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Ethno Veterinary Practices Followed by Attappadi Tribal Farmers of Kerala

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ABSTRACT

Background: The study was undertaken to document the different plants of ethno veterinary uses and to identify the most prevailing livestock disease category among livestock farmers of Attappadi using consensus methodology.

Methods: This study was conducted in Attappadi with a structured interview with tribal farmers, Ethno Veterinary Medicine (EVM) healers and key informants engaged in the livestock farming.

Result: There was great agreement among the informants regarding ethno veterinary uses of plants with Factor of Informants Consensus (F_{IC}) value ranging from 0.50 to 0.97, with an average value of 0.87, used to generate novel, cost effective, active and eco-friendly herbal formulations for healthcare management. A total of 55 plant species under 39 families in Attappadi area have been documented for treatment of 15 categories of ailments.

Key words: Attappadi tribes, Consensus factor, Ethno veterinary medicinal plants, Livestock health, Medicinal uses.

INTRODUCTION

Livestock contributes to 4.11 per cent of GDP and 25.6 per cent of total Agriculture GDP. About 20.5 million people depend upon livestock for their livelihood (Dash, 2017 and Priyanka and Binita, 2017). Hence the diseases in livestock should be given more importance. Ethnic communities keep their livestock as a symbol of heritage and pride and they follow indigenous practices to treat their animals. The statistics by the World Health Organization explains that around 80 per cent of people in developing nations primarily rely on traditional medicine to prevent and cure a variety of illnesses that affect both humans and their animals. These conventional healing procedures and practices are called as “Ethnoveterinary Medicine (EVM)”. Ethnoveterinary medicine deals with knowledge, skills, methods, practices and beliefs of the community in their care of livestock. EVM and remedies are dynamic, easy to prepare and administer at little or no cost with minimal risks (Balaji and Chakravarthy, 2010 and Sharma *et al*., 2021). There are variations in ethno veterinary medicine not only across and within cultures, but also between regions. The comprehensive and systems-analytical approach of ethnoveterinary practice is the source of its multidisciplinary character. This recognizes the importance and mutual reliance of the political, social, cultural, historical and economic contexts that surround animals and their owners. These are basically under the theoretical concepts of bioprospecting and pharmacognosy, local adaptation theory, empirical observation theory and social capital theory (Fig 1). The knowledge and information on the EVM are transferred over ethnic generations through the oral folklore communication alone (Sikarwar *et al*., 2020 and Kumar *et al*., 2020). So, many of the important and relevant information are not documented and, this knowledge is under great threat of cultural extinction (Bruchac, 2014).

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Kerala being rich in the floral diversity opens a wide range of array in ethno botanical and pharmaceutical studies. The people in the tribal belt depend on agriculture and animal husbandry as the main sources of their livelihood. In Kerala, there are 36 tribal communities consist of a total population 4, 84,839 (Census of India, 2011). Palakkad, one among the largest tribal concentrated districts of Kerala has 10.1 per cent of the total tribal population of the state. Attappadi is the largest tribal settlement area of Palakkad district with three tribes *viz*., Irulas (84 per cent), Mudugas (10 per cent) and Kurumbas (six per cent) (Census of India, 2011) who are traditionally engaged in livestock activities. The study aims to document the different plants of ethno veterinary uses.

MATERIALS AND METHODS

The present study was conducted during the year of 2018-2019, purposively in Attappadi block of Palakkad district in Kerala. Attappadi block comprised of three panchayats, Agali, Pudur and Sholayoor. The pilot study with forty

farmers was carried out in Agali panchayat to test the interview schedule. A total of 40 tribal livestock farmers from each of the three panchayats, thus a total of 120 tribal livestock farmers were selected based on the livestock strength (minimum of any one unit of livestock/poultry species) as respondents for the study along with the EVM healers and key informants. A total of five EVM healers and ten key informants from three panchayats were interacted to gather and confirm the information on EVM practices shared by the farmers. Prior Informed Consent (PIC) was taken from the Knowledge Providers. A descriptive research design with interaction with the key informants and EVM healers, survey by pretested interview schedule and Participatory Rural Appraisal (PRA) approach were employed. During the field study, information on uses of plants to treat different illnesses of livestock, parts used, modes of preparation, dosage and administration of medicine have been collected. Plants name were checked with https://www.worldfloraonline.org/. Based on the information obtained from the EVM healers and farmers in the study area, the reported ailments have been grouped into 15 categories.

The level of homogeneity among information provided by different informants was calculated by the Informants' Consensus Factor, F_{IC} (Trotter and Logan, 1986) using the following formula:

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

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.

Here in this study each polyherbal remedy has been considered as single use-report. The value of F_{IC} provides a range of 0 to 1, where a higher value signifies its greater authenticity as a fixed group of plants are used frequently for that disease or disease category. On the other hand, lower value signifies disagreement among the informants. The similar studies were conducted to know the consent of relevant ethnoveterinary practices in livestock (Aziz *et al*., 2018 and Lulekal *et al*., 2014). Later, the higher use value of the plant species depicts the authenticity and the pharmacokinetic properties of its constituents (Venkatachalapathi *et al*., 2018). The high use value and the taxa with higher consensus among the informants in treating a peculiar ailment are suggested for future studies.

RESULTS AND DISCUSSION

The socioeconomic status patterns of the tribal community are comparable to those of the state's livestock farmers as a whole. Farmers' migratory patterns have become more, focussing on daily wage jobs. Table 1 reveal that majority belonged to elder age group, this might be due to the lack of interest among youth in livestock rearing. Recent study by Shinde *et al.* (2024) from Nanded District, Maharashtra, has also reported similar findings. Henceforth, while planning programmes more attention should be given to attract youngsters. Majority of the respondents were female (64.17 per cent) and (67.50 per cent) were illiterate. Similar findings were reported by Gour *et al.* (2015). In order to popularize the scientific animal husbandry practices among tribal farmers, it is essential to develop extension programmes and promote use of teaching aids that are easily understood by the farmers to adopt. The average land holding of tribal livestock farmers is less due to

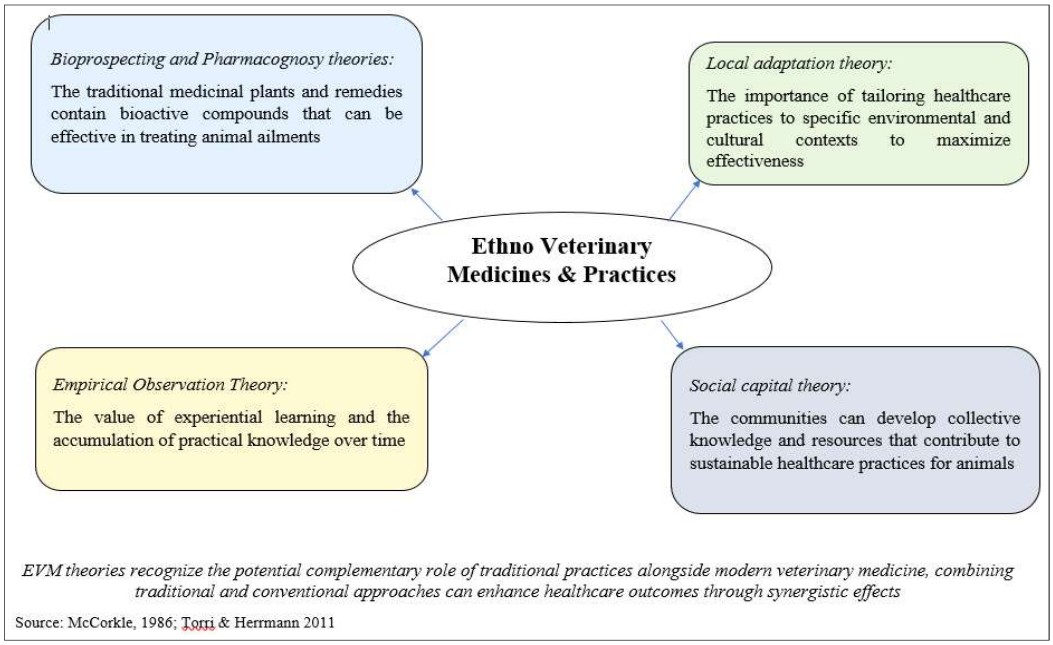

Fig 1: Theoretical framework.

fragmentation of land, forest buffer zone issues and population explosion. Majority of the respondents had many years of experience, suggesting that tribal farmers are well-versed in livestock farming.

More than three-fourth of the respondents (81.67 per cent) shared their knowledge on EVM. Others felt that the sharing of information would lead to the loss of healing potential of these plants. This is a common trend reported across the globe with regard to the sharing of indigenous knowledge (Dinbiso *et al*., 2022 and Abraha, 2016). A total of 55 plant species under 39 families in Attappadi area have been documented for treatment of 15 categories of ailments. As Table 2 bespeaks, there was a medium to high level of consensus among the informants. The F_{IC} value for different disease categories has ranged from 0.50 to 0.97 with an average value of 0.87 that has indicated the level of agreement among the informants regarding different phyto therapeutic uses of medicinal plants. Similar findings were reported from Velliangiri holy hills (Ragupathy *et al*., 2008). Pox showed highest F_{IC} value followed by FMD. High F_{IC} values indicates the prevalence of these ailments in the study area. Medicinal plants supposed to be efficient in treating ailments have high F_{IC} value (Belayneh *et al*., 2020). The low F_{IC} value could be due to the fact that ailments were unnoticed by the farmers owing to their indirect influence on animal's production (Xiong *et al*., 2020). As Table 3. depicts butter milk with garlic paste, a combination of red onion, little tree plant, jaggery and coconut flower is ground in equal proportion and ground curry leaves were used to treat diarrhoea. This clearly indicated that the above practice were highly effective in treating diarrhea which suggests the scope of future studies with the high use value of 0.67. Under the condition constipation, the documented practices were use of honey in warm water and a mixture of 10 g turmeric, 25 g cumin, 100 g jaggery, 100 g ginger and 15 red chillies. Similar findings and practices were reported from southern states of India by (Nair *et al*. 2017). There were four practices documented in the treatment of indigestion condition in animals. Similar reports using pepper, cumin and ginger combination to treat indigestion in ruminants was revealed by (Gogoi, 2022). The practice of usage of papaya, neem, fenugreek, cassia, lemon and bitter gourd against the helminthic infestation are common among the rural communities (Pathak and Chhabra, 2014).

A perusal of Table 4 indicates that the practice of treating the bovine infertility with drumstick leaves and aloe vera are commonly advocated among the rural farmers. This agrees to the findings of Sarswat and Purohit, (2020) and Patil *et al*. (2015). The cases of infertility directly hit the farmers as they are the traits of the economic importance, hence the analysis of these phytocompounds towards the reproductive health are need of the hour. To avoid dystocia, *Moringa* leaves' extract was pasted over the vulva and chaff flower was given. Similar findings were reported by Singh (2018) explaining their high antimicrobial, anti-inflammatory and antioxidant flavonoids. The higher use value for the combinations of onion, garlic and little flower and the remedial measures of reproductive disorders shows their significance in treating respective ailments which opens a scope of future studies. Garlic and Turmeric

Table 1: Socioeconomic profile.

Variable	Category	Per cent
Age	Young	6.67
	Middle	16.67
	Old	76.66
Gender	Male	35.83
	Female	64.17
Education	Illiterate	67.50
	Can read	3.33
	Can read and write	24.17
	Primary	3.33
	Secondary	1.67
Land holding	Landless	44.17
	On lease	4.17
	Marginal (<1 ha.)	38.33
	Small (1-2 ha.)	10.83
	Large (>4 ha.)	2.50
Experience (years)	Low	13.33
	Medium	25.84
	High	60.83
Occupation	Agriculture	3.33
	Livestock	3.33
	Labour	0.84
	Daily Wages	87.50
	Others	5
Herd size	Low	88.33
	Medium	7.50
	Large	4.17

Table 2: Categories of ailments and informant consensus factor (F_{IC}) for each category.

Illness category	N_{ur}	N_t	F_{IC}
Gastrointestinal disorders	89	8	0.92
Poisoning	9	3	0.75
Respiratory disorders	42	4	0.92
Skin diseases	48	7	0.87
Dewormer	29	4	0.89
Fever, Cold	46	4	0.93
Mastitis	46	5	0.91
Reproductive disorders	61	8	0.88
Acaricides	28	2	0.96
Musculo skeletal disorders	19	3	0.88
FMD	91	5	0.96
Pox	76	3	0.97
Anti-inflammatory	5	3	0.50
HS	4	2	0.67
Snake bite	25	2	0.96

were found to be effective in the treatment of reproductive diseases (Gopikrishnan *et al*., 2022). It could be observed from Table 5 that farmers encountered mastitis with mixture paste of aloe vera (250 g), turmeric (50 g), calcium hydroxide (10 g) as externally. The treatment of mastitis using the paste of aloe vera, turmeric and tassel flower is quite popular across Asia (Somvanshi *et al*., 2016 and Bhatt and Agarwal, 2018). The *in vitro* antimicrobial activity of extracts of *Aloe vera* and *Curcuma longa* (turmeric) were exhibited against the common pathogens *Escherichia coli,*

Table 3: EVM to manage gastro intestinal diseases.

Vernacular/Scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Arecanut *Areca catechu* (Arecaceae)	Fruit	Worm infestation	Orally as bolus or in pulverized form	50 g
Ajowan/*Trachyspermum ammi* (Apiaceae)	Leaf, seed	Indigestion	Orally as paste and given along with boiled water	300 ml
Betel/*Piper betle* (Piperaceae)	Seed	Indigestion	Oral	30 g
Bitter gourd/*Momordica charantia* (Cucurbitaceae)	Leaf	Worm infestation	Oral	500 g
Coconut/*Cocos nucifera* (Arecaceae)	Flower, tender water	Diarrhoea	Oral	3-5 lr
Curry leaves/*Murraya koenigii* (Rutaceae)	Leaf	Stomach pain	Oral	100 g
Fenugreek/*Trigonella foenum graecum* (Leguminosae)	Seed, leaf	Worm infestation	Orally as paste	50-80 g
Garlic/*Allium sativum* L. (Amaryllidaceae)	Clove	Diarrhoea, Indigestion	Oral	50 g
Ginger/*Zingiber officinale* Rosc.(Zingiberaceae)	Rhizome	Constipation, Indigestion	Orally with garlic and asafoetida	100 g
Guava/*Psidium guajava* (Myrtaceae)	Leaf	Bloat	Orally as paste	150 g
Jeerakam/*Cuminum cyminum* (Umbelliferae)	Fruit	Constipation	Oral	25 g
Kaayam Asafoetida/*Ferula asafoetida* L. (Apiaceae)	Resin	Indigestion	Orally, after mixing with boiled water	25 g
Lemon/*Citrus limon* (Rutaceae)	Leaf, fruit	Worm infestation	Oral	250 g
Mukkutti/*Biophytum nervifolium* (Oxalidaceae)	Stem	Diarrhoea	Oral	500 g
Neem/*Azadirachta indica* (Meliaceae)	Juice of the plant, leaf	Worm infestation	Orally as liquid drench	300-500 ml
Papaya/*Carica papaya* (Caricaceae)	Fruit, seed, leaf	Indigestion, worm infestation	Orally as paste	300 g
Pepper/*Piper nigrum* L. (Piperaceae)	Seed, leaf	Indigestion	Oral	100 g
Red chilly/*Capsicum annuum* L. (Solanaceae)	Fruit, stem	Constipation	Oral	15 no/30 g
Red onion/*Allium sepa* L. (Liliaceae)	Bulb	Diarrhoea, Indigestion	Orally as paste	200 g
Shathavari/*Asparagus racemosus* wild (Liliaceae)	Extracts from dried root	Worm infestation	Oral	100-150 ml
Tamarind/*Tamarindus indica* (Fabaceae)	Leaf, fruit	Diarrhoea	Orally as paste	100 g
Touch me not/*Mimosa pudica* (Fabaceae)	Leaf, root, stem	Diarrhoea	Oral	100 g
Turmeric/*Curcuma domestica* vallars (Zingiberaceae)	Rhizome	Constipation	Orally mixed with boiling water	100 g
Ungu Milletia/*Millettia pinnata* (Fabaceae)	Root, stem, bark	Indigestion	Orally, after mixing with boiled water	100 g

Staphylococcus aureus and *Pseudomonas aurogenosa.* Curcuminoids have antioxidant, anti-inflammatory, antiviral and antifungal properties.

The very commonly prevailing viral disease of cattle in the study area is Foot and Mouth Disease (FMD). FMD was treated with paste made from cumin (10 g), fenugreek (10 g), turmeric (10 g), pepper (10 g), garlic (4 no.), jaggery (100 g) with one coconut was given orally thrice a day. Lard of wild boar in banana, veldt grape, curd (0.75 *l*), with turmeric, neem leaves and red onion was given orally to counter. Ten grams of turmeric, neem, cumin, fenugreek, garlic and lard of pig are commonly used in the treatment of FMD among the livestock farmers (Sangma and Manohara, 2017 and Visvesvaran and Thirumalaiswamy, 2015). The combination of cumin, fenugreek, onion, pepper and turmeric are proven for their success rates against FMD (Visvesvaran and Thirumalaiswamy, 2015 and Ganeshan *et al*., 2008). Hankiso *et al.* (2024) has also discussed this combination which confirms the significance of plant as a treatment strategy across years.

Neem and thulasi leaves are proven for their efficacy in wound healing (Somvanshi *et al*., 2016). Table 6 denotes that Malabar nut with 50 g ginger, 200 g jaggery was given for 6 days in treatment for respiratory distress. Use of hand full red onion and ginger against respiratory diseases were reported by Sangma and Manohara (2017). Different plant-derived volatiles and oils such as camphor, turpentine oil, eucalyptus oil, neem oil, *etc*. have been shown to be very effective against myiasis as depicted in Table 7 (Chhabra and Pathak, 2009). As the Table 8 depicts, in order improve milk production, boiled papaya, *moringa* leaves and asparagus were given orally. Moringa leaves popularly

Table 4: EVM to manage reproductive health.

Vernacular/scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Aloe vera/*Aloe barbadensis* Mill. (Asphodelaceae)	Leaf, extract and latex of plant skin	Infertility, Mastitis	Oral	4 hands
Bamboo/*Bambusa arundinacea* (Retz.) wild. (Poaceae)	Young stem, leaves	Retention of foetal membranes	Oral	250 g
Banana/*Musa paradisiacal* L. (Musaceae)	Plant juice, Fruit, leaf	Anoestrum	Oral	300 g
Chaff flower/*Achyranthes aspera* L. (Amaranthaceae)	Herb, leaves, seeds, root flower (whole plant)	Dystocia	External	200 g
Greater yam/*Dioscorea alata* (Dioscoreaceae)	Tuber, leaf	Retention of foetal membranes	Oral	500 g
Malabar kino/*Pterocarpus marsupium* (Fabaceae)	Bark, leaf	Uterine infection	Oral	300 g
Mango/*Mangifera indica* Linn. (Anacardiaceae)	Leaf	Retention of foetal membranes	Oral	500 g
Moringa/Moringa oleifera Lam. (Moringaceae)	Leaf, root, juice of the stem	Infertility, dystocia	Oral	300 g - 500 g
Njerinjil/*Tribulus terrestris* (Zygophyllaceae)	Seed	Uterine prolapse	Oral	250 g
Pineapple/*Ananas comosus* (Bromeliaceae)	Fruit	Retention of foetal membranes	Oral	3 no/1500 g
Piranda/*Cissus quadrangularis* (Vitaceae)	Stem, leaf	Infertility	Oral	500 g

Table 5: EVM to manage production diseases.

Vernacular/Scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Cashew/*Anacardium occidentale* (Anacardiaceae)	Extract of the seed	FMD	External	100 g
Erukku/*Calotropis procera* (L.) (Apocynaceae)	Juice of the plant	HS	External	250 g
Henna/*Lawsonia inermis* (Lythraceae)	Leaf	FMD	External	3 hand full
Nutmeg/*Myristica fragrans* (Myristicaceae)	Seed	FMD	External	150 g
Tassel flower/*Emilia sonchifolia* (Asteraceae)	Leaf, seed	Mastitis	External	150 g
Thazhudama/*Boerhavia diffusa* (Nyctaginaceae)	Leaf, root	Mastitis	External	100 g
Thulasi/*Ocimum tenuiflorum* L. (Lamiaceae)	Leaf	FMD	External	100 g
Umam Datura/*Datura metel* Linn. (Solanaceae)	Ripen fruit, leaf, root	Mastitis	External	100 g

known as drumstick tree or Miracle tree is an excellent source of nutrients which is observed to increase animal performance in many parts of the world (Bhokre *et al*., 2023).

The indigenous knowledge has a significant role in addressing the challenges with locale-location specific and resource efficient solutions. The findings demonstrate that the Attappadi tribal livestock farmers are not an exception to this fact. But often diseases pertaining to skin, foot *etc* are unattended. The ethno botanical and traditional knowledge are under the threat of extinction,

Table 6: EVM to manage respiratory conditions.

Vernacular/Scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Ginger/*Zingiber officinale* Rosc. (Zingiberaceae)	Rhizome	Respiratory distress, Cough	Oral	50 g-100 g
Malabar nut/*Justicia adhatoda* (Acanthaceae)	Leaf	Respiratory distress, Cough	Oral	100 g
Neem/*Azadirachta indica* (Meliaceae)	Juice of the plant, leaf	Respiratory distress	Inhalant	250 g
Pepper/*Piper nigrum* L. (Piperaceae)	Seed, leaf	Cough	Oral	50 g-100 g
Red onion/*Allium sepa* L. (Liliaceae)	Bulb	Cough	Oral	250 g
Thulasi/*Ocimum tenuiflorum* L. (Lamiaceae)	Leaf	Respiratory distress	Inhalant	250 g

Table 7: EVM to manage skin and bone conditions.

Vernacular/Scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Aatha sweetsop/*Annona squamosa* (Magnoliales)	Leaf, fruit	Wounds, Myiasis	External	100 g
Cassia/*Cassia fistula* Linn. (Fabaceae)	Seed	External parasites	External	100 g
Ficus/*Ficus benghalensis* Linn (Moraceae)	Leaf, root	Myiasis	External	100 g
Garlic/*Allium sativum* L. (Amaryllidaceae)	Clove	Warts, Myiasis	External	10 no.
Henna/*Lawsonia inermis* (Lythraceae)	Leaf	Myiasis	External	3 hand full
Jeerakam/*Cuminum cyminum* (Umbelliferae)	Fruit	Warts, Fracture	External	25 g
Kanjiram strychnine/*Strychnos nux-vomica* Linn (Loganiaceae)	Root	Wounds	External	100 g
Mukkutti/*Biophytum nervifolium* (Oxalidaceae)	Stem	Wounds	External	150 g
Neem/*Azadirachta indica* (Meliaceae)	Juice of the plant, leaf	Wounds, Myiasis, External parasites, pox	External	150 g
Piranda/*Cissus quadrangularis* (Vitaceae)	Stem, leaf	Fracture	Immobilizer	250 g
Thulasi/*Ocimum tenuiflorum* L. (Lamiaceae)	Leaf	Warts	External	100 g
Thumba/*Leucas zeylanica* (Lamiaceae)	Leaf, stem	External parasites	External	50 g
Tobacco/*Nicotiana tabacum* (Solanaceae)	Leaf, extract from leaf	Wounds	Externally Tobacco leaves are soaked overnight, crushed well and extract is applied over the affected area.	100 g
Touch me not/*Mimosa pudica* (Fabaceae)	Leaf, root, stem	Wounds, Sprain	External	250 g
Turmeric/*Curcuma domestica* vallars (Zingiberaceae)	Rhizome	warts, Myiasis, Pox	External	100 g
Vatha kodi/*Naravelia zeylanica*/ *Clematis zeylanica* (Runnunculaceae)	Leaf	Fracture	Externally: leaves are soaked, crushed well and extract is applied over the affected area.	100 g

Table 8: EVM to manage general health and poisoning conditions.

Vernacular/Scientific name (Family)	Parts used	Conditions	Route of administration	Dosage
Betel *Piper betle* (Piperaceae)	Seed	Poisoning, immunity	Oral	10 no
Coconut *Cocos nucifera* (Arecaceae)	Flower, tender water	Immunity	Oral	2-3 litre
Corinader *Coriandrum sativum* (Apiaceae)		Immunity	Oral	20 g
Curry leaves *Murraya koenigii* (Rutaceae)	Leaf	Immunity	Oral	500 g
Jeerakam *Cuminum cyminum* (Umbelliferae)	Fruit	Immunity	Oral	10 g
Neem *Azadirachta indica* (Meliaceae)	Juice, leaf	Poisoning	Oral	500 g
Pepper *Piper nigrum* L. (Piperaceae)	Seed, leaf	Poisoning, snake venomation, immunity	Oral	150 g
Sweetflag *Acorus calamus* (Acoraceae)	Leaf, fruit	Snake venomation	Oral	100 g
Thulasi *Ocimum tenuiflorum* L. (Lamiaceae)	Leaf	Immunity	Oral	200 g
Kaayam Asafoetida *Ferula asafetida* L. (Apiaceae)	Resin	Snake venomation	Oral	250 g

Source: Researcher's findings.

due to the expanding urban interfaces, industrialization and societal changes in the global context. This survey study not only shows the inseparable dependence of the Attappadi tribal farmers in livestock management, but also the relevance of ethno botanical knowledge in their livelihood.

Conclusion

This study is one of the initial efforts to quantify the ethno medicinal information used in livestock health care in Attappadi that facilitates better option for the selection of widely used medicinal plants for searching and identifying bioactive compounds to treat ailments. The highlighted high F_{IC} values in the present study have indicated that the species traditionally used to treat these ailments are worth searching for bioactive compounds and this has illuminated the cultural importance of this ethno veterinary wisdom which is consonantly blended with the tribal culture of the area. There is an urgent need to formulate suitable conservation strategies for naturally growing ethno medicinal plants to overcome their depletion from natural resources and to make these practices more eco-friendly.

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Author contributions

All authors have equally contributed.

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