

Original Article

TRADITIONAL HEALING WITH ANIMALS (ZOOTHERAPY) BY THE MAJOR ETHNIC GROUP OF  
KARBI ANGLONG DISTRICT OF ASSAM, INDIA

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ABSTRACT

**Objective:** To survey and document the traditional knowledge related to medicinal uses of animals among the ethnic groups in Karbi Anglong district of Assam.

**Methods:** A long term field survey was conducted from July 2008 to October 2009 by performing personal interviews through structured questionnaire with more than 500 respondents, who provided information regarding the use of different animals and their products in their traditional medicine. Most of the information on the use of various animals in traditional medicine by them was provided by elderly people in the age groups of more than 50 years.

**Results:** A total of 48 different animals were recorded to be used for different ethno-medical purposes against various diseases, including tuberculosis, asthma, cancer, paralysis, jaundice, leprosy, toothache, rabies, dysentery, baldness, rheumatism, arthritis, weakness, piles etc. The highest percentage of animals used for traditional treatment is mammals (about 40%) followed by insects (about 21%) and birds (about 19%).

**Conclusion:** The findings reveal a rich traditional knowledge of indigenous people of Karbi Anglong about the use of animals and their product in traditional medicine. It is suggested that this kind of traditional knowledge should be included into the scientific literature for the conservation and management of medicinal faunistic resources.

**Keywords:** Karbi Anglong, Traditional medicine, Karbi, North-east, Zootherapy.

INTRODUCTION

Traditional medicine is the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illnesses [1]. Practices of traditional medicine vary greatly from country to country, and from region to region, as they are influenced by factors such as regional biodiversity, life style, culture, history, personal attitude and philosophy. Traditional medicine therapies include medication therapies, if they involve use of herbal medicines, animal parts and/or minerals, and non-medication therapies, if they are carried out primarily without the use of medication, as in the case of acupuncture, manual therapies and spiritual therapies [2]. The terms 'complementary' and 'alternative', 'non-conventional' or 'parallel' are used to refer to a broad health care practices that are not part of a country's own tradition or not integrated into its dominant health care system [2].

The use of plants, animals, mineral substances and other natural materials in traditional medicine by indigenous people is a well accepted practice throughout the world and across time. World Health Organization (WHO) reported that the percentage of population in developing countries using the traditional medicine for primary health care is more (60-90%) than that in developed countries (31-70%) [2]. In African countries up to 80% of the population uses traditional medicines to help meet their health care needs [2]. Although plants and plant-derived materials constitute the principal source of ingredients for traditional medicine, the identification of animal resources for medical cures is also important in human health care [3]. Ethnozoology is the study of the past and present interrelationships between human cultures and the animals in their environment. Zootherapy is a component of ethnozoology which deals with the healing of human ailments with remedies made from animals and their products. Wide variety of animals and products derived from different organs of their bodies have constituted part of the inventory of medicinal substances used in

various cultures since ancient times [4-6] and such uses still exist in traditional medicine. Of the 252 essential chemicals that have been selected by the World Health Organization (WHO), 11.1 percent come from plants and 8.7 percent from animals [7]. In modern societies, zootherapy constitutes an important alternative among many other known therapies practiced worldwide [3-6]. Wild and domestic animals and their by-products (e.g., hooves, skins, bones, feathers, tusks) form important ingredients in the preparation of curative, protective and preventive medicine [8, 9]. For example, in Traditional Chinese medicine (TCM), more than 1500 animal species have been recorded to be of some medicinal use [10].

The use of animals in traditional medicinal purposes is increasingly becoming more relevant to discussion on conservation biology, public health policies and sustainable management of natural resources, biological prospection and patents [8], and zootherapy has attracted as an important alternative among many other known therapies practiced worldwide [6]. In zootherapy there is wide use of animals or animal-derived products from all taxonomic groups like echinoderms, insects, arthropods, reptiles, birds and mammals [3, 11-14]. Alves *et al.* [4] have described the medicinal use of 283 animal species for the treatment of various ailments in Brazil. In Latin America at least 584 animal species, distributed in 13 taxonomic categories, have been used in traditional medicines [15]. In India nearly 15-20 percent of the Ayurvedic medicines are based on animal-derived substances [16].

India shows extreme variation in geographical and climatic condition with immense faunal and floral biodiversity. Different tribal and ethnic communities dispersed all over the country are highly knowledgeable about the animals and their medicinal value. In most of the rural areas, these people are almost totally dependent on local traditional medicinal system for their health care needs because they generally reside in remote areas where hospital and other modern medical facilities are not easily available. By and large, their traditional medicinal knowledge is passed through oral communication from generation to generation in the family [5]. The use of animals in the human health care from some parts of India has

been documented [9, 14]. It has been reported that out of different 109 animals and their 270 uses in traditional medicine by different ethnic communities in India, mammals constitute approximately 40%, invertebrates 22%, birds 17%, reptiles 11%, fishes 8% and amphibians 2% [14]. The traditional knowledge of local communities in district Kachchh, Gujarat identified 34 animals and bird species, used in primary health care of human [17]. It has been found that the *Bhils*, *Gamits*, *Koknas* and *Pawaras* tribes of Maharashtra use animal parts from 15 animal species as medicines along with plants as traditional medicinal resources [18]. In Chhattisgarh State over 500 insects, mites and spiders have been reported to be useful to cure common and complicated ailments. For example, the red velvet mite (*Trombidium grandissimum* Koch 1867) is commonly used for paralysis while the bed bug (*Cimex lectularius* L 1758) is used in the treatment of epilepsy, piles, alopecia and urinary disorders [12]. An ethnozoological field survey among Garasiya tribal group in the adjoining areas of Mount Abu wildlife sanctuary located in Sirohi district of Rajasthan showed that a total of 24 animal species were used for 35 different medicinal purposes including asthma, weakness, tuberculosis, cough, paralysis and blister and for other religious purposes. The animal species used as traditional medicine by these people consist of fourteen mammals, five birds, three reptiles, one arthropod and one amphibian [5]. Fifteen animal species were reported to be used for different ethnomedicinal purposes among Saharia tribes of Rajasthan, India [19]. Forty four animal species and their products were identified and used by irular, mudugar and kurumbar tribal people from Attappady hills of Western Ghats, in Palghat district of Kerala, India [20].

The ethno-zoological studies in Similipal Biosphere Reserve of Mayurbhanj district, Orissa, India revealed the uses of thirteen animal species by the seven tribes for medicine purposes. The inventoried species comprised 3 taxonomic categories of mammals (7), reptiles (2) and aves (4). These species are used to treat 12 different diseases which comprised mainly piles, asthma, skin diseases, fever and rheumatism [21].

North-east India lies deep in the lap of eastern most Himalayan hills in the North-eastern part of India which is constituted by eight States i.e. Assam, Arunachal Pradesh, Meghalaya, Mizoram, Manipur, Nagaland, Sikkim and Tripura. North-eastern region of India is unique for its ethnic and cultural diversities coupled with biological diversity. The region is largely inhabited by hill tribes of Mongoloid origin [22]. The North-eastern region of India has been in focus for its high biodiversity and priority for leading conservation agencies of the world. In the year 2000, the Eastern Himalaya biodiversity 'hotspot' was modified to the 'Indo Burma hotspot' covering central Nepal to whole of North-east India which contains more than one-third of the country's total biodiversity [23].

There are only some reports on the traditional medicinal uses of animals from North-east region. The traditional method of treating various kinds of ailments using twenty six animal species and their products by different Naga tribes has been described [24]. The eighty one species of edible and therapeutic insects [25] and thirty six vertebrate species used in treatments of ailments and diseases [26] by two tribal societies i.e., the Nyishi of East Kameng and the Galo of West Siang in Arunachal Pradesh have been recently reported. Interestingly, very few domestic animal species (e.g., goat and cattle) are also used in zootherapy by these people. More frequently, the wild animals, including endangered or protected species like hornbill, pangolin, clouded leopard, tiger, bear, and wolf are either used in folk remedies or as food by these people. Approximately 20 common health related complaints of humans as well as foot and mouth disease of cattle were targets of these zootherapies. Most common treatments were for fever, body aches and pains, tuberculosis, malaria, wounds and burns, typhoid, smallpox, dysentery, diarrhoea, jaundice and early pregnancy pains [26]. Solanki and Chutia [27] in their ethnozoological study of Arunachal Pradesh, India also identified various animal species used in their traditional medicinal system.

Among the prominent tribes of the North-east region are the *Karbis* who possess unique traditions and culture distinct from other hill

tribes. They speak a dialect belonging to the Tibeto-Burmese, particularly Kuki-Chin sub-group of languages [28, 29] and are mostly inhabitant of Karbi Anglong district of Assam. Karbi Anglong district is the largest amongst the 27 districts of Assam. The district is bounded by Golaghat district in the east, Meghalaya State and Marigaon district in the west, Nagaon and Golaghat districts in the north and North-Cachar Hills district and Nagaland State in south. The district with dense tropical forest covered hills and a flat plain is situated between 25° 33' N to 26° 35' N Latitude and 92° 10' to 93° 50' E Longitude. Total area under Karbi Anglong district is of about 10, 434 sq.Km.

Although, many researchers have documented the medicinal value of different plant species from the North-east India, the use of animals for the treatment of different disease in relation to Karbi Anglong district has not been well documented. Dutta *et al.* [30] studied use of certain animals and their product in medical treatment by tribal people in Assam. By observing the ethnozoological importance of blister beetles *Mylabris cichorii* in the culture of traditional healers of this region, we evaluated its potent anticancer activity against murine ascites Dalton's lymphoma and Ehrlich ascites carcinoma [31, 32].

The rapid growth in the population and modern civilization is making most of the primitive societies to break away from their culture, traditional beliefs and practices. Therefore, before these people completely lose their knowledge on the traditional medicinal value of animals, there is an imperative need to record such information for the benefits of mankind. In present study, an attempt has been made to document this vanishing knowledge of the traditional medicinal properties of animals commonly used by the tribes in Karbi Anglong district of Assam, India, which may be helpful for devising strategies for sustainable exploitation and use of these natural resources and biodiversity.

#### Climate

Due to variation in the topography, this hill zone experiences different climates in different parts. The winter commences from October and continues till February. During summer, the atmosphere becomes sultry. The temperature ranges from 6 to 12 °C in winter and 23 to 32°C in summer. The average rainfall is about 2416 mm. The pH of the soil in different parts ranges from 4.1- 6.2. The variation of ecological factors like high rainfall, warm temperature, humidity and the weather has contributed to the growth of plentiful forests.

#### Population pattern

The district has a population density of 93 inhabitants per square kilometer. As per census 2011, the population of the district is 965,280 which constituted 3.10% of total Assam population. Of the total population, 88.18 percent are rural and only 11.82 percent are in urban areas of the district. The average literacy rate is 73.52 percent. If, things are looked out at gender wise, male and female literacy were 82.12 percent and 64.62 percent respectively. The Sex ratio in Karbi Anglong is 956 female per 1000 male [33]. The district has three sub-divisions i.e. Diphu, Hamren and Bokajan. Diphu is the head quarter of Karbi Anglong district. The population of the district is predominantly tribal with Karbis being the main tribe. The other ethnic tribal groups of this district are Bodos, Kukis, Dimasas, Hmars, Garos, Rengma Nagas, Tiwas, Man-Tai and Chakmas. Besides, a large number of non-tribals also live together in this hilly region [34].

#### MATERIALS AND METHODS

##### Ethnozoological study

A survey was conducted during July 2008 to October 2009 with the ethnic people of Karbi Anglong to collect information on the medicinal uses and traditional preparation of animal's product by them. The field survey was conducted in eight different places of Karbi Anglong district that include Borlongfer, Lancholiet, Lamchhakhan, Tisso Basty, Diphu, Hojai Basty, Fanch Basty and Kachhari Basty (Fig. 2). Before going for field survey prior permission was taken from the village chief (Gaon Burah) and only

permitted data have been included here. Information was recorded on the animal parts used, storage for future use and their uses in different diseases using semi-structured questionnaires and personal interviews from the village chief (Gaon Burahs), medicine men and other local men and women who were in the age group of 30 to 70 years (Fig. 1). Analysis of data was also made with the help of group discussions among different age groups of villagers that included both the genders of the society. A total of five hundred informants (350 men and 150 women) were selected randomly during the household field survey. The identification of animals species was done by Dr. J. Arjun (Zoologist and Faculty, Lumding college, Assam) in association with Zoological survey of India (ZSI), Kolkata bearing identification report no 9/2007 and a voucher specimen of some selected species was deposited in the department of Zoology, North-Eastern Hill University, Shillong.

## RESULTS AND DISCUSSION

The survey recorded total of 48 animals which were used to treat different ailments such as diarrhoea, stomach ache, gastritis, jaundice, body ache, bleeding, etc. More information on the uses of various animals in traditional medicine was provided by elderly people in the age groups of more than 50 years (Fig. 1). This data indicates that the aged people are more experienced in the zootherapeutic practices and they are carrying the knowledge given by their elders in the family. The results indicate that the indigenous inhabitants of the Karbi Anglong district still rely on traditional medicines for their primary health care. Photograph capture during field survey showing representative animal, blister beetles used in their traditional practices and also the methods of drug preparation is given in Figure 3.

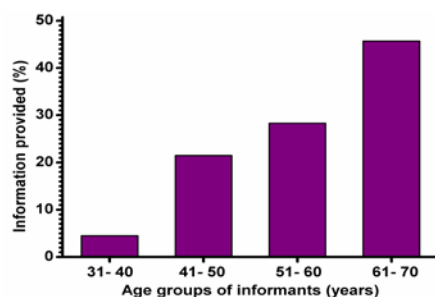


Fig. 1: Different age groups of traditional healers involved during field survey and their contribution towards information sharing

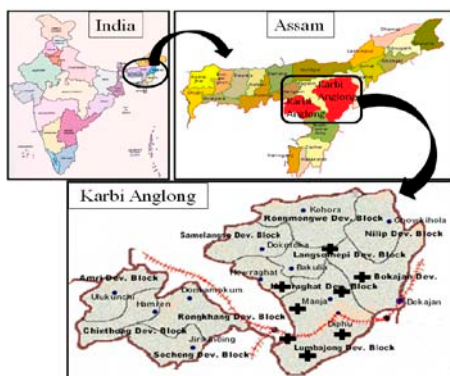


Fig. 2: Maps of India, Assam and Karbi Anglong showing the sites of field survey (thick plus marks)

Table 1 provides the scientific, common and local names of commonly used animals in the treatment of different human ailments, as well as it also includes information on the parts used and prescription. Overall, 19 mammals, 10 insects, 9 birds, 4 reptiles and others including annelids, fishes, amphibians and arachnids were identified. These animals were used to treat a total of 54

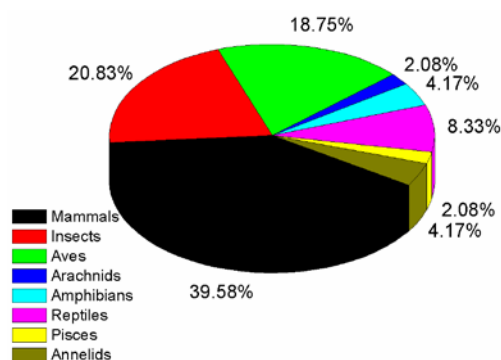
diseases including asthma, cancer and respiratory problems. The most animals (6) were used for asthma, followed by rheumatism (3) and respiratory problem (3).



Fig. 3: Photograph capture during field survey showing traditional methods of drug preparation by the local Karbi tribal lady with one of the authors (AKV). (a) Data collection from traditional healer; (b) dry blister beetles *Mylabris cichorii*; (c) showing different animal products used for traditional practices; (d) grinding of animal product for drug preparation; (e) filtering of animal extract and (f) final extract ready for consumption

The percentage of animals which constituted the zootherapeutics practices in the Karbi Anglong district is shown in Figure 4. The taxonomic grouping of animals showed that mammals (about 40%) are used by these people in the treatment of most diseases, followed by insects (about 21%) and birds (19%). Representatives of most commonly used animals and their products in traditional practices by these people are shown in Figure 5. The photographs of some commonly used animals in their zootherapeutic practices were collected from the Google (<https://www.google.co.in>) for better understanding. The relevance of highlighting the use of different animal-based drugs to treat various diseases by different ethnic communities in different parts of India has been established by several authors [14, 25, 27, 31, 32] which reported the use of animals for food as well as tools. Tools were made out of animal bones and teeth, and clothes out of animal skin and fur. Animals were also used for religious purposes, such as sacrifices and they played an important part in magic rituals and mysticism [31, 32]. In the present study it was recorded that vertebrate resources are maximally used by the Karbi tribe in different medications for the treatment of different ailments including body pain, rheumatism, asthma, eczema, tuberculosis, paralysis, skin disease, stomach disorder, jaundice, night blindness, bone fracture, malaria, dysentery, kidney trouble, breathing problem, stammering, piles and general weakness etc. While fat of different animals, particularly, buffalo, pig, domestic fowl is warmed up and externally applied for relief from pain, most of the other parts is cooked, crushed into powder or boiled and eaten. Flesh is taken after cooking while milk, urine and fresh blood of some animals are taken fresh to get rid of general weakness and other serious diseases. It has been reported that the Chakhesang tribes of Nagaland use twelve mammals, one bird, one reptile, two amphibians, one fish, one mollusk, one annelid and four arthropods for treatment of various diseases [35]. The Ao tribes of Nagaland [36] and Nyishi and Galo tribes of Arunachal Pradesh [27] have also been reported to use more mammalian species as compared to other vertebrate species in their traditional medicines.

The most common and popular therapy among the many tribes of Karbi Anglong district was noted to be the leech therapy. The tombs of Egyptian pharaohs contained pictures of leeches, and descriptions of leech medical treatments appear in ancient Greek and Roman texts [37, 38]. Leeches are placed on the skin and guided to the desired site by applying a sucrose solution. Leeches are then allowed to feed for 10-15 minutes depending on the age and maturity of a person, after which they stop on their own and detach from the site. Although a leech only consumes about 5-7 ml of blood, once they are removed they may cause leakage of blood from the host and itching sensation for hours [39].



**Fig. 4: Presentation of different taxonomic groups of animals being used in the zootherapeutic practices among the traditional healers of Karbi Anglong**

Traditional healers of Karbi Anglong commonly use leech therapy for variety of medical purposes including arthritis, blood-clotting disorders, varicose veins, Elephantiasis, piles, swelling of muscle, boil on skin and other circulatory disorders. During the present field survey it has been observed that sanitary conditions of zootherapeutic product storage were poor, with obvious contamination risks to these products. Practically none of the interviewees demonstrated any concern about the storage conditions of animal-based medicines, and on most occasions we found no attention given to the way zoo-therapeutics were handled. For example, several livestock keepers were observed cleaning of boil, removing of pus, applying fat or other drugs over wounds without using gloves. Sometimes it was also observed that many of the traditional healers who give medicines to humans also treat domestic animals without proper safety and sanitation. These observations do suggest the need for greater sanitary precautions with medicinal animal products, and to the importance of including zotherapy into public health programs.

**Table 1: Animals and their body parts traditionally used by the ethnic tribes of Karbi Anglong district of Assam in the treatment of different ailments**

S. No.	Animal groups	Scientific name	English name	Local name*	Parts used	Medicinal uses	Prescription
1	Insects	<i>Apis mellifera</i>	Honey bee	Piyo	Honey	Coughs, flu, asthma	Raw honey is consumed
2	Insects	<i>Periplaneta americana</i>	Cockroach	Kilu	Whole body	Asthma	Fried and eaten
3	Insects	<i>Achaeta sp.</i>	Cricket	Changrong	Hind legs	Diuretic	Burn on fire and eaten
4	Insects	<i>Pseudacanthotermes sp.</i>	Termite	Arhlock	Whole body	Asthma	Fried and eaten
5	Insects	<i>Musca domestica</i>	House fly	Bitu	Whole body	Baldness	Body is roasted and consumed
6	Insects	<i>Poecillocerus strictus</i>	Grasshopper	Phelong	Whole insect	Lung infection	Fried and eaten
7	Insects	<i>Trigona spinipes</i>	Stingless bee	Piyoli	Honey	Throat inflammation	Raw honey consumed
8	Insects	<i>Lytta vesicatoria</i>	Spanish fly	Jeut	Whole body	Anticancer, increase sexual pleasure	Crashed, dissolved in water and orally taken
9	Insects	<i>Mylabris cichorii</i> <i>Epicauta hirticornis</i>	Blister beetle, red-headed blister beetles	Helicopter pok	Whole body	Anticancer, warts, rabies	Crashed, dissolved in water and orally taken
10	Insects	<i>Pediculus sp.</i>	Louse	Hrek	Whole body	Clears urinary tract obstructions	Eaten in live condition
11	Annelids	<i>Hirudo medicinalis</i>	Leech	Ingphat	Live leech	Leech therapy including piles, swelling of muscle etc.	Live leech is allow to suck blood from the affected spot
12	Annelids	<i>Lumbricus sp.</i>	Earthworm	Hilong	Whole body	Clears obstructions of the urinary tract, arthritis	Crashed with water and consumed
13	Arachnids	<i>Tytius sp.</i>	Scorpion	Arlok achehe	Whole body	To treat its own sting, inguinal hernia	Burn and eaten
14	Amphibians	<i>Bufo sp.</i>	Toad	Pharchonho	Hind legs	Urinary retention, Acne	Thigh muscle is cooked and consumed
15	Amphibians	<i>Rana sp.</i>	Frog	Chongho	Skin Flesh	Wounds Tongue blister	skin oil is used Flesh is cooked and consumed
16	Reptiles	<i>Tropidurus torquatus</i>	Lizard	Bilit	Whole body	Chicken pox	Fried skin oil is used on wound
17	Reptiles	<i>Crotalus durissus</i>	Neotropical rattlesnake	Jhunjhuna	Fat	Rheumatism, arthritis, alleviate tremor	Raw fat is used
18	Reptiles	<i>Testudo sp.</i>	Tortoise	Chitung	Blood Flesh Heart	Erysipelas Piles To stop the sensation of thirsty	Raw blood is consumed Flesh is cooked and consumed Cooked and consumed
19	Reptiles	<i>Echis coloratus</i>	Viper	Furul	Eggs Fat	Inguinal hernia Joint pain of bone	Boil and consumed Raw fat is melted

20	Aves	<i>Streptopelia chinensis</i>	Ground-dove	Ghughu	Feathers	Stroke	over heat and used
					Flesh	Skin diseases	Feathers ashes is consumed
21	Aves	<i>Pavo cristatus</i>	Peacock	Woram	Blood	Paralysis	Cooked and consumed
22	Aves	<i>Struthio camelus</i>	Ostrich	Vokaut	Fat	Joints pains	Raw blood is consumed
23	Aves	<i>Columba livia</i>	Dove	Wothum	Blood	Leprosy	Raw fat is melted over heat and used
24	Aves	<i>Passer domestica</i>	House sparrow	Vochet	Flesh	Stammering	Raw blood is consumed
25	Aves	<i>Corvus splendens</i>	Crow	Woakk	Flesh	Paralysis	Cooked and consumed
26	Aves	<i>Columba livia</i>	Pigeon	Wothung	Excreta	Typhoid, toothache	Mixed with rice beer and consumed
					Flesh	Blood pressure	Burn over fire and consumed
27	Aves	<i>Gallus sonnerati</i>	Jungle fowl	Wo-har	Flesh	Breathing problem	Burn over fire and consumed
28	Aves	<i>Gallus domesticus</i>	Chicken	Hem awaho	Fat	Nasal congestion	Raw fats is boiled apply
29	Pisces	<i>Amphipnous cuchia</i>	Eel	Kumchirui	Blood	Asthma, jaundice, weakness	Raw blood is consumed
30	Mammals	<i>Equus asinus</i>	Donkey	Gadho	Milk	Whooping cough,	Fresh milk is consumed
					Urine	Amoebiasis	Fresh urine is boiled and consumed
31	Mammals	<i>Dusicyon sp.</i>	Fox	Mengsurung	Fat	Rheumatism	Locally apply over wound
32	Mammals	<i>Bos taurus</i>	Ox	Chainong-A-Lo	Dung	Mosquitoes repellent	smoke
33	Mammals	<i>Hystrix sp.</i>	Porcupine	Jukhi	Penis Hide Bile	Sexual impotence Stroke Dysentery	Fried and consumed Fried and consumed Consumed with water
34	Mammals	<i>Sus scrofa domestica</i>	Pig	Phak	Fat	Furuncles, tumors	Fats is boiled and used
35	Mammals	<i>Bos indicus</i>	Cow	Chainong	Testicle Fresh urine	Bronchitis Anemia	Fried and consumed Taken fresh
36	Mammals	<i>Bos bubalus</i>	Buffalo	Chelong	Dung	Eczema	Curd is mixed in the dung and applied locally to cure eczema
37	Mammals	<i>Bos frontalis</i>	Mithun	Chai	Penis	Breast pain of lactating mother	Cooked and consumed
38	Mammals	<i>Camelus dromedarius</i>	Camel	Kaut	Droppings	Stomachache	Taken with water
39	Mammals	<i>Rhinolophus sp.</i>	Bat	Woarplack	Flesh	Asthma	Raw flesh is consumed
40	Mammals	<i>Selenarctos sp.</i>	Bear	Thokwam	Bile	Malaria	Raw is consumed
41	Mammals	<i>Ovis aries</i>	Sheep	Biresak	Fat	Torsion, Rheumatism	Boiled fats is used
					Milk	For weakness during jaundice	Raw milk is consumed
42	Mammals	<i>Macaca sp.</i>	Monkey	Thero	Blood	Tuberculosis	Raw blood is taken
43	Mammals	<i>Talpa sp.</i>	Mole	Jotang	Flesh	Asthma	Fried and consumed
44	Mammals	<i>Sciurus carolinensis</i>	Squirrel	Karle	Flesh	Cough	Raw flesh is consumed
45	Mammals	<i>Cerdocyon thous</i>	Fox	Mengsurung	Liver	Rheumatism and bronchitis	Cooked and consumed
46	Mammals	<i>Mus musculus</i>	House mouse	Phuzuk	Flesh	Colds and skin diseases	Cooked and consumed
					Urine	For killing termites	Fresh urine is taken
47	Mammals	<i>Lepus capensis</i>	Rabbit	Mengserang	Heart	Prevents miscarriage	Cooked and consumed
48	Mammals	<i>Homo sapiens</i>	Human	Arlengmunit	Urine	Conjunctivitis, skin disease	Fresh urine is taken

\*The local names of the animals are given in Karbi language, except for the animals at serial number 20 and 30 where the names are written in Assamese



In the present study, it was also observed that many of the traditional medicines from animals which are used to treat humans are also used on domestic animals based on similar disease symptoms.



**Fig. 5: Representatives of some animals being used in traditional practices by the indigenous people of Karbi Anglong district of Assam. (a) Porcupine, *Hystrix sp.*; (b) Mithun, *Bos frontalis*; (c) Viper, *Echis coloratus*; (d) Louse, *Pediculus sp.*; (e) Leech, *Hirudo medicinalis*; (f) Blister beetle, *Mylabris cichorii*; (g) Grasshopper, *Poecillocerus strictus* and (h) Squirrel, *Sciurus carolinensis*. Photographs were taken from Google image.**

The use of folk remedies to treat diseases or ailments in animals based on similar or identical illness that attack humans were denominated 'human models for animal diseases' by Barboza *et al.* [40]. The relationships between ethno-veterinary and human ethno-medicine can be easily explained in this perspective, as the main stock animals (e.g. cattle, sheep, goats, pigs etc) among others are

mammals which often have health problems that are similar to humans with identical symptoms and these similarities have been noted by many different communities [41-47].

Response of the inhabitants against perceived illnesses in three month period from July-September 2009 in Borlangfer Zone are shown in Table 2. Borlangfer is the largest village among all other villages where field survey was carried out. The data showed that traditional medicine was a more frequent choice of care for females (22.7%) than males (19.31%) and total of 22.4% people are dependent on traditional based treatment. Effect of economic status on their concerns to treat illnesses from July-September 2009 is shown in Table 3. Among the respondents who claimed to have used traditional medicine, 69%, 21% and 4% were from low, middle and high economic status respectively.

This indicates that most of the indigenous people of Karbi Anglong using traditional medicine are from low economic background. Traditional medicines form a central component in health care systems in developing countries, where up to 70% of the population depends on traditional medical systems [2]. Ethno zoological drugs of vertebrate origin have great importance to the Karbi tribe due to limited access to allopathic medicines, lack of proper medical facility, and transportation and extremity problems. It was noticed that in spite of extremely precise ecological knowledge and strong tradition of conservation and sustainable use, certain animals become rare due to subsistence hunting for food and other uses, and only preserved parts of those animals have been used as raw materials for treatment of diseases. Among the Ao tribes of Nagaland also the preserved parts of some animals such as flying squirrel, Mithun, Mongoose, Bear, Porcupine, flying fox, Mole, jungle fowl, peacock, eagle and tortoise have been reported as raw

**Table 2: Responses by inhabitants of Borlangfer zone of Karbi Anglong during three months period (July-September 2009) against perceived illnesses**

Demographic characteristics	No action taken	Went to traditional healers	Tried homemade remedy	Went to health institutions	Total
Sex					
Male	22	45	12	154	233
Female	25	56	32	133	246
Age					
1-10	-	12	15	60	87
10-30	12	35	7	67	121
30-50	18	34	38	34	124
Total	77	182	104	448	811

**Table 3: Economic status and response of inhabitants of Borlangfer zone against illnesses during three months period (July-September 2009)**

Activity	Economic status*				Total
	Low	Middle	High		
No action taken	43	25	8		76
Went to traditional healers	126	40	16		182
Tried homemade remedy	73	20	12		105
Went to health institutions	112	136	200		448
Total	354	221	236		811

\*Economic status (per month): Low, about Rs. 5,000.00 to 10,000.00, Medium, above Rs. 10,000.00 to 25,000.00 High, above Rs. 25,000.00

materials for treatment of disease [38]. It is noteworthy to mention that while studying the traditional use and sale of animals for medicinal purpose, one should take care of ecological balance.

Kakati and Doulo [37] mentioned six animal species as rare among twenty three mammalian species being used by Chakhesang tribes of Nagaland. The interest for traditional social institutions is gradually eroding among the young generation due to possible intrusion and assimilation of alien cultures.

Therefore, the socio-ecological system has to be strengthened through sustainable management and conservation of biodiversity. It must be established as an important step towards understanding of the valuable contribution of this indigenous knowledge system, so that the users and sellers are aware of legal and ecological status of

the species they use as a reliable source of medicine, food, income and other benefits.

## CONCLUSION

Knowledge about animals that were used for medicinal purposes in the past and are still being used as part of traditional medicine by the ethnic people of Karbi Anglong is very valuable. This knowledge is relevant to science and human society in fostering better understanding of traditional medicines and its relationship from historical, economic, sociological, anthropological, and environmental viewpoints. It is of utmost importance that the conservation of these animals should be kept in mind in folk medicinal preparations and the knowledge and expertise of the folk healers should also be evaluated systematically in laboratory.

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## CONFLICT OF INTERESTS

Declared None

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