



Exploring Ethno-veterinary Practices for Livestock Diseases: A Survey-Based Approach

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Received: 04 June 2023

Revised: 18 July, 2023

Accepted: 24 July, 2023

ABSTRACT

The current study explores the ethno-veterinary practices adopted by rural farmers and examined their socio-dynamic profile. A total of 183 plant species belonging to 158 genera and 70 families were identified. Among these, 165 were dicotyledons, 17 species belonged to monocotyledons, and one was classified as a pteridophyte. Within the studied plant families, Euphorbiaceae had the highest representation with 14 species (7.65%), followed by Fabaceae with 12 species (6.56%). Apocynaceae, Lamiaceae, Malvaceae, and Solanaceae each had 7 species (3.82%). Asclepiadaceae, Asteraceae, Liliaceae, and Mimosaceae had equal representation with 6 species each, accounting for 3.28% of the total species. Annonaceae and Rutaceae exhibited the lowest representation among the families, each consisting of 5 species, representing 2.73% of the total. The plant habit encompasses various categories, including climber, shrub, tree, herb, and lian. A diverse range of plant parts were utilized, such as aerial parts, leaves, bulb, clove, corn, flower, fruit, latex, leaves, oil, pod, pulp, rhizome, root, root bark, seed, steam, steam bark, tender shoot, tuber, and whole plant. Trees ranked as the most frequently utilized species, followed by herbs, shrubs, and climbers. Out of the respondents engaged in the practices, males were 325 while females were 480 with a percent of 40.37 and 59.63, respectively. The age groups with highest perception of ethno-veterinary practices were 61-70 years followed by 31-40 years and 51-60 years age group. Further most of the positive respondents were with primary education followed by medium education and illiterates.

HIGHLIGHTS

- Euphorbiaceae and Fabaceae were among the mostly used families in ethno-veterinary medicine.
- Ethno-veterinary practices predominantly relied on the utilization of trees and leaves.
- Females and higher age groups (61-70 years) exhibit a stronger perception of the practices.

Keywords: Ethno-veterinary practices, livestock diseases, plant parts, plant families, demographics

Livestock plays a crucial role in the Indian economy, contributing significantly to the agricultural sector and livelihoods. Particularly, in rural areas, livestock rearing provides employment opportunities for millions of people, supports rural economies, and contributes to food security (Thornton, 2010).

How to cite this article: Venkata Krishna, N., Pradeep Kumar Reddy, Y., Pandu Ranga Reddy, P., Dharma Rao, M.V., Naveena, K. and Guru Manoj, A. (2023). Exploring Ethno-veterinary Practices for Livestock Diseases: A Survey-Based Approach. *J. Anim. Res.*, 13(04): 609-621.

Source of Support: None; **Conflict of Interest:** None



Various health issues, including diseases and ailments, can have devastating effects on animal health and productivity, posing challenges to farmers and the overall livestock sector (Perry *et al.*, 2009). One of the major problems faced by rural regions is the availability of veterinary medicines. Remote locations and limited infrastructure often result in inadequate access to veterinary medicines (Jaime *et al.*, 2022). This issue is exacerbated by the high cost of medicines, which makes it financially burdensome for rural communities to procure the necessary treatments for their livestock. In this context, the practice of ethno-veterinary medicine gains importance. Ethno-veterinary refers to the collective beliefs, traditional knowledge, skills, and practices in relation to animal health. These valuable resources serve as a primary means of addressing various animal health issues, offering indigenous solutions and medicines for different diseases (Stucki *et al.*, 2019). These practices have been passed down through generations, relying on local resources and traditional healing methods. Ethno-veterinary medicine serves as a valuable alternative or complementary approach, especially in areas where access to conventional veterinary care and medicines is limited.

The Eastern Ghats vegetation in Andhra Pradesh presents a valuable advantage for the state, offering a diverse array of plant species that can be utilized in ethno-veterinary

practices (Raju *et al.*, 2017; Reddy *et al.*, 2018). These traditional practices, mostly passed through generations in local knowledge, play a significant role in animal healthcare. Despite their widespread usage, a lacuna exists in comprehensive documentation and scientific analysis of these ethno-veterinary practices within the state. This gap highlights the need for systematic research and evaluation to better understand the potential benefits and effectiveness of these traditional remedies. Creating a database and scientific review of these practices may help in preserving the traditional knowledge, identifying effective remedies, and increased adoption rate. Hence the current study aimed to identify the ethno-veterinary practices followed by rural farmers in Andhra Pradesh and evaluation of species-wise, Type-wise, partwise, and habit-wise ethno-veterinary practices.

MATERIALS AND METHODS

Study area and survey methodology

The study is conducted in Andhra Pradesh (latitudes 12.41°N and 19.05°N, and longitudes 77.46°E and 84.50°E) with six agroclimatic zones and rich Eastern Ghats' vegetation (Fig. 1). The survey aimed to gather data from farmers engaged in the rearing cattle, buffaloes,

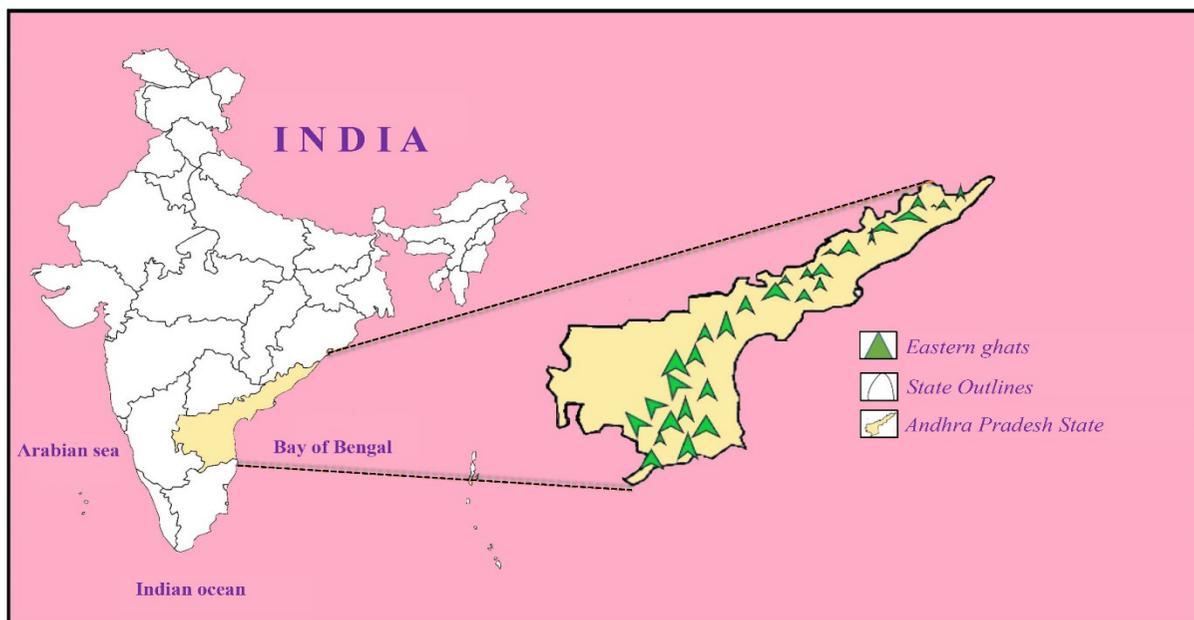


Fig. 1: Outline showing the study area

sheep, and goats. To ensure a wide representation across the state, Veterinary Officers and Veterinary Assistants provided guidance throughout the questionnaire distribution process. The informants selected for the survey included:

1. Village Veterinary staff and traditional medicine practitioners knowledgeable in the field.
2. Village Headmen, priests, influential individuals, and other people who possessed relevant awareness.
3. Men and women actively working in the fields, local markets, and other common gathering places, specifically targeting individuals aged fifty years and above.

Identification of specimens

After completing the plant collection from the fields, the specimens were identified by a renowned Botanist. The Telugu names mentioned by the informants were translated into standard English language. Subsequently, to ensure accuracy, the plant names were cross verified by presenting images of the plants to the informants. Each plant was critically studied and identified using the 'Flora of Presidency of Madras' (Gamble and Fishcer, 1657) 'Flora of Andhra Pradesh' (Pullaiah and Channaiah, 1997) and available authenticated literature.

Socio-dynamic profile of the informants

The socio-dynamic profile of the informants practicing ethno-veterinary practices is collected by using the above-mentioned survey questionnaire. The questionnaire consisted of different sections addressing key demographic factors, including gender (Male/Female), age range (20-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years, and >71 years), and educational attainment (Illiterate, Primary, Intermediate, Secondary, and University level of education).

STATISTICAL ANALYSIS

The statistical analysis for rounding off the age parameter and percent calculations was performed using SAS (V 9.4). The age parameter was rounded off and sorted to the nearest lower value using FLOOR function. The frequency

and percent of habit-wise, family wise, and part-wise data were calculated using PROC FREQ statement.

RESULTS

Various plant and plant parts used in different veterinary diseases is presented in Table 1 (trees), 2 (herbs), 3 (shrubs), and 4 (climbers and Lianas). In the present study a total of 183 species of plants included 158 genera and 70 families were recorded which are exploited by the tribal for their animal healthcare practices. The habit of the plants includes, climber, shrub, tree, herb, and lian.

Table 1: Tree species and their corresponding plant parts utilized as ethno-veterinary practices

Sl. No.	Name of the species	Habit	Part used	Disease
1	<i>Acacia chundra</i> L.	Tree	Stem bark	Ephemeral fever
			Stem bark	Ulcers and Wounds
2	<i>Acacia nilotica</i> (L.) Del.	Tree	Stem bark	Trypanosomiasis
			Stem bark	Indigestion
			Seeds	Fertility
			Stem bark	Dysentery
			Flower	Jaundice
3	<i>Aegle marmelos</i> (L.) Correa	Tree	Pods	Lactation
			Fruit	Tympany
			Leaves	Opacity of cornea
			Leaves	Bone fracture
			Fruit	Diarrhoea
			Fruit	Mouth Disease
			Leaves	Retained Placenta
4	<i>Ailanthus excels</i> Roxb.	Tree	Fruit	Internal injury
			Stem bark	Skin disease
			Stem bark	Swelling
5	<i>Alangium salvifolium</i> L.F.	Tree	Leaves	Lice
			Root	Wounds
			Root	Snake bite
6	<i>Albizia lebbek</i> (L.) Willd.	Tree	Stem bark	Snake bite
			Stem bark	Trypanosomiasis
7	<i>Alstonia scholaris</i> (L.) R.Br.	Tree	Stem bark	Fever
			Stem bark	Diarrhoea
			Latex	Dysentery
			Stem bark	Dysentery
8	<i>Alstonia venenata</i> R. Br.	Tree	Stem bark	Fever
			Stem bark	Skin disease
			Stem bark	Galactagogue



9	<i>Annona squamosa</i> L.	Tree	Leaves Flower Fruit Leaves Leaves Leaves	Wounds Ephemeral fever Insect bite Worms Dysentery Ectoparasites	20	<i>Cipadessa baccifera</i> (Roth)	Tree	Stem bark Stem bark	Dysentery Fever
					21	<i>Cleistanthus collinus</i> (Roxb.)	Tree	Root bark Stem bark	Foot and Mouth Skin disease
					22	<i>Cochlospermum religiosum</i> L.	Tree	Stem bark	Jaundice
10	<i>Anogeissus latifolia</i>	Tree	Seeds Seeds Stem bark Stem bark Stem bark Stem bark	Insect bite Snake bite Tympany Skin disease Horn cancer Fever	23	<i>Dalbergia latifolia</i> Roxb.	Tree	Stem bark Stem bark	Gout Lice
					24	<i>Dalbergia sissoo</i> Roxb.	Tree	Leaves Leaves Leaves Leaves	Diarrhoea Blisters Ureatic Diarrhoea
					25	<i>Datura metal</i> L.	Shrub	Leaves	Snake bite
11	<i>Azadirachta indica</i> A. Juss.	Tree	Leaves Stem bark Stem bark Leaves Stem bark Leaves Leaves	Ephemeral fever Ephemeral fever Anthrax Black quarter Disease Blisters Eczema Fever	26	<i>Dendrocalamus strictus</i> Roxb.	Shrub	Leaves Leaves Leaves Tender shoot Tender shoot Leaves Stem	Anthrax Easy delivery Panting Expulsion of Placenta Poisoning Anthrax Bone fracture
					27	<i>Dillenia pentagyna</i> Roxb.	Tree	Leaves Stem bark Stem bark Whole Plant	Anthrax Wounds Narcotic Bone fracture
12	<i>Balanites aegyptiaca</i> (L.) Del	Tree	Seeds Stem bark Seeds Root bark	Retained Placenta Snake bite Inflammation Injuries of eye	28	<i>Diospyros melanoxylon</i> Roxb.	Tree	Root bark Leaves Stem bark	Helminthes Mastitis Paralysis
13	<i>Bambusaarund inacea</i>	Tree	Leaves Stem	Dysentery Bone fracture	29	<i>Eucalyptus globulus</i> L.	Tree	Oil	Wounds
14	<i>Barringtonia acutangula</i>	Tree	Root bark Leaves	Rheumatism Dysentery	30	<i>Ficus benghalensis</i> L.	Tree	Root Latex Root	Diarrhoea Maggot Dysentery
15	<i>Bridelia retusa</i> (L.) Spreng.	Tree	Stem bark Leaves	Abortion Disability	31	<i>Ficus hispida</i> L.f.	Tree	Leaves Leaves Leaves	Expulsion of Foetus Diarrhoea Expulsion of Placenta
16	<i>Butea monosperma</i> Taub.	Tree	Root Stem bark Seeds Flower Root	Wounds Babesiosis Deworming Paralysis Tympany	32	<i>Ficus racemosa</i> L.	Tree	Stem bark Fruit Stem bark Latex Leaves Stem bark Fruit	Skin disease Galactagogue Render Pest Antiseptic Dysentery Skin disease Expulsion of Placenta
17	<i>Cassia fistula</i> L.	Tree	Root Stem bark Fruit Stem bark Leaves Seeds Fruit	Throat swelling Diarrhoea Swelling Ephemeral fever Dysentery Snake bite Asthma	33	<i>Ficus religiosa</i> L.	Tree	Stem bark Leaves Stem bark Leaves	Foot and Mouth Bronchitis Cough Dysuria
18	<i>Ceiba pentandra</i> (L.) Gaertn.	Tree	Leaves	Trypanosomiasis					
19	<i>Chloroxylon swietenia</i> DC.	Tree	Stem bark Leaves Stem bark	Ephemeral fever Ulcers and Wounds Yoke gall					

34	<i>Gardenia latifolia</i> Ait.	Tree	Leaves Stem bark	Wounds Trypanosomiasis	54	<i>Phyllanthus emblica</i> L.	Tree	Fruit Fruit Stem bark	Anthrax Rheumatism Fever
35	<i>Glycosmis pentaphylla</i> DC	Tree	Whole Plant Seeds	Indigestion Pyrexia				Leaves	Bone fracture
36	<i>Grewia hirsute</i> Vahl.	Tree	Root	Bone fracture	55	<i>Plumeria alba</i> L.	Tree	Latex	Scabies
37	<i>Grewia tiliaefolia</i> Vah.	Tree	Root bark	Dislocated Joints	56	<i>Polyalthea cerasoides</i> Bedd.	Tree	Stem bark	Ephemeral fever
38	<i>Holarrhena pubescence</i> Wall.	Tree	Stem bark Stem bark	Helminthiasis Wounds	57	<i>Pongamia pinnata</i> (Linn.)	Tree	Seeds Stem bark Stem bark	Indigestion Dysentery Trypanosomiasis
39	<i>Holoptelea integrifolia</i> (Roxb.)	Tree	Leaves	Bronchitis				Leaves Seeds Leaves	Skin disease Ringworm Wounds
40	<i>Lannea coromandelica</i> Murr.	Tree	Stem bark	Anthrax	58	<i>Prosopis cineraria</i> (L.) Druce	Tree	Root Leaves	Babesiosis Insect bite
41	<i>Lawsonia inermis</i> L.	Tree	Leaves Leaves	Loose Motions Foot and Mouth	59	<i>Psidium guajava</i> L.	Tree	Leaves	Helminthiasis
42	<i>Macaranga peltata</i> (Roxb.)	Tree	Stem bark Leaves	Deworming Maggot	60	<i>Pterocarpus marsupium</i>	Tree	Stem bark	Deworming
43	<i>Madhuca longifolia</i> (Koen.)	Tree	Flower Seeds	Kill Worms Pains and Stiffness	61	<i>Pterolobium hexapetalum</i> (Roth) Sant. & Wagh.	Tree	Stem bark Root Leaves Stem bark	Dyspepsia Tapeworms Lice Cough
44	<i>Mallotus philippensis</i> (Lam.)	Tree	Seeds Seeds Seeds	Diarrhoea Wounds Kill Worms	62	<i>Ricinus communis</i> L.	Tree	Seeds Leaves	Indigestion Expulsion of Placenta
45	<i>Mangifera indica</i> L.	Tree	Seeds Stem bark Stem bark Stem bark Seeds	Vermifuge Wounds Healing Fracture Diarrhoea Dysentery				Seeds Seeds Leaves Latex Leaves	Gas production Horn cancer Increase milk Scabies Constipation
46	<i>Manilkara hexandra</i> (Roxb.)	Tree	Stem bark	Throat swelling	63	<i>Schleichera oleosa</i> (Lour.)	Tree	Seeds Seeds	Wounds Maggot
47	<i>Melia azedarach</i> L.	Tree	Leaves Leaves Leaves	Ephemeral fever Swelling Lice	64	<i>Semecarpus anacardium</i> L.	Tree	Fruit Seeds Seeds Seeds	Foot sore Foot and Mouth Cough Wounds
48	<i>Miliusa tomentosa</i> Roxb.	Tree	Stem bark	Trypanosomiasis	65	<i>Sesbania grandiflora</i> (L.) Poir.	Tree	Fruit Leaves	Dysentery Opacity of carnea
49			Whole Plant	Wounds				Seeds	Tympany
50	<i>Moringa oleifera</i> Lam.	Tree	Root bark Stem bark Leaves Leaves Leaves	Rheumatism Arthritis Injury Wounds Anthrax	66	<i>Soymida febrifuga</i> A. Juss	Tree	Stem bark	Trypanosomiasis
51	<i>Murraya koenigii</i> (L.) Spreng.	Tree	Leaves Whole Plant	Fertility Fever	67	<i>Sterculia urens</i> Roxb.	Tree	Stem bark	Bone fracture
52	<i>Murraya paniculata</i> (Linn.)	Tree	Leaves Leaves	Bone fracture Rheumatic Pains	68	<i>Strychnosmuvomica</i> L. (Musini)	Tree	Seeds Seeds Stem bark	Insect bite Anaemia Rheumatism
53	<i>Oroxylum indicum</i> (Linn.)	Tree	Stem bark Seeds Root bark	Maggot Wounds Wounds					

69	<i>Strychnos potatorum</i> Linn. f.	Tree	Seeds	Eye infection
			Seeds	Sexual stimulant
70	<i>Syzygium cumini</i> (L.) Skeels	Tree	Stem bark	Stomach troubles
			Stem bark	Maggot
			Leaves	Foot and Mouth
			Stem bark	Flatulence
			Root bark	Diarrhoea
			Leaves	Wounds
71	<i>Tamarindus indica</i> L.	Tree	Seeds	Bone fracture
			Leaves	Oedema
			Fruit	Bruises
			Leaves	Wounds
72	<i>Terminalia bellirica</i> (Gaertn.)	Tree	Fruit	Diarrhoea
			Fruit	Colic
			Stem bark	Wounds
			Fruit	Foot and Mouth
			Stem bark	Anthrax
73	<i>Terminalia chebula</i> Re	Tree	Fruit	Wounds
			Fruit	Anthrax
			Fruit	Foot and Mouth
			Leaves	Eye diseases
			Fruit	Dysentery
			Leaves	Swelling
			Aerial Parts	Foot and Mouth
			Leaves	Sores
74	<i>Wrightia arborea</i> (Dennst.)	Tree	Stem bark	Arthritis
	<i>Wrightia tinctoria</i> (Roxb.)	Tree	Leaves	Trypanosomiasis
			Stem bark	Ephemeral fever
			Leaves	Tympany
75	<i>Ziziphus jujuba</i> L.	Tree	Leaves	Burns
			Fruit	Skin disease

Plant parts, family-based, and habit wise analysis

The habit-wise classification of the plants is presented in Fig. 2. The various types encompass trees, herbs, climbers, shrubs, and lianas. Among these, trees (40%) were found to be the most utilized in ethno-veterinary practices, followed by herbs (31%), shrubs (18%), climbers (10%), and lianas (1%).

Fig. 3 illustrates the families of the most employed plants. Among the plant families examined, Euphorbiaceae demonstrated the highest presence with a total of 14 species (7.65%), making it the most prevalent family. Following closely behind was Fabaceae, encompassing 12 species (6.56%). Apocynaceae, Lamiaceae, Malvaceae, and Solanaceae exhibited equal representation with 7 species each (3.82%). Asclepiadaceae, Asteraceae, Liliaceae, Mimosaceae, and Rutaceae

and Mimosaceae shared an equal number of 6 species each, collectively accounting for 3.28% of the overall species. Annonaceae and Rutaceae displayed the least representation among the families, with both consisting of 5 species, representing a mere 2.73% of the total.

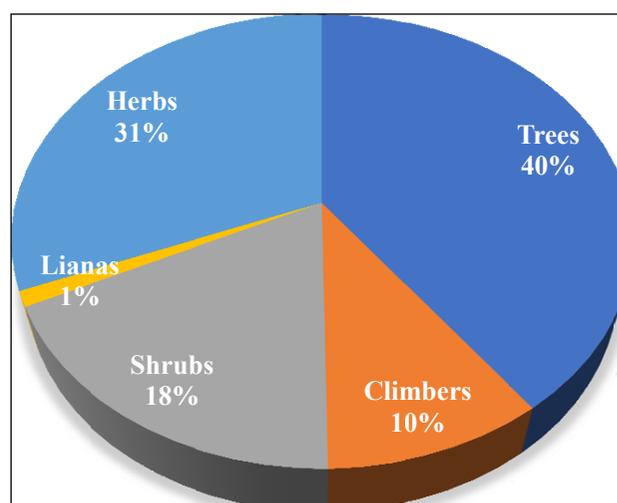


Fig. 2: Habit-wise classification of ethno-veterinary practices

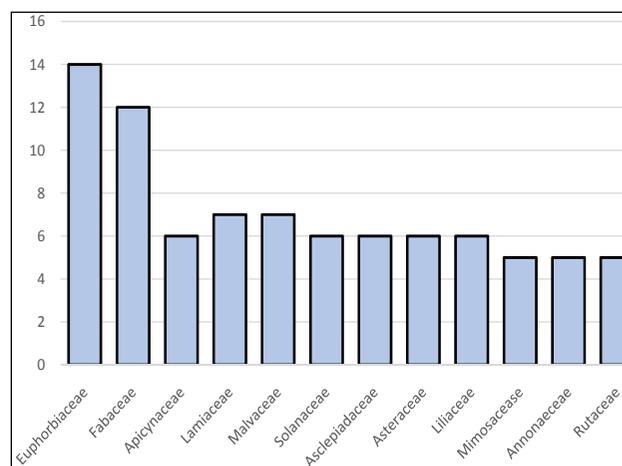


Fig. 3: Family-wise classification of ethno-veterinary practices

The part-wise analysis of ethno-veterinary practices is presented in Fig. 4. They include, aerial parts, flower, oil, root, stem bark, bulb, fruit, pod, root bark, tender shoot, clove, latex, pulp, seed, tuber, corn, leaves, rhizome, steam, and whole plant. The leaves (29%) were the mostly used part followed by stem bark (14.64), root (9.39), seed (8.84), and fruit (6.63).

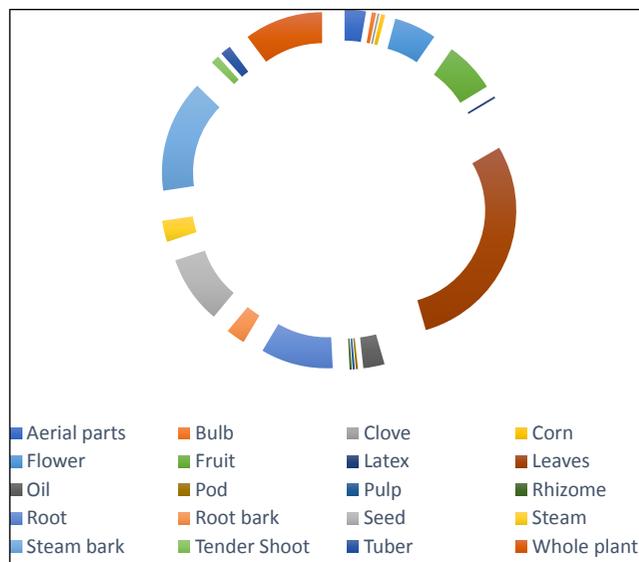


Fig. 4: Part-wise classification of ethno-veterinary practices

Socio-dynamic profile of the informants

The Socio-dynamic profile of the informants participating ethno-veterinary practices is shown in table 2.

Table 2: Herb species and their corresponding plant parts utilized as ethno-veterinary practices

Sl. No.	Name of the species	Habit	Part used	Disease
1	<i>Acalypha indica</i> L.	Herb	Leaves	Skin disease
			Leaves	Wounds
			Root and	Intestinal
			Leaves	worms
2	<i>Achyranthes aspera</i> L.	Herb	Leaves	Opacity of carnea
			Whole Plant	Diuretic
			Leaves	Eye injury
			Roots	Insect bite
			Whole Plant	Removal of Placenta
3	<i>Aerva lanata</i> (L.) Juss. ex.	Herb	Leaves	Wounds
			Whole Plant	Snake bite
			Leaves	Dog bite
			Root	Constipation
4	<i>Agave americana</i> L.	Herb	Whole Plant	Malarial Fever
			Leaves	Wounds

5	<i>Allium cepa</i> L.	Herb	Bulb	Food poisoning
			Bulb	Flatulence
			Bulb	Tongue infection
			Bulb	Hoof disease
			Bulb	Cough
6	<i>Allium sativa</i> L.	Herb	Bulb	Insect bite
			Bulb	Dog bite
			Clove	Food poisoning
			Bulb	Mastitis
			Pulp	Indigestion
7	<i>Aloe vera</i> L.	Herb	Pulp	Mastitis
			Pulp	Insect bite
			Whole Plant	Burns
			Leaves	Sterility
8	<i>Amaranthus spinosus</i> L.	Herb	Pulp	Injuries
			Whole Plant	Skin disease
			Whole Plant	Swelling
9	<i>Amaranthus viridis</i> L.	Herb	Whole Plant	Galactagogue
			Seeds	Tympany
10	<i>Amorphophallus paeoniifolius</i>	Herb	Corn	Helminthiasis
			Root	Insect bite
11	<i>Andrographis paniculata</i>	Herb	Whole Plant	Fever
			Leaves	Ephemeral fever
			Leaves	Epilepsy
			Leaves	Wounds
12	<i>Anisomeles indica</i>	Herb	Leaves	Ephemeral fever
			Leaves	Arthritis
13	<i>Argemone mexicana</i> L.	Herb	Leaves	Swelling
			Leaves	Wounds
14	<i>Barleria prionitis</i> L.	Herb	Whole Plant	Wounds
			Whole Plant	Diuretic
15	<i>Boerhaavia diffusa</i> Linn.	Herb	Leaves	Ear ache
			Leaves	Bloat
16	<i>Caralluma adscendens</i>	Herb	Leaves	Bloat
			Leaves	Eye injury
			Whole Plant	Yoke sores
			Whole Plant	Constipation
17	<i>Commelina benghalensis</i> Linn.	Herb	Whole Plant	Helminthiasis
			Whole Plant	Constipation
			Whole Plant	Helminthiasis
18	<i>Croton bonplandianum</i> Baill.	Herb	Leaves	Lice
			Leaves	Lice
19	<i>Cuminum cyminum</i> L.	Herb	Seeds	Indigestion
			Seeds	Acidic indigestion
			Seeds	Tympany



20	<i>Curculigo orchioides</i> Gaertn.	Herb	Root	Impaction	34	<i>Ocimum americanum</i> Linn.	Herb	Leaves	Wounds						
			Stem	Impaction				Whole Plant	Lice						
			Root	Ophthalmic				35	<i>Ocimum basilicum</i> L.	Herb	Leaves	Eczema			
			Rhizome	Wounds							Leaves	Snake bite			
			Rhizome	Mouth blisters							Whole Plant	Cough			
21	<i>Curcuma longa</i> L.	Herb	Whole Plant	Wounds	36	<i>Ocimum tenuiflorum</i> L.	Herb	Leaves	Constipation						
			Rhizome	Swelling				Leaves	Skin disease						
			Rhizome	Eye injury				37	<i>Oxalis corniculata</i> L.	Herb	Whole Plant	Increase milk			
			Rhizome	Bone fracture							38	<i>Pedaliium murex</i> L.	Herb	Fruit	Diuretic
			Rhizome	Swelling of teats										39	<i>Phyllanthus amarus</i> L.
Rhizome	Blood motions	40	<i>Physalis minima</i> L.	Herb	Whole Plant	Swelling									
22	<i>Cynodon dactylon</i> L.	Herb	Whole Plant	Internal wounds	41	<i>Polygala arvensis</i> Willd.	Herb	Leaves	Snake bite						
			Rhizome	Internal injury				42	<i>Sansevieria roxburghiana</i>	Herb	Leaves	Trypanosomiasis			
			Plant Juice	Haematuria							43	<i>Sida acuta</i> L.	Herb	Leaves	Skin disease
			Whole Plant	Mastitis				Leaves	Diarrhoea						
			Stem bark	Paralysis				44	<i>Sida cordifolia</i> Linn.	Herb				Leaves	Rheumatism
Stem bark	Diarrhoea	45	<i>Solanum nigrum</i> L.	Herb	Leaves	Gastritis									
23	<i>Eclipta prostrata</i> L.	Herb	Leaves	Rheumatism	46	<i>Solanum surattense</i> Burm.F.	Herb	Flower	Ophthalmic						
			Fruit	Foot and Mouth				Leaves	Expectorant						
			Leaves	Diarrhoea				Whole Plant	Bone fracture						
			Leaves	Loose Motions				47	<i>Solanum torvum</i> Sw.	Herb	Fruit	Diarrhoea			
			Root	Wounds							48	<i>Tephrosia purpurea</i> (L.) pers.	Herb	Whole Plant	Foot and Mouth
24	<i>Elephantopus scaber</i> Linn.	Herb	Leaves	Diarrhoea	49	<i>Terminalia bellirica</i> (Gaertn.)	Tree	Fruit	Disease						
			Leaves	Loose Motions				Fruit	Diarrhoea						
			Root	Wounds				Stem bark	Colic						
			Leaves	Horn cancer				Fruit	Wounds						
			Stem	Galactagogue				Stem bark	Foot and Mouth						
25	<i>Euphorbia hirta</i> L.	Herb	Whole Plant	Cough	50	<i>Trianthema portulacastrum</i> L.	Herb	Stem bark	Anthrax						
			Whole Plant	Loose Motions				Root	Eye diseases						
			Root bark	Dislocated Joints				Leaves	Sores						
			Whole Plant	Trypanosomiasis				51	<i>Tribulus terrestris</i> Linn.	Herb	Fruit	Diarrhoea			
			Whole Plant	Reproductive Disorder							Stem	Wounds			
26	<i>Grewia tiliaefolia</i> Vah.	Tree	Leaves	Ulcers and Wounds	52	<i>Trichodesma indicum</i> L. R. Br	Herb	Root	Tapeworms						
			Leaves	Skin disease				Leaves	Bone fracture						
			Leaves	Insect bite				Whole Plant	Wounds						
			Whole Plant	Malarial Fever				Leaves	Haematuria						
			Leaves	Old Boils				Leaves	Wounds						
27	<i>Hedyotis corymbosa</i> L.	Herb	Leaves	Ulcers and Wounds	53	<i>Tridax procubens</i> L.	Herb	Whole Plant	Wounds						
			Leaves	Wounds				Leaves	Haematuria						
			Leaves	Oestrus				Leaves	Wounds						
			Leaves Herbs	Ripen Abscesses				54	<i>Urena lobata</i> Linn.	Herb	Whole Plant	Worms			
			Leaves Herbs	Expulsion of Placenta							55	<i>Vernonia cinerea</i> (L.) Less.	Herb	Whole Plant	Worms
28	<i>Helianthus annuus</i> L.	Herb	Leaves	Ulcers and Wounds	56	<i>Vigna mungo</i> (L.) Hepp.	Herb	Seeds	Constipation						
			Leaves	Wounds				Seeds	Bone fracture						
			Leaves	Oestrus											
			Leaves Herbs	Ripen Abscesses											
			Leaves Herbs	Expulsion of Placenta											
29	<i>Hemionitisa rifolia</i> (Burm. F.)	Herb	Leaves	Ulcers and Wounds											
			Leaves	Skin disease											
			Leaves	Insect bite											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
30	<i>Kalanchoe pinnata</i> (Lam.)	Herb	Leaves	Ulcers and Wounds											
			Leaves	Wounds											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
			Leaves	Ulcers and Wounds											
31	<i>Leucas cephalotes</i> (Roth.) Spr.	Herb	Leaves	Ulcers and Wounds											
			Leaves	Wounds											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
			Leaves	Ulcers and Wounds											
32	<i>Mimosa pudica</i> L.	Herb	Leaves	Ulcers and Wounds											
			Leaves	Wounds											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
			Leaves	Ulcers and Wounds											
33	<i>Mollugo nudicaulis</i> Lam.	Herb	Leaves	Ulcers and Wounds											
			Leaves	Wounds											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
			Leaves	Ulcers and Wounds											
34	<i>Momordica charantia</i> L.	Herb	Leaves	Ulcers and Wounds											
			Leaves	Wounds											
			Whole Plant	Malarial Fever											
			Leaves	Old Boils											
			Leaves	Ulcers and Wounds											

57	<i>Vigna radiata</i> (L.) R. Wilcz	Herb	Seeds Leaves Seeds	Cough Wounds Bone fracture		Root Flower	Epistaxis Intestinal worms	
58	<i>Xanthium strumarium</i> Linn.	Herb	Whole Plant Leaves Leaves	Swelling Maggot Wounds	5	<i>Calotropis procera</i> (Ait.) Shrub	Root bark Stem Stem bark Latex Root 6Latex Stem bark Leaves	Cracking of teats Wounds Swelling Skin disease Lice Wounds Insect bite Bone fracture Ephemeral fever
59	<i>Zea mays</i> L.	Herb	Corn` Rhizome Rhizome	Reproductive Disorder Diarrhoea Constipation				
60	<i>Zingiber officinale</i> Rosc	Herb	Rhizome Rhizome Rhizome	Stomach troubles Anorexia	6	<i>Canthium parviflorum</i> Lam. Shrub	Stem bark Leaves	
					7	<i>Carissa spinarum</i> Linn. Shrub	Stem bark Root Root Seeds	
					8	<i>Cassia tora</i> Linn. Shrub	Seeds Seeds	Maggot Wounds Galactagogue Increase weight Skin disease
					9	<i>Costus speciosus</i> (koen.) Sm. Shrub	Rhizome	Jaundice
					10	<i>Datura metal</i> L. Shrub	Leaves Leaves Leaves Leaves Tender shoot	Snake bite Anthrax Easy delivery Panting Expulsion of Placenta
							Tender shoot	Poisoning
					11	<i>Dendrocalamus strictus</i> Roxb. Shrub	Leaves Stem Fruit Stem bark Latex Leaves Stem bark Fruit	Anthrax Bone fracture Galactagogue Render Pest Antiseptic Dysentery Skin disease Expulsion of Placenta
					12	<i>Hyptis suaveolens</i> (L.) Poit. Shrub	Leaves	Conjunctivitis
					13	<i>Indigofera tinctoria</i> L. Shrub	Whole Plant	Rabies
					14	<i>Ixora pavetta</i> Andr. Shrub	Stem bark Leaves	Ephemeral fever Wounds
					15	<i>Jatropha curcas</i> L. Shrub	Latex Root Root	Eye injury Bronchitis Tympany
					16	<i>Jatropha gossypifolia</i> Linn. Shrub	Root	Injuries

Among the respondents practicing the practices, males were 325 while females were 480 with a percent of 40.37 and 59.63, respectively. The age groups with highest perception of ethno-veterinary practices were 61-70 years followed by 31-40 years and 51-60 years age group. Further, most of the positive respondents were with primary education followed by medium education and illiterates.

Table 3: Shrub species and their corresponding plant parts utilized as ethno-veterinary practices

Sl. No.	Name of the species	Habit	Part used	Disease
1	<i>Abutilon indicum</i> (L.) Sweet	Shrub	Leaves Leaves Leaves Leaves Root Root	Diarrhoea Dysentery Helminthiasis Sore eye Tympany Insect bite
2	<i>Asparagus racemosus</i> Willd.	Shrub	Stem Fruit Whole Plant Leaves	Dysentery Galactagogue Increase milk Chronic bronchitis
3	<i>Azima tetraacantha</i> Lam.	Shrub	Leaves Stem bark Seeds Flower Root Leaves	Foot and Mouth Babesiosis Deworming Paralysis Tympany Swelling
4	<i>Calotropis gigantea</i> R.Br.	Shrub	Flower Leaves Root	Ephemeral fever Arthritis Wounds



17	<i>Justicia adhatoda</i> L.	Shrub	Leaves	Cold and Cough
			Leaves	Bronchitis
			Leaves	Blisters
18	<i>Leonotis nepetaefolia</i> (L.)	Shrub	Leaves	Ephemeral fever
			Root	Mastitis
			Seeds	Pains and Stiffness
19	<i>Malvastrum coromandelianum</i> (L.) Garcke	Shrub	Leaves	Insect bite
			Leaves	Mosquito bites
			Stem bark	Diarrhoea
			Seeds	Dysentery
20	<i>Martynia annua</i> Linn.	Shrub	Seeds	Wounds
			Leaves	Ulcers and Wounds
			Leaves	Epilepsy
			Leaves	Parasitic Wounds
21	<i>Nicotiana tabacum</i> Linn.	Shrub	Leaves	Foot and Mouth
			Seeds	Foot and Mouth
			Leaves	Ephemeral fever
22	<i>Plumbago zeylanica</i> L.	Climbing	Whole Plant	Sores
			Leaves	Bone fracture
		Shrub	Leaves	Indigestion
			Leaves	Constipation
23	<i>Securinega leucopyros</i> Muell.	Shrub	Root	Diarrhoea
			Root	Inflammation
			Leaves	Wounds
24	<i>Thespesia lampas</i> (Cav.) Dalz.	Shrub	Fruit	Eye diseases
25	<i>Toddalia asiatica</i> (L.) Lam.	Shrub	Leaves	Dyspepsia
26	<i>Triumfetta pentandra</i> A. Rich.	Shrub	Root	Galactagogue
			Root	Expulsion of Placenta
27	<i>Vitex negundo</i> L.	Shrub	Seeds	Cough
28	<i>Withania somnifera</i> L. Dunal	Shrub	Leaves	Wounds
			Root	Weakness
29	<i>Woodfordia fruticosa</i> (L.)	Shrub	Fruit	Fever
			Leaves	Sores
30	<i>Ziziphus xylopyras</i> L.	Shrub	Flower	Wounds
			Root	Anthrax
31	<i>Ziziphus oenoplia</i> (L.) Mill.	Shrub	Seeds	Wounds
			Leaves	Dysentery
			Stem bark	Horn cancer
			Stem bark	Bone fracture

Table 4: Climber and Lian species and their corresponding plant parts utilized as ethno-veterinary practices

Sl. No.	Name of the species	Habit	Part used	Disease
1	<i>Abrus precatorius</i> L.	Climber	Leaves	Insect bite
			Stem bark	Anthrax
2	<i>Aristolochia indica</i> L.	Climber	Leaves	Insect bite
			Root	Insect bite
			Root	Snake bite
3	<i>Atylosia scarabaeoides</i> (L.)	Climber	Whole Plant	Diarrhoea
			Leaves	Dysentery
			Whole Plant	Oestrus
			Leaves	Ephemeral fever
4	<i>Cardiospermum halicacabum</i>	Climber	Root	Insect bite
			Leaves	Rheumatism
			Whole Plant	Parasitic
5	<i>Cassytha filiformis</i> L.	Climber	5Leaves	Diarrhoea
			Whole Plant	Bone fracture
6	<i>Cissus quadrangularis</i> L.	Climber	Stem bark	Bone fracture
			Stem	Dysentery
			Leaves	Ephemeral fever
7	<i>Cocculus hirsutus</i> (L.) Diels.	Climber	Stem	Cough
			Stem	Bone fracture
			Leaves	Urinary disorder
			Leaves	Epistaxis
8	<i>Cryptolepis burchanani</i> Roem.	Climber	Leaves	Blood motions
			Leaves	Lactation
			Leaves	Babesiosis
9	<i>Cuscuta reflexa</i> Roxb.	Climber	Leaves	Galactagogue
			Stem	Maggot
			Whole Plant	Poultry disease
10	<i>Gloriosa superba</i> L.	Climber	Whole Plant	Bone fracture
			Root	Anthrax
			Root	Nasal and Ear Drops
11	<i>Pergularia daemia</i> (Forsk.)	Climber	Tuber	Foot and Mouth
			Tuber	Maggot
			Leaves	Epilepsy
11	<i>Pergularia daemia</i> (Forsk.)	Climber	Leaves	Ephemeral fever
			Leaves	Tympany
			Tender shoot	Anthrax
			Leaves	Impaction
11	<i>Pergularia daemia</i> (Forsk.)	Climber	Leaves	Gout
			Leaves	Muscular pain

12	<i>Piper longam</i> L.	Climber	Fruit	Mouth blisters
			Fruit	Wounds
			Root	Amoebiasis
			Root	Dysentery
13	<i>Smilax zeylanica</i> Linn.	Climber	Root	Swelling
			Root bark	Diarrhoea
			Leaves	Wounds
			Leaves	Eye diseases
			Fruit	Dysentery
			Stem	Fever
14	<i>Tinospora cordifolia</i> Hook.f.	Climber	Stem	Dysentery
			Whole Plant	Vomiting
			Leaves	Swelling
			Aerial Parts	Foot and Mouth
			Leaves	Bone fracture
			Leaves	Fever
15	<i>Trichosanthes tricuspidata</i> L.	Climber	Tubers	Dysentery
			Root	Poisoning
			Tubers	Tympany
			Leaves	Tympany
16	<i>Tylophora indica</i> (Burm. f.)	Climber	Whole Plant	Anthrax
			Leaves	Insect bite
17	<i>Wattakaka volubilis</i> (L.F.)	Climber	Stem bark	Yoke gall
18	<i>Bauhinia vahlli</i> Wight	Lian	Stem bark	Bone fracture
19	<i>Entada pursaetha</i> DC.	Lian	Seeds	Vermifuge
			Seeds	Diarrhoea

Table 5: Socio-dynamic profile of the informants practicing ethno-veterinary practices

Sex	Males	Females	Total %ge
Male	325		40.37
Female		480	59.63
Age (Yrs)			
20-30	40	80	14.91
31-40	70	80	18.63
41-50	80	24	12.92
51-60	32	104	16.89
61-70	78	136	26.58
>71	25	56	10.06
Education level			
Illiterate	85	124	25.96
Primary	120	170	36.02
Medium	93	127	27.33
Secondary	20	45	8.07
University	7	14	2.61

DISCUSSION

The habit-wise findings revealed that the ethno-veterinary practices exhibited a hierarchical preference for different plant habits, with trees emerging as the most extensively utilized category, followed by herbs, shrubs, climbers, and lianas. Trees are often more readily available and abundant, increasing the accessibility for traditional healers. Besides, their extensive biomass allows for the extraction of various plant parts, including bark, leaves, and fruits, which are rich in beneficial phytochemicals (van der Sande *et al.*, 2015). Herbs and shrubs, next in the sequence, are known for their concentrated medicinal properties and high diversity of bioactive compounds (Sofowora *et al.*, 2013). The richness of medicinal values in herbs and shrubs makes them highly sought after trees for ethno-veterinary practices. The relatively lower utilization of climbers and lianas could be attributed to the limited abundance and accessibility within the regions.

The higher contribution of Euphorbiaceae and Fabaceae to the medicinal practices compared to the other identified families was a remarkable finding. Interestingly, these two families are considered as largest among the identified families within the current study. The diverse bioactive components and the ability of these two families in addressing a wide array of health issues are well observed by earlier researchers (Bijekar and Gayatri, 2014; Maroyi, 2023). This prevalence expands the range of available plant resources associated with these two families, further emphasizing their importance in ethno-veterinary practices. Nevertheless, it is noteworthy that the reason for higher representation of Euphorbiaceae and Fabaceae to other families may vary depending on the local ecological context, cultural practices, and traditional knowledge systems. Further scientific research and ethnobotanical studies would be required to provide a more comprehensive understanding of the underlying reasons for the prevalence of Euphorbiaceae and Fabaceae in ethno-veterinary practices.

The part-wise analysis indicated variations in the utilization frequency of different plant parts. Among them, leaves were the predominant plant parts used followed by stem bark, root, seed, and fruit. These five parts are rich in bioactive components with antimicrobial, anti-inflammatory, and analgesic properties (Reddy *et al.*, 2020). The ease of access and consistent availability of



leaves, stem bark, and roots may have positioned them as a convenient and frequently utilized resource for traditional healers, thus placing them at the forefront of the usage sequence.

Due to the extensive number of species involved in ethno-veterinary practices, it is impractical to discuss each individual species of the database in this manuscript. Therefore, our discussion primarily focuses on a few selected diseases that hold significant importance in the veterinary scientific world. The stem bark of *Acacia chunda* L. was discovered to be used to ameliorate Ephemeral fever and trypanosomiasis. The literature search revealed the effective antiviral (Rehman *et al.*, 2011) and antiprotozoal (Ali *et al.*, 2021) activities of *Acacia* species in *in vitro* conditions. A total of thirteen species were identified as possessing the anthelmintic properties. These findings can be substantiated by the claim of Jayawardene *et al.* (2021), who suggested natural products as a promising source for anthelmintic drug discovery.

Finding cost-effective natural galactagogues is crucial for optimizing milk production and maximizing profitability in the dairy industry. In this lieu, the database revealed that the utilization of galactagogues was prevalent with the whole plant of *Asparagus racemosus* and *Oxalis corniculata* along with the leaves of *Ricinus communis*. An earlier review by Bazzano *et al.* (2016) mentioned these plants as cost-effective and widely available galactagogues. Further, the prevalence of the snake menace in rural areas stresses the importance of prioritizing natural remedies for snake bites. The plant species used against snake bite include *Achyranthes aspera* L., *Alangium salvifolium* L.F., *Polygala arvensis* Willd., *Ocimum basilicum* L., *Polygala arvensis* Willd. Similarly, Dey and De (2012) emphasized the critical importance of incorporating folklore practices in the management of snakebite. In line with the previous review by Abdisa (2018), the database identified nine species used to expel the retained placenta, which is the most common gynaecology-related problem. A remarkable total of 22 species were discovered to be employed for the management of livestock diarrhoea, highlighting the significant diversity of therapeutic resources available. These plants hold considerable significance due to the growing concerns surrounding the antimicrobial resistance of antibiotics utilized in the management of calves' diarrhoea (Reddy *et al.*, 2020).

All the aforementioned treatment approaches of the diverse plant species could be attributed to the wide range of bioactive compounds that contribute to antimicrobial, antimycotic, anti-inflammatory, antioxidant, and immunomodulatory properties (Reddy *et al.*, 2020). The usage of the ethno-veterinary practices need a cautious perspective to avoid blind adherence. Although these traditional practices have been passed down through generations, they should be considered as anecdotal, which necessitates the essentiality of further scientific studies to validate them. This evidence-based approach will enhance our understanding of the bioactive compounds present in plants, their mechanisms of action, and potential interactions with other treatments. Additional factors needed to be considered include dosage, potential side effects, and interactions with other medications (Elghandour *et al.*, 2018).

Among the informants engaged in ethno-veterinary practices, there was a higher representation of females compared to males. This phenomenon highlights the pivot role and involvement of women in household livestock management. The sequence of age groups with the highest perception of ethno-veterinary practices, with older age groups leading the list, can be attributed to the extensive knowledge and experience gained through years of practical involvement with animals and disease management. The lower representation of individuals with secondary or university education among the respondents could be related to the low familiarity of these practices and complete reliability on modern veterinary services and scientific approaches for animal healthcare.

CONCLUSION

The current study provides valuable insights into the utilization of ethno-veterinary practices and the importance of traditional plant-based remedies in animal healthcare. The habit-wise classification highlights the significance of trees followed by herbs, shrubs, climbers, and lianas in ethno-veterinary practices. The prevalence of Euphorbiaceae and Fabaceae families underscores their contributions and emphasizes their importance in addressing livestock diseases. The utilization of different plant parts, particularly leaves, stem bark, roots, seeds, and fruits, shows their rich bioactive components and accessibility for traditional healers. However, it is crucial

to approach these practices with caution and validate their efficacy through further scientific research. Females play a prominent role in ethno-veterinary practices, while older age groups show a higher perception of these traditional approaches, indicating the importance of experience and practical knowledge.

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