

A Survey on Ethnoveterinary Medicines used by the Tribal Peoples of Kalasapadi Hills, Dharmapuri District of Tamil Nadu

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ABSTRACT

Objective: This study aims at providing a comprehensive documentation on ethnoveterinary plant knowledge of the tribal people in order to preserve the fast-eroding knowledge and resources of the kalasapadi hills, Pappireddipatti revenue Tk, Dharmapuri.

Methods: Field work was conducted from 2015–2016. Moreover 36 informants were interviewed. First, successive oral free listing and semi-structured interviews were performed. The veterinary diseases as described by the informants were categorized according to the symptoms they cause and the organs they affect. Information on the cited plants, informant consensus factor (ICF) and fidelity level (FL) was calculated based on use reports.

Results: Utilization of 49 plant species, belonging to 30 genera under 31 families, has been recorded against livestock ailments. Plant parts, such as leaf, root, flower, bark, resin, and rhizome, are used in the preparation. Among the plant parts, bark is predominately used. Most of the preparations include parts of more than one plant as the ingredients, and many of such combined preparations are used for treating more than one ailment.

Conclusion: According to the local people, the most often mentioned species have high medicinal potential. At the same time the comprehensive pharmacological investigations of the herbal plants will be helpful in development of new drugs for a particular condition. There is a need to conserve the

knowledge of medicinal plant use in the Kalasapadi hills for future generations and to incorporate it into existing livestock health care services.

Keywords: *Ethno-veterinary medicine, Malayali tribes, Livestock, Kalasapadi, Kalrayan hills.*

1. Introduction:

India is rich in plant diversity and possesses almost 7% of the world's flowering plants. The Eastern Ghats of India are endowed with an extensively rich variety of biological species, geographical formations, and diverse ethnic tribes. Ethnomedicinal studies in the Eastern Ghats of Tamil Nadu have been carried out previously by a number of researchers [1, 2]. There is abundant undocumented traditional knowledge of herbal remedies used to treat animal diseases in most cultures [3]. Indian therapeutic system adopted observations and rational procedures by the end of the Vedic era. This led to the foundations of a new medicinal system known as Ayurveda. The knowledge formed the basis for veterinary medicine [4]. In India, ancient literature such as the Vedas, and other written scriptures like Scand Puran (2350 BC), Cherak and shusrutha (2500-600 BC), have long documented the treatment of animal disease by using medicinal plants [5,6] The uses of a protective ointment for human beings, cows and horses have been documented in the Atharva Veda (IV, 9, 2) [7]. Traditional ethnoveterinary medicine (EVM) prepared by humans, for the purposes of maintaining or

restoring animal health, plays a significant role in several regions of the world especially in areas where cattle is a major source of income for rural peoples [8]. In certain areas, these folk medical prescriptions are endemic and have survived throughout ages from one generation to the next throughout spiritual word of mouth. They do not exist as written knowledge. Indigenous people developed this knowledge through practical experience and skill to solve the problems that they faced on day to day activity [9, 10]. The treatment of animal diseases often parallels the treatment of human illness, as do the fundamental concepts [11] and the similar therapeutic plants may be used for both, humans and animals [12]. Especially in mountainous and high elevation areas, cattle is very important for local economies, food and social security, and is often a symbol of prestige [13, 14]. Livelihood strategies of rural people heavily depend on livestock farming, particularly in developing countries [15]. Livestock plays a vital role in (Indian) farmer's life. It gives manure, fuel, milk and meat, etc and also generates rural economy and rural employment. Farmers take care of their livestock using EVM. These medicines are cheaper than western drug [16, 17]. According to [18], we also determined the frequency index (FI), informant consensus factor (ICF) of the ethno-veterinary diseases and use-value of the plant species. Cattle are considered as the wealth of the tribal people, and their well-being is considered to be very important [19]. As the tribal people are enriched with traditional ethno-veterinary knowledge, the forest resources in their surroundings play a very significant role in their routine life [20], and medicinal plants are the chief source for the primary health-care services of such rural population [21]. Ethno-veterinary medicine (EVM) is defined as the traditional animal healthcare which comprises the folk knowledge, beliefs, practices, skills, methods, and practices pertaining to health care of animals [22, 23]. As the villagers around the globe are having limited access to modern medicine, they strictly depend on the traditional medicine for the health care of livestock. Regrettably, these practices are not properly documented and largely lost because they are passed on generation through verbal communication and dilution due to lack of observation and technical skills. EVM contributes in the management of animal diseases in a cost-effective manner but unfortunately research works, which prove the pharmaceutical efficiency of plants, have not been done so far, or a very little research work has been done [24]. It is an established

fact that plants serve as potent medicines for curing various diseases of the tribal community as well as their livestock [25]. As 80% of populations from the developed countries are depend on traditional medicine prepared from the medicinal plants, it is necessary to investigate them for understanding their properties, safety, and their efficacy [26]. Keeping this in view, the present study was initiated to explore plants utilized for ethnoveterinary health care and document the traditional veterinary medicinal knowledge of Kalasapadi hills *Malayali* tribes.

2. MATERIALS AND METHODS

2.1 Study area

The present study area was conducted among the Kalasapadi hamlets, west part of the Kalrayan hills in Pappireddipatti block of Dharmapuri district, Tamil Nadu, India (Fig. 1). The total extends of Pappireddipatti taluk (Sub-district) is 788.3 Sq. km (Statistical handbook-2007-08). Kalasapadi is located at 11° 54' and 48 66" N latitude and 78° 29' and 12 36" E longitudes and altitude varies from 252 to 3783 ft (etrex 20-Germin) the highest peak (Bootu malai) of the hills is 1153 meters above mean sea level. The average annual rainfall ranges from 783.97 to 1582.20 mm, and the temperature varies from 25°C to 35°C. Vegetation of Kalrayan hills is semi-deciduous to scrub forests where sandal wood grows naturally along with other dominant species like teak and bamboo. Indigenous species like *Terminalia chebula*, *Pterocarpus marsupium* and *Dalbergia latifolia* also found abundant in this region [27].

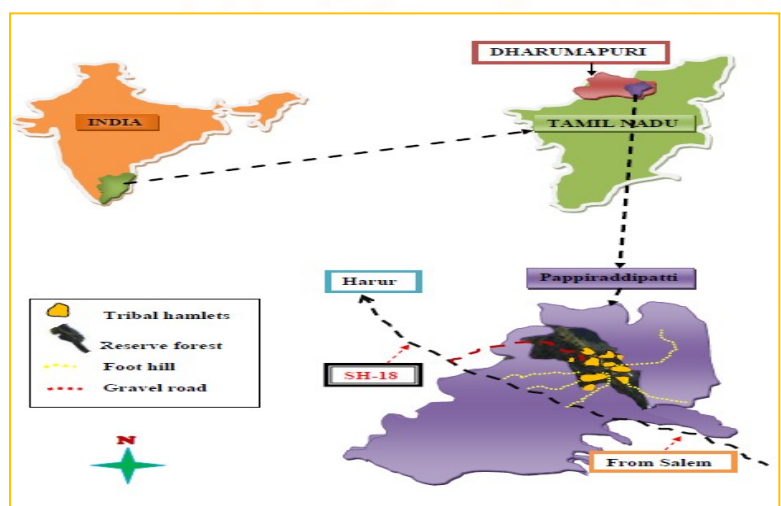


Fig 1: Location map of study area

2.2 Tribal community

Native tribal people of Karayan hills are called *Malayali* (lit. Malai = hill; alu = inhabit) [28], their language has been formed by the place where they stayed [1]. The native people of the Kalrayans were called as *Vedar* (Hunter). The warriors belonging to *Karalar* community had invaded from Kanchipuram district and settled in Kalrayan hills. The mixed population of *Karalar* and *Vedar* communities presently called *Malayali* and they call themselves as *malayala goundars* [29]. Some of them are farmers and remaining People depend on works interrelated with agriculture and involved in livestock keeping, poultries, collection of honey, bee wax, and other minor forest products [30].

2.3 Data Collection

A systematic and extensive ethno veterinary medicine survey was carried out in Kalasapadi hills during Jan 2015 to March 2016 following the standard protocols for the collection of ethno- botanical data [31, 32]. Ethno veterinary information and EVM importance of plants were collected from traditional healers, aged persons, and farmers having familiarity and knowledge with plants by following standard methods such as personal interviews, discussions, and field observations through regular field visits to various hamlets. The information on EVM was cross verified by the communication with traditional healers and other knowledgeable persons, elders, farmers, livestock owners, informants residing in nearby area. The plants of EVM interest were identified and verified with standard flora available [33, 34] and the voucher specimens were deposited in Department of Botany, Periyar University, Salem. EVM plants enumerated according to the ailments cured in alphabetical sequence of the botanical name in each ailment with vernacular name followed by family, plant part used, mode of preparation, administration, and dosage required.

2.4 Data analysis

The informant or respondent consensus factor (FIC) (Table. 3) was calculated to estimate user variability of medicinal plants [35, 36]. FIC values range from 0.00 to 1.00. High FIC values are obtained when only one or a few plant species are reported to be used by a high proportion of informants to treat a particular ailment, whereas low FIC values indicate that informants disagree over which plant to use [35].

High FIC values can thus be used to pinpoint particularly interesting species for the search of bioactive compounds [36]. FIC is calculated using the following formula [37]. Most frequently used plants for different ailment categories based on maximum FL (%) in each ailment category

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

Where Np = number of informants that claim a use of a plant species to treat a particular disease; N = number of informants that use the plants as a medicine to treat any given disease [31]. Informant consensus factor the informant consensus factor (FIC) was used to see if there was agreement in the use of plants in the ailment categories between the plant users in the study area. The FIC was calculated using the following formula [35]. Where Nur refers to the number of use-reports for a particular ailment category and Nt refers to the number of taxa used for a particular ailment category by all informants. The product of this factor ranges from 0 to 1. A high value (close to 1.0) indicates that relatively few taxa are used by a large proportion of the informants. A low value indicates that the informants disagree on the taxa to be used in the treatment within a category of illness. Where Nur is the number of individual plant use reports for a particular illness category, and Nt is the total number of species used by all informants for this illness category. The fidelity level (FL) The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported and men, and among respondents [38]. The women learn from their mothers or fathers through routine observations while their fathers' teach the man, in addition to routine observations, since the traditional knowledge in the family or community is passed from male parent to his first-born son [39]. Categories of ailments and informant consensus factor (FIC) for each category

Where, Nur = number of use reports from informants for a particular plant-use category; Nt = number of taxa or species that are used for that plant use category for all informants.

$$F_{ic} = \frac{Nur - Nt}{Nur - 1}$$

3. RESULTS

The traditional knowledge of tribal communities of Kalasapadi, west part of the Kalrayan hills, Eastern Ghats of India had high ethno veterinary importance. People utilized numerous plants and their various parts. Apart from the various plant parts, healers use certain animal products as the ingredients in the medicaments such as pig ghee, egg white yolk, cow dung, cow milk, goat milk, buttermilk, animal flesh, and children's urine. Describes the plants used by its diseases followed by botanical name which it belongs to family name, traditional name, life form, parts use, mode of preparation, other ingredients, route of administration, dosage and duration of treatment methods of preparation and dosage by farmers, and validity scores as per prepared questionnaire. The present study revealed 49 plant species belonging to 30 genera and 31 families commonly (Table.1).

The plant species used are commonly available in the region and play special role in veterinary medicine. Various animal conditions were identified in the study area. The present study highlights the EVM

knowledge and practices found among the tribes of Kalasapadi hills of the study area. Through the discussion with the native people, we understand the population of cattle has been reduced in the study area. The main factor for this decrease is the profligate returns due to the low productivity and replacement of livestock in the agricultural practices by the machinery. Most of the tribes are aware of the traditional EVM system, but all of them are not practically using them. During the study, we came across the traditional knowledge of *Malayali* tribes of Kalasapadi hills on EVM.

3.1. Habit and habitat of medicinal plants

Nearly all of the medicinal plants (Fig. 2) were collected from the wild (89%) and others were from dwelling gardens(11%), the habit of the medicinal plants indicated that most of them trees and shrubs dominate with (57.14%), species followed by herbs (26.53%), climbers (14.28%), and Prostrate herb (2.04%).

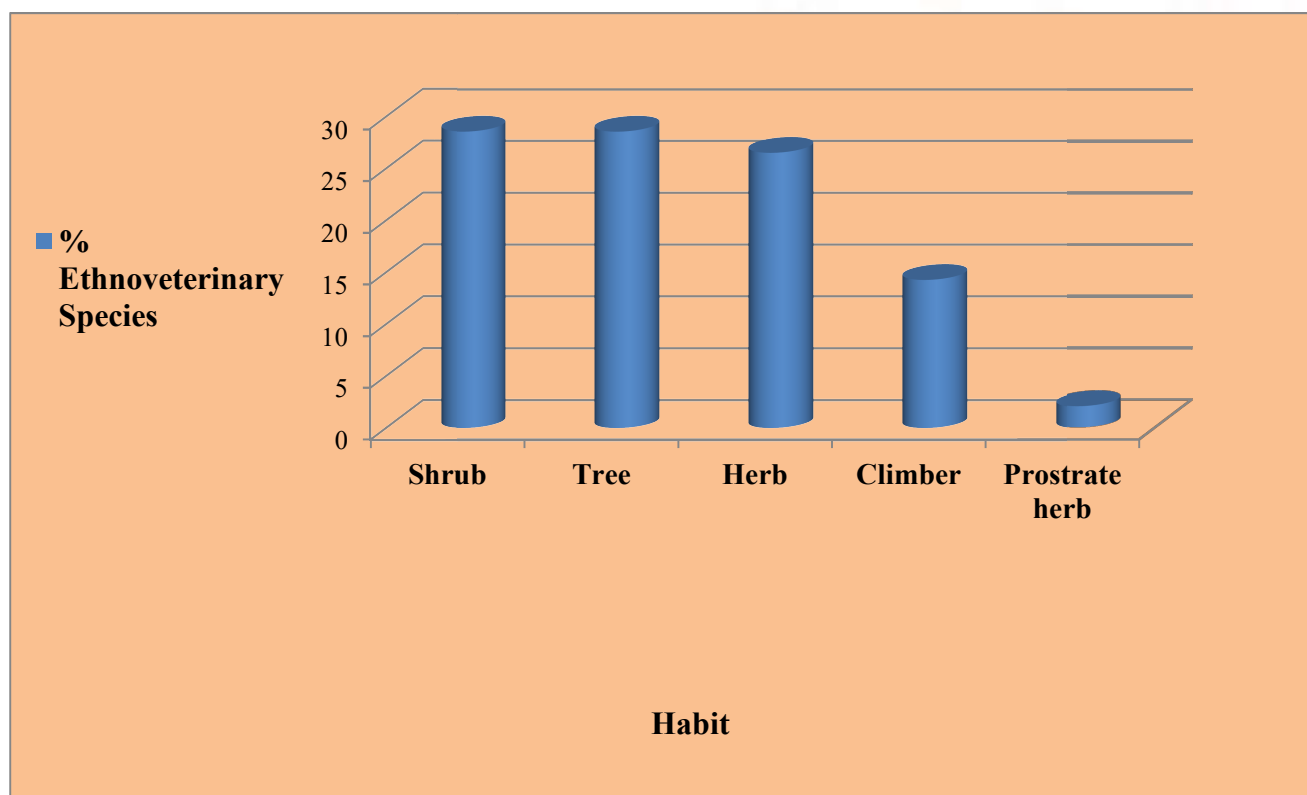


Fig 2: Habit

Table 1: List of Disease and medicinal plants used by local Malayali Tribales in Kalasapadi hills

Diseases	Botanical name	Family	Traditional name	Life form	parts use	Mode of Preparation	Other ingredients	Route of administration, dosage and duration of treatment
Dysentery with blood (Rathakalichal)	Carmona retusa	Boraginaceae	Kurangu vethalai	Shrub	Leaf	Paste	butter milk	3 tender leaves of each plant are ground together and paste into a Lemon juice and add to a butter milk is given orally twice a day for 3 or 4 days or up to cure.
	Cassia auriculata	Fabaceae	Avaram	Shrub	Leaf	Paste	butter milk	
	Flueggea leucopyrus	phyllanthaceae	Vara poola	Shrub	Leaf	Paste	butter milk	
Mastitis (blood in milk)	Asparagus rescemosus	Lillieaceae	Thanner vettan khilangu	climber	Root tuber	Paste	-	Root and leaf crused, in paste from these are externally applied on the infected area.
	Evolvulus alsinoides(linn)	Convolvulaceae	Ushnaganthi	Herb	Leaf	Paste	-	
	Kleinia grandiflora (Wall.ex)	Asteraceae	Nainaakuelai	shrub	Leaf	Paste	-	Leaves and Curcuma longa (Fresh rhizome) are crused, mixed with Ricinus communis oil and are externally used to cure Mastitis.
	Curcuma longa L.,	Zingiberaceae	Manjal	Herb	Rhizome	Paste	-	
Fever (kunthu)	Cadaba fruticosa (L.)Druce	Capparaceae	Mullu ellamolagar anai	shrub	Leaf	Paste	Hot water	3 tender leaves of each plant are ground together and paste and add 5 pepper (milagu) and (vellaipoondu)Allium sativam at
	Toddalia asiatica (L.)Lam	Rutaceae	Mullu molagaranai	shrub	Leaf	Paste	Hot water	
	Calotropis gigantea (L.) W.T.Aiton	Asclepiadaceae	Earukku	Shrub	Leaf	Paste	Hot water	

								bearable heat decoction is administered orally two or three tumbler for 1 or 2 days in the morning and evening.
Parturition (Delivery problems and release of retained placenta)	Grewia asiatica	Tiliaceae	Thadasa maram	Tree	Leaf	Raw	-	20-25 leaves are given the feed orally at the time of delivery which regulates the proper elimination of placenta.
	Bauhinia recemosa	Fabaceae	Sitathi	Tree	Leaf	Raw	-	
Dog bite	Achyranthes aspera Linn.	Amaranthaceae	Nayuruvi	Herb	Whole plant	Juice	Slaked lime	Slaked limes with Nayuruvi leaf like juice are exteranally applied on the infected area. Tender twig latex applies for externally.
	Calotropis procera A.	Asclepiadaceae	Vella earukku	Shrub	Latex	latex	-	
Eye wounds due to stick injuries (kuchi kannil kuthuthal)	Borassus flabellifer L.	Areceae	Panai	Tree	Leaf petiole	Juice	Salt	Borassus flabellifer leaf petiole and heating are taken in equal amount of salt pound and juice is applied externally as drops in eyes through white cloth 2 or 3 times up to cure. Oil is applied externally as drops in eyes through finger 2 or 3 times up to cure.
	Ricinus communis L	Euphorbiaceae	Muthu kottai	Shrub	Seed	oil	-	
	Decalepis hamiltonii	Dioscoreaceae	Peru maviligam	Climber	Root	Paste	-	Fresh root

Lactation (Milk yielding)	wight&Arm Henidesmus indicus(L).R.Br	Asclepiadaceae	Serumaviligam	Climber	Root	Paste	-	grain Fresh root used as fodder to increase lactation. Fresh root grain Fresh root used as fodder to increase lactation.
Feeding problem (Theevanam utkollamai)	Cissus quadrangularis L.	Vitaceae	Perandai	Climber	Stem	Paste	-	Stem half paste and ordinary salt is applied in tongue externally.
	<i>Caralluma umbellata</i> Haw.	Asclepiadaceae	Kallu Mulaiyan	Herb	Stem	Paste	Salt	
Snake bite	Andrographis lineate Wall.	Acanthaceae	Periyanganai	Herb	Leaf	Decoction	Hot water	Each three plant dry power with Hot water and administered orally (sooranum) and 4 or 5 pepper are taken internally cure snake bite.
	Andrographis paniculata(Burm.F.)	Acanthaceae	Siriyanganai	Herb	Leaf	Decoction	Hot water	
	Aristolochia bracteolate Lam.	Aristolochiaceae	Aaduthinda paalai	Herb	Leaf	Decoction	Hot water	
Sprain(sulukku pidithal)	Ricinus communis L	Euphorbiaceae	Muthukottai	Shrub	seed	oil	-	Oil is applied externally as drops in eyes through finger 2 or 3 times up to cure Make into a paste apply on the skin for Sprain.
	Eleusine coracana Gaertn.	Poaceae	Aarium(keveru)	Herb	Grains	powder	Hot water	
Wound (Thorns in legs)	<i>Calotropis gigantea</i> (L.) W.T.Aiton	Asclepiadaceae	Earukku	Shrub	Latex	Raw	-	Tender twig latex apply for externally
	<i>Cleistanthus collinus</i> (Roxb.)	Euphorbiaceae	Oduvanthala	Tree	Leaf	Paste	-	Leaf paste applying for externally

	Hook.f.							wounded area.
Wounds and injuries	Evolvulus alsinoides (Linn.)	Convolvulaceae	Uishnaganthi	climber	Leaf	paste	Slaked lime	Leaf paste and (slaked lime) applied on the Wound part externally.
	Lantana camera.L	Verbenaceae	Uni mul	shrub	Leaf	paste	Slaked lime	
Yoke gal (kaluthu katti)	Coccinia indica Wight&Arn.	Cucurbitaceae	Kovai kodi	Climber	Leaf	Juice	Salt	Leaf juice and salt applied On externally.
	Perularia extensa (jacq.)N.E.Br	Asclepiadaceae	Veliparuthi	climber	Leaf	Juice	Salt	
Cancer (puthu kattigal)	Endostemon viscosus (Roth)M.R.Ashby	Lamiaceae	Kaayapathini	Herb	Leaf	Paste	-	Leaf grind well into paste mixed with salt and apply externally Root bark exudates are applied externally.
	Hardwickia binata Roxb	Fabaceae	Aachaa	Tree	Root Bark	paste	-	
Animal uniformity	Begonia Sp.,	Begoniaceae	Orukai thalai	Herb	Leaf	Juice	Water	Cattles are always in groups the won disturbed other animals.
	Peperomia blanda (Jacq.)	Piperaceae	Sangalapoondu	Herb	Leaf	juice	Water	
Mesmerism (vasiyam)	<i>Mimosa pudica</i> L.	Mimosaceae	Thotta Sinungi	Herb	Leaf	Paste	-	Hole plant crushed and mixed the coconut oil apply the animal.
	Drosera burmannii vahl	Droseraceae	Alukanni	Prostrate herb	Whole plant	Paste	-	
Bone fracture (Ealumbu murivu)	<i>Albizia procera</i> Benth.	Fabaceae	Kudumaduri	Tree	Bark	Paste	Egg(naakukholi)	Albizia procera or <i>Artocarpus hirsutus</i> bark are grind well with egg white yolk and made into solid paste Paste is applied externally on the area up to cure.
	<i>Artocarpus hirsutus</i> Lam.	Moraceae	Kattu Pala	Tree	Bark	Paste		

Sokku (Spiritual)	<i>Calotropis gigantea</i>	Asclepiadaceae	Erukku	Shrub	-	-	Soil	We have to collect soil near the roots of <i>Calotropis gigantea</i> and round that plant three times. Fruit are used in internal 500 ml. Spiritual.
	<i>Tamarindus indica</i> L.	Caesalpinaceae	Puli	Tree	Fruit	Paste	Water	
Komari (foot and mouth disease)	<i>Musa paradisiaca</i> L.	Musaceae	Monthan Valai	Tree	Fruit	-	pig ghee	Two or three fruits are longitudinally split into two and pig ghee is placed in the split. Given orally in mornings for 3-5 days, which ensures the speedy recovery from pain and wounds
	<i>Limonia acidissima</i> L.	Rutaceae	Vila	Tree	Fruit	-	pig ghee	
Anorexia (Thiruttu Noi)	<i>Capsicum annum</i> L.	Solanaceae	Milalai	Shrub	Fruit	Decoction	Hot water	Plant parts are pounded in stone mortar. Mixed with Hot water and Decoction is administered orally once in a day for ½ lit (1-kottum) up to cure.
	<i>Dalbergia latifolia</i> Roxb.	Fabaceae	Eeti	Tree	Bark	Decoction	Hot water	
All ill health Problems	<i>Cassia fistula</i> L.	Caesalpinaceae	Konnai	Tree	Bark	Decoction	Hot water	All bark materials are grind well. Leaf materials are ground well with <i>Allium cepa</i> , <i>Piper nigrum</i> separately and
	<i>Clausena anisata</i> (Willd.) Hook.f.	Rutaceae	Thappattai chedi	Herb	Bark	Decoction	Hot water	
		Fabaceae	Kundasa maram	Tree	Bark	Decoction	Hot water	
				Tree		Decoction	Hot water	

<i>Dalbergia latifolia</i> Roxb.	Ebenaceae	Vekkana		Bark			mixed with the bark materials decoction is administered orally about one tumler (kottum) day for 3-5 days every day in the morning
<i>Diospyros montana</i> Roxb							

Table 2: Fidelity level (FL)

S. No	Botanical name	Ailment categories	Citation for particular disease (Use-report)	Fidelity level (%)
1	<i>Cassia auriculata</i>	Dysentery with blood	29	80.00
2	<i>Cissus quadrangularis</i>	Feeding problem	24	66.66
3	<i>Musa paradisiacal</i>	Foot and mouth disease	23	63.88
4	<i>Evolvulus alsinoides</i>	Wounds and injuries	22	61.11
5	<i>Andrographis paniculata</i>	Snake bit	19	52.77
6	<i>Cassia fistula</i>	All ill health problems	18	50.00
7	<i>Alibizia procera</i>	Bone fracture	17	47.22
8	<i>Cleistanthus collinus</i>	Wound	16	44.44
9	<i>Grewia asiatica</i>	Delivery problems	15	41.66
10	<i>Capsicum annum</i>	Type of fever	14	38.88
11	<i>Kielinia grandiflora</i>	Mastitis	13	36.11
12	<i>Toddalia asiatica</i>	Fever	12	33.03
13	<i>Endostemon viscosus</i>	Cancer	11	30.55
14	<i>Drosera burmannii</i>	Mesmerism	10	27.77
15	<i>Achyranthus aspera</i>	Dog bite	09	25.00
16	<i>Tamarindus indica</i>	Faint	08	22.22
17	<i>Coccinia indica</i>	Yoke gal	07	19.44
18	<i>Decalepis hamiltonii</i>	Lacation	06	16.66
19	<i>Eleasine coracana</i>	Sprain	05	13.88
20	<i>Peperomia dindigulensis</i>	Animal uni	04	11.11
21	<i>Borasuss flabellifer</i>	Eye wound due to stick injuries	03	08.33

Table 3: Informant consensus factor

S. No	Use categories	Number of taxa (Nt)	Number of use report (Nur)	Consensus factor
01	Yoke gal	2	07	0.83
02	Wounds and injuries	2	15	0.92
03	Wound	2	16	0.09
04	Sprain	2	05	0.75
05	Faint	2	08	0.85
06	Parturition	2	15	0.92
07	Mesmerism	2	10	0.88
08	Lactation	2	06	0.08
09	Foot and mouth disease	2	23	0.95
10	Feeding problem	2	08	0.85
11	Eye wounds	2	03	0.05
12	Dog bite	2	09	0.87
13	Cancer	2	04	0.66
14	Bone fracture	2	14	0.92
15	Anorexia	2	14	0.92
16	Animal uniformity	2	04	0.06
17	Snake bite	3	09	0.75
18	Fever	3	12	0.81
19	Dysentery with blood	3	18	0.89
20	Mastitis	4	08	0.57
21	All ill health Problems	4	17	0.81

3.2 Plants families and percentage of plats at study area

Plants used for EVM come under 31 families. Among them Asclepiadaceae, (7 species), predominate all other families followed by Fabaceae, (6 species), Euphorbiaceae. Rutaceae (3 species), Remaining families are represented by single or two species (Fig. 3). Most of the plants are having multiple usages, i.e., used in treating more than one ailment. *Curcuma longa L* and *Ricinus communis* are added in four herbal preparations.

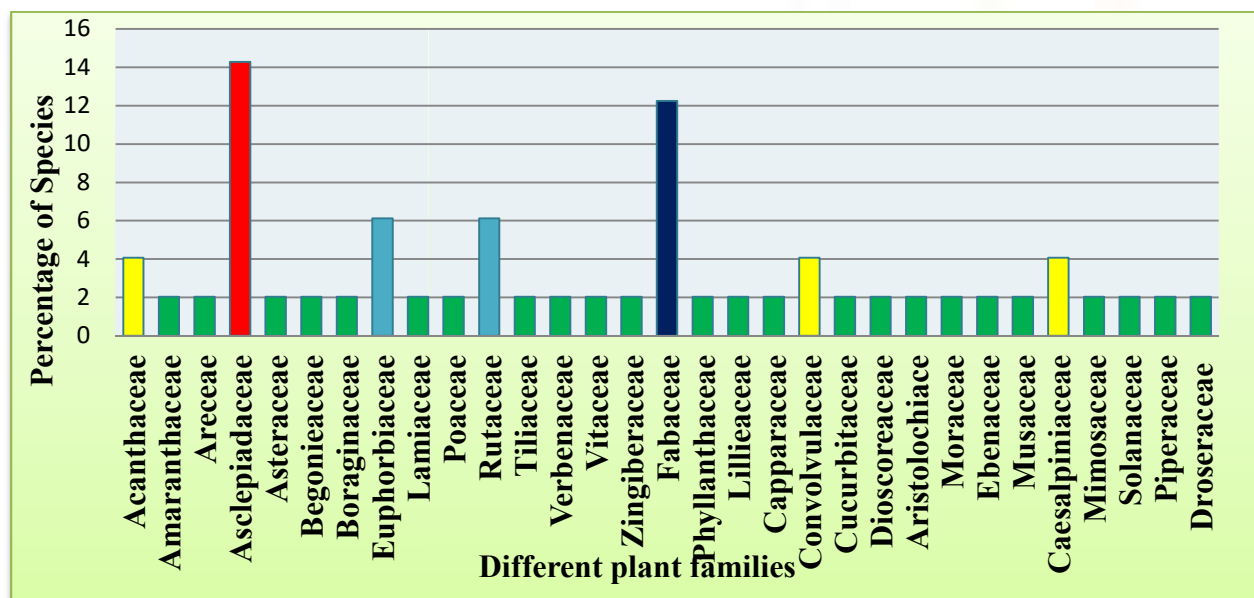


Fig 3: Representation of the families and percentage of plants at study area

3.3 Plant parts used

The traditional healers of the Kalasapadi hills use various plant parts such as stem, leaf, bark, latex, oil, resin, fruit, seeds, root, rhizome, whole plant, and by-products of the plants for various medicaments. Utility value of the Leaves predominates (22) all other parts followed by Barks (7), fruits (4), root (3), stem (17), entire plant and rhizome (8 in each), by-products of the plants (7), latex and tender parts (3 in each), flower and thorn (2 in each), and resin (1). In 12 preparations, more than one part of the same plant is used. (Fig. 5)

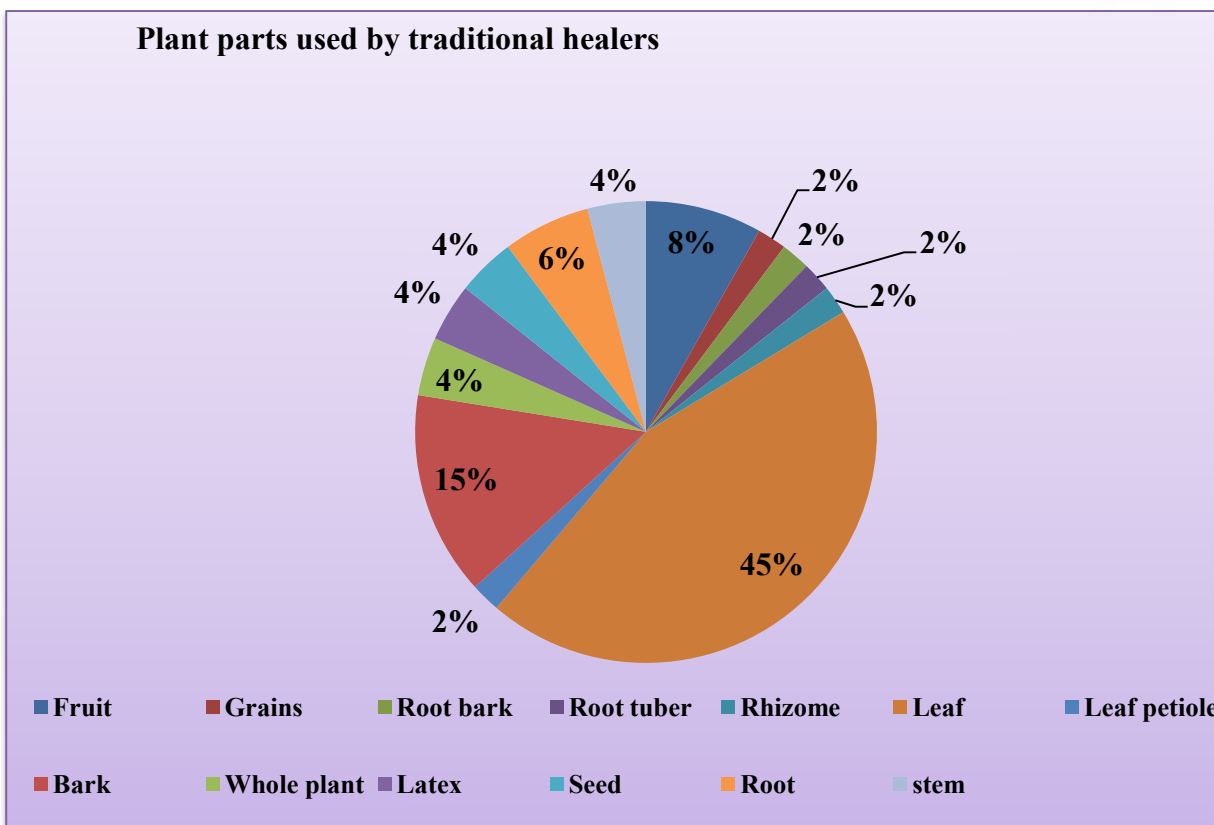


Fig 4: plants parts used by traditional healers

3.4. Mode of preparation and administration

As most of the traditional healers are illiterate, the knowledge on the mode of preparation and dosage of the drugs are learnt only through the long experience of the healer. For the EV health-care treatments, the native people use different methods of herbal preparations and administrations. Paste, juice, fresh parts as such and decoction are the methods commonly practiced in the study area for the preparation of EVM. In addition, some preparations include smoke or vapor forms through fumigation, processing of materials by boiling, using plant oils or soaking in water (Fig. 5). In some cases, more than one mode of preparations is also carried out.

Mode of administration also varies depends on the disease and materials used. In general, the medicines are administrated by following three types, viz., oral, external, and nasal. Oral administration is

predominately used in preparations followed by external applications (52 preparations), which include administration in eyes, ears, *othadam* (fomentation), and fumigation process. For the control of ectoparasites, cattle sheds are fumigated regularly with dried and fresh foliages to reduce the insect pests such as ticks, mites, flies, and mosquitoes. In three preparations, both oral and external administrations are carried out and in two spiritual aspects herbal plants or preparations are not administered in any of the three modes. In the case of treating “*Kunthu*,” materials are taken along with all ingredients in small quantities and pounded in *Kal Ural* (stone mortar). The paste material of an orange size is taken in a white cloth, and this preparation is dipped in urine of children below 10 years of age kept in a cup or tumbler. In the unavailability of urine, hot water is also used. However, urine is preferred for the effective treatment. Then, the preparation is taken up

from the cup and extract oozing from the preparation through the cloth is administered as drops in ears, eyes, and nostrils for three times in both sides. Finally, solid material remained in the cloth is administered orally. It is done in early hours or in the evening hours only. This entire process is called as “*Nasiam vetuthal*,” and it is continued for 2-3 days or up to cure. In some health problems, the herbal treatment is connected with spiritual aspects. For the processing of the herbal materials, they are using mud pots only and during the preparation, they never keep the utensils or medicinal plants directly in the ground. They hope that this practice may reduce the efficacy of the drug. Some of the preparations are carried out only in specific days such as Tuesdays, Sundays, or in *Amavasai* (no moon days) and can be used after 6 months only. For the treatment of udder inflammations, bloating, poison bites, and throat swellings, certain plants are used for the purpose of chanting sacred words to recover from ill health by holding the plant parts by the healers and this process is known as “*Paadam Poduthal*” (Chanting *Manthra* to recover from ill health). In 1 L of boiled juice,

about 500 g of *Eleusine coracana* flour is added and mixed well while care must be taken to avoid the formation of any solid material. This preparation is boiled for 15 minutes until it becomes gel. This processed material is allowed to cool down and it is directly applied at bearable heat on the sprain area and left for 3 days without washing. It will be followed for 3 to 5 times at 3 days of interval. The same procedure can be followed to cure rheumatic swellings in human beings also. For the treatment of the same disease, *Artocarpus hirsutus* bark powder is also used instead of *E. coracana* in another preparation. Apart from the various ill health problems, they are protecting their mobile wealth through some general health management practices such as post-natal care of animals, protection from ecto- and endo-parasitic infections, laziness in feeding, low lactation problems, use of antiseptics, and care for insect bites. For the post-natal care, they treat animals consecutively from 2 to 21 days after delivery. The details of plants used for the treatment of various EV ailments, their preparations, administration, and dosages are given in (Table 2).

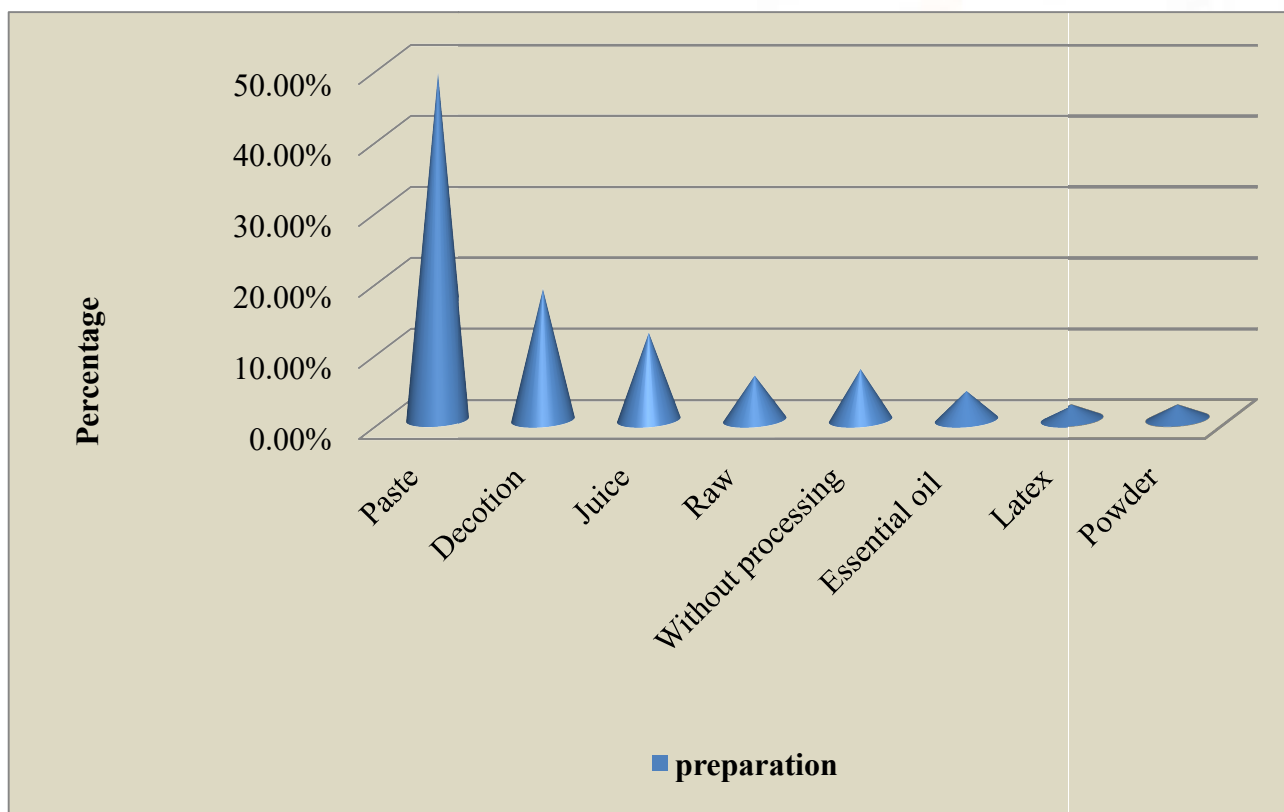


Fig. 5: Mode of preparation and administration

3.6 Preservatives

Due to the seasonal availability of certain plants, there are some limitations in the practice of EVM. For which, traditional healers are preserving the preparations using certain preservatives, or they follow some procedures to preserve them for off-season uses. For the preservation of their preparations, the healers are using six plant species as ingredients, namely, *Allium sativum*, *Cuminum cyminum*, *Papaver somniferum* and *Piper nigrum*. These plants are used as ingredients, both for their medicinal values and also for their preservative properties. These plants can be gathered from wild or collected from cultivation. Preparation of herbal drugs in no moon days or in fresh mud pots are notable preservative procedures. Some of the preparations include “*Saaru sakkarai*” (cooking salt) as one of the ingredients for its preservative property, and the healer will not say the common word “*Uppu*” for cooking salt. It is concerned with the spiritual aspects.

4. DISCUSSION

Livestock increasing is the root of the traditional culture in the Kalasapai hills since centuries. The combination of various parts of more than 24 plants along with some preservatives is used for a single preparation in Kalasapadi hills for the treatment of more than one disease, particularly for the treatment of health infection related with “*Kunthu*.” They hope that those combined preparations will recover the efficacy of the medicine. In the current study, 49 species of ethnoveterinary importance were recorded. There was considerable indigenous plant use knowledge among the traditional medicine practitioners of the study area. The results revealed that older traditional medicine practitioners know and use more number of EVM species than younger ones. This may indicate that the indigenous knowledge is declining among the younger generation, but could be attributed to the fact that traditional healers are reluctant to share knowledge or healing practices. This finding is in line with the work done on Mapuche community of Northwestern Patagonia, Argentina, by [40]. The study also revealed that 47% of the respondents combine more than one plant in the preparation of medicines. Plant combinations may have a synergistic effect, and could result in more effective treatment of a wider range of worms and their effects. Some (33%) of the respondents mixed plant extracts with non plant materials such as potassium permanganate, copper sulfate, Epsom salts

and table salt, and blue soap. Potassium permanganate, copper sulfate and salt are reported in literature to have been used in fish aquariums to control fish worms this phenomenon is reported by Maphosa *et al* [41]. Parthiban *et al* [42] reported that, the plants such as *Achyranthes aspera*, *Asparagus recemosus* Wild, *Andrographis paniculata*, *Calotropis gigantean*, *Cardiospermum halicacabum*, *Cissus quadrangularis*, *Coccinia indica*, *Musa paradisiacal*, *Ricinus communis* and *Tamarindus indica* are used by the scheduled castes and scheduled tribes in kudavasal taluk of Thiruvapur district. Kannan *et al.*, [27] *Curcuma longa*, *Artocarpus hirsutus*, *Cassia auriculata*, *Toddalia asiatica*, *Grewia asiatica*, *Limonia acidissima* are used by the malayali tribes of Kalrayan hills in Salem district for the treatment of different types of diseases in livestock. According to Tolossa *et al.*, [44] plant family Lamiaceae was most frequently useful species. In the present study area threat to the species is least as leaves are the most important plant used for medicinal purposes. It was observed that the collection of whole plant as medicinal plant from the wild were not sustainable. According to local people, this type of activity is carried out by the collectors related to illegal trade of medicinal plants. *Drosera burmannii*, *Begonia Sp*, is vulnerable to this kind of activity in the study area.

5. CONCLUSION

The traditional culture and indigenous knowledge of tribal in Kalasapadi hills *Malayali* tribal communities of the study area and they are well experienced in the administration of local herbs for the treatment of veterinary ailments. These plants are widespread, low cost and easily accessible at the time of requirement. But the practice of herbal medicine is being utilized by few „*Vaidhyars*“ and elderly people only. It is concluded that the healthcare system of *Malayali* tribe of Kalasapadi hills, traditionally depends on herbal practices for their ailments. Moreover, elders and traditional healers have rich knowledge on herbal wealth. The traditional knowledge of the healers helped us in the documentation of the ethnobotanical information. Hence, the documentation of traditional knowledge will help in the field of herbal research and inventory of new therapeutic plants for a particular therapeutic effect. At the same time the comprehensive pharmacological investigations of the herbal plants will be helpful in development of new drugs for a particular condition.

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