Ethnoveterinary practice of medicinal plants in Chhatradev Rural Municipality, Arghakhanchi District of Western Nepal

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Abstract. Dhakal A, Khanal S, Pandey M. 2021. Ethnoveterinary practice of medicinal plants in Chhatradev Rural Municipality, Arghakhanchi District of Western Nepal. Nusantara Bioscience 13: 29-40. The use of medicinal plants is a traditional system in treating domestic animals in Nepal. This study was done to investigate and document knowledge about using different plants with medicinal value to cure different animal ailments in Chhatradev Rural Municipality, Arghakhanchi district of western Nepal. A total of 100 elderly people rearing domestic animals and having traditional knowledge of ethnoveterinary plants were selected for interview. A semi-structured questionnaire was employed, and interviews were conducted for addressing detailed ethnoveterinary information. The uses of 103 plant species belonging to 56 families were documented for the treatment of 21 animal ailments. Fabaceae was found to be a dominant family with 10 plant species followed by Poaceae (8 species). The most commonly used plant parts were leaf, seed, and fruit. Herbs were dominant with 44 plant species followed by trees (32 species), shrubs (14 species), and climbers (13 species). The wide application of the medicinal plants as the form of paste formulation was observed for 41 plant species, while 25 plant species were used as powder formulation followed by Juice (21 species), raw (20 species), decoction (19 species), infusion (5 species), and roasted formulation (3 species). Oral route was the most common route followed by dermal and ocular. It was found that the informant consensus factor (ICF) values varied from 0.858 to 0.96. A high informant consensus factor was found for ailment of reproductive category (0.96) followed by respiratory (0.957), gastrointestinal (0.949) while the least was in urinary problem category (0.858). The highest citation frequency was found for Trachyspermum ammi (L.) Sprague (247) followed by Myristica fragrans Houtt. (111), Sesamum indicum L. (109), Saccharum officinarum L. (107) and Zea mays L. (97). The wide use and rich knowledge of ethnoveterinary practice were found in the study area. This study might be handy to discover useful ethnomedicinal agents applicable in the livestock industry. Conservation programs should be done from the government level and study on the use of medicinal plants for treating animal diseases is recommended.

Keywords: Animal care, indigenous knowledge, livestock, Nepal, traditional veterinary healers

INTRODUCTION

Medicinal plants have been used by humans for human as well as animal ailments, and disease treatment from the earliest history of human beings (Bartha et al. 2015; Petrovska 2012). Ethnoveterinary medicine is the traditional approach relating to the treatment and maintenance of animal health care. It is following folklore beliefs, skills, and practices of people by using locally available plant species (Hassan et al. 2017; Katerere and Luseba 2010; Ryan 2014). These medicinal plants discovered by traditional societies are an important source of new potential therapeutic drugs (Pan et al. 2014).

The current studies have the equal concern of improving human medication as well as animal health by the use of locally available medicinal plants. In contrast to modern veterinary medicine, ethnoveterinary practices have been established through trial and error methods with deliberate experimentation by farmers in the fields (Baskota and Doj Raj 2013). The increase in the cost of caring for and maintaining animal health in modern health facilities has made researchers increase their enthusiasm towards the study of ethnoveterinary medicinal plants (Phondani et al. 2010). Nepal is predominantly an agricultural county with about 90% of people in rural areas own livestock as a part of their livelihood (MOAD 2017). For a developing country like Nepal with a huge number of poor farmers, ethnoveterinary practice for animal treatment is a sustainable way of veterinary medicine practice in the new era (NAVS 2015). The indigenous use of ethnoveterinary medicinal plants is of great boon to the developing countries because of its quick accessibility and affordability where there is no easy access to the modern veterinary care facilities (Aziz et al. 2018). Although ethnoveterinary medicinal plants carry great potential in the treatment of the animals, proper documentation of the plants has not been done in the majority of the rural areas of Nepal. The knowledge has been transferred from one to the next generation only verbally or orally (Raut and Shrestha 2012) which is not a dependable way to preserve the knowledge of ethnoveterinary practices. The ease of access to modern health facilities, increase in development of socio-economic aspects, failure to transfer indigenous knowledge regarding medicinal plants, change in technology, and unplanned urbanization have led the use of...
ethnoveterinary medicinal plants in a great threat (Subedi 2017; Weckmüller et al. 2019).

As ancient practice of herbal treatment of livestock diseases are still significant today, and are still used by many farmers, veterinarian, Ayurvedic physicians, and Vaidyas, so that this study was conducted to investigate, and document local knowledge about the use of different plants with medicinal value in Chhatradev Rural Municipality of Arghakhanchi district in Nepal. The objectives to carry this study were (i) to document the plants with medicinal values used in the treatment of various ailments category of the animals, (ii) to disseminate the formulation technique and the plant part used, (iii) to determine the informant consensus factor and (iv) to record the plant species with the highest citation frequency. This study will be a useful resource for the conservationist, veterinarians, phytochemists, and Ayurvedic physicians to conduct pharmacological studies in the coming days, and will be a valuable asset for the farmers for the treatment of animals health.

MATERIALS AND METHODS

Study area

Chhatradev Rural Municipality is a rural municipality of Arghakhanchi district located in Lumbini province of Nepal. It has an area of 87.62 square kilometres. The climate is tropical to subtropical type with cool and humid. The majority of people are Brahman, Chhetri, Magar, and other ethnic groups like Kumal, Gurung, Kami, Damai, Sarki, Thakuri, Sanyasi, Newar, Badi, and others (CBS 2012). The rural people are not only dependent on forests and natural vegetation to fulfill their daily needs of fuelwood, fodder, grasses, leaf litter, etc., but also for the treatment of ailments and diseases using medicinal plants. The map of the study area is shown in Figure 1. People here are acquainted more with the traditional ethnobotanical knowledge, and are well practitioner of folk beliefs.

Data collection

The data were collected from July to September 2020. A total of 100 elderly, knowledgeable, and experienced persons rearing domestic animals who had traditional knowledge of ethnoveterinary plants were selected. A questionnaire was prepared, and interviews were taken from them addressing detailed ethnoveterinary information. The interview process followed international codes of ethics (ISE 2006).

Plant specimen collection and identification

Some of the collected specimens were identified in the field, whereas others were identified with the help of standard botanical literature. Nomenclature of the identified species follows standard kinds of literature (Aryal et al. 2016; DPR 2015; IUCN Nepal 2000; POWO 2017).

Figure 1. A. Map of Nepal showing Arghakhanchi districts with green color and other hollow ones are other districts. B. Map of Arghakhanchi district showing Chhatradev Rural Municipality. C. Map of Chhatradev Rural Municipality
**Data organization**

After completion of fieldwork, data entry was done in Microsoft Excel 2016. The life form of the medicinal plants was classified into herbs, shrubs, trees, and climbers. The plant part utilized was classified into bark, bulb, flower, fruit, latex, leaf, rhizome, root, seed, stem, tuber, and whole plant. The preparation technique was classified into different groups, i.e., powder, paste, juice, infusion, raw, decoction, and roast. Route of administration was categorized into oral, dermal, and ocular. The uses of medicinal plants were categorized into ten major categories: reproductive, respiratory, gastrointestinal, antipyretic, parasitic, general weakness, eye, dermatological, osteological, and urinary problems.

**Data analysis**

For analysis of socio-demographic profile, Microsoft Excel 2016 was used.

**Informant consensus factor (ICF)**

To determine the agreement among informants in terms of the use of plants, the Informant Consensus Factor (ICF) was calculated (Heinrich et al. 1998). It was followed in the number of Ethnoveterinary studies of Medicinal Plants (Adeniran et al. 2020; Tariq et al. 2014).

\[
ICF = \frac{N_u - N_t}{N_u - 1}
\]

Where; ICF = Informants consensus factor, \( N_u \) = number of use reports from informants for a particular plant-use category; \( N_t \) = number of taxa or species that are used for that plant use category for all informants.

The result of this index ranges from 0 to 1. ICF values are low if plants are chosen randomly or if there is no exchange of information about their use among informants, and approach one (1) when there is a well-defined selection criterion in the community and/or if information is exchanged between informants.

**Citation frequency (Cf)%**

Cf of medicinal plants is useful to determine the most commonly used medicinal plants in the study area.

\[
Cf\% = \frac{n}{N} \times 100
\]

Where; \( n \) refers to the number of times a particular species was mentioned, \( N \) refers to the total number of times that all species were mentioned.

**RESULTS AND DISCUSSION**

**Socio-demographic profile of the informants and their domestic animal composition**

Out of 100 informants, more than half of the respondents were male (58) while there were 42 female respondents. Most of the interviewees (72) were older than 50 years and 28 interviewees were between 35-50 years old. Agriculture was the main source of household income to 70 respondents while 19 people had government services, and 11 had remittance as the way to make a living. Among the informants, there were not any illiterate while the majority (70) of the informants had gained primary education, 19 informants had gained secondary education, and the rest (11 informants) had got other higher forms of education (Table 1). Livestock (Buffalo, Goat, Cow, Poultry) were important economic sources of informants. The majority of the respondents (98) kept buffalo, 81 respondents kept goats, 28 respondents kept poultry and 4 respondents kept cow with their total number 191, 237, 191, and 7 respectively (Figure 2).

**Source of ethnoveterinary knowledge**

The majority of the respondents received the knowledge of ethnoveterinary use of plants from their ancestors whereas some came from neighbors, newspapers, and radio. Elderly people, mainly male, were rich in ethnoveterinary knowledge, and more concerned about the conservation of plants than younger people. This observation has also been reported by Khan et al. (2015).

<table>
<thead>
<tr>
<th>Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>35-50</td>
<td>28</td>
</tr>
<tr>
<td>&gt;50</td>
<td>72</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
</tr>
<tr>
<td>Male</td>
<td>58</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>70</td>
</tr>
<tr>
<td>Secondary</td>
<td>19</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
</tr>
<tr>
<td><strong>Primary occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>70</td>
</tr>
<tr>
<td>Government services</td>
<td>19</td>
</tr>
<tr>
<td>Remittance</td>
<td>11</td>
</tr>
</tbody>
</table>

**Table 1. Socio-demographic characteristics of respondents**

![Figure 2. Respondents with the number of their livestock in the study area](image-url)
<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Family</th>
<th>Local name</th>
<th>Life form</th>
<th>Part used</th>
<th>Form of medication</th>
<th>Route</th>
<th>Method of use and application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justicia adhatoda L.</td>
<td>Acanthaceae</td>
<td>Asuro</td>
<td>Shrub</td>
<td>Whole plant</td>
<td>Decoction</td>
<td>Oral</td>
<td>Decoction prepared from the whole plant is given twice a day orally until cure of common cold.</td>
</tr>
<tr>
<td>Achyranthes aspera L.</td>
<td>Amaranthaceae</td>
<td>Datyun</td>
<td>Herb</td>
<td>Whole plant</td>
<td>Raw</td>
<td>Oral</td>
<td>Fed as a feed to cure endoparasite.</td>
</tr>
<tr>
<td>Chenopodium album L.</td>
<td>Amaranthaceae</td>
<td>Bethe</td>
<td>Herb</td>
<td>Whole plant</td>
<td>Juice</td>
<td>Oral</td>
<td>The whole plant is crushed and obtained juice is given orally to treat dysentery.</td>
</tr>
<tr>
<td>Allium sativum L.</td>
<td>Amaryllidaceae</td>
<td>Lasun</td>
<td>Herb</td>
<td>Bulb</td>
<td>Paste</td>
<td>Oral</td>
<td>The bulb is mixed with turmeric powder to cure ectoparasite.</td>
</tr>
<tr>
<td>Mangifera indica L.</td>
<td>Anacardiaceae</td>
<td>Aap</td>
<td>Tree</td>
<td>Bark</td>
<td>Powder</td>
<td>Oral</td>
<td>The bark is dried then ground with camphor and applied to the burn area.</td>
</tr>
<tr>
<td>Rhus javanica L.</td>
<td>Anacardiaceae</td>
<td>Bhakkimlo</td>
<td>Tree</td>
<td>Fruit</td>
<td>Infusion</td>
<td>Oral</td>
<td>Ripe fruits are soaked in water, and water is given twice a day to animal by mixing with curd.</td>
</tr>
<tr>
<td>Semecarpus anacardium L.</td>
<td>Anacardiaceae</td>
<td>Blha</td>
<td>Tree</td>
<td>Fruits</td>
<td>Juice</td>
<td>Dermal</td>
<td>Fruit is ground with mustard oil and applied to wound.</td>
</tr>
<tr>
<td>Centella asiatica (L.) Urb.</td>
<td>Apiaceae</td>
<td>Ghodtare</td>
<td>Herb</td>
<td>Whole plant</td>
<td>Raw</td>
<td>Oral</td>
<td>The whole plant is fed to treat urinary disorders.</td>
</tr>
<tr>
<td>Trachyspermum anmi (L.) Sprague</td>
<td>Apiaceae</td>
<td>Juwano</td>
<td>Shrub</td>
<td>Seed</td>
<td>Powder, Decoction</td>
<td>Oral</td>
<td>The required amount of dry seed is crushed and fed with water, cornflour meal. It can also be</td>
</tr>
<tr>
<td></td>
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<td>boiled in water and fed twice a day to cure cough, diarrhea, and fever. Whereas dried seeds of</td>
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<td></td>
<td>Trachyspermum anmi (L.) Sprague, Sesamum indicum L. and Myristica fragrans Houtt. are crushed to</td>
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<td></td>
<td></td>
<td>make powder, and given to animals by mixing with cornflour to cure constipation and increase milk</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>production.</td>
</tr>
<tr>
<td>Calotropis gigantea (L.)</td>
<td>Apocynaceae</td>
<td>Aank</td>
<td>Tree</td>
<td>Leaf</td>
<td>Paste</td>
<td>Dermal</td>
<td>Lightly crushed leaves are warmed on fire and kept on swelling joints.</td>
</tr>
<tr>
<td>Dryand.</td>
<td>Apocynaceae</td>
<td>Indrajau</td>
<td>Tree</td>
<td>Bark</td>
<td>Decoction</td>
<td>Oral</td>
<td>Decoction obtained from bark is given to the livestock to treat constipation, diarrhea, and dysentery</td>
</tr>
<tr>
<td>Holarhena rubescens Wall. ex G.Don</td>
<td>Apocynaceae</td>
<td>Bilajor</td>
<td>Climber</td>
<td>Root</td>
<td>Paste</td>
<td>Dermal</td>
<td>Root paste is applied on swelling bone area.</td>
</tr>
<tr>
<td>Marsdenia tenacissima (Roxb.) Moon</td>
<td>Apocynaceae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acorus calamus L.</td>
<td>Araceae</td>
<td>Bojho</td>
<td>Herb</td>
<td>Rhizome</td>
<td>Paste</td>
<td>Dermal</td>
<td>Paste prepared from the rhizomes is applied to the body of animals to remove lice.</td>
</tr>
<tr>
<td>Colocasia esculenta (L.) Schott</td>
<td>Araceae</td>
<td>Karkalo</td>
<td>Herb</td>
<td>Leaf, Stem</td>
<td>Decoction</td>
<td>Oral</td>
<td>Small pieces are made by cutting them and given to animal by cooking with cornflour to cure endoparasite and diarrhea</td>
</tr>
<tr>
<td>Agave cantula Roxb.</td>
<td>Asparagaceae</td>
<td>Ketuki</td>
<td>Herb</td>
<td>Leaf</td>
<td>Juice</td>
<td>Oral</td>
<td>Juice extracted from boiled leaf is given orally to cure fever.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Leaves are ground to obtain juice and fed for any urinary related problem.</td>
</tr>
<tr>
<td>Aloe vera (L.) Burn.f.</td>
<td>Asphodelaceae</td>
<td>Ghyu kumari</td>
<td>Herb</td>
<td>Leaf</td>
<td>Raw</td>
<td>Dermal</td>
<td>Jelly portion of leaf is rubbed in burn area and cure mastitis.</td>
</tr>
<tr>
<td>Begonia picta Smith L.</td>
<td>Bignoniaceae</td>
<td>Magarkanche</td>
<td>Herb</td>
<td>Root</td>
<td>Infusion</td>
<td>Ocular</td>
<td>Water obtained after infusion of the root is applied to treat conjunctivitis of buffalos.</td>
</tr>
<tr>
<td>Oroxyllum indicum (L.) Kurz</td>
<td>Bignoniaceae</td>
<td>Tatalahlo</td>
<td>Tree</td>
<td>Bark</td>
<td>Powder</td>
<td>Oral</td>
<td>Bark of Oroxyllum indicum (L.) Kurz and Schima wallichii (DC.) Korth. are dried, then ground to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>obtain powder, and fed to cure diarrhea.</td>
</tr>
<tr>
<td>Cynoglossum zeylanicum Thumb. ex. Lehm.</td>
<td>Boraginaceae</td>
<td>Bhere kuro</td>
<td>Herb</td>
<td>Leaf, seed</td>
<td>Paste</td>
<td>Ocular</td>
<td>Powder obtained from dried plant is blown to eye problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Whole plant</td>
<td></td>
<td></td>
<td>Fresh leaves and seeds are ground to make a paste, and fed to cure urinary problem.</td>
</tr>
<tr>
<td>Brassica nigra L.</td>
<td>Brassicaceae</td>
<td>Tori</td>
<td>Herb</td>
<td>Seed</td>
<td>Paste</td>
<td>Dermal</td>
<td>Paste of plant mixed with water and applied to cure skin scabies and wound.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Juice</td>
<td>Oral</td>
<td>The mustard oil is directly fed to cure endoparasite and uterus prolapse.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paste</td>
<td>Dermal</td>
<td>Mustard cake is mixed with maize flour, and fed to increase milk production.</td>
</tr>
<tr>
<td>Botanical Name</td>
<td>Family</td>
<td>Medicinal Part</td>
<td>Form of Use</td>
<td>Route of Administration</td>
<td>Ethnoveterinary Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cannabis sativa L.</td>
<td>Cannabaceae</td>
<td>Herb</td>
<td>Powder</td>
<td>Oral</td>
<td>The mixture of leaf and seed is ground then drenched with water to cure diarrhea, fever, and urinary related problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crataeva unilocularis</td>
<td>Capparaceae</td>
<td>Leaf, stem</td>
<td>Raw</td>
<td>Oral</td>
<td>The grass and edible stem are directly fed to cure endoparasite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carica papaya L.</td>
<td>Caricaceae</td>
<td>Seed</td>
<td>Powder</td>
<td>Oral</td>
<td>Matured dry seeds are crushed to make powder, and given orally to cattle once a day for up to six days against internal parasites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminalia bellirica (Gaertn.)</td>
<td>Combretaceae</td>
<td>Fruit</td>
<td>Powder</td>
<td>Oral</td>
<td>Fresh fruit is given orally to treat diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commelina benghalensis L.</td>
<td>Commelinaceae</td>
<td>Leaf</td>
<td>Paste</td>
<td>Dermal</td>
<td>Paste obtained from leaf is made and applied locally on fresh wounds in animals as antiseptic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artemisia indica L.</td>
<td>Compositae</td>
<td>Leaf, stem</td>
<td>Juice, Decoction</td>
<td>Oral</td>
<td>Leaf and kerosene are crushed to make a juice and applied to cure ectoparasite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tagetes patula L.</td>
<td>Compositae</td>
<td>Root</td>
<td>Paste</td>
<td>Oral</td>
<td>Fresh roots are ground and fed to treat urinary problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuscuta reflexa Roxb.</td>
<td>Convolvulaceae</td>
<td>Stem</td>
<td>Paste</td>
<td>Oral</td>
<td>Stem along with local tomato, ghee, butter, and curd is placed in a copper vessel over a night. It is given orally to cattle against endoparasites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumis sativus L.</td>
<td>Cucurbitaceae</td>
<td>Seed</td>
<td>Powder</td>
<td>Oral</td>
<td>Dried seeds are crushed to make powder and fed by drenching with water to cure urinary problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucurbita maxima DuchesneCucurbitaceae</td>
<td></td>
<td>Fruit</td>
<td>Decoction</td>
<td>Oral</td>
<td>Ripen yellow pumpkin is cooked with cornflour and feed to cure mastitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solena heterophylla Tour.</td>
<td>Cucurbitaceae</td>
<td>Root</td>
<td>Paste</td>
<td>Dermal</td>
<td>The paste prepared from the root is applied to cure mastitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichosanthes cucumerina L.</td>
<td>Cucurbitaceae</td>
<td>Seed</td>
<td>Powder</td>
<td>Oral</td>
<td>The whole plant is considered a nutritious feed, and also used to increase milk production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyperus diiformis L.</td>
<td>Cyperaceae</td>
<td>Root</td>
<td>Raw</td>
<td>Oral</td>
<td>Dried seeds are crushed to make powder and fed by mixing with turmeric to cure endoparasite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dioscorea deltoidea Wall.</td>
<td>Dioscoreaceae</td>
<td>Root</td>
<td>Paste</td>
<td>Oral</td>
<td>The root nodules are crushed and fed to cure any urinary related problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equisetum debile Roxb. ex</td>
<td>Equisetaceae</td>
<td>Stem</td>
<td>Paste</td>
<td>Dermal</td>
<td>Juice obtained from tuber is given twice a day is to treat constipation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaucher</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albizia procera (Roxb.) Benth.</td>
<td>Fabaceae</td>
<td>Bark</td>
<td>Powder</td>
<td>Oral</td>
<td>Dried bark is crushed to make powder, and drenched with water to cure bone related problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bauhinia purpurea L.</td>
<td>Fabaceae</td>
<td>Leaf</td>
<td>Raw</td>
<td>Oral</td>
<td>Oral administrations of leaves as feed to enhance lactation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassia fistula L.</td>
<td>Fabaceae</td>
<td>Bark, seed</td>
<td>Decoction</td>
<td>Dermal</td>
<td>Slightly warm stem bark decoction is used to cure wounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalbergia sissoo Roxb.</td>
<td>Fabaceae</td>
<td>Leaf, Fruit</td>
<td>Juice</td>
<td>Oral</td>
<td>Leaf is crushed to obtain juice, and then mixed with churning curd, and fed to cure diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythrina stricta Roxb.</td>
<td>Fabaceae</td>
<td>Bark</td>
<td>Infusion</td>
<td>Dermal</td>
<td>Bark is soaked in water and applied over the body to treat scabies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lens culinaris Medikus</td>
<td>Fabaceae</td>
<td>Seed</td>
<td>Decoction</td>
<td>Oral</td>
<td>Seeds are cooked with maize flour and given to animal twice a day to increase milk production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mimosa pudica L.</td>
<td>Fabaceae</td>
<td>Herb</td>
<td>Powder</td>
<td>Oral</td>
<td>Fed whole plant to animal as feed to cure uterus prolapse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phanera vahlii (Wight &amp; Arn.)</td>
<td>Fabaceae</td>
<td>Whole plant</td>
<td>Raw</td>
<td>Oral</td>
<td>Dried bark is ground to make powder and fed with honey to treat joint-related problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Family</td>
<td>Part Used</td>
<td>Preparation</td>
<td>Route of Administration</td>
<td>Application</td>
<td></td>
<td></td>
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<td>------------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trigonella foenum-graecum L.</td>
<td>Fabaceae</td>
<td>Herb Seed</td>
<td>Infusion</td>
<td>Oral</td>
<td>Soaked seeds are mixed with cornflour meal, and given orally to cure chronic cough and fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentha arvensis L.</td>
<td>Lamiaceae</td>
<td>Herb Leaf</td>
<td>Decoction</td>
<td>Oral</td>
<td>Mentha arvensis L. and Allium sativum L. are mixed in a ratio of 2:1, and fed after crushing to cure diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocimum tenuiflorum L.</td>
<td>Lamiaceae</td>
<td>Shrub Leaf, flower</td>
<td>Paste Powder</td>
<td>Dermal, Oral</td>
<td>The plant is rubbed into the body of the animal to cure ectoparasite and fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pogostemon benghalensis (Burm. F.) O. Ktze</td>
<td>Lamiaceae</td>
<td>Herb Leaf</td>
<td>Paste Powder</td>
<td>Oral</td>
<td>Leaf and flowers are dried in sun. Powder is prepared by crushing them and fed to cure diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linderia neesiana (Wall. ex Nees) Kurz.</td>
<td>Lauraceae</td>
<td>Tree Fruit</td>
<td>Paste Powder</td>
<td>Dermal</td>
<td>Leaf and flowers are crushed to make a paste, and applied to cure a wound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asparagus racemosus Wild.</td>
<td>Liliaceae</td>
<td>Shrub Root</td>
<td>Paste Powder</td>
<td>Oral</td>
<td>The fruit juice is given to cure any weakness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linum usitatissimum L.</td>
<td>Linaceae</td>
<td>Shrub Seed</td>
<td>Powder</td>
<td>Oral</td>
<td>Tuberous roots are crushed and mixed with cattle feed for any bone related problem and mastitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscum album L.</td>
<td>Loranthaceae</td>
<td>Stem Flower</td>
<td>Juice Powder</td>
<td>Oral</td>
<td>Flower is crushed and fed to cure constipation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abelmoschus esculentus (L.) Moench</td>
<td>Malvaceae</td>
<td>Shrub Root</td>
<td>Paste Powder</td>
<td>Oral, Oral</td>
<td>Root is crushed and fed to cure urinary-related problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bombax ceiba L.</td>
<td>Malvaceae</td>
<td>Tree Flower</td>
<td>Juice Powder</td>
<td>Oral</td>
<td>Flower is crushed and fed to cure constipation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corchorus capsularis L.</td>
<td>Malvaceae</td>
<td>Stem Bark</td>
<td>Bark Paste</td>
<td>Dermal</td>
<td>Powder obtained from bark mixed with powder of pepper and ginger, and then given orally to cure dysentery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osbeckia stellata Buch. Ham ex D. Don.</td>
<td>Malvaceae</td>
<td>Shrub Leaf, fruit</td>
<td>Solid Paste</td>
<td>Dermal</td>
<td>Raw bark is crushed to obtain juice and given to remove the placenta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azadirachta indica A.Juss.</td>
<td>Meliaceae</td>
<td>Tree Leaf, seed</td>
<td>Paste Powder</td>
<td>Oral</td>
<td>The seed is ground with mustard oil, and then applied to treat the wounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melia azedarach L.</td>
<td>Meliaceae</td>
<td>Tree Leaf, seed</td>
<td>Decoction Powder</td>
<td>Dermal</td>
<td>Stem is burned, and obtained ash is mixed with mustard, then fed to treat diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tinospora cordifolia (Thunb.) Miers</td>
<td>Menispermaceae</td>
<td>Climber Stem</td>
<td>Decoction Powder</td>
<td>Oral, Oral</td>
<td>A decoction of the leaf and fruit twice a day is given to domestic animals for any kind of weakness</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paste is made by crushing leaf and applied to cure ectoparasite, and fed to cure wound</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Azadirachta indica A.Juss. , Artemisia indica L. and Melia azedarach L. are taken and cut into pieces, then cooked with cornflour to cure endoparasite</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paste Decoction Powder</td>
<td>Melia azedarach L., Azadirachta indica A.Juss., and Artemisia indica L. are taken and cut into pieces. It is cooked with cornflour then fed to treat endoparasite</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Paste Dermal Powder</td>
<td>Seed and leaf are crushed to make a paste. It is applied to cure wound by mixing with camphor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stem is made into small pieces, then boiled with water and fed to cure chronic cough and constipation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The powder is obtained from dried stem and given orally with water to treat diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Family</td>
<td>Part Used</td>
<td>Form</td>
<td>Method Used</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Artocarpus heterophyllus Lam.</td>
<td>Moraceae</td>
<td>Rukh katar</td>
<td>Tree</td>
<td>Fruit, leaf</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficus religiosa L.</td>
<td>Moraceae</td>
<td>Peepal</td>
<td>Tree</td>
<td>Bark, powder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficus semicordata Buch.-Ham. ex Sm.</td>
<td>Moraceae</td>
<td>Khanyu</td>
<td>Tree</td>
<td>Leaf, raw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morus australis Poir.</td>
<td>Moraceae</td>
<td>Ban kimbu</td>
<td>Tree</td>
<td>Root, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musa x paradisiaca L.</td>
<td>Musaceae</td>
<td>Malvoc Kera</td>
<td>Herb</td>
<td>Fruit, raw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myristica fragrans Houtt.</td>
<td>Myristicaceae</td>
<td>Jaifal</td>
<td>Tree</td>
<td>Seed, powder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraxinus floribunda Wall.</td>
<td>Oleaceae</td>
<td>Lankuri</td>
<td>Tree</td>
<td>Bark, powder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxalis corniculata L.</td>
<td>Oxalidaceae</td>
<td>Chariamilo</td>
<td>Herb</td>
<td>Leaf, juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sesamum indicum L.</td>
<td>Pedaliaceae</td>
<td>Kalo Til</td>
<td>Herb</td>
<td>Seed, powder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phyllanthus emblica L.</td>
<td>Phyllanthaceae</td>
<td>Amala</td>
<td>Tree</td>
<td>Fruit, leaf, latex, juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinus roxburghii Sarg.</td>
<td>Pinaceae</td>
<td>Sallo</td>
<td>Tree</td>
<td>Latex, juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piper nigrum L.</td>
<td>Piperaceae</td>
<td>Marich</td>
<td>Climber</td>
<td>Seed, powder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scoparia dulcis L.</td>
<td>Plantaginaceae</td>
<td>Chini jahr</td>
<td>Herb</td>
<td>Stem, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cynodon dactylon (L.) Pers.</td>
<td>Poaceae</td>
<td>Dubo</td>
<td>Herb</td>
<td>Whole plant, raw, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleusine coracana Gaertn.</td>
<td>Poaceae</td>
<td>Kodho</td>
<td>Herb</td>
<td>Seed, decoction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eulaliopsis binnata (Retz.)</td>
<td>Poaceae</td>
<td>Babio khar</td>
<td>Herb</td>
<td>Whole plant, raw, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hordeum vulgare L.</td>
<td>Poaceae</td>
<td>Jau</td>
<td>Herb</td>
<td>Leaf, juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imperata cylindrical (L.) P. Beav.</td>
<td>Poaceae</td>
<td>Siru</td>
<td>Herb</td>
<td>Root, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saccharum officinarum L.</td>
<td>Poaceae</td>
<td>Ukhlu</td>
<td>Herb</td>
<td>Stem, juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thysanolaena maxima (Roxb.) Kuntz</td>
<td>Poaceae</td>
<td>Amriso</td>
<td>Herb</td>
<td>Leaf, raw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zea mays L.</td>
<td>Poaceae</td>
<td>Makai</td>
<td>Herb</td>
<td>Fruit, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prunus persica (L.) Batsch.</td>
<td>Rosaceae</td>
<td>Aaru</td>
<td>Tree</td>
<td>Leaf, juice, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubus ellipticus Sm.</td>
<td>Rosaceae</td>
<td>Aiselu</td>
<td>Shrub</td>
<td>Leaf, paste</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ripen jackfruit is fed directly, and the fruit core is applied in teats to cure mastitis. Ripen banana is fed to animal for treating endoparasite. Heads of plantain corms are boiled in water to increase milk production. Leaves as fodder are given to livestock twice a day to enhance the lactation. Whole plant is fed to livestock daily to increase milk production. Newly born leaf buds are taken and crushed to make juice. Then it is mixed with camphor and applied when endoparasites are seen. It is also applied to treat wound.
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Family</th>
<th>Part</th>
<th>Use</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aegle marmelos (L.) Corêa</td>
<td>Rutaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Boethinghauensia albiflora (Hook.) Rchb. ex Meissn</td>
<td>Rutaceae</td>
<td>Herb</td>
<td>Seeds are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Citrus limon (L.) Osbeck</td>
<td>Rutaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Citrus medica L.</td>
<td>Rutaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Oxyris wightiana Wall. ex Wight</td>
<td>Santalaceae</td>
<td>Root</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Sapindus mukorossi Gaertn.</td>
<td>Sapotaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Diploenasma butyracea (Roxb.) H.J.Lam</td>
<td>Sapotaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Capsicum annuum L.</td>
<td>Solanaceae</td>
<td>Bark</td>
<td>Bark is ground with water and applied by mixing with camphor to cure the wound</td>
<td>Oral</td>
</tr>
<tr>
<td>Datura metala L.</td>
<td>Solanaceae</td>
<td>Fruits</td>
<td>Fruits are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Solanum lycopersicum L.</td>
<td>Solanaceae</td>
<td>Fruit</td>
<td>Fruits are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Solanum melongena L.</td>
<td>Solanaceae</td>
<td>Fruit</td>
<td>Fruits are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Solanum tuberosum L.</td>
<td>Solanaceae</td>
<td>Stem</td>
<td>Fruits are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Schima wallichii (DC.) Korth.</td>
<td>Theaceae</td>
<td>Leaf</td>
<td>Fruits are roasted on open fire, and fed to treat diarrhea, dysentery and fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Urtica dioica L.</td>
<td>Urticaceae</td>
<td>Leaf</td>
<td>The newly born leaf is crushed and fed to remove the placenta</td>
<td>Oral</td>
</tr>
<tr>
<td>Vitec negundo L.</td>
<td>Verbenaceae</td>
<td>Leaf</td>
<td>Bark of Schima wallichii (DC.) Korth. and Oroxylum indicum (L.) Kurz are dried, ground to obtain powder, and given orally to cure diarrhea. Schima wallichii (DC.) Korth. alone is given to cure endoparasite</td>
<td>Oral</td>
</tr>
<tr>
<td>Ampelocissus divaricata (Wall. ex M.A.Lawson) Planch.</td>
<td>Vitaceae</td>
<td>Leaf</td>
<td>Bark of Schima wallichii (DC.) Korth. and Oroxylum indicum (L.) Kurz are dried, ground to obtain powder, and given orally to cure diarrhea. Schima wallichii (DC.) Korth. alone is given to cure endoparasite</td>
<td>Oral</td>
</tr>
<tr>
<td>Cissus repens Lam.</td>
<td>Vitaceae</td>
<td>Root</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Curcuma longa L.</td>
<td>Zingiberaceae</td>
<td>Leaf</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Elettaria cardamomum (L.) Maton</td>
<td>Zingiberaceae</td>
<td>Seed</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
<tr>
<td>Zingiber officinale Roscoe</td>
<td>Zingiberaceae</td>
<td>Root</td>
<td>The fruit is crushed and made paste to treat fever</td>
<td>Oral</td>
</tr>
</tbody>
</table>
Plant diversity and uses

The present study revealed the ethnoveterinary use of 103 plant species belonging 56 families to cure 21 animal ailments. Mostly, plants were collected by local people from forests, marginal land, grassland, and cultivated fields. Out of 56 families, Fabaceae was found to be dominant with 10 plant species similar to the findings of Acharya et al. (2015). This might be due to its higher abundance in the study area and high bioactivity. Fabaceae was followed by Poaceae (8 species), Rutaceae and Solanaceae (5 species each), Cucurbitaceae and Moraceae (4 species each), Anacardiaceae, Apocynaceae, Lamiaceae, Malvaceae, and Zingiberaceae (3 species each). The remaining 45 families had less than 3 species each. In contrast to our study, Raut and Shrestha (2012) found Liliaceae as a dominating family. This difference in observation might be due to different vegetation of the study area or might be due to differences in traditional beliefs. The list of the ethnoveterinary medicinal plants identified in the study area is shown in Table 2, whereas Families with their number of plant species are shown in Table 3.

Plant parts used and their life forms

It was found that the informants used varieties of plant parts for treating different ailments of animals. However, the most commonly used plant part was leaf (of 32 plant species), followed by seed (of 21 plant species), fruit (of 20 plant species), and bark (of 13 plant species). A study by Malla and Chhetri (2012); Acharya et al. (2015) also found leaf as the most used plant part similar to this present study. A preferred use of leaf might be ease of collection as compared to other plant parts. The leaf is also the center for many physiological processes and contains different metabolites (Tariq et al. 2014). The collection of leaves over other parts have no threat to the survival of the plant (Poffenberger et al. 2010). In contrast to this study, Acharya and Acharya (2010) found maximum use of whole plant whereas maximum use of fruit and seed was found by Raut and Shrestha (2012). The plant parts and the number of plant used reports are provided in Figure 3. In addition to this, the data on the life form of plants indicate that most plant species were herbs (44 species), trees (32 species), shrubs (14 species), and climbers (13 species) (Figure 4). Herbs are available everywhere and easy to collect as compared to other life forms. Herbs were also found to be the prevailing life form in the study by Acharya et al. (2015). It might be due to ease of collection, storage, extraction, and transportation than other life forms. But, in contrast to this study Acharya and Acharya (2010) found climbers as mostly used life form.

Preparation technique and routes of administration

The application of the medicinal plants as the form of paste formulation was observed for 41 plant species while 25 plant species were used as powder formulation followed by Juice (21 species), raw (20 species), decoction (19 species), infusion (5 species), and roasted formulation (3 species). In contrast to this study, juice was the widely used preparation technique in previous studies in other parts of Nepal (Acharya and Acharya 2010; Raut and Shrestha 2012).

Table 3. Taxonomic diversity of medicinal plants

<table>
<thead>
<tr>
<th>Family name</th>
<th>Number of plant species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthaceae</td>
<td>1</td>
</tr>
<tr>
<td>Amaranthaceae</td>
<td>2</td>
</tr>
<tr>
<td>Amaryllidaceae</td>
<td>1</td>
</tr>
<tr>
<td>Anacardiaceae</td>
<td>3</td>
</tr>
<tr>
<td>Apiales</td>
<td>2</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td>3</td>
</tr>
<tr>
<td>Araceae</td>
<td>2</td>
</tr>
<tr>
<td>Asparagaceae</td>
<td>1</td>
</tr>
<tr>
<td>Asphodelaceae</td>
<td>1</td>
</tr>
<tr>
<td>Begoniaceae</td>
<td>1</td>
</tr>
<tr>
<td>Bignoniaceae</td>
<td>1</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>1</td>
</tr>
<tr>
<td>Brassicaceae</td>
<td>1</td>
</tr>
<tr>
<td>Cannabaceae</td>
<td>1</td>
</tr>
<tr>
<td>Capparaceae</td>
<td>1</td>
</tr>
<tr>
<td>Caricaceae</td>
<td>1</td>
</tr>
<tr>
<td>Combretaceae</td>
<td>1</td>
</tr>
<tr>
<td>Commelinaceae</td>
<td>1</td>
</tr>
<tr>
<td>Compositae</td>
<td>2</td>
</tr>
<tr>
<td>Convolvulaceae</td>
<td>1</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td>1</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td>1</td>
</tr>
<tr>
<td>Dioscoreaceae</td>
<td>1</td>
</tr>
<tr>
<td>Equisetaceae</td>
<td>1</td>
</tr>
<tr>
<td>Fabaceae</td>
<td>10</td>
</tr>
<tr>
<td>Lamiaceae</td>
<td>3</td>
</tr>
<tr>
<td>Lauraceae</td>
<td>1</td>
</tr>
<tr>
<td>Liliaceae</td>
<td>1</td>
</tr>
<tr>
<td>Linaceae</td>
<td>1</td>
</tr>
<tr>
<td>Loranthaceae</td>
<td>1</td>
</tr>
<tr>
<td>Malvaceae</td>
<td>3</td>
</tr>
<tr>
<td>Melastomataceae</td>
<td>1</td>
</tr>
<tr>
<td>Meliaceae</td>
<td>2</td>
</tr>
<tr>
<td>Menispermacceae</td>
<td>1</td>
</tr>
<tr>
<td>Moraceae</td>
<td>4</td>
</tr>
<tr>
<td>Musaceae</td>
<td>1</td>
</tr>
<tr>
<td>Myristicaceae</td>
<td>1</td>
</tr>
<tr>
<td>Oleaceae</td>
<td>1</td>
</tr>
<tr>
<td>Oxalidaceae</td>
<td>1</td>
</tr>
<tr>
<td>Pedaliaceae</td>
<td>1</td>
</tr>
<tr>
<td>Phyllanthaceae</td>
<td>1</td>
</tr>
<tr>
<td>Pinaceae</td>
<td>1</td>
</tr>
<tr>
<td>Piperaceae</td>
<td>1</td>
</tr>
<tr>
<td>Plantaginaceae</td>
<td>1</td>
</tr>
<tr>
<td>Poaceae</td>
<td>8</td>
</tr>
<tr>
<td>Rosaceae</td>
<td>2</td>
</tr>
<tr>
<td>Rutaceae</td>
<td>5</td>
</tr>
<tr>
<td>Santalaceae</td>
<td>1</td>
</tr>
<tr>
<td>Sapindaceae</td>
<td>1</td>
</tr>
<tr>
<td>Sapotaceae</td>
<td>1</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>5</td>
</tr>
<tr>
<td>Theaceae</td>
<td>1</td>
</tr>
<tr>
<td>Urticaceae</td>
<td>1</td>
</tr>
<tr>
<td>Verbenaceae</td>
<td>1</td>
</tr>
<tr>
<td>Vitaceae</td>
<td>2</td>
</tr>
<tr>
<td>Zingiberaceae</td>
<td>3</td>
</tr>
</tbody>
</table>
Similarly, different types of vehicles were found to be used for the administration of plant recipes like water, mustard oil, cornflour, curd, and water. Out of them cornflour and water were the most commonly used. The common route of administration was oral, followed by dermal, and ocular. Maximum use of oral route of medication was similar to the findings of Raut and Shrestha (2012). Nasal way of administration was not found in this study. Different preparation techniques and routes of administration with number of plants are shown in Table 4 and Table 5 respectively. Similar to our study, a single plant, as well as a combination of two or more plant species, was used to cure ailments (Acharya et al. 2015).

Informant consensus factor (ICF)

Informant consensus factors of different ailment categories are shown in Table 6. It was found that the ICF values vary from 0.858 to 0.96 with an average value of 0.926. High informant consensus factor was found for reproductive (0.96), followed by respiratory (0.957), gastrointestinal (0.949) while the least was for urinary problems (0.858). The high ICF value for the reproductive category indicated that reproductive ailments are common in the area. Furthermore, three plant species were used for four ailments categories, eight plant species for three ailments categories, twenty-nine plant species for two ailments categories, and sixty-three plant species were used for single ailment category (Figure 5).

Citation frequency (CF%)

The total number of times that all species mentioned was 2450 times (N). The highest citation frequency was found for *Trachyspermum ammi* (L.) Sprague 247 (10.08%) followed by *Myristica fragrans* Houtt. 111 (4.53%), *Sesamum indicum* L. 109 (4.44%), *Saccharum officinarum* L. 107 (4.36%), and *Zea mays* L. 97 (3.95%). The top 20 plant species with the highest citation frequency are provided in Table 7. n refers to the number of times a particular species was mentioned.

Table 6. Informant consensus factor by categories of ailments in the study area

<table>
<thead>
<tr>
<th>Ailment category</th>
<th>Nur</th>
<th>Nt</th>
<th>ICF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproductive</td>
<td>651</td>
<td>27</td>
<td>0.96</td>
</tr>
<tr>
<td>Respiratory</td>
<td>143</td>
<td>7</td>
<td>0.957</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>454</td>
<td>24</td>
<td>0.949</td>
</tr>
<tr>
<td>Antipyretic</td>
<td>148</td>
<td>9</td>
<td>0.946</td>
</tr>
<tr>
<td>Parasitic</td>
<td>385</td>
<td>22</td>
<td>0.945</td>
</tr>
<tr>
<td>General weakness</td>
<td>43</td>
<td>4</td>
<td>0.928</td>
</tr>
<tr>
<td>Eye</td>
<td>98</td>
<td>9</td>
<td>0.917</td>
</tr>
<tr>
<td>Dermatological</td>
<td>329</td>
<td>29</td>
<td>0.914</td>
</tr>
<tr>
<td>Osteological</td>
<td>113</td>
<td>13</td>
<td>0.892</td>
</tr>
<tr>
<td>Urinary problem</td>
<td>86</td>
<td>13</td>
<td>0.858</td>
</tr>
</tbody>
</table>

Table 7. Top 20 medicinal plant species with highest citation frequency

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Local name</th>
<th>n</th>
<th>Cf%</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Trachyspermum ammi</em> (L.) Sprague</td>
<td>Juwano</td>
<td>247</td>
<td>10.08</td>
</tr>
<tr>
<td><em>Myristica fragrans</em> Houtt.</td>
<td>Jaijal</td>
<td>111</td>
<td>4.53</td>
</tr>
<tr>
<td><em>Sesamum indicum</em> L.</td>
<td>Kalo til</td>
<td>109</td>
<td>4.44</td>
</tr>
<tr>
<td><em>Saccharum officinarum</em> L.</td>
<td>Ukhu</td>
<td>107</td>
<td>4.36</td>
</tr>
<tr>
<td><em>Zea mays</em> L.</td>
<td>Makai</td>
<td>97</td>
<td>3.95</td>
</tr>
<tr>
<td><em>Artemisia indica</em> L.</td>
<td>Titepati</td>
<td>95</td>
<td>3.87</td>
</tr>
<tr>
<td><em>Cannabis sativa</em> L.</td>
<td>Ganja</td>
<td>89</td>
<td>3.63</td>
</tr>
<tr>
<td><em>Azadirachta indica</em> A.Juss.</td>
<td>Neem</td>
<td>81</td>
<td>3.30</td>
</tr>
<tr>
<td><em>Solanum melongena</em> L.</td>
<td>Bhenta</td>
<td>80</td>
<td>3.26</td>
</tr>
<tr>
<td><em>Artocarpus heterophyllus</em> Lam.</td>
<td>Rukh katar</td>
<td>77</td>
<td>3.14</td>
</tr>
<tr>
<td><em>Marsdenia tenacissima</em> (Roxb.) Moon</td>
<td>Bilajor</td>
<td>68</td>
<td>2.77</td>
</tr>
<tr>
<td><em>Carica papaya</em> L.</td>
<td>Mewa</td>
<td>64</td>
<td>2.61</td>
</tr>
<tr>
<td><em>Melia azedarach</em> L.</td>
<td>Bakaino</td>
<td>62</td>
<td>2.55</td>
</tr>
<tr>
<td><em>Aloe vera</em> (L.) Burm.f.</td>
<td>Ghyukumari</td>
<td>60</td>
<td>2.44</td>
</tr>
<tr>
<td><em>Curcuma longa</em> L.</td>
<td>Besar</td>
<td>55</td>
<td>2.24</td>
</tr>
<tr>
<td><em>Piper nigrum</em> L.</td>
<td>Marich</td>
<td>47</td>
<td>1.91</td>
</tr>
<tr>
<td><em>Musa x paradisiaca</em> L.</td>
<td>Mailboe kera</td>
<td>41</td>
<td>1.67</td>
</tr>
<tr>
<td><em>Brassica nigra</em> L.</td>
<td>Tori</td>
<td>41</td>
<td>1.67</td>
</tr>
<tr>
<td><em>Trigonella foenum-graecum</em> L.</td>
<td>Methi</td>
<td>39</td>
<td>1.59</td>
</tr>
<tr>
<td><em>Pisum sativum</em> L.</td>
<td>Simi</td>
<td>36</td>
<td>1.46</td>
</tr>
</tbody>
</table>

Table 4. Preparation technique with a number of ethnoveterinary medicinal plants identified in the study area

<table>
<thead>
<tr>
<th>Preparation technique</th>
<th>Number of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paste</td>
<td>41</td>
</tr>
<tr>
<td>Powder</td>
<td>25</td>
</tr>
<tr>
<td>Juice</td>
<td>21</td>
</tr>
<tr>
<td>Raw</td>
<td>20</td>
</tr>
<tr>
<td>Decoction</td>
<td>19</td>
</tr>
<tr>
<td>Infusion</td>
<td>5</td>
</tr>
<tr>
<td>Roast</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5. Routes of administration of the ethnoveterinary medicinal plants identified in the study area

<table>
<thead>
<tr>
<th>Route</th>
<th>Number of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>76</td>
</tr>
<tr>
<td>Dermal</td>
<td>41</td>
</tr>
<tr>
<td>Ocular</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 3. Different plant parts used
In conclusion, traditional medicine is widely practiced by the people of Chhatradev Rural Municipality, Arghakhanchi district as it has become a part of social life and culture, and modern medicine implies a higher cost. People are dependent on the locally available indigenous plant species for the treatment of animals. As the people of younger generations are not acquainted with the knowledge on the use of medicinal plants, the actions should be taken for the documentation of uses of plants, to save the knowledge of ethnoveterinary medicinal plants from generation to generation, and increase the interest of young generation for the study of ethnoveterinary medicinal plants. It is of utmost necessity to involve the community in preserving and rational use of medicinal plants at the local level. Conservation programs should be done from the government level, and study on the use of medicinal plants as well as animals for treating animal diseases is recommended to a bigger extent.

ACKNOWLEDGEMENTS

We would like to thank Dr. Subodh Khanal for his guidance, and help during the preparation of the manuscript. We are indebted to all the respondents for sharing their indigenous knowledge and cooperation during the fieldwork.

REFERENCES


Figure 4. Life form of medicinal plants

Figure 5. Number of plant species used for number of ailment categories