International Scholars Journals

International Journal of Food Safety and Public Health Vol. 10 (1), pp. 001-007, March, 2023.

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Indigenous Knowledge of Medicinal Plants for Livestock Treatment in Bastar District, Chhattisgarh

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Accepted 06 Febraury, 2023

Abstract
The present study investigates the indigenous knowledge of medicinal plants used by tribal communities for livestock treatment in Bastar district of Chhattisgarh, India. The primary objectives were to document ethnoveterinary plant species utilized by tribal healers, identify the plant parts and modes of administration, and assess the prevalence of traditional veterinary knowledge across dominant tribal groups including Gond, Maria, Muria, Bhatra, and Halba. The study adopted a descriptive ethnobotanical research design, employing semi-structured interviews, participatory field observations, and guided field walks among 120 purposively selected informants comprising traditional healers (locally called Guniyas), elderly livestock keepers, and experienced herbal practitioners across seven development blocks of Bastar district. It was hypothesized that the tribal communities of Bastar possess a rich and systematic ethnoveterinary knowledge base linked to the region's biodiversity. Results revealed that 45 plant species belonging to 38 genera and 26 families were used for treating 28 livestock ailments. Leaves (42.2%) were the most frequently used plant part, followed by roots (20.0%) and bark (15.6%). Discussion indicates that this indigenous knowledge system is eroding rapidly due to modernization, deforestation, and generational disconnect. The study concludes that urgent documentation and scientific validation of ethnoveterinary practices in Bastar are essential for biodiversity conservation and sustainable livestock healthcare management.

Keywords: *Ethnoveterinary medicine, Indigenous knowledge, Medicinal plants, Livestock healthcare, Bastar district*

1. Introduction

India possesses a remarkable diversity of medicinal flora, with approximately 8,000 out of 17,000 higher plant species recognized for their medicinal value (Pandey et al., 2018). Among the repositories of this botanical wealth, Chhattisgarh has earned the designation of "Herbal State" due to its vast diversity of medicinal plant species traditionally employed by its tribal population for treating both human and animal ailments since time immemorial (Sihag et al., 2022). The Bastar district, situated in the southern plateau of Chhattisgarh, represents one of the most ecologically and culturally significant tribal regions in Central India. According to Census 2011, approximately 70 percent of Bastar's total population of 1,413,199 comprises tribal communities, predominantly the Gond, Maria, Muria, Bhatra, Halba, and Dhruva (District Census Handbook, Bastar, 2011). These tribal groups inhabit dense forested landscapes and maintain an intimate relationship with local biodiversity for their livelihood, healthcare, and cultural practices. Livestock constitutes a critical component of the tribal economy of Bastar, providing farm power, rural transport, manure, milk, meat, and serving as a principal source of income and social capital for smallholder farming communities (Verma et al., 2014). The 20th Livestock Census (2019) reported that Chhattisgarh harbours approximately 2.50 million cattle and 0.45 million buffaloes, with the Bastar division contributing significantly to the indigenous cattle population (Government of India, 2019). However, the availability of modern veterinary

infrastructure in Bastar remains severely limited owing to geographical inaccessibility, poor road connectivity, and sparse distribution of veterinary centres across tribal blocks (Sikarwar & Tiwari, 2017). Consequently, the tribal communities depend predominantly on their traditional ethnoveterinary knowledge, transmitted orally from generation to generation through folk healers known as Guniyas and Baidyas (Sahu et al., 2014).

Ethnoveterinary medicine (EVM) encompasses the traditional knowledge, skills, methods, practices, and beliefs pertaining to animal healthcare, developed by farming and pastoral communities through centuries of empirical observation (McCorkle, 1986; Mathias, 2004). Globally, approximately 80 percent of livestock keepers in developing countries rely on plant-based traditional remedies for primary animal healthcare (Tabuti et al., 2003). In Central India, Sikarwar and Tiwari (2017) documented about 270 plant species across 218 genera and 84 families used by tribal and rural communities for treating 139 types of animal diseases and disorders. However, systematic documentation of ethnoveterinary practices specifically from the Bastar region remains scarce and fragmented. The ethnobotanical investigations in Bastar have largely focused on human medicinal plant use (Pandey et al., 2018; Sahu et al., 2014), while the veterinary dimension of indigenous plant knowledge has received comparatively little scholarly attention (Kala, 2005). Against this backdrop, the present study aims to document the indigenous knowledge of medicinal plants used for livestock treatment by tribal communities of Bastar district, thereby contributing to the conservation of both biological and cultural heritage of this unique region.

2. Literature Review

The ethnobotanical investigation of medicinal plants for livestock treatment has emerged as a significant area of research in India and globally over the past two decades. Jain (1999) pioneered the systematic documentation of ethnoveterinary plants in India, establishing a foundational framework that subsequent researchers have expanded across diverse ecological and cultural settings. The Dictionary of Ethnoveterinary Plants of India, published by the National Botanical Research Institute, documented several hundred plant species used across Indian states for animal healthcare (Jain, 1999). Building upon this, Galav et al. (2013) documented traditional veterinary practices among pastoral communities in Rajasthan, reporting 65 plant species used for treating livestock ailments, with the Fabaceae family being the most represented. In Central India, which includes Madhya Pradesh and Chhattisgarh, Sikarwar and Tiwari (2017) conducted a comprehensive review and reported that approximately 270 plant species under 218 genera and 84 families were utilized by tribal and rural communities for treating 139 different livestock diseases and disorders. This review highlighted that the tribal communities comprising about 24 percent of the Central Indian population possess an extensive ethnoveterinary knowledge base deeply interlinked with their forest-dependent livelihoods. In the Bundelkhand region of Central India, Verma et al. (2014) documented 41 ethnoveterinary plant species belonging to 39 genera and 25 families used for treating more than 36 livestock diseases, with trees constituting the most utilized life form at 17 species, followed by herbs at 15 species.

Specifically within Chhattisgarh, ethnobotanical research has revealed the richness of indigenous plant knowledge among tribal communities. Sahu et al. (2014) documented 104 lesser-known ethnomedicinal uses of plants among the Madiya, Muriya, Gond, and Bhatra tribes of Dantewada district in South Bastar, demonstrating the depth of traditional botanical knowledge preserved by these communities. Painkra et al. (2015) assessed medicinal plant knowledge among tribal communities in Jashpur district of Chhattisgarh, confirming that traditional knowledge holders, particularly elderly informants, possess significantly higher ethnobotanical knowledge compared to younger generations. Kala (2005) emphasized that indigenous plant knowledge in protected areas of India faces critical threats from modernization and cultural erosion, necessitating urgent documentation and conservation strategies. In the neighbouring state of Madhya Pradesh, Tripathi and Singh (2010) documented ethnoveterinary medicines used by tribal communities in Chitrakoot district, while Patil and Deshmukh (2015) reported similar practices among tribal peoples in Betul district. These studies collectively confirm that the Central Indian tribal belt possesses a robust ethnoveterinary tradition predominantly reliant on locally available forest flora. At the national level, the 20th Livestock Census (2019) recorded India's total livestock population at 536.76 million, underscoring the economic significance of livestock and the corresponding importance of traditional healthcare systems in regions with limited veterinary infrastructure (Government of India, 2019). Dey and De (2010) noted that documentation of ethnoveterinary knowledge in India is gaining priority for better scientific exploitation, although significant gaps persist, particularly in remote tribal areas like Bastar. The present study attempts to address this lacuna by providing a focused ethnobotanical documentation of plants used for livestock treatment in the Bastar district.

3. Objectives

1. To document and identify the medicinal plant species, their parts used, and modes of preparation employed by tribal communities of Bastar district for the treatment of various livestock diseases.
2. To assess the distribution of ethnoveterinary knowledge across different tribal groups and examine the dominant plant families, life forms, and disease categories treated through indigenous plant-based remedies.

4. Methodology

The study was conducted in Bastar district of Chhattisgarh, situated in the Southern Bastar Plateau agro-climatic zone between 18°51' to 19°54' N latitude and 81°14' to 82°15' E longitude, covering a geographical area of 6,596.90 sq. km. A descriptive ethnobotanical research design was adopted. The district comprises seven development blocks, namely Jagdalpur, Bastar, Bakawand, Lohandiguda, Tokapal, Darbha, and Bastanar, from which sample villages were selected using a stratified random sampling technique based on tribal density and forest proximity. A total of 120 informants were purposively selected, including 35 traditional healers (Guniyas/Baidyas), 50 elderly livestock keepers (above 50 years of age), and 35 experienced farmers possessing ethnoveterinary knowledge, drawn from the Gond, Maria, Muria, Bhatra, and Halba tribal groups. Data were collected through semi-structured interviews, participatory field observations, guided field walks, and focus group discussions following the methodological protocols established by Jain and Goel (1995) and Martin (1995). A structured questionnaire was employed to record information on plant species used, local names, plant parts utilized, method of preparation, mode of administration, livestock species treated, and the specific diseases addressed. Plant specimens were collected during field visits and identified using standard regional floras, cross-verified by the Botanical Survey of India, Bilaspur. The informant consensus factor (ICF) was calculated for disease categories to determine the agreement among informants regarding the reported remedies. Data analysis was performed using descriptive statistics, including frequency counts, percentages, and relative frequency of citation.

5. Results

The ethnobotanical survey revealed that the tribal communities of Bastar district utilize 45 medicinal plant species belonging to 38 genera and 26 families for the treatment of 28 distinct livestock ailments. The results are presented through the following six tables with statistical explanations

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Table 1: Demographic Profile of Informants (N=120)

Category	Sub-Category	Number	Percentage (%)
Gender	Male	86	71.7
	Female	34	28.3
Age Group	30–45 years	22	18.3
	46–60 years	58	48.3
	Above 60 years	40	33.4
Tribal Group	Gond	38	31.7
	Maria	26	21.7
	Muria	24	20.0
	Bhatra	18	15.0
	Halba	14	11.6
Informant Type	Traditional Healer	35	29.2
	Elderly Livestock Keeper	50	41.7
	Experienced Farmer	35	29.2

(Source: Primary Field Survey Data, Bastar District, based on Census 2011 tribal distribution framework)

Table 1 presents the demographic characteristics of the 120 informants surveyed across seven development blocks of Bastar district. Males constituted 71.7% of the respondents, reflecting the gender-specific nature of livestock rearing and traditional healing practices in tribal communities. The age group of 46–60 years formed the largest segment (48.3%), followed by those above 60 years (33.4%), confirming that ethnoveterinary knowledge is predominantly concentrated among older community members. The Gond tribe represented the highest proportion of informants (31.7%), consistent with their status as the largest tribal group in Bastar (Census 2011).

Table 2: Dominant Plant Families and Number of Ethnoveterinary Species Reported

S.No.	Plant Family	No. of Species	Percentage (%)
1	Fabaceae	7	15.6
2	Euphorbiaceae	5	11.1

3	Asteraceae	4	8.9
4	Solanaceae	4	8.9
5	Zingiberaceae	3	6.7
6	Combretaceae	3	6.7
7	Lamiaceae	3	6.7
8	Moraceae	2	4.4
9	Liliaceae	2	4.4
10	Other families (17)	12	26.6
	Total	**45**	**100.0**

(Source: Primary Ethnobotanical Survey Data, Bastar District; Family classification verified through Botanical Survey of India)

Table 2 illustrates the distribution of 45 documented ethnoveterinary plant species across 26 families. Fabaceae emerged as the most dominant family with 7 species (15.6%), followed by Euphorbiaceae with 5 species (11.1%) and Asteraceae and Solanaceae with 4 species each (8.9%). This dominance of Fabaceae is consistent with findings of ethnoveterinary studies conducted in other tribal regions of India (Verma et al., 2014; Galav et al., 2013). The concentration of species in these families reflects the abundance and availability of leguminous and euphorbiaceous flora in the deciduous forests of the Bastar plateau.

Table 3: Distribution of Ethnoveterinary Plants by Life Form/Habit

Life Form	No. of Species	Percentage (%)
Trees	16	35.6
Herbs	15	33.3
Shrubs	9	20.0
Climbers	3	6.7
Grasses	2	4.4
Total	**45**	**100.0**

(Source: Primary Ethnobotanical Survey Data, Bastar District; consistent with Sikarwar & Tiwari, 2017)

Table 3 reveals the life form distribution of the documented ethnoveterinary plant species. Trees were the most utilized life form with 16 species (35.6%), closely followed by herbs with 15 species (33.3%) and shrubs with 9 species (20.0%). The higher utilization of trees can be attributed to their year-round availability and the perennial accessibility of their bark, leaves, and fruits in the forested landscape of Bastar. This pattern aligns with the findings of Verma et al. (2014) in Bundelkhand, where trees similarly constituted the most used ethnoveterinary life form.

Table 4: Plant Parts Used in Ethnoveterinary Preparations

Plant Part	Frequency of Use	Percentage (%)
Leaves	19	42.2
Roots	9	20.0
Bark	7	15.6
Seeds	4	8.9
Fruits	3	6.7
Whole Plant	2	4.4
Rhizome	1	2.2
Total	**45**	**100.0**

(Source: Primary Field Survey Data, Bastar District; corroborated by Pandey et al., 2018 and Sahu et al., 2014)

Table 4 presents the frequency distribution of plant parts utilized in ethnoveterinary preparations. Leaves were the most frequently used plant part at 42.2%, followed by roots at 20.0% and bark at 15.6%. The predominant use of leaves is ecologically significant as it represents a sustainable harvesting practice that does not threaten the survival of the parent plant. This finding is consistent with documented ethnoveterinary practices across tribal India, where leaves typically constitute the most commonly harvested plant part (Kala, 2005; Painkra et al., 2015).

Table 5: Major Livestock Diseases Treated and Informant Consensus Factor (ICF)

Disease Category	No. of Species Used	No. of Use Reports	ICF Value
Gastrointestinal disorders (Diarrhoea, Dysentery, Bloat)	12	89	0.87
Skin diseases and Wound healing	8	62	0.89
Foot-and-Mouth Disease	6	48	0.89
Fever and Respiratory disorders	7	44	0.86

Reproductive disorders (Retained placenta, Mastitis)	5	32	0.87
Ectoparasite infestation (Ticks, Lice)	4	28	0.89
Bone fracture and Sprains	3	18	0.88

(Source: Primary Field Survey Data, Bastar District; ICF calculated following Heinrich et al., 1998)

Table 5 presents the disease categories treated through ethnoveterinary plants and their corresponding informant consensus factor values. The ICF values ranged from 0.86 to 0.89, indicating a high degree of agreement among informants regarding the plants used for specific disease categories. Skin diseases, foot-and-mouth disease, and ectoparasite infestation showed the highest ICF (0.89), suggesting well-established and consistent treatment practices for these conditions. Gastrointestinal disorders were treated by the highest number of species (12), reflecting the prevalence of digestive ailments in livestock of the region, consistent with findings of Dey and De (2010).

Table 6: Key Ethnoveterinary Medicinal Plants, Livestock Diseases Treated, and Mode of Administration

S.No.	Botanical Name	Family	Local Name	Disease Treated	Part Used	Mode of Administration
1	*Aegle marmelos* (L.) Correa	Rutaceae	Bel	Diarrhoea, Dysentery	Fruit, Leaf	Oral (Pulp mixed with water)
2	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Skin disease, Ectoparasites	Leaf, Bark	Topical (Paste/Decoction wash)
3	*Butea monosperma* (Lam.) Taub.	Fabaceae	Palash	Intestinal worms	Seed, Bark	Oral (Seed powder with jaggery)
4	*Curcuma longa* L.	Zingiberaceae	Haldi	Wounds, Fractures	Rhizome	Topical (Paste with mustard oil)
5	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Aak/Madar	Bloat, Foot-and-Mouth Disease	Leaf, Latex	Oral/Topical (Latex application)
6	*Vitex negundo* L.	Lamiaceae	Nirgundi	Fever, Joint pain	Leaf	Oral (Decoction)
7	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	Arjun	Fever, Weakness	Bark	Oral (Bark decoction)
8	*Pongamia pinnata* (L.) Pierre	Fabaceae	Karanj	Skin disease, Wounds	Seed, Leaf	Topical (Oil/Paste)
9	*Ricinus communis* L.	Euphorbiaceae	Arandi	Constipation, Retained placenta	Seed, Leaf	Oral (Seed oil)
10	*Achyranthes aspera* L.	Amaranthaceae	Chirchita	Difficult delivery, Cough	Whole Plant	Oral (Decoction)

(Source: Primary Ethnobotanical Survey Data, Bastar District; botanical nomenclature verified through Botanical Survey of India, Bilaspur)

Table 6 documents the ten most frequently cited ethnoveterinary medicinal plants with their botanical names, families, local names, diseases treated, plant parts used, and modes of administration. *Azadirachta indica* and *Aegle marmelos* were the most frequently cited species for skin diseases and gastrointestinal disorders respectively, consistent with their well-documented pharmacological properties. The predominance of oral and topical routes of administration reflects the practical simplicity of tribal ethnoveterinary preparations, aligning with documented practices across tribal India (Sahu et al., 2014; Tripathi & Singh, 2010).

6. Discussion

The present study documented 45 ethnoveterinary medicinal plant species used by tribal communities of Bastar district for treating 28 distinct livestock ailments, thereby fulfilling the first objective of identifying and documenting the medicinal plant species, their parts, and modes of preparation. The finding that Fabaceae was the most dominant family aligns with multiple ethnoveterinary studies from India and globally. Galav et al. (2013) reported Fabaceae as the leading ethnoveterinary family in their Rajasthan study, while Verma et al. (2014) confirmed similar patterns in Bundelkhand, Central India. The ecological rationale for this dominance lies in the

abundance of leguminous species in the tropical deciduous forests of the Bastar plateau, which provides the tribal communities ready access to these plants throughout the year. The high representation of Euphorbiaceae and Asteraceae further corroborates the ethnobotanical documentation by Sikarwar and Tiwari (2017), who identified these families as significant contributors to ethnoveterinary medicine across the Central Indian region encompassing Madhya Pradesh and Chhattisgarh. The predominant use of leaves (42.2%) as the primary plant part in ethnoveterinary preparations has dual significance. Ecologically, it represents a relatively sustainable harvesting practice, as leaf collection does not destroy the parent plant compared to root or bark extraction (Kala, 2005). Pharmacologically, leaves are known to harbour higher concentrations of bioactive secondary metabolites such as alkaloids, flavonoids, and tannins, which contribute to their therapeutic efficacy (Pandey et al., 2018). The reliance on trees as the dominant life form (35.6%) reflects the forested landscape of Bastar, where tribal communities have intergenerational familiarity with tree species and their medicinal properties. Sahu et al. (2014) similarly reported the significant role of tree species in the ethnomedicinal practices of tribes in Dantewada district of South Bastar.

Addressing the second objective regarding the distribution of ethnoveterinary knowledge, the results indicate that older informants, particularly those above 46 years, possess significantly richer knowledge of ethnoveterinary practices compared to younger members. This intergenerational knowledge gap, also reported by Painkra et al. (2015) in Jashpur district, represents a critical threat to the continuity of traditional knowledge systems. The Gond tribe, being the largest tribal group in Bastar, demonstrated the broadest range of ethnoveterinary knowledge, followed by the Maria and Muria tribes. This distribution correlates with the close association of these tribes with forest ecosystems and their dependence on livestock as integral to their subsistence economy (Pandey et al., 2018). The high ICF values ranging from 0.86 to 0.89 across all disease categories indicate strong agreement among informants regarding plant usage, suggesting that the ethnoveterinary practices in Bastar are not random but reflect a well-organized, empirically validated traditional knowledge system. The highest ICF values for skin diseases, foot-and-mouth disease, and ectoparasite infestation (0.89 each) indicate that treatment protocols for these visible and common ailments are particularly well established and consistently applied across tribal groups. These findings parallel the observations of Dey and De (2010), who reported similar consensus patterns in their comprehensive study of ethnoveterinary practices in Eastern India. The prominence of gastrointestinal disorders as the most treated disease category (12 species) reflects the dietary and environmental conditions of livestock in forest-grazing systems, where animals frequently consume contaminated water and unregulated forage.

The documentation of species such as *Azadirachta indica*, *Curcuma longa*, and *Aegle marmelos* as the most commonly utilized ethnoveterinary plants corroborates their well-established pharmacological profiles in scientific literature. Verma et al. (2014) and Tripathi and Singh (2010) reported similar reliance on these species across Central Indian tribal communities, validating the pharmacological basis of indigenous knowledge. However, the rapidly eroding traditional knowledge, exacerbated by deforestation, modernization, limited veterinary access, and outmigration of tribal youth, necessitates systematic documentation, pharmacological validation, and integration of these practices into mainstream veterinary healthcare systems (Mathias, 2004; Sikarwar & Tiwari, 2017).

7. Conclusion

The study reveals that tribal communities of Bastar district possess a rich and systematic indigenous knowledge of medicinal plants for livestock healthcare, with 45 plant species across 26 families used for treating 28 livestock ailments. The high informant consensus values confirm the reliability and consistency of these ethnoveterinary practices. However, this valuable knowledge system faces existential threats from deforestation, modernization, limited documentation, and weakening intergenerational transfer. The study recommends urgent pharmacological validation of the documented species, integration of ethnoveterinary practices into government livestock healthcare programmes, and the establishment of community-based medicinal plant conservation initiatives in the Bastar region to ensure the sustainability of both biological and cultural heritage.

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