Sr. No.	Botanical Name (Family)	Common name	Flowering and Fruiting	Parts used	Habit	Application	Ethnoveterinary Uses
1	*Asparagus filcinus* D.Don (Asparagaceae)	Chiriyakanda	May-July	Roots	Fern	Oral	The juice of fresh Roots is mixed with hot water and given orally to treat dysentery and diarrhoea until recovering.
2	*Abies spectabilis* (D.Don.) Spach (Pinaceae)	Kolroi	April-May, Cones ripen during September-October	Leaves	Tree	Oral	The fresh juice of crushed Leaves given orally with hot water for treatment of wound healing.
3	*Amaranthus viridis* L. (Amaranthaceae)	Jungali chaulayi	July-October	Leaves	Herb	Oral	The juice of dried Leaves is mixed with hot water and given orally to treat a skin infection, cold and used as a tonic.
4	*Achillea millefolium* L. (Asteraceae)	Bhutkesi	June-December	Whole part	Herb	Oral	The dried powder of the whole plant is given orally with hot water to treat skin allergy, wound healing and sunburn.
5	*Atylosia crassa* Prain (Papilionaceae)	Leaves, Roots	May -October	Leaves	Climber	Applied on skin	The juice of fresh Leaves is mixed with oil and applied on the skin for wound healing.

6	*Adhatoda vasica* Nees. (Acanthaceae)	Arusa	December-June	Leaves	Herb	Oral	The juice of fresh leaves is given orally to treat food poisoning, constipation, cold and indigestion.
7	*Bauhinia veriegata* (L.) Benth. (Fabaceae)	Kachnar	April-November	Leaves, Bark	Tree	Applied on skin, Oral	The juice of dried Leaves and Bark are mixed with cold water and applied on the skin for wound healing, remove lice and also given orally to treat dysentery.
8	*Bergenia ciliata* (Haw.) Sternb. (Saxifragaceae)	Pashanbhed	June-August	Rhizomes, Leaves, Flowers	Herb	Oral	The decoction of dried Rhizome powder given orally to cure cough, food poisoning, dysentery, diarrhea and skin diseases. Dried Leaves and Flowers are given orally to increase lactation.
9	*Berberis lycium* Royle (Berberidaceae)	Karmashal	March-July	Fruits, Roots	Shrub	Oral	The dried root extract is used in wound healing, hoof infections and sprain. Fresh fruits decoction is given in cough.
10	*Betula utilis* D. Don (Betulaceae)	Bhojpatra	May-October	Seeds	Tree	Applied on skin	Seeds mixed with *Cynodon dactylon* and make a paste, used to plaster on fractured part then covered the bark of *Betula utilis*. Seed extract of *B. utilis* is also used in wound healing, skin allergy and insect repellent.
11	*Celtis tetrandra* Roxb. (Ulmaceae)	Khirk	February-April	Seeds	Tree	Oral	The juice from the Seeds is given orally in the treatment of indigestion, constipation and tonic during pregnancy.

12	*Commelina benghalensis* L. (Commelinaceae)	Kana	Throughout the year.	Leaves, Roots, Flowers	Herb	Oral	The juice of fresh Leaves, Roots and Flowers are given orally as a tonic. The juice of dried roots is given orally for diarrhoea.
13	*Cynodon dactylon* (L.) Pers. (Poaceaea)	Doob	Throughout the year	Whole plant	Grass	Oral	The Juice of whole grass is mixed with milk and given orally to treat skin allergy and cough.
14	*Cannabis sativa* L. (Cannabaceae)	Bhang	June-Septemb er	Leaves	Herb	Inhale	Leaves of *Cannabis sativa* burn over flame and smoke is used for body pain.
15	*Chenopodium album* L. (Chenopodiaceae)	Bathua	June -September	Seeds, Roots, Stem	Herb	Chewed , Applied on skin	The dried Seeds are given orally to treat indigestion. The juice of fresh Roots and stem is given orally for treatment of dysentery.
16	*Dioscorea deltoidea* Wall. ex Griseb. (Dioscoreaceae)	Singli mingli	July-October	Tubers, Leaves	Climber	Applied on skin	The wounds and cuts are washed with fresh Tubers and Leaf extract.
17	*Euphobia hirta* L. (Euphorbiaceae)	Duddhi	November-A pril.	Stem, Leaves	Herb	Oral	The juice of dried Stem and Leaves are given orally to increase milk quantity and wound healing.
18	*Ephedra gerrardiana* Wall. ex Stapf	Rachi, Budagur, Chhe	May-September	Whole part	Shrub	Oral	*E. gerrardiana* extract prepared from whole plant is used in cold and cough.

	(Ephedraceae)						
19	*Ficus religiosa* L. (Moraceae)	Peepal	November-February	Leaves, Bark	Tree	Applied on skin, Oral	The powder of dried Bark and Leaves mixed with milk and applied to cure wounds and skin allergy. Leaf extract is used in indigestion and constipation.
20	*Gentiana kurrooa* Royle (Gentianaceae)	Kaur, Kutki	August-October	Roots, Leaves Rhizomes	Herb	Oral	Fresh juice of Roots, Leaves and Rhizomes are given orally to relief from excess urine, cough, and constipation.
21	*Hedychium spicatum* Sm. (Zingiberaceae)	Kapurkachri	July-October	Rhizomes	Herb	Oral	The fresh Rhizomes are given orally to relief from cough, cold and skin infections.
22	*Hypericum oblongifolium* Choisy. (Hypericaceae)	Basant	May-September	Roots	Herb	Applied on skin	The powder of dried Roots is mixed with oil and applied on skin allergy.
23	*Heracleum lanatum* Michx. (Apiaceae)	Patrala	June-July	Roots	Herb	Oral	The juice of fresh Roots is given internally for the treatment of coughs, asthma, and allergic complaints.
24	*Hippophae salicifolia* D. Don (Elaeagnaceae)	Chuk	June-July	Bark, Fruits	Shrub	Applied on skin	The powder of dried Bark and Fruits are mixed with oil and applied on sunburn.

25	*Hypericum perforatum* L. (Hypericaceae)	Basant, Balsana	May-September	Leaves, Roots	Herb	Applied on skin	The juice of fresh Leaves and Roots are mixed with honey and applied on skin allergy.
26	*Juglans regia* L. (Juglandaceae)	Akhrot	April-October	Bark, Leaves,	Tree	Chewed	The fresh Leaves and Bark are given for chewed to relief from tooth pain.
27	*Junniperus communis* L. (Cupressaceae)	Bethar	March-September	Bark, Needles	Shrub	Oral	The fresh juice of Bark and Needles are given orally to treat body pain and skin allergy.
28	*Jurinea dolomiaea* Boiss. (Asteraceae)	Jari-Dhoop	July-September	Roots	Herb	Oral	The juice of fresh Roots are given orally for the treatment of wound healing, foot and mouth disease, cold and cough.
29	*Lyonia ovalifolia* (Wall.) Drude (Ericaceae)	Ayar	April-September	Leaves, Buds	Herb	Oral	The juice of young Leaves and Buds are used in tonsils. Leaves given orally to treat dysentery and swelling in body part.
30	*Leycestera formosa* Wall. (Caprifoliaceae)	Piralu	June-November	Roots	Shrub	Oral	The juice of fresh Roots is given orally to treat skin infection.
31	*Oxalis corniculata* L. (Oxalidaceae)	Amrul	April-October	Leaves	Herb	Oral	The juice of fresh Leaves are given orally to treat stomach diseases and skin allergy.
32	*Picrorhiza kurroa* Royle ex Benth.	Karru	June -August	Leaves	Herb	Oral	The Juice of fresh Leaves and Rhizomes are given orally in food poisoning, cold, cough, and

	(Scrophulariaceae)						body pain.
33	*Phytolacca acinosa* Roxb. (Phytolaccaceae)	Jharka	July -September	Leaves, Twigs	Herb	Oral	The fresh tender Leaves and Twigs extract are given orally to treat cough, cold and constipation.
34	*Pyracantha crenulata* (D.Don) M.Roem. (Rosaceae)	Bedu, Chhota seb	March-June	Leaves, Fruits	Shrub	Oral	Leaves and Fruits juice are given orally as a tonic and for indigestion.
35	*Prunus cerasoides* Buch.-Ham.ex D.Don (Rosaceae)	Pajja	December-March	Fruits	Tree	Oral	Fresh Fruits are given orally as a tonic and for indigestion.
36	*Pinus roxburghii* Sarg. (Pinaceae)	Chir	March-May	Leaves	Tree	Applied on skin	The juice of fresh Leaves mixed with oil and used externally in joints pain.
37	*Rhus parviflora* Roxb. (Anacardiaceae)	Samakdana	July-August	Bark	Shrub	Applied on skin	The paste prepared from the dried Bark is used to relief body pain.
38	*Rhododendron arboreum* Sm. (Ericaceae)	Burans	March-September	Flowers	Tree	Oral	The juice of dried Flowers is given orally to treat cough and cold.

39	*Rumex hastatus* D. Don (Polygonaceae)	Churki	June-August	Roots, Shoots	Herb	Oral	The juice of Shoots and Roots are given orally for indigestion, pimple, wounds, scorpion sting, foot and mouth diseases.
40	*Solanum surattense* Burm.f. (Solanaceae)	Kantkari	April-August	Fruits	Herb	Oral	The juice of fresh Fruits are given orally for skin infections and Leaf extract is applied on skin for burn.
41	*Solanum nigrum* L. (Solanaceae)	Mokoi	April- July	Leaves, Roots	Herb	Oral	The juice of fresh Fruits are given orally for skin infections and Leaf extract is applied on skin for burn.
42	*Selinum vaginatum* C.B. Clarke. (Apiaceae)	Bhutkeshi	July-September	Leaves	Herb	Applied on skin	The Juice of fresh Leaves is applied on skin allergy. Fresh leaf extract is given orally for increase lactation and body pain.
43	*Saussurea obvallata* (DC.) Edgew. (Asteraceae)	Brahma Kamal	July-September	Roots, Leaves	Herb	Applied on skin	The juice of fresh Roots is applied on wounds and cuts. Fresh leaf extract is given orally as tonic, for cough and internal injury.
44	*Trillium govanianum* Wall. ex D.Don (Trilliaceae)	Nagchatri	May-June	Leaves, Roots	Herb	Oral	The Juice of fresh Leaves and Roots are given orally to treat cough, cold, body pain, wound healing, internal injury, foot and mouth diseases.
45	*Thymus serphyllum* L. (Lamiaceae)	Banajwain	April-September	Seeds, Leaves	Shrub	Oral	The fresh juice of Seeds and Leaves are considered as a popular remedy for cough, cold, body pain, foot and mouth diseases.

46	*Urtica parviflora* Roxb. (Urticaceae)	Kandali	June-October	Leaves, shoots	Herb	Applied on skin	The Juice of fresh Leaves and Shoots are applied on sprain, wounds, foot and mouth diseases.
47	*Urtica dioica* L. (Urticaceae)	Bichhu Booti	June-October	Leaves	Herb	Applied on skin, Oral	The Juice of fresh Leaves and Shoots are applied on sprain of foot and wounds.
48	*Vitex negundo* L. (Verbenaceae)	Nirgandi	March-September	Leaves	Herb	Applied on skin	The juice of fresh Leaves is applied to heal swollen joints pain.
49	*Valeriana jatamansi* Jones (Caprifoliaceae)	Muskbala	March-April	Leaves, Roots	Herb	Applied on skin	The juice of dried Leaves and Roots mashed in water. The juice of dried Roots is applied on wounds for better healing.
50	*Verbascum thapsus* L. (Scrophulariaceae)	Tamaku	June- August	Roots	Herb	Oral	The juice of fresh Roots is given orally to treat vomiting, body pain and sprain.
51	*Zanthoxylem armatum* DC. (Rutaceae)	Tirmir	April-June	Bark, Seeds, Fruits	Shrub	Applied on skin, Chewed	The powder of dried Bark and Seeds are applied on tooth pain. Fruits are given orally to treat tooth pain.

Fig. 3: The photographs of 51 species of medicinal plants

Asparagus filcinus

Abies specatabilis

Amaranthus viridis

Achillea millefolium

Atylosia crassa

Adhatoda vasica

Bauhina variegata

Berginia ciliata

Berberis lycium

Betula utilis

Celtis tetrandra

Commelina benghalensis

Cynodon dactylon

Cannabis sativa

Chenopodium album

Dioscorea deltoidea

Euphorbia hirta

Ephedra gerrardiana

Ficus religiosa

Gentiana Kurroo

Hedychium spicatum

Hypercum oblongifolium

Heracleum lanatum

Hippophae salicifolia

Hypericum perforatum

Juglans regia

Junniperus communis

Jurinea dolomiaea

Lyonia ovaliflolia

Leycestera formosa

Oxalis corniculata

Picrorhiza kurroa

Phytolacca acinosa

Pyracantha crenulata

Prunus cerasoides

Pinus roxburghii

Rhus parviflora

Rhododendron arboretum

Rumex hastatus

Solanum surattense

Solanum nigrum

Selinum vaginatum

Saussurea obvallata

Trillium govanianum

Thymus serphyllum

Urtica dioica

Urtica palviflora

Vitex negundo

Valeriana jatamansi

Verbascum thapsus

Zanthoxylem armatum

4. Materials and Methods

4.1 Study area

The present study has been carried out in Rakchham-Chitkul Wildlife Sanctuary situated in the Baspa (Sangla) valley with geo-coordinates of latitude 31^0 14′22″ N - 31^0 28′37″ N and longitudes 78^0 17′31″ E - 78^0 31′30″ E cover a region of about 304 Km^2 in the northeast corner of Kinnaur district in Himachal Pradesh, India (Fig. 2). The Baspa (Sangla) valley is characterized by mountains covered by snow [33]. The temperature ranges from -15°C to 18°C, and annual snowfall 1,130 mm. The altitude of the Baspa (Sangla) valley ranges from 2,800 masl to 5,486 masl. The environmental characteristics change very sharply in the mountains due to the steep gradient. Thus there is a difference in climatic conditions in the Baspa (Sangla) valley. The parts of Rakchham- Chitkul Wildlife sanctuary up to altitude 3,450 m get good precipitation in the form of snow or rain. The forest category of this sanctuary includes Upper Western Himalayan Temperate Forest, Sub-Alpine Birch-Fir Forest and Lower Western Himalayan Temperate Forest. The sanctuary area is fed with numerous snow-fed perennial and seasonal streams [34-35].

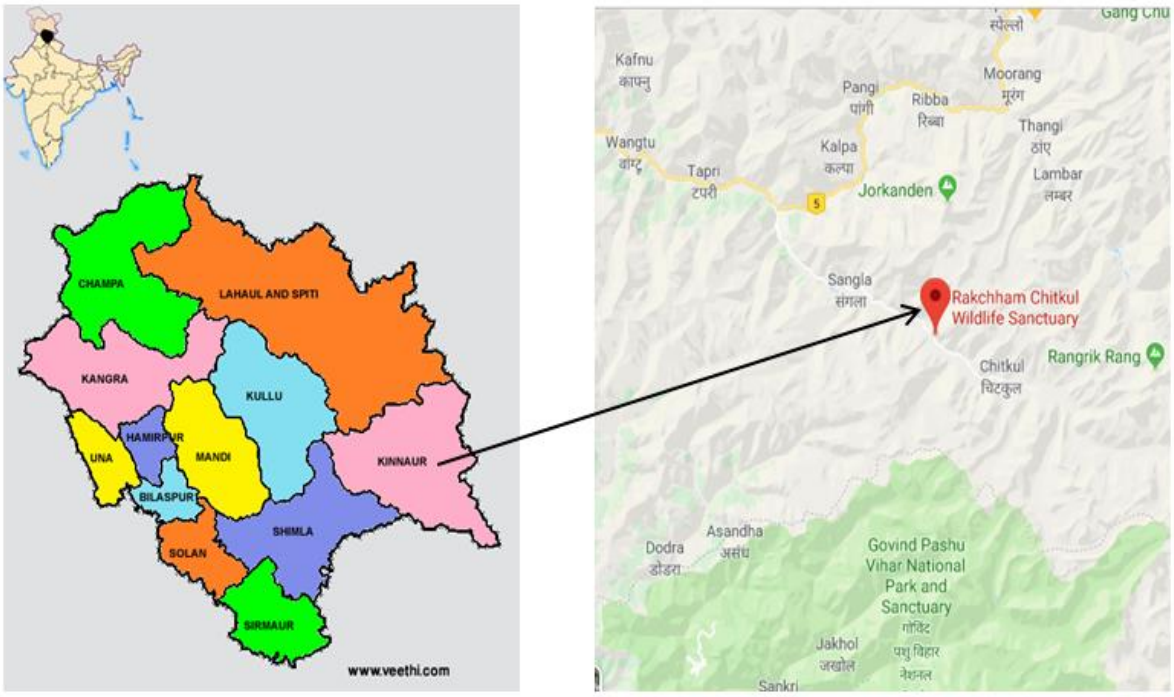

Fig.2. Location of the study area in the state of Himachal Pradesh, India pointed by black arrow

4.2 Data collection

The information on ethnoveterinary medicines used by shepherds was collected by using a pretested questionnaire, interviews, and participatory discussion from 2018 to 2019 (some pictures from field Fig. 3). Further, the specimens of ethnoveterinary medicines being used by migratory shepherds for their livestock healthcare were collected, dried and mounted on herbarium sheets, with labeled information describing the place and time of collection. Plants were identified either in the field itself through literature study [36] or with the help of experts from the Botanical Survey of India, and Forest Research Institute, Dehradun, Uttarakhand. The specimen collected and identified was kept in records of the herbarium of Shoolini University, Solan, Himachal Pradesh.

Fig.3. Field survey picture in study area

5. Conclusions

Ethnoveterinary traditional practices used to animal healthcare is as old as the domestication of livestock. They consist of traditional knowledge, belief, practices and skills that refer to the healthcare of livestock. The traditional medicines are usually used for livestock healthcare can cut down costs significantly. Moreover, they are readily available from our surroundings without any cost. In this study, we found that old aged shepherds have much more traditional knowledge and experience in remote study areas for curing veterinary ailments. The traditional system of treatment is one of the most significant systems in the study area, where modern veterinary health care facilities are in deplorable conditions.

Shepherds reported that their new generation is not much interested in the shepherd's profession due to their modern needs, so therefore its urgent need to document this traditional knowledge before disappearing from society. In the future, pharmacological studies in the field of ethnoveterinary should be carried out.

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