Assessment of Fidelity Level and Use-Value of Vertebrate Species through Ethno-Pharmacological Survey of Indigenous Communities in Durg and Balod Districts, Chhattisgarh

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ABSTRACT

Indigenous and traditional medicine serves as the principal healthcare approach for numerous ethnic communities. Nevertheless, the reliance on oral knowledge transmission results in gradual deterioration and abandonment owing to inadequate record-keeping. This ethno pharmacological investigation systematically catalogued zootherapeutic practices employed by indigenous populations across Durg and Balod districts in Chhattisgarh. A cross-sectional ethno zoological survey was implemented between August 2024 and February 2025 utilizing deliberately chosen participants and semi-structured interview instruments. Use-value, and fidelity level metrics were computed. Data collected from 280 sources revealed 35 animal species employed in the treatment of multiple health conditions. Mammals constituted 40% of identified species, while amphibians accounted for 8.57%. The results indicate considerable animal resource utilization for fundamental healthcare requirements within the research region. To formulate potent therapeutic agents derived from animals for various medical conditions, this ethno zoological information must be combined with modern medical science.

Keyword: Traditional medicine, Ethno pharmacological, Use-Value, Fidelity Level and therapeutic agents

INTRODUCTION

A branch of anthropology called ethno-zoology studies the relationships between the tribal populations of particular cultures and geographical areas and the animals they come into contact with. This area of study looks into how they interact and change over time. It also includes studies on tribes and rural communities with the goal of recording their unique perspectives on animal resources, the search for novel medicines derived from animals, and the conservation of animals with ecological and commercial value (Prakash et al 2021). Ethno-zoology encompasses various branches, such as ethno-entomology, focused on the medicinal applications of insects in human health care; ethno-ichthyology, which addresses the medical uses of fish in human health care; ethno-herpetology, concerned with the health care uses of amphibians and reptiles; and ethno-ornithology, which involves the therapeutic roles of birds in human health care (Prakash et al 2021). Zoo-therapy is the use of animals and animal byproducts to heal different human diseases (Costa-Neto, 1999).

India is home to numerous ethnic and tribal groups. These communities are well-versed in the therapeutic uses of freshwater fish and their byproducts, as well as the therapeutic qualities of amphibians and reptiles. Because they live in isolated places without access to hospitals or other contemporary medical facilities, tribal and ethnic people in many rural areas solely rely on local traditional medicine for their medical needs. As a result, they use their traditional knowledge—which has been passed down orally from generation to generation—for medical purposes (Jaroli et al., 2010) .

Most tribal communities live in forested areas and have gathered extensive knowledge about biological resources over the centuries. There exists a significant interdependence between humans and bio-resources for survival. Currently, individuals from tribal and ethnic backgrounds are increasingly acknowledging the importance of their traditional understanding of biomaterials in indigenous healing methods (Prakash, 2017).

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In India, a total of 427 tribal and ethnic communities are lived throughout the country (Chandra Prakash Kala, 2005). In addition to offering extensive insights into the medicinal applications of amphibians and reptiles, members of these communities possess considerable expertise about the local wildlife and its therapeutic benefits. Due to their residence in isolated regions that lack hospitals or contemporary medical facilities, most residents in rural areas, as well as tribal and ethnic groups, depend solely on the traditional medical system available in their locality for healthcare. Consequently, they utilize their ancestral knowledge for medical purposes, which is transmitted orally through generations (Jaroli et al., 2010).

Researchers are concentrating more on medico-ethno-zoological studies as the importance of medications derived from animals is recognized globally, even in developed countries. This system makes extensive use of a wide variety of drugs derived from animals. These therapies have either been shown to be successful or are thought to be beneficial for a variety of human health problems. Tribal communities' knowledge and methods for treating illness and easing suffering have a lot to offer modern society (Azmi, 1989) .

Similarly, this ethno pharmacological study evaluates and preserves knowledge regarding medicinal applications of animals and animal-derived products among indigenous populations in Durg and Balod districts, Chhattisgarh.

MATERIAL AND METHODS

[a] Description of the study area

Nikum Gram Panchayat, was strategically selected as the primary research site for this comprehensive investigation. Positioned along the National Highway-6 (NH-6), approximately 22 kilometres south of the Durg district administrative office, Nikum occupies a strategically central location within Durg and Balod district, making it an ideal location for conducting extensive field research. The research area maintains significant geographical proximity to two major water bodies, namely the Tandula and Shivnath rivers, which play crucial roles in the regional hydrology and ecosystem dynamics. A total of 28 villages around the Nikum gram panchayat were systematically included in the study, ensuring comprehensive spatial coverage of the research region. The study area is precisely positioned at geographical coordinates 21°05' North latitude and 81°24' East longitude, which facilitates accurate mapping and future reference of the research location.

[b] Selection of research locations

To facilitate systematic and organized data collection across the study region, the entire research area was carefully stratified into four distinct study blocks based on carefully considered geographical characteristics and river basin delineation criteria. This stratification approach was designed to ensure representative sampling across the study area, thereby enhancing the robustness and validity of the research findings. The detailed of these four study blocks are presented in Table 1 below.

Table-1- The study area and study blocks

S.N.	Character	Study area			
1	Blocks	A	B	C	D
2	Direction around Nikum	North	South	East	West
3	Total number of village	7	7	7	7
4	Name of village	Achhoti	Bamhani	Aamti	Arjunda
		Albaras	Chirchar	Anda	Batoli
		Bharda	Devri	Chicha	Bhothali
		Changori	Devsara	Khursuni	Jhola
		Chigari	Godella	Masabhat	Mahud
		Khada	Khurshipar	Mohandipat	Ruda
		Tirga	Kumtalori	Vinayakpur	Thanaud

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[c] Data collection and sampling -

Ethno pharmacological data on animal utilization among vertebrates was collected using Participatory Rural Appraisal (PRA) techniques. The methodology included structured inquiries about animal applications in conventional medicine, their therapeutic properties, and local relevance. Visual depictions of indigenous fauna facilitated community discussions. Participants included conventional medical practitioners, farming specialists, local social workers and regional medicinal practice experts.

[d] Study quality assurance -

A semi-structured interview guide was developed in English based on published research, then translated to Chhattisgarhi and back-translated to ensure linguistic consistency. The study ran from August 2024 to February 2025 with 280 respondents. Organism identification was supported by visual aids and photographs during interviews. Data collection staff received one day of training from the research team. All collected information was continuously assessed and cross-checked for accuracy and completeness.

[e] Ethical concerns-

After receiving approval from our institute's head, the Sarpanch of the corresponding village, data was gathered. The goal of the study was explained to each participant at the outset, and their choice to decline was respected. Throughout the time spent gathering data, ethical behavior shall be upheld. Confidentiality and privacy were maintained during the study period.

[f] Analysis of data -

Data collection and analysis followed established protocols using descriptive statistical methods. Key metrics calculated included fidelity level (Friedman et al 1986) and use-values (Vitalini et al 2013).

$$\text{Fidelity level (FL)} = (Np/N \times 100)\%$$

'N' represents total informants using animals medicinally for a specific condition, while 'Np' denotes informants reporting a particular species.

$$\text{Use - values (Uv)} = \Sigma\, UVi / N$$

'N' also represents total respondents surveyed, with Uvi indicating usage reports per species.

OBSERVATION

[a] Socio demographic Characteristics of Survey Participants -

Among 280 survey participants, 177 (63.22%) were male and 103 (36.78%) were female. The largest age group was 40-49 years (27.14%), with 8.21% aged 70 or older. Most participants (84.64%) were married. Regarding location, 30.35% lived in urban areas and 69.65% in rural areas. Illiteracy affected 18.93% of participants. Farmers using conventional healthcare services comprised the largest occupational group at 56.07% (Table-2).

Table -2- Socio demographic characteristic of informants

S.N.	Characters		Frequency	Percentage
1	Gender	Male	177	63.22
		Female	103	36.78

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2	Residence	Rural	195	69.65
		Urban	85	30.35
3	Age groups	21-29	12	4.28
		30-39	49	17.5
		40-49	76	27.14
		50-59	53	18.94
		60-69	67	23.93
		70- above	23	8.21
4	Education level	Illiterate	53	18.93
		Primary	68	24.29
		High school	91	32.49
		College	68	24.29
5	Occupation	Farmer	157	56.07
		House wife	69	24.64
		Merchant	23	8.22
		Traditional health worker	20	7.14
		Teacher	11	3.93
6	Marital status	Single	17	6.07
		Married	237	84.64
		Divorced	8	2.86
		Widowed	18	6.43

[b] Ethno zoological Information

Among the 93 respondents surveyed, representing 33.21% of the total sample, paternal guidance served as the primary source for acquiring knowledge regarding the therapeutic applications of fauna and zoological derivatives. Furthermore, 195 of the 279 participants, constituting 69.65% of the cohort, demonstrated a commitment to transmitting their accumulated medical knowledge to subsequent generations (Table 3).

Table -3-. Source of Knowledge, the attitude of community and Practice related information.

S.N.	Characters		Frequency	Percentage
1	Knowledge Source	Father	93	33.21
		Mother	17	6.07
		Grand father	37	13.21
		Religious source	31	11.07
		Friends	68	24.29
		Trial and error	14	5.01
		Others	20	7.14
2	Desire to pass on conventional medicinal knowledge to the upcoming generation	Interested	195	69.65
		Not interested	85	30.35
3	The advantages of receiving standard medical care	Income source	141	50.35
		Satisfaction	76	27.15
		Traditional	63	22.5
4	The community's acceptance of traditional medical	Acceptable	192	68.57
	services	Not acceptable	88	31.43

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[c] Class of animals medicinally used in the study area-

This investigation addressed 67 health conditions using 35 animal species across five taxonomic classes: fish, amphibians, reptiles, birds, and mammals. Indigenous communities and conventional practitioners primarily utilized 14 mammalian species (40% of total species) for therapeutic purposes (Table-4). Some non-local animals, like the bear (*Ursus arctos*), camel (*Camelus bactrianus*) , mole (*Talpa europaea*), and porcupine (*Erethizon dorsatum*), are also mentioned in Table 4 below. This is because local residents and users have reported obtaining these animals from other states or their native habitats and using them, as instructed by a practitioner, to treat various ailments. Because a user may use human milk and urine for their own treatment in compliance with medical guidelines without endangering themselves, humans are also included in this table.

Table -4- Class and species of animals used traditionally in disease treated

S.N.	Class	Species	No. of Species	%	Disease treated
1	Mammals	Bear *(Ursus arctos)*	14	40	Arthritis,
		Cat *(Felis catus)*			Asthma
		Camel (*Camelus bactrianus*)			Baldness especially in male
		Goat (*Capra hircus*)			Burn,
		Cow (*Bos taurus*)			Detoxification
		Buffalo (*Bubalus bubalis*)			Diarrhoea
		Squirrel (*Rodentia sciurus*)			Early pregnancy pain
		Human (*Homo sapience*)			Epilepsy
		Rabbit (*Oryctolagus cuniculus*)			Eye ache.
		Sheep (*Ovis aries*)			Gastric pain
		Donkey (*Equus asinus*)			Gastritis.
		Rat (*Rattus rattus*)			General weakness
		Mole (*Talpa europaea*)			Hepatitis B and C
		Porcupine (*Erethizondorsatum*)			Injuries
					Liver problems,
					Night blindness,
					Paralysis,
					Skin diseases
					Stomach disorders.
					Tuberculosis
					Whooping cough,
2	Birds	Crow (*Corvus corax*)	7	20	Abdominal pain
		Duck (*Anas platyrhychos*)			Anemia,
		Hen (*Gallus domesticus*)			Arthritis ,
		Eagle (*Clanga hastata*)			Asthma,
		Owl (*Bubo bengalensis*)			Blisters and pimples
		Pigeon (*Columba livia*)			Blood pressure
		Sparrow (*Passer domesticus*)			Burns
					Cough,
					Diarrhea
					Early tooth eruption
					Fever,
					General weakness
					Hair fall,
					Healing of injuries

					Kidney problems
					Leucoderma
					Maleness (malevolency)
					Pain,
					Paralysis.
					Sexual desire,
					Stomach upsets,
					Stuttering
					Used to treat sprains
					Vitality
					Whooping cough,
					Wounds
3	Reptiles	Cobra (*Naja naja*)	7	20	Abscess,
		Viper (*Vipera russelli*)			Arthritis,
		Rat snake (*Ptyasmucosus*)			Asthma,
		Python (*Python malurius*)			Body Pain
		Indian mabuya (*Eutropiscarinata*)			Bone fracture
		Monitor lizard (*Varanus sp*.)			Bronchitis,
		Turtle (*Testudo sp.*)			Conjunctivitis
					Cough & Fever
					Diabetes
					Galactoschesia
					Gastric Problem
					Goiter
					Impotency
					Inguinal hernia,
					Jaundice,
					Leprosy
					Malaria
					Male Sex Stimulant
					Menstrual irregularity
					Night blindness,
					Paralysis,
					Piles
					Promote eyesight
					Rickets,
					Sciatica,
					Skin disease,
					Snake bite,
					Tonsil,
					Tuberculosis
					Vitiligo,
4	Amphibia	Frog (*Rana tigrina*)	3	8.57	Acne (pimples)
		Toad (*Buffo sp.*)			Asthma,
		Tree frog (*Hyla sp*.)			Burn
					Eczema
					Hyperpyrexia (very high

					fiver)
					Jaundice
					Paralysis
					Piles,
					Pneumonia
					Rheumatism
					Urinary retention,
					Whooping cough,
					Wound
5	Fish	Eel (*Monopterus albus*)	4	11.43	Anemia
		Rohu (*Labeorohita*)			Arthritis
		Clarias (*Clarias batrachus*)			Asthma,
		Snake head murrel (*Channa striata*)			Burn injuries
					Cough and cold
					Diarrohea.
					Fish sting pain
					General weakness,
					Kidney stones
					Liver problem
					Malaria.
					Rickets,
					Skin Fairness
					Small pox,
					Urine blockage problem
					Weakness after delivery.
Total			35		

[d] Fidelity Level of Medicinal Animals-

This investigation revealed fidelity level values across different animal classes used in traditional medicine. Amphibia showed a minimum of 10.96, while reptiles exhibited the highest at 31.51. Fish, birds, and mammals showed 14.38, 19.86, and 23.29, respectively. Fidelity levels ranged from 7.53 (goats) to 0.68 (minimum), with camel, buffalo, rabbit, rat, mole, and owl each recording 0.68 for multiple illnesses (Table 5).

[e] Use Values of Medicinal Animals-

Reptiles (0.16) and Amphibia (0.06) represented the most frequently utilized animal classes for preparing remedies in the study region. Goats were the next most common (0.039), while camels, rats, moles, rabbits, and owls demonstrated minimum use values of 0.04 (Table 5)

Table-5- Statistical analysis of experimental value of medicinal animals

S.	EXPERIMENTAL VALUE FOR CLASS			EXPERIMENTAL VALUE FOR SPECIES		
N.	Class	FL-C	UV-C	Species	FL-S	UV-S
1	Mammals	23.29	0.12	Bear (*Ursus arctos*)	2.74	0.014
				Cat (*Felis catus*)	1.34	0.007
				Camel (*Camelus bactrianus*)	0.68	0.004

				Goat (*Capra hircus*)	**7.53**	0.039
				Cow (*Bos taurus*)	1.34	0.007
				Buffalo (*Bubalus bubalis*)	0.68	0.004
				Squirrel (*Rodentia sciurus*)	1.34	0.007
				Human (*Homo sapience*)	1.34	0.007
				Rabbit (*Oryctolagus cuniculus*)	0.68	0.004
				Sheep (*Ovis aries*)	1.34	0.007
				Donkey (*Equus asinus*)	2.05	0.010
				Rat (*Rattus rattus*)	0.68	0.004
				Mole (*Talpa europaea*)	0.68	0.004
				Porcupine (*Erethizondorsatum*)	2.05	0.010
2	Birds	19.86	0.10	Crow (*Corvus corax*)	2.74	0.014
				Duck (*Anas platyrhychos*)	3.42	0.018
				Hen (*Gallus domesticus*)	6.85	0.036
				Eagle (*Clanga hastata*)	2.05	0.010
				Owl (*Bubo bengalensis*)	0.68	0.004
				Pigeon (*Columba livia*)	1.34	0.007
				Sparrow (*Passer domesticus*)	2.74	0.014
3	Reptiles	31.51	0.16	Cobra (*Naja naja*)	6.85	0.036
				Viper (*Vipera russelli*)	4.12	0.021
				Rat snake (*Ptyasmucosus*)	3.42	0.018
				Python (*Python malurius*)	6.16	0.032
				Indian mabuya (*Eutropiscarinata*)	1.34	0.007
				Monitor lizard *(Varanus sp.)*	4.12	0.021
				Turtle (*Testudo sp.)*	5.48	0.029
4	Amphibia	10.96	0.06	Frog (*Rana tigrina*)	6.16	0.032
				Toad (*Buffo sp*.)	3.42	0.018
				Tree frog (*Hyla sp*.)	1.34	0.007
5	Fish	14.38	0.08	Eel (*Monopterus albus*)	4.12	0.021
				Rohu (*Labeorohita*)	6.16	0.032
				Clarias (*Clarias batrachus*)	2.74	0.014
				Snake head murrel*(Channa striata)*	1.34	0.007

DISCUSSION AND RESULTS

A wide range of domestic and wild animals, along with their byproducts (including skin, bones, blood, meat, hooves, feathers, and tusks), were utilized to gather essential elements for developing medicines that serve

preventive, curative, and protective functions. In this context, the tribal community's tradition of employing animals and their products for treating various ailments stands out as a crucial element (Prakash et al 2020).

India possesses a remarkable range of faunal and floral biodiversity due to the significant differences in the geographical and climatic conditions found within the country (Bagde et al 2013). India holds the top position globally for its diversity of insects (54,600), followed by fish (2,546), birds (1,232), reptiles (456), mammals (390), and amphibians (209). Approximately 10% of all recognized biological species on Earth can be attributed to its faunal diversity (Bagde et al 2017).

In the current analysis presented in Table-4, mammals represented the most frequently employed class of animals at 40%, followed by birds and reptiles, each at 20%, fish at 11.43%, and amphibians at 8.57%. As illustrated in Table-5 of this study, fidelity levels for animal species associated with medicinal use ranged from 10.96% for amphibians to 31.51% for reptiles, with mammals at 23.29%, birds at 19.86%, and fish at 14.38%. The fidelity levels observed for specific animal species varied from 7.53% for goats to 0.68% for camels, buffalo, rabbits, rats, moles, and owls. The higher use-values assigned to certain species indicate the preparation of various remedies utilizing different anatomical parts to treat a range of health issues. The significance of each species was gauged based on the information provided by informants. Reptiles showed the highest use-value (0.16) in animal-based remedies, followed by amphibians (0.06) and goats (0.039), while camels, rats, moles, rabbits, and owls were assigned minimal values of 0.04.

Quantitative analysis plays an essential role in ethno-medical studies as it provides foundational data for further ethno-pharmacological research. To enhance the understanding of their zootherapeutic potential and explore the undiscovered bioactive compounds related to their ethnomedicinal efficacy, it is recommended that animal species with use-value and FL undergo further ethno-pharmacological validation.

CONCLUSION

Concordance among participants was assessed using the informant consensus factor methodology. The study found that traditional medicines are prevalent in developing nations, with indigenous practitioners using animal-derived remedies. Research documented 35 animal species across mammals, birds, reptiles, amphibians, and fish treating 67 health conditions, with mammals being most frequently used. Despite practitioners' expertise in formulating animal-based treatments, conservation efforts for medicinal species remain inadequate. Local populations need education on biodiversity importance and sustainable species management. Interdisciplinary research should investigate therapeutic applications of animals and their derivatives to identify bioactive compounds for pharmaceutical development.

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