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Study on the use of animal products in making traditional medicine used by the traditional healers of Kokrajhar District, Assam, India

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Abstract
Traditional medicine, rooted in cultural practices, remains an important component of healthcare, utilizing knowledge systems that include remedies derived from plants, animals, and minerals (Adnan *et al*., 2022, WHO, 2022). The present study documents animal-based medicinal practices among traditional healers of the Bodo, Garo, Santali, and Rabha tribes of Kokrajhar district, Assam, India. A total of 46 animal species were recorded, comprising 7 invertebrates (15%) and 39 vertebrates (85%). These species are used to treat a wide range of ailments, including metabolic, infectious, dermatological, and neurological disorders, along with conditions such as tuberculosis, jaundice, asthma, rheumatic pain, and anemia, several uses are also associated with spiritual beliefs. The Use-Value (UV) index was highest for Rhesus monkey and cat (0.40), followed by banded krait, money cowrie, centipede, pig, porcupine, softshell turtle, and Royal Bengal tiger (0.33), while moderate values were observed for Indian peafowl, elephant, Indian flying fox, black cat, and honey bee (0.27).The findings highlight the richness of ethnozoological knowledge and its continued role in primary healthcare. Documentation of such practices is essential for conservation planning and provides a basis for future pharmacological validation and discovery of novel bioactive compounds.

Keywords: Ethnozoology, traditional healers, animal by-products, traditional knowledge

Introduction

The Indian traditional medicine is the oldest traditional medical system in use worldwide which has a number of social and religious connotations attached to it. The World Health Organization (WHO) defines traditional medicine as the entirety of knowledge, skills, and practices based on the beliefs, experiences, and theories of indigenous people from diverse cultures, regardless of whether they make sense or not. It is also used to support healthcare services and to prevent, identify, treat, or improve physical and psychological instability. In low-income nations, the traditional medicines are most widely used and is the reasonably priced type of treatment. It provides primary healthcare to about 70-80% of the world's rural population, the majority of whom live in poor nations (Chhetri *et al*. 2020). In some religions and societies, animals and goods derived from them are sacred and have long been used as a source of traditional medicines (Prakash & Prakash, 2021).According to WHO (2014) estimates, compared to affluent countries (23-80%), the percentage of people utilizing traditional medicine in poor countries is significantly greater (60-90%). Indigenous people all around the world have contributed significantly to the field of traditional medicine by helping to find living things that are crucial for treating various human health issues. Approximately 80% of the world's population, mostly uses medicines derived from plants and animals according to the World Health Organization (1993). Many civilizations have been using animals and their products to prepare traditional treatments since ancient times (Lev, 2003). Hooves, hides, bones, feathers, and tusks are among the many remedies that are preventive, therapeutic, and defensive (Adeola, 1992; Anageletti *et al*. 1992). North-East India, in addition to being a hotspot for biodiversity, boasts a wide range of traditional communities and biological resources that have allowed for the evolution of a vast amount of ethno-zoological knowledge. The knowledge of the traditional healers includes edible, medicinal, and therapeutic uses. Understanding the significance of animal parts in tribal medicine requires an exploration of the ecological, cultural, and spiritual dimensions that influence these kinds of practices. Animals are often regarded as the integral elements in tribal cosmologies, and their parts are believed to possess distinct therapeutic properties. The study will navigate the diverse landscape of the tribal regions, examining the specific animal parts employed in traditional healing rituals. The participatory observations and the ethnographic interviews will play a crucial role in unravelling the intricate knowledge systems that govern the selection and preparation of these remedies.

Materials and Methods

Study area: The study was conducted in the Kokrajhar district of Assam, India, which is in the western part of Assam, situated in the northern bank of Brahmaputra River. It is located between 89°46′ E and 90°38′ E longitude and 26°19′ N and 26°54′ N latitude, covering an area of about 3,169.22 sq. km. Kokrajhar district is surrounded by the

Bhutan in the northern side, Chirang and Bongaigaon districts are in the eastern side, Dhubri district is in the southern side and West Bengal is in the western side. The region is considered to be the centre of Bodo culture, but also Rabha, Garo, Santali communities are there. The study was conducted in 9 different villages (Jolaigaon, Paglijhora Pt.-II, Bashbari, Pondhargaon, Sagarfena, Sagarfenajhor, Dolongjhora, Satyapur, Dindinga Thakurpur) of Kokrajhar district, Assam, India.

Data collection: Data were collected through questionnaire-based interviews conducted between November 2023 and April 2024.Semi structured questionnaires with both open and closed end questions were used to document traditional medicinal practices involving animals and their by-products. A total of 15 traditional healers from the Bodo, Rabha, Garo, and Santali communities residing in different villages of the study area were interviewed. The informants, aged between 35 and 82 years, included local herbalists and experienced healers. Information regarding remedies, treated ailments, animal species or by-products used, and their sources was recorded during the interviews. Photographs of animal by-products were taken with prior consent, and GPS coordinates of the surveyed villages were documented. Species identification was initially based on local and vernacular names provided by informants and later verified using standard taxonomic literature. The study was strictly non-destructive in nature, based solely on traditional knowledge, historical usage, and photographic documentation. No animals were harmed, collected, or disturbed during the course of the survey. Data which were obtained through the interview, semi-structured questionnaires, and group discussion were analysed and summarized using descriptive statistical methods.

Use-value (UV) Index: UV Index signifies the value of a specific animal used in preparing medicine. It is the numerical indicator of how important a particular animal species is to the community. The formula for calculating the UV Index is-$UV=\Sigma UVi/Ni$

Where, UVi indicates how many reports the informants had cited for the species, and N is the total number of respondents interviewed for a given animal species (Wendimu and Tekalign, 2023)

Results: A total of 46 animal species were documented from the surveyed areas of Kokrajhar district, Assam, used in traditional medicinal practices by the Bodo, Garo, Santali, and Rabha communities. Among these, 7 species (15%) belonged to invertebrates and 39 species (85%) to vertebrates. Within the invertebrate group, Arthropoda was dominant with 6 species (86%), followed by Mollusca with 1 species (14%). In the vertebrate category, Mammalia constituted the highest proportion with 22 species (57%), followed by Reptilia and Aves with 6 species each (15%), Pisces with 4 species (10%), and Amphibia with 1 species (3%).The Use-Value (UV) index analysis indicated that rhesus monkey and cat had the highest UV values (0.40), followed by banded krait, money cowrie, centipede, pig, porcupine, softshell turtle, and Royal Bengal tiger (0.33), while Indian peafowl, elephant, Indian flying fox, black cat, and honey bee showed moderate values (0.27). Furthermore, conservation status assessment revealed that among the recorded species, 2 were critically endangered, 5 endangered, 4 vulnerable, 3 near threatened, 19 least concern, and 13 data deficient. These findings highlight the extensive reliance on faunal resources and the diversity of ethnozoological practices in the study area.

Discussion

The present study reveals the rich ethnozoological knowledge of the Bodo, Garo, Santali, and Rabha communities of Kokrajhar district, Assam, documenting the medicinal use of 46 animal species. Of these, 7 species (15%) belong to invertebrates and 39 species (85%) to vertebrates, with arthropods dominating the invertebrate group and mammals (57%) forming the largest proportion among vertebrates, followed by reptiles and birds (15% each), fishes (10%), and amphibians (3%). The prominence of mammals may be linked to their availability and perceived therapeutic effectiveness. These animal species are used to treat a wide range of ailments, including metabolic, infectious, dermatological, and neurological disorders, demonstrating the depth and diversity of traditional healthcare practices in the study area.Animal-derived materials such as blood, bones, organs, body fluids, and fur are used either individually or in combination to prepare remedies in different forms, including powders, liquids, ash, and ointments. In several cases, these materials are mixed with plant-based ingredients to enhance their medicinal efficacy. Apart from their therapeutic applications, certain animal parts are also used as amulets for protection against evil spirits, negative energies, and black magic, reflecting the strong cultural and spiritual beliefs associated with traditional healing systems. Most of the species are collected from the wild, although some domesticated animals are also utilized, indicating a close interaction between the communities and their natural environment. However, the use of several species belonging to threatened categories, including endangered, vulnerable, and critically endangered taxa, raises concerns regarding sustainability and conservation. The Use-Value (UV) index highlights that species such as rhesus monkey and cat hold the highest importance, followed by banded krait, porcupine, softshell turtle, and Royal Bengal tiger, indicating their significant role in local medicinal practices. These findings emphasize the urgent need for sustainable management strategies and conservation awareness to minimize pressure on wild populations. Furthermore, systematic documentation of such indigenous knowledge is essential not only for preserving cultural heritage but also for providing a scientific basis for future pharmacological validation and the discovery of novel bioactive compounds.

Table 1: Animal byproducts used by the Bodo tribe of Kokrajhar district, Assam, India

Sl. No.	Common name	Scientific Name	Local Name	No. of respondent	Parts Used	Medicinal Use	Method Of Administration
1	Rhesus monkey	*Rhesus macaque*	Mukrah	2	Bone	Hypocalcemia, Osteoporosis, Tetanus	Makes into powdery form and mixed with water and drinks.
2	Fresh water gar fish	*Xenentodon cancila*	Khangkhila nah	1	Mouth part along with teeth	Haematoma, Bruise injury	Dried the mouth part and with the help of the teeth drain out the clotted blood.
3	Royal bengal tiger	*Panthera tigris tigris*	Lokhra	Total-4 (Milk-3)	Milk	Weakness, Lose of appetide, Faintness during pregnancy, Eclampsia.	Little amount of milk is inserted into an amulet and wear it. Also drinks along with water.
				2	Fat	Pain	Oil extracted from the fat and applied in the affected area.
				1	Teeth	Spiritual belief	Wear as a ring or use as an amulet to prevent super natural power.
4	Indian Pangolin	*Manis crassicaudata*	Kheotai	2	Scale and nails	Asthma, Pain	Makes a hole in the scale and wear it in the affected area.
5	Cat	*Felis catus*	Mauji	Total-6 Fur-3	Fur	Spiritual belief	Use as an amulet to prevent super natural power.
				3	Bone	Spiritual belief	Use as an amulet to prevent super natural power, mainly in case of children.
6	Asian black bear	*Ursus thibetanus*	Muphur	3	Fur	Intermittent fever	Use as an amulet.
7	Porcupine	*Hystrix indica*	Mudoi	Total-2 Rectum-1	Rectum	Stomach ache	Cuts the rectum into small pieces and along with water they eat.
				2	Spine	Spiritual belief	Kept inside the house.
8	Large Indian Civet	*Viverra zibetha*	Jahamalai	1	Rectum along with fur	Spiritual belief (Eclampsia)	Use as an amulet or wear it directly.
9	Crab	*Sartoriana trilobata*	Khangkhrai	2	Meat	Jaundice	Cook and eat.
10	Soft shell turtle	*Trionychidae*	Kasow	3	Meat	Spiritual belief (increases lifespan)	Cook and eat.
11	Kadaknath	*Gallus gallus domesticus*	Dwao	2	Meat	Jaundice, Anemia	Cook and eat.
12	Asian common toad	*Duttaphryns melanosticus*	Ambustro	1	As a whole	Asthma	Burn and after that mixed with Tulsi, Indian pennywort, honey and eat.
13	Chicken	*Gallus gallus domesticus*	Dwao	3	Fat	Burning, Crack heel	Oil extracted from the fat and applied in the affected area.
14	Indian python	*Python molurus*	Gibwoutt	2	Fat	Paralysis,Rheumatic pain	Oil extracted from the fat and applied in the affected area.
15	Horse	*Equus ferus caballus*	Gorai	1	Urine	Alcoholism	Drinks a little amount of urine.
16	Indian carplet	*Amblypharyngodon mola*	Moa	Total-1	As a whole	Burning due to centipede bite	Dried and mixed with colocasia, leaves of bottle gourd and kept in a jar for few days and applied in the affected area.
				1	As a whole	Urinary dysfunction	Cook and eat.
17	Indian peafowl	*Pavo cristatus*	Daorai	4	Feather	Spiritual belief	Kept inside the house.

Table 2: Animal byproducts used by the Garo tribe of Kokrajhar district, Assam, India

Sl. No.	Common Name	Scientific Name	Local Name	No. of responder	Parts Used	Medicinal Use	Method of Administration
1	Royal bengal tiger	*Panthera tigris tigris*	Matcha	1	Bone	Menorrhagia	Use as an amulet.
2	Fox	*Vulpes bengalensis*	Pheru	1	Bone	Spiritual belief	Use as an amulet to prevent super natural power.
3	Dog	*Canis lupus familiaris*	Achak	2	Bone	Spiritual belief	Use as an amulet to prevent super natural power.

4	Horse	*Eqqus ferus caballus*	Gore/Guri	1	Bone	Mental illness	Use as an amulet.
5	Goat	*Capra aegagrus hircus*	Dobok	2	Bone	Spiritual belief	Use as an amulet to prevent super natural power mainly in case of children.
6	Spotted deer	*Axis axis*	Balgichak	1	Antler	Spiritual belief	Use as an amulet to prevent any kind of super natural power.

Table 3: Animal by products used by the Santali tribe of Kokrajhar district, Assam, India

Sl. No.	Common name	Scientific name	Local name	No. of responders	Parts used	Medicinal use	Method of administration
1	Pig	*Sus domesticus*	Sukri	Total-3	Gall bladder	Polydipsia, Epilepsy, Hysteria	Removes the gallbladder and dried, makes powdery form and mixed with water and drinks.
				1	Gall bladder	Stomach ache	Put some rice inside the gallbladder and store for few days and eat the rice part.
				1	Teeth	Spiritual belief	They perform some rituals for well being.
2	Greater adjutant	*Leptoptilos dubius*	Gwarur	2	Bone	Prevent snake bite (Spiritual belief)	Wear as a locket or wear in the waist.
3	Chimpanzee	*Pan troglodytes*	Virhar	1	Bone	Mental disorder	Mixed the bone dust with the bark of a special tree locally called Gowbar and smell it.
4	Banded krait	*Bungarus fasciatus*	Banphora	5	Bone	Urinary disorder	Makes the powdery form of bone and applied on tongue.
						Fecal impaction(Severe constipation)	Rub the bone in a stone and the powdery form mixed with water and applied in the umbilicus.
5	Rhesus monkey	*Rhesus macaque*	Ganni	2	Bone (Skull)	Colic (Healthy baby cries for a very long period of time)	Wear as an amulet.
6	Vulture	*Gyps indicus*	Gidi	Total-2 Bone-2	Bone	Myiasis/Maggots	Makes the powdery form of bone and mixed with coconut oil and applied to the affected area.
				1	Feather	Spiritual belief	Wear as an amulet in the right side of waist to prevent super natural power.
7	Fox	*Vulpes bengalensis*	Toiyu	1	Canine teeth	Asthma, Spiritual belief	Wear as an amulet.
8	Elephant	*Elephas maximus indicus*	Hatti	2	Tusk	TB	Rub the tooth on a hard surface, powdery form is mixed with water and drinks.
9	Rhinoceros	*Rhinoceros unicornis*	Genda	3	Horn	Chronic fever	Wear as an amulet.
10	Indian flying fox	*Pteropus giganteus*	Baddonoi	2	Bone	To prevent fever (Spiritual belief)	Bones cut into small pieces and insert some amount in an amulet and wear it.
11	Porcupine	*Hystrixindica*	Jhik	3	Rectum	Ascites, Oedema	Dried the rectum, makes the powdery form of it and makes tablet and eat (1 Tab for 7 days).
12	Centipede	*Scolopendra gigantea*	Sengal marmar	5	As a whole	Arthritis, Rheumatic pain	Deeply fry the centipede along with mustard oil and applied to the oil on the affected area.
13	Wild boar	*Sus scrofacristatus*	Bur sukri	2	Bone	Tetanus	Makes the powdery form of bone and applied on tongue directly.
14	Spotted deer	*Axis axis*	Jil	1	Antler	Spiritual belief	They perform some rituals.
15	King cobra	*Ophiophagus hannah*	Ayang	1	Head portion	Arthritis, Rheumatic pain	Deeply fry the head portion of cobra, centipede along with mustard oil and applied the oil to the affected area.

Table 4: Animal by products used by the Rabha tribe of Kokrajhar district, Assam, India

Sl.no.	Common name	Scientific name	Local name	No. Of responders	Parts used	Medicinal use	Method of administration
1	Otter	*Lutrinae*	Hudu	Total-3 Bone- 2	Bone (Muzzle)	Heart disease	Makes the powdery form of bones, mixed with water and drinks.
				1	Flesh		Cook and eat
2	Jungle cobra	*Naja melanoleuca*	Chotong daplangi	2	Bone	Spiritual belief	Wear as an amulet to prevent super natural power.

3	Elephant	*Elephas maximus indicus*	Nemplo	2	Bone	Spiritual belief	Wear as an amulet to prevent super natural power.
4	Cow	*Bos tourus*	Musu	3	Bone	Spiritual belief	Wear as an amulet for well being.
5	Indian flying fox	*Pteropus giganteus*	Badur	Total-2 Bone-2	Bone	Spiritual belief	Wear as an amulet to prevent any kind of super natural power mainly in case of children.
				2	Meat	Asthma	Cook and eat
6	Black cat	*Felis catus*	Meong penek	4	Bone	Spiritual belief	Wear as an amulet to prevent super natural power.
7	Rhesus monkey	*Rhesus macaque*	Khowoi	2	Bone	Spiritual belief	Wear as an amulet to prevent super natural power.
8	Puffer/Blow fish	*Tetradon cutcutia*	Gangatopa nah	1	As a whole	Orchitis	Dried the fish and makes powdery form and applied to the testes. Also used for stomach problem
9	Money cowrie	*Monetaria moneta*	Cowrie	5	Shell	Spiritual belief	Wear as a locket to prevent super natural power mainly in case of children.
10	Asian swamp eel	*Monopterus albus*	Kuchi nah	3	As a whole	Anemia	Cook and eat
11	Red junglefowl	*Gallus gallus*	Tow konta	1	Fat	Sporotrichosis	Oil extracted from the fat tissue and applied on the affected area.
12	Millipede	*Diplopoda*	Sengcri	1	As a whole	Anemia, Weakness	Juice of millipede mixed with butter and eat for 3 days.
13	Firefly	*Lampyridae*	Bilou	1	As a whole	Night blindness	Fly inserted into a banana and eat.
14	Pig	*Sus domesticus*	Baak	2	Meat	Chicken pox	Cook and eat.
15	Soft shell turtle	*Trionychidae*	Khokok	2	Shell	Spiritual belief	Kept in the house.
16	Indian honey bee	*Apis cerana indica*	Nijung	4	Honey	Stomatitis	Applied on tongue.
17	Gangetic river dolphin	*Platanista gangetica*	Sishu	3	Fat	Rheumatic arthritis	Oil extracted from fat tissues and mixed with mustard oil and applied on the affected area and massage.
18	Monitor lizard	*Varanus bengalensis*	Phot	2	Meat	Skin disease	Cook and eat.
19	Asian giant hornet	*Vespa mandarinia*	Nek	1	Hornet's nest	Tonsilitis	Mixed with hot water and applied on the affected area.

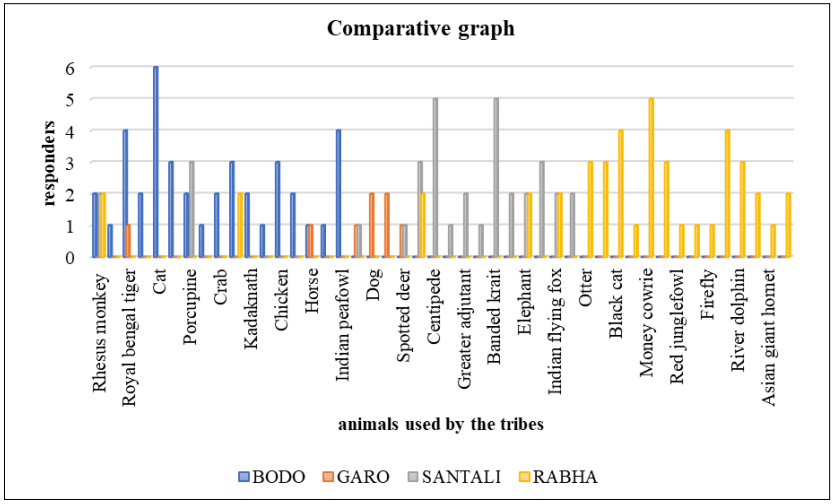

Fig 1: Comparative graph of different animals used by the different tribes in the study area

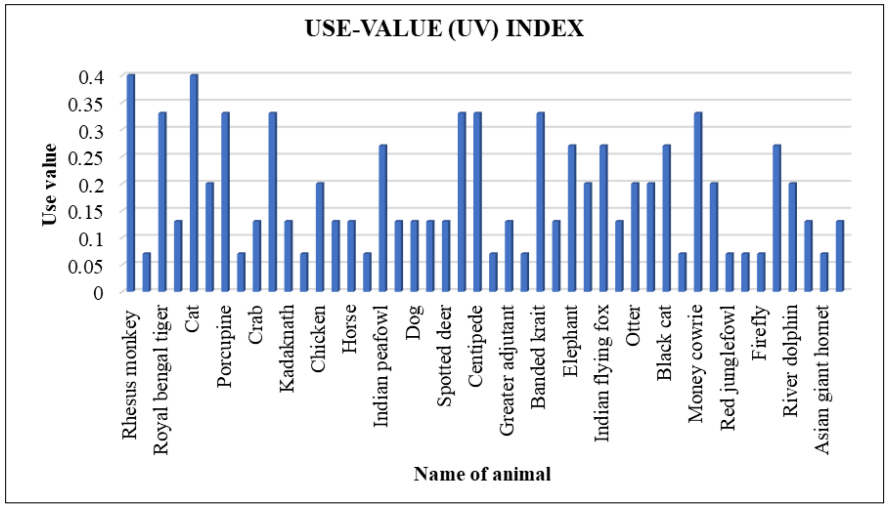

Fig 2: Graph showing the UV Index of animals used as ethno-medicine in the surveyed area

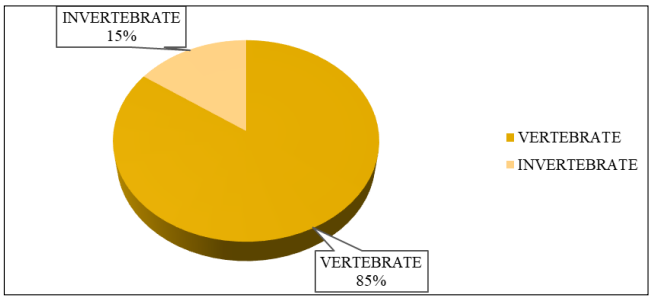

Fig 3: Pie chart showing the percentage of vertebrates and invertebrates used in making traditional medicine

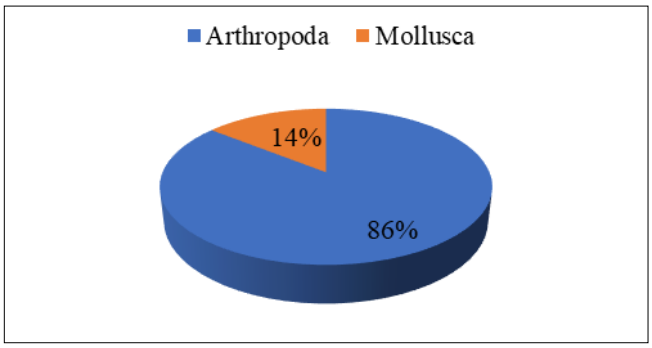

Fig 4: Pie chart showing the contribution of different invertebrate group in the surveyed area

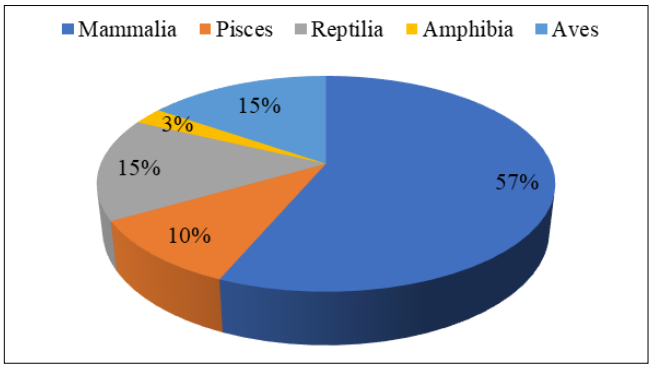

Fig 5: Pie chart showing the contribution of different vertebrate groups in the surveyed area

Conclusion

Indigenous communities of Kokrajhar district largely depend on traditional, animal-based medicines for primary healthcare due to cultural beliefs and limited access to modern facilities. This study provides the first systematic documentation of zoo-therapeutic knowledge among the Bodo, Garo, Santali, and Rabha communities. The findings highlight the pharmacological and cultural significance of these practices, preserved through generations. Such documentation is essential for future scientific validation, conservation of biodiversity, and sustainable management of faunal resources.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study. Prior informed consent was obtained from all participants before conducting interviews, and their knowledge was documented with full respect for cultural values and confidentiality. The study was non-destructive in nature and based on historical information, traditional knowledge, and photographic documentation. No animals were harmed, collected, or disturbed during the course of the research.

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