

**Review Article**

**ZOOTHERAPY AMONG THE ETHNIC GROUPS OF NORTH EASTERN REGION OF INDIA-A  
CRITICAL REVIEW**

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**ABSTRACT**

The main objective of the study is to review the practices of Zootherapy among the ethnic groups of the northeastern part of India and to prepare an inventory of all the information. The data were collected from 11 published papers on the practices of zootherapy among different ethnic groups from the region. All the papers were published in the years 2002-2016. A total of 221 animals species are used by 19 ethnic groups from the region. Mammals are the most widely used animal groups followed by Arthropods, Aves, Pisces, Reptiles, Annelids, Amphibian and Molluscs. The number of the animal species are-77 species of Mammals (34.84%) followed by 65 species of Arthropods (29.41%), 24 species of Aves (10.85%), 22 species of Pisces (9.95%), 18 species of Reptiles (8.14%), 6 species of Annelids (2.71%), 5 species of Amphibians (2.26%) and 4 species of Molluscs (1.80%). The most commonly treated ailments are-Tuberculosis, Malaria, Diabetes, Asthma, Arthritis, Rheumatic pain, Jaundice, Anaemia, Paralysis, Pertussis, etc. This review on the zoo therapy practices among the ethnic groups of the region will summarise all the information in one place which will be helpful for the scientists and researchers working in the field of ethnomedicine to study and develop new potential drugs.

**Keywords:** Ethnic group, Zootherapy, North Eastern India

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**INTRODUCTION**

The use of plants and animals to treat different ailments has a long history. Worldwide, almost 70-80% of the rural population depends on traditional medicine for primary health care [1]. People have been using the plants and animals, or parts therapeutically since ancient time and even in the modern time animal and plant-based medicines continue to play an essential role in world health care sector [2]. Zootherapy is the use of animals and animal products to heal different human diseases [3]. Many wild and domestic animals and their by-products (e. g., skin, bones, blood, meat, hooves, feathers, tusks) from essential ingredients in the preparation of protective, preventive and curative medicine [4, 5]. WHO has selected 252 essential chemicals that can be used to treat different ailments, out of which 11.1% come from plants and 8.7% from animals [6]. In China, people are using more than 1500 animal species to treat different ailments in their traditional medicine [7].

In Japan, 60 different species of insects used to treat a wide range of ailments [8]. The Tamang people of Nepal, use by-products of 24 animals therapeutically [9]. In North Eastern Brazil, 180 medicinally important animals have been reported from Bahia state [10]. A report of the use of 250 animal species in traditional treatments of a variety of ailments in North Eastern Brazil is there [11]. People from Pakistan also use 31 substances derived from animals and products that constitute a 9% of all the inventory of traditional medicine in Pakistan [12].

In India, zootherapy to treat different ailments is widely used too. Mahawar and Jaroli inventoried approximately 109 animal species used in the treatment of different kind of ailments in India [13]. In Maharashtra, tribal group's like-Bhils, Gamits, Koknas and Pawaras have been using almost 15 species of animals as medicine in combination with different plant species [14]. In Tirunelveli district of Tamil Nadu, people use 11 insect species in traditional medicine [15]. In another study, it has been reported the use of 16 animal species including 6 mammals, 5 birds, 2 reptile, 2 arthropods and 1 annelid by nine ethnic groups in four districts from Tamil Nadu [16]. They treat almost 17 different ailments using those species of animals. The Bhil tribe of Rajasthan has also been found to use animals to treat

different ailments of human beings and domestic cattle [17]. In Gujarat, Gupta *et al.* [18] recorded 34 animal species used by local communities of Kachchh district in the primary health care of human beings and live stocks. Mishra *et al.* [19] recorded the use of animal parts of 7 species of vertebrates to treat 12 different illnesses in the locals of Orissa.

In the northeastern part of India, zootherapy has been practising by different ethnic groups. This region has a total of 220 ethnic groups (Indian census, 2011) distributed in seven states viz., Assam, Meghalaya, Arunachal Pradesh, Manipur, Mizoram, Tripura, Nagaland and Sikkim contributing 3.8% of the total population of India. All the tribes have their own culture and they have their own indigenous method of healing for different ailments. In this review, 19 ethnic groups from the region viz., NK (Nath and Karbi), Ka (Karbi), B (Baite), Mis (Mishing) from Assam, Miz (Tribes from Mizoram), Ao (Ao), An (Angami), Se (Sema), Sang (Sangatam), Khia (Khamniungan), Kon (Konayak), Ch (Chakhesang), Lo (Lotha), Zel (Zeliang), Po (Pochury), Re (Rengma) from Nagaland, N (Nyishi), G (Galo), Adi from Arunachal Pradesh are considered.

**Mammals used by the ethnic groups**

Mammals are one of the widely and commonly used groups of animals by the ethnic groups of North East India. A total of 77 species of mammals are being used by 9 ethnic groups from the region (Table 1). The mammalian species *Hystrix indica* (the Indian Porcupine) is the most commonly used species, and it is used by nine ethnic groups. The most commonly used parts are the flesh, Gall bladder, liver, etc. and the commonly treated diseases are cancer, asthma, diabetes, malaria, tuberculosis, rheumatism, fertility improvement, etc.

**Aves used by the ethnic groups**

Aves are also used by many ethnic groups from the region. A total of 24 species of birds are used by 17 ethnic groups to treat different ailments (Table 2). The most commonly treated ailments are-rheumatism, normal body pain, asthma, paralysis, gall bladder stone. (The Crow Pheasant) is the mostly used species and it is used by 12 ethnic groups. Mostly used parts are the flesh, fat etc.

Table 1: Mammals used in traditional medicine by the ethnic groups of North Eastern India

S. No.	Animal species	English name	Parts used (Ethnic group)	Ailment treated	References
<b>Mammals</b>					
1	<i>Enocystereis spelae</i>	Bat	Meat(NK)	Asthma	[20]
2	<i>Rhinoceros unicornis</i>	Rhino	Flesh, Gall bladder(B)	Eneuresis, Diabetes	[21]
			Urine, Skin, Horn(NK)	Jaundice, Chicken pox	[20]
3	<i>Hystrix indica</i>	Indian porcupine	Horn(Miz)	Anti-venom	[22]
			Alimentary Canal(NK)	Liver diseases, Tonsil	[20]
			Spine, Small intestine, Stomach(Ch)	Bone fracture, Gastritis, Fever	[23]
			Stomach, spine(Ka)	Pneumonia, dysentery, stomach cramp	[24]
			Meat, Intestine, rectum(Miz)	Facilitates easy birth labor, Fever, Stomachache, dysentery, Malaria, Colic	[22]
4	<i>Canis aureus</i>	Golden Jackel	Gallbladder, Stomach, Intestine(N,G)	Diarrhoea, Gastritis, Tuberculosis	[25]
			Flesh(B)	Easy delivery of child	[21]
			Bile(Ao)	Dysentery	[26]
			Pennis, Bile (Ka)	Sexual impotence, Stroke, Dysentery	[27]
			Meat(NK)	Body ache	[20]
5	<i>Capra hircus</i>	Goat	Bone(Adi)	Skin diseases	[22]
			Head(Miz)	Wound and Ulcers	[22]
			Milk(NK)	Leucorrhoea	[20]
			Placenta(Ka)	Leg Cracking's, Piles	[24]
6	<i>Bos indicus</i>	Cow	Fresh milk(Miz)	Snake bite	[22]
			Gall bladder, Frontal (N)	Fever, early pregnancy pain,	[25]
			Flesh(B)	Joint pain	[21]
			Milk,Dung(NK)	Jaundice, Leucorrhoea, Skin disease	[20]
7	<i>Plantanista gangetica</i>	River dolphin	Fresh urine(Ka)	Anaemia	[27]
8	<i>Sus scrofa domestica</i>	Domestic Pig	Oil(NK)	Female infertility	[20]
9	<i>Bos taurus</i>	Bull	Fat(Ao)	Body pain, snake bite, Rheumatism, Burn	[26]
			Fat(Ka)	Furuncles, Tumour	[27]
			Urine(NK)	Blood Cancer	[20]
10	<i>Vulpes bengalensis</i>	Indian fox	Dung(Ka)	Epistaxis	[24]
			Dung(Ka)	Mosquito repellent	[27]
			Flesh, Fats(Ka)	Paralysis, Asthma	[24]
11	<i>Hyobates hoolock</i>	Hoolock Gibbon	Bone(Adi)	Fertility	[22]
12	<i>Melursus ursinus</i>	Sloth bear	Flesh(N)	Tuberculosis	[25]
13	<i>Lutra sumatra</i>	Hairy nosed otter	Flesh, Bone(Ka)	Pertussis	[24]
			Gall bladder(Ka)	Malaria, TB, Pertussis	[24]
			Gall bladder(B)	Easy delivery of child	[21]
14	<i>Pteropus meidus</i>	Fruit bats	Bile, hair, fat(Miz)	Stomach-ache, dysentery, diarrhoea, Rheumatism	[22]
			Trachae (Ka)	Fishbone	[24]
			Liver(Ka)	Schizotrenia	[24]
15	<i>Sciurus niger</i>	Fox squirrel	Liver(Ka)	Schizotrenia	[24]
16	<i>Elephas maximus</i>	Indian elephant	Ash, Tusk(Ka)	Scabies	[24]
17	<i>Homo sapiens</i>	Human	Urine, Milk (Ka)	Piles, Eyes ailments	[24]
18	<i>Panthera pardus</i>	Common Leopard	Fats(Ka)	Cracking on legs, Pertussis, Joint pain	[24]
			Bone marrow(N)	Body pain	[25]
19	<i>Panthera leo</i>	Lion	Tooth(Ka)	Pertussis	[25]
20	<i>Capricornis sumatraensis</i>	Serow	Horn(Ka)	Bone fracture	[25]
			Dried tongue, Horn(Miz)	Chronic ulcer, Revitalization	[22]
21	<i>Maschus sp</i>	Deer	Front foot(B)	Joint pain, Rheumatism	[22]
			Urine, Blood(Ch)	Ear swelling and pain, Anaemia, Stomach-ache	[23]
22	<i>Pteromys sp</i>	Flying squirrel	Urine, Flesh, Hair(Ch)	Urethritis, Constipation, Gestation, Skin burn	[23]
23	<i>Cervulus sp</i>	Barking deer	Bone marrow(Ch)	Bone	[23]
24	<i>Funambulus sp</i>	Squirrel	Flesh(Ch)	Cough	[23]
25	<i>Entomias sp</i>	Chipmunk	Flesh(Ch)	Cough, Fever	[23]
26	<i>Felix sp</i>	Wild cat	Flesh(Ch)	Body swelling, Fever, Malaria, Cough, Asthma	[23]
27	<i>Sus scrofa crissatus</i>	Wild boar	Flesh, Bile(Ao)	Asthma, Liver cirrhosis	[23]
			Flesh(Ch)	Stomach pain	[23]
28	<i>Manis tricuspis</i>	Tree pangolin	Meat(Miz)	Piles	[22]
			Skin burn(Ch)	Scale	[23]
29	<i>Macaca sp</i>	Monkey	Flesh(Ch)	Cough	[23]

30	<i>Macaca mulata</i>	Rhesus macaque	Bone(Adi)	Fertility	[22]
31	<i>Sus scrofa</i>	Wild Boar	Bone(Adi)	Fertility	[22]
32	<i>Sphaerias blanfordi</i>	Fruit bat	Wings(Adi)	Skin diseases	[22]
33	<i>Taphozous nudiventris kachhenis</i>	Naked rumped tom Bat	Wings(Adi)	Skin diseases	[22]
34	<i>Bos gaurus</i>	Indian bison	Urine, Bile(Miz)	Scurvey, Asthma	[22]
35	<i>Callosciurus pygerythrus</i>	Irrawaddy squirrel	Meat and soup(Miz)	Antispasmodic, Swelling and Sprain	[22]
36	<i>Canis lupus familiaris</i>	Dog	Blood, Flesh(B)  Fresh blood, Skull, Liver(Miz)	Epilepsy, Tonic for pregnant women  Asthma, fever, Burn, Haemostatic, Night blindness	[21]  [22]
37	<i>Cervus unicolor</i>	Sambar	Tender horn, Blood(Miz)	Weakness, Dysentery	[22]
38	<i>Chiropter sp</i>	Bat	Meat, Bone(Miz)	Involuntary urination in night, Toothache	[22]
39	<i>Hylobates hoolock</i>	Hoolock Gibbon	Meat, fresh blood, bored tusk(Miz)  Brain, Bone, Skull Bone, Hand,Urine(B)	Facilitates easy labor during delivery, Bee-sting, Fever, Colic,T. B., hepatitis, hemicranias, Headache etc  Tonic for pregnant women, Rheumatism	[22]  [21]
40	<i>Macaca assamensis</i>	Assamese Macaque	Meat and Brain, Fresh warm blood(Miz) Brain, Gall bladder, Dried hand(B)	Easy labor and Weakness, Malaria  Tonic for pregnant women, Diabetes, Mumps	[22]  [21]
41	<i>Manis crassicaudata</i>	Indian pangolin	Bile, Meat, Scale, Feathers (Miz)	Splenomegaly, Muscle stiffness, Piles	[22]
48	<i>Muntiacus muntjak</i>	Barking deer	Horn, Fresh urine(Miz) Flesh(B)	Revitalization of body, Otterhoae Easy conception	[22] [21]
42	<i>Nycticebus coucang</i>	Slow loris	Dry bones, ribs, hairs(Miz) Fur, Blood(B)	Haemostatic Cuts and wound, bed sore, Chronic Malaria	[22] [21]
43	<i>Ovis aries</i>	Sheep	Meat, Fat(Miz) Fat, Milk(Ao)	Skin diseases, Torsion, Rheumatism, Weakness during Jaundice	[22] [27]
44	<i>Panthera tigris tigris</i>	Tiger	Fatty oil, Liver(Miz)	Scabies, Itches, Leprosy	[22]
45	<i>Bos frontalis</i>	Mithun	Gall bladder, Testicles, Lobe(N,G)	Dysentery, Cough, Fever, Low lactation Stomach-ache	[25]
46	<i>Rattus sp</i>	Rat	Whole body(N)	Minimize pain after conception	[25]
47	<i>Talpa sp</i>	Mole	Flesh(N)	Tuberculosis	[25]
45	<i>Canis lupus</i>	Wolf	Skin(N)	Cough, Fever	[25]
46	<i>Manis pentadactyla</i>	Chinese Pangolin	Naila(G)	Boils	[25]
47	<i>Herpestes javanicus</i>	Mongoose	Whole body(N)	Any disease prevention	[25]
48	<i>Herpestes edwardsi</i>	Mongoose	Meat(Miz)	Inflammatory diseases, Male impotency	[22] [26]
49	<i>Moschus chrysogaster</i>	Moongose Deer	Penis(Ao) Gall bladder, Umbilicus(G)	Malaria, Diarrhoea, fever,	[25]
50	<i>Cervus unicolor</i>	Sambar	Fresh blood(N) -(G)	Stomach upset, tuberculosis Bursting open boils	[25]
51	<i>Selenarctos thibetanus</i>	Black bear	Gall bladder(N,G)  Gall bladder, Flesh(B)  Gall bladder, Penis, Hair, Fat (Ch)	Malaria,Diarrhoea, fever, body  immunity, stomach upset Easy delivery of child, Diabetes Tonic for pregnant women	[25]  [21]  [23]
			Bile(Ka) Bile(Ao)	Malaria Malaria	[27] [26]
52	<i>Panthera tigris</i>	Tiger	Bone and marrow(N)	Jaundice	[25]
53	<i>Neofelis nebulosa</i>	Clouded leopard	Bone marrow(N)	Body pain	[25]
54	<i>Manis crassicaudata</i>	Indian Pangolin	Scales, Flesh, Gall bladder(B)	Hookworm, Tuberculosis, Malaria	[21]
55	<i>Elephas maximus</i>	Asian elephant	Teeth(B) Tooth(Ao)	Toothache Leucoderma, Itching	[21] [26]
56	<i>Lutrogale perspicillata</i>	Smooth coated otter	Flesh,Fur(B)	Fish bone stuck in throat, Burns	[21]
57	<i>Trachypithecus pileatus</i>	Capped langur	Tongue(B)	Food poisoning	[21]
58	<i>Sus scrofa</i>	Wild boar	Fat(B)	Hair care	[21]
59	<i>Trachypithecus cristatus</i>	Silvered leaf monkey	Gall bladder(B)	Diabetes and high blood pressure	[21]

60	<i>Bubalus arnee</i>	Water Buffalo	Fat(Ao)	Body pain, sprain	[26]
61	<i>Petaurista petaurista</i>	Flying squirrel	Intestine, Bile(Ao)	Ant poison, Asthma	[26]
62	<i>Capra sibirica</i>	Asiatic Ibex	Urine(Ao) Liver, legs, Milk(Ao)	Asthma, tuberculosis, Paralysis, Skin diseases, Stomach problem Jaundice, Night blindness, Sprain, Bone fracture, Weakness	[26]
63	<i>Bos frontalis</i>	Mithun	Penis(Ao)	Brest pain of lactating mother, Skin diseases	[26]
64	<i>Rhinolophus</i>	Bat	Penis(Ka) Fat(Ao) Fleah(Ka)	Brest pain of lactating mother, Asthma Asthma	[27] [26] [27]
65	<i>Macaca sp</i>	Monkey	Blood(Ao)	Tuberculosis	[26]
66	<i>Pteropus sp</i>	Flying fox	Urine(Ao)	Kidney stone	[26]
67	<i>Talpa sp</i>	Mole	Flesh(Ao) Flesh(Ka)	Asthma Asthma	[26] [27]
68	<i>Dusicyon sp</i>	Fox	Fat(Ka)	Rheumatism	[27]
69	<i>Bos babulus</i>	Buffalo	Dung(Ka)	Eczema	[27]
70	<i>Camelus domesticus</i>	Camel	Droppings(Ka)	Stomach ache	[27]
71	<i>Macaca sp</i>	Monkey	Blood(Ka)	Tuberculosis	[27]
72	<i>Sciurus caroliniensis</i>	Squirrel	Flesh(Ka)	Cough	[27]
73	<i>Cerdocyon thous</i>	Fox	Liver(ka)	Rheumatism and Bronchitis	[27]
74	<i>Mus musculus</i>	House mouse	Flesh(Ka)	Colds and skin disease	[27]
75	<i>Lepus capensis</i>	Rabbit	Heart(Ka)	Prevents miscarriage	[27]
76	<i>Homo sapiens</i>	Human	Urine(ka)	Conjunctivitis, skin disease	[27]
77	<i>Equus asinus</i>	Donkey	Milk(ka)	Whooping cough	[27]

Table 2: Aves used in traditional medicine by ethnic groups of North Eastern India

S. No.	Animal species	English name	Parts used	Ailments treated	References
<b>Aves</b>					
1	<i>Acridotheres tristis</i>	Common Myna	Meat(NK)	Diarrhoea	[20]
2	<i>Columba livia</i>	Pigeon	Meat(NK, Ka) Meat; Blood(Ao, Ka)	Low blood pressure Weakness; Leprosy	[20,24] [26,27]
3	<i>Tyto alba</i>	Brow owl	Meat(NK)	Dysentery	[20]
4	<i>Gallus domesticus</i>	Chicken	Meat(NK) Smoked meat; Fat(Ka, Ao)	Bone fracture Pertussis; Burn	[20] [24,26]
5	<i>Grus sp</i>	Crane	Soft furs, Fat(Ka)	Blisters, Sore, Nasal problem	[26]
6	<i>Centropus sinensis</i>	Crow pheasant	Cooked flesh(Ao, An, Se, Re, Khia, Po, Lo, Sang, Zel, Kon, Ch, Miz)	Body ache, Rheumatic pain and earache, Asthma	[22,30]
7	<i>Aquila sp</i>	Eagle	Feather; Fat(Ch, Ao)	Wound; Sprain, Burn	[23,26]
8	<i>Gallus gallus</i>	Red jungle fowl	feather, fat and Meat(Miz, B)	Pinworm removal, Nasal obstruction, Burn	[21,22]
9	<i>Picus canus hassei</i>	Black napped green wood pecker	Meat(Miz)	Asthma	[22]
10	<i>Rhyticeros undulatus ticehursti</i>	Weathered hornbill	Fatty oil(Miz)	Easy labor during delivery	[22]
11	<i>Aceros nipalensis</i>	Necked hornbill	Fat (B)	Burn	[21]
12	<i>Aceros undulates</i>	Weathered hornbill	Fats(N, G)	Body pain	[25]
13	<i>Buceros bicornis</i>	Great hornbill	Fats(N, G) Fat(B)	Body pain Arthritis	[25] [21]
14	<i>Anthracoceros albirostris</i>	Pied	Fats(N, G)	Body pain	[25]
15	<i>Corvus macrorhynchos</i>	Jungle crow	Flesh(B)	Health tonic for aged	[21]
16	<i>Passer domesticus</i>	House sparrow	Brain; Flesh(B, Ao)	Impotency; Stammering	[21,26]
17	<i>Myophonus caeruleus</i>	Blue whistling trush	Flesh(B)	Meat allergy	[21]
18	<i>Upupa epops</i>	Hoopoe	Flesh(B) Body (Miz)	Gall bladder stone Kidney problem	[21] [22]
19	<i>Gallus sonnerati</i>	Jungle fowl	Flesh(Ao, Ka)	Asthma; Breathing problem	[26,27]
20	<i>Pavo cristatus</i>	Peacock	Bone; Blood(Ao, Ka)	Ear ache; Paralysis	[26,26]
21	<i>Corvus splendens</i>	Crow	Flesh, Bones(Ao)	Rheumatism, Paralysis, Earache	[26]
22	<i>Struthio camelus</i>	Ostrich	Fat (Ka)	Joint pains	[27]
23	<i>Streptopelia chinensis</i>	Ground dove	Feathers(Ka)	Stroke	[27]
24	<i>Columba livia</i>	Pigeon	Excreta, Flesh(Ka)	Typhoid, Toothache, Blood pressure	[27]

### Reptiles used by the ethnic groups

The numbers of species of reptiles used by the ethnic groups are 18. Reptiles are used by 15 ethnic groups from the region.

They mostly use the reptiles from the genus *Naja*, which consists of cobra species. The most commonly treated ailments are asthma, arthritis, and malaria, etc. Mostly used parts are the fats, flesh etc.

Table 3: Reptiles used in traditional medicine y the ethnic groups of North Eastern India

S. No.	Animal species	English name	Parts used (Ethnic groups)	Ailments treated	References
<b>Repties</b>					
1	<i>Hydrophis sp</i>	Snake	Liver(Ch)	Diarrhoea, Dysentery, Malaria, Typhoid	[23]
2	<i>Calotes sp</i>		Roasted meat(Miz)	Pneumonia, Asthma, Cough	[22]
3	<i>Calotes versicolor</i>	Common garden lizard	Dried and roasted meat(Miz)	Asthma, Cough, Cold	[22]
4	<i>Geochelone elongata</i>	Star tortoise	Fluid commonly out from neck(Miz)	Piles	[22]
5	<i>Tehanochelys trijuga</i>	Turtle	Meat, Bile (Miz)	Malaria fever	[22]
6	<i>Varanus bengalensis</i>	Monitor Lizard	Tongue, Meat, bile, Skeleton(Miz)	Asthma, Malaria, Arthritis, Stammering	[22]
			Flesh(NK)	Skin disease	[20]
			Flesh(N,G)	Cough and fever	[28]
			Tooth (Ka)	Clostridium welchii	[24]
			Flesh(B)	Jaundice	[21]
			Skin, fat(Ao)	Piles, rheumatism	[26]
7	<i>Viper ruselli</i>		Fatty oil, Bile(Miz)	Warts; Malaria fever	[22]
8	<i>Python molurus</i>	Indian python	Flesh, fat(Ka)	Leprosy	[24]
			Bile and meat, fats(Miz)	Colic, stomach-ache, cholera, burn, cut, wound	[22]
			Fats(N,G)	Massage for join pain	[28]
			Flesh, fat(B)	Seizure, sprain, piles, burn	[21]
9	<i>Naja sp</i>	Cobra	Flesh(N,G)	Foot and mouth disease of cattle	[28]
			Flesh(Ao, Lo, Se, Khia, Sang, Po, Zel, Ch, Kon)	Rheumatic pain, burn, healing of fracture bones	[30]
10	<i>Ophiophagus hannah</i>	King cobra	Gall bladder(B)	Snake bite, diabetes	[21]
11	<i>Gekko gecko</i>	Tokay gecko	Flesh(B)	Impotency	[21]
12	<i>Melanochelys trijuga</i>	Indian pond terrapin	Flesh(B)	Allergy	[21]
13	<i>Chrysenys formasanus</i>	-	Ash of carapace(Ka)	Skin disease	[24]
14	<i>Testudo sp</i>	Tortoise	Flesh(Ao)	Skin disease and piles	[26]
			Blood, flesh(Ka)	Erysipelas, piles	[27]
15	<i>Tropidurus torquatus</i>	Lizard	Whole body(Ka)	Chickenpox	[27]
16	<i>Crotalus durissus</i>	Rattle snake	Fat(Ka)	Rheumatism, arthritis	[27]
17	<i>Echis coloratus</i>	Viper snake	Eggs, fat(Ka)	Inguinal hernia, joint pain of bone	[27]
18	<i>Python reticulates</i>	Python	Flesh(Ao, An, Se, Khia, Sang, Re, Po, Zel, Ch, Kon)	Rheumatism, burn, body pain	[30]

**Amphibians used by the ethnic groups**

A total of 5 species of amphibian are used by 14 ethnic groups. The mostly used species is the *Limnonecties limnocharis* (Frog) by 9

ethnic groups. Skin, flesh etc. are the commonly used parts and the ailments like wound, diabetes, tongue blister etc. are the commonly treated ailments using amphibian species.

Table 4: Amphibians used in traditional medicine by the ethnic groups of North Eastern India

S. No.	Animal species	English names	Parts used (Ethnic group)	Ailment treated	References
1	<i>Limnonecties limnocharis</i>	Frog	Skin, flesh (Ch),(Ao), (An),(Se), (Khia), (Lo), (Po), (Sang), (Zel)	Skinburn, Gastrictis, tongue blister	[23]
				Rheumatic joint pain	[30]
2	<i>Paludomus conica</i>	Frog	-(Adi)	Given to weak person, diabetic patient and fertility enhancement	[22]
3	<i>Parreysia sikkimensis</i>	Frog	-(Adi)	Given to weak person, diabetic patient and fertility enhancement	[22]
4	<i>Rana sp.</i>	Frog	Whole body (N),(G)	Wound healing	[28]
			Skin (Ao)	Wound healing	[26]
			Skin, flesh (Ka)	Wound healing, tongue blister	[27]
5	<i>Bufo sp.</i>	Frog	Hind legs (Ka)	Urinary retention, Acne	[27]
			Bile (Miz)	Diabetes	[22]
			Gall bladder (Ch)	Thorns in the flesh	[23]

**Pisces used by the ethnic groups**

Pisces are one of the widely used animal groups by the ethnic groups of the region. 15 ethnic groups are using 22 different species of fishes for medicinal purpose and the species *Monopterus albus* (Eel fish) is the most commonly used species which is used to treat anaemia and asthma etc. Mostly treated ailments are the skin diseases, burn, asthma, anaemia, etc.

**Molluscs used by the ethnic groups**

Molluscs are also used by 13 ethnic groups from the region. The mostly used species is from the genus *Pila* (Snail) among the 4 species of molluscs and mostly used part is the flesh.

The commonly treated ailments are asthma, tuberculosis, stomach disorders, jaundice etc.

**Table 5: Pisces used in traditional medicine by the ethnic groups of North Eastern India**

S. No.	Animal species	English names	Parts used (Ethnic group)	Ailment treated	References
1	<i>Barbus sp.</i>	Fish	Slimy (Ch)	Chickenpox	[23]
2	<i>Mystus seenghala</i>	Giant river cat fish	-(Adi)	Given to new mother, bones used for taboo purposes	[22]
3	<i>Channa punctatus</i>		-(Adi)	Given to a new mother, malaria	[22]
4	<i>Cyclemys gemeli</i>	Turtle	-(Adi)	Skin disease	[22]
5	<i>Anabas testidunus</i>	Climbing perch	-(Adi)	Given to a weak person, malaria	[22]
6	<i>Clarius batracus</i>	Walking catfish	-(Adi)	Given to a weak person	[22]
7	<i>Anguilla sp</i>	Eel	Body mucus (N,G)	Burns	[28]
8	<i>Semiplotus sp.</i>	Fresh water fishes	Stomach and gut (N)	Stomach ache and digestive problems	[28]
9	<i>Bagarius bagarius</i>	Gangetic goonch	Fins, bones (G)	Body burns, stomach pain	[28]
10	<i>Amblyceps sp.</i>	Catfish	Bones (G)	Body burns	[28]
11	<i>Psilorhynchus ballitora</i>	Ballitora minnow	whole body (N,G)	Diarrhoea	[28]
12	<i>Semiplotus sp</i>	King fish	Whole body (N)	Smallpox	[28]
13	<i>Amphipnous cuchia</i>	Eel	Blood (Ao) Blood (Ka) Meat, blood (NK)	Asthma, general weakness Asthma, jaundice, weakness Premenstrual abdominal pain, anaemia	[26] [27] [20]
14	<i>Channa gachua</i>	snake head	Whole body (NK)	Abdominal pain	[20]
15	<i>Xenentodon cancila</i>	Fresh water garfish	Whole body (NK)	Joint pain and swelling	[20]
16	<i>Amblypharyngodon mola</i>	Indian carplet	Whole body (NK)	Premenstrual abdominal pain	[20]
17	<i>Chaca chaca</i>	Devil fish	Whole body (NK)	Polio	[20]
18	<i>Channa punctatus</i>	Sengeli	Whole body	Body pain	[29]
19	<i>Mastacembalus armatus</i>	Giant thorny eel	Whole body	Carbuncle	[29]
20	<i>Monopterus cuchia</i>	Cuchia	Blood	Diabetes	[29]
21	<i>Labeo gonius</i>	Carp fish	Edible portion	Obesity	[29]
22	<i>Monopterus albus</i>	Eel fish	Blood (Ao),(An), (Se), (Khia), (Lo), (Re), (Po), (Zel),(Ch), (kon)	Anaemia, asthma	[30]

**Table 6: Molluscs used in traditional medicine by the ethnic groups of North Eastern India**

S. No.	Animal species	English names	Parts used (Ethnic groups)	Ailment treated	References
1	<i>Pila sp</i>	Snail	Flesh, shell (Ch)	Affected bone, skin burn, injuries, gastritis, tongue blister	[23]
			Flesh (Ao), (An), (Se), (Re), (Khia), (Lo), (Sang), (Po), (Ch), (Kon)	Asthma, tuberculosis, stomach disorder	[30]
2	<i>Lymnaea sp</i>	Snail	Flesh (Miz)	Measles, liver ailment and jaundice, swelling and sprain	[22]
			Flesh (B)	Jaundice	[22]
3	<i>Cryptozona sp</i>	Snail	Flesh (B)	Rheumatism and sciatic	[22]
4	<i>Ariolimax columbianus</i>	Banana slug	Whole body (Ka)	Pertusis	[24]

**Tables 7: Annelids used in traditional medicine by the ethnic groups of North Eastern India**

S. No.	Animal species	English names	Parts used (Ethnic group)	Ailment treated	References
1	<i>Pheritima sp</i>	Earthworm	Whole body (Ch) Whole body (Miz) Whole body (Khia), (Lo), (Sang), (Re), (Po), (Zel), (Ch), (Kon),(Ao), (An)	Eye (red) Chronic fever, malaria, convulsion Antitode in snake and spider bites	[23] [22] [30]
2	<i>Tachypodoiulus niger</i>	Black millipede	Whole body (Miz)	Tuberculosis	[22]
3	<i>Hirudo medicinalis</i>	Leech	Whole body (Ka)	Piles, swelling of muscle	[27]
4	<i>Lumbricus sp</i>	Earthworm	Whole body (Ka) (NK)	Clear obstruction of urinary tract, arthritis Pertussis	[24] [20]
5	<i>Metaphire houletti</i>	Earthworm	Whole body (NK)	Burn	[20]
6	<i>Perionyx sp</i>	Earthworm	Whole body (NK)	Piles	[20]

**Annelids used by the ethnic groups**

Six different species of Annelida are used by 13 ethnic groups from the region. They mostly use the whole body of the species and mostly used species is from the genus *Pheretima* (Earthworm). Commonly treated ailments are malaria, fever, tuberculosis, piles, etc.

**Arthropods used by the ethnic groups-**

Arthropods are the second widely used group of animals by the ethnic groups of the region. 65 different species of arthropods are

used by 17 ethnic groups. The mostly use the species the *Blatta orientalis* (Cockroach) and the *Paalamnaeus wammerdami* (Scorpion). They mostly use the parts-whole body and honey. Ailments like-diabetes, asthma, malaria are mostly treated with arthropods species. Some species like *Lyttavesicatoria* (Spanish fly), *Mylabris cichorii* (Blister beetles), *Epicauta histiconis* (Red headed blister beetles), etc. they also use against cancer. The traditional edible insect of northeastern India, *Vespa affinis* L., showed some antioxidant potential which can be a cure to the oxidative-stress associated disorders [32].

**Table 8: Arthropods used in traditional medicine by the ethnic groups of North Eastern India**

S. No.	Animal species	English names	Parts used (Ethnic groups)	Ailment treated	References
1	<i>Cancer pararus</i>	Crab	whole body(Ch) Flesh	Urethritis, Malaria, Cough, Earache Stomach pain	[23]
2	<i>Apis indica</i>	Bee	Honey(Ch) Honey(Mis) Honey (NK) Honey (Ka)	Deep wound, Cough Cough, cold and fever Cough Cold, cough, fever, ulcer on tongue, sore throat	[23] [31] [20] [24]
3	<i>Myrmeleon immaculatus</i>	Ant lion	whole body(Ch)	Wart	[23]
4	<i>Podisus sp</i>	Plant bug	whole body(Ch)	Cough	[23]
5	<i>Paneus indicus</i>	Prawn	whole body(Adi)	Diabetes	[22]
6	<i>Oecophylla samargdina</i>	Weaver ant	-(Adi) Larvae and Pupa (Ka) Whole body (N), (G) Whole body, larvae (N,G)	Digestive system Production of Children Stomach-ache and dysentery Stomach pain, fever	[22] [20] [28] [25]
7	<i>Aspongopus najus</i>	Stink bug	-(Adi)	Malaria	[22]
8	<i>Apis mellifera</i>	Bee	Honey(Miz) Honey(Ka),(N,G)	Throat pain, irregular menstruation, Burns, Cuts Cough, fu, Asthma	[22] [27]
9	<i>Carausius morosus</i>	Stick insect	whole body(Miz)	Wounds	[22]
10	<i>Cimex lactularis</i>	Bed bug	whole body(Miz)	Inflammatory glands, ulcers, Boils, Malaria	[22]
11	<i>Gryllus pensylvanicus</i>	Field cricket	Whole body flesh(B)	Malaria	[21]
12	<i>Heteropoda vanatoria</i>	House spider	whole body(Miz)	Chest problem	[22]
13	<i>Myrmeleon formicarius</i>	Ant lion	Dead and dry spider(Miz)	Otorrhoea	[22]
14	<i>Paratelpusa sp</i>	Fresh water crab	Whole part(Miz)	Warts and verrucose	[22]
15	<i>Periplaneta americana</i>	Cockroach	Whole body-boiled(Miz) Whole body (B) Body(Miz) Whole body dried (B) Whole body(Ka)	Inflammatory glands, Warts Jaundice Asthma, stomach-ache, saliva exuding in children Tuberculosis Asthma	[22] [21] [27] [31]
16	<i>Samia cynthia ricini</i>	Eri sikworm	Pupae, cocoon and cocoon ash(Mis)	Protect Liver	[31]
17	<i>Vespa orientalis</i>	Wasps	Whole insect, egg, larvae(Mis)	Cough, cold and stomach problem	[31]
18	<i>Dorylus orientalis</i>	Red ant	Egg, adults(Mis)	Small pox, chicken Pox, stomach- ache, Dysentery	[31]
19	<i>Schistocera gregaria</i>	Desert locusts	Body and body oil(Mis) Whole body and body oil (Ka)	Lip cracking Lip and leg cracking	[31] [24]
20	<i>Antheraea assamensis</i>	Muga silkworm	Pupae and silk(Mis)	Diet supplement	[31]
21	<i>Eumenes petiolatus</i>	Potter wasp	Eggs, larvae(Mis)	Headache	[31]
22	<i>Achaeta sp</i>	Cricket	Hind legs(Ka)	Diuretic	[27]
23	<i>Pseudocantherotermes sp</i>	Termites	Whole body(Ka)	Asthma	[27]
24	<i>Musca domestica</i>	House fly	Whole body (Ka)	Boldness	[27]
25	<i>Poecillocerus strictus</i>	Grasshopper	Whole insect(Ka)	Lung infection	[27]
26	<i>Trigona spinipes</i>	stingless bee	Honey(Ka)	Throat inflammation	[27]
27	<i>Lytta vesicatoria</i>	Spanish fly	Whole body (Ka)	Anti-cancer, Increase sexual pleasure	[27]
28	<i>Mylabris cichorii</i>	Blister beetle	Whole body(Ka)	Anti-cancer, warts, rabies	[27]
29	<i>Epicauta hirticornis</i>	Red-headed blister beetles	Whole body (Ka)	Anti-cancer, warts, rabies	[27]
30	<i>Pediculus sp</i>	Louse	Whole body (Ka)	Clears urinary tracts obstructions	[27]
40	<i>Sceliphron sp</i>	Wasps	Whole insect (N K)	Pneumonia	[20]
41	<i>Grylotalpa africana</i>	African mole cricket	Ash(Ka)	Ear infection	[24]
42	<i>Philosomia ricini</i>	Eri silkworm	Whole body and Cocoon(Ka)	Dribbling saliva	[24]
43	<i>Lampyris noctuluca</i>	Common glow worm	Whole body (N K)	Night blindness	[20]
44	<i>Coptotermes formosanus</i>	Termites	Whole body (Ka)	Hepatomegaly and hepatitis	[24]

45	<i>Achaearanea tepideriorum</i>	American house spider	Dead skin (Ka)	Blisters, schizotrenia	[24]
46	<i>Carcinus sp</i>	Crab	Whole body (Ka)	Night blindness	[24]
47	<i>Galeodes sp</i>	Spider	Whole body (Ka)	Schizotrenia	[24]
48	<i>Aeshna mixta</i>	Dragonfly	Whole body (Ka)	Nocturnal enuresis	[24]
49	<i>Neurothermis fluctuans</i>	Dragonfly	Whole body (Ka)	Nocturnal enuresis	[24]
50	<i>Apis dorsata</i>	Giant honey bee	Honey (Ka)	Cold, cough, fever, ulcer on tongue, sore throat	[24]
51	<i>Apis florea</i>	Dwarf honey bee	Honey (Ka)	Cold, cough, fever, ulcer on tongue, sore throat	[24]
			Honey, comb (N,G)	Cough, fever, stomach pain, stomach cleanser, skin irritation	[25]
52	<i>Apis cerena</i>	Honey bee	Honey, comb (N, G)	A cough, fever, stomach pain, stomach cleanser, skin irritation	[25]
53	<i>Bothroponera rufipes</i>	Black ant	Whole body (N,G)	Scabies, toothache; high blood pressure, boils, wounds malaria, dysentery, chest pain. Foot and mouth disease (Mithun). Maggots/ worm infection (cattle)	[25]
54	<i>Tetraponeraa rufonigra</i>	Iron ant	Whole body (N,G)	Foot and mouth disease (Mithun)	[25]
55	<i>Ephemera danica</i>	May fly	Nymph (N,G)	Stomach disturbance	
56	<i>Cantharid sp.</i>	Beetle	Whole body (N,G)	Skin allergy	[25]
57	<i>Lepidiota sp.</i>	Beetle	Whole body (N,G)	Skin allergy	[25]
58	<i>Catharsius sp.</i>	Beetle	-(N,G)	Diarrhoea	[25]
59	<i>Tytilus sp</i>	Scorpion	Whole body(Ka)	To treat its own sting	[27]
60	<i>Blatta orientalis</i>	Cockroach	Flesh(Ao, Re, Se, An, Lo, Po, Zel, Ch, Khia)	Asthma	[30]
61	<i>Palamnaeus wammerdami</i>	Scorpion	(Ao, Re, Se, An, Lo, Po, Zel, Ch, Khia)	Rheumatic joint pain	[30]
62	<i>Penaeus indicus</i>	Prawn	-(Adi)	Diabetes	[22]
63	<i>Scylla serrate</i>	Crab	-(Adi)	Diabetes, skin disease	[22]
64	<i>Tachypodoiulus niger</i>	Black millipede	Whole body (Miz)	Tuberculosis	[22]
65	<i>Myrmelon formicarius</i>	Ant lion	Whole body(Miz)	Warts or verrucose	[22]

## CONCLUSION

It has been seen that the practice of zoo therapy in the north-eastern part of India is very common like many other parts of India and world. From the observations on the zoo therapy practised by the ethnic groups of North Eastern India, it can be summarized that-

(1) Among the 19 ethnic groups from the region, the use of Mammalian species has found to be the highest followed by Arthropods, Aves, Pisces, Reptiles, Annelids, Amphibians and Molluscs.

(1) The most commonly treated important diseases are- Tuberculosis, Diabetes, Schrizotrenia, Cancer, Gallbladder stone, Kidney problem, Arthritis, Impotency and Malaria etc.

In this modern world with tremendous advancement in the medical field, cure for some diseases like- Cancer, Diabetes etc. has yet to be found. Many people around the world still prefer to go for traditional medicine to treat different ailments, which primarily is based on their knowledge and experience. This knowledge of traditional medicine has been the basis for the development of many potential drugs that are being used in modern medical field. Thus, with screening and proper scientific study of the animal species used in traditional medicine by different ethnic groups can lead to the development of new potential drugs for many serious diseases of the present time.

## CONFLICTS OF INTERESTS

Declared none

## REFERENCES

- World Health Organization. Traditional medicine strategy 2002-2005. Geneva, Switzerland; 2002. p. 1-74.
- Chivian E. Global environmental degradation and biodiversity loss: Implications for human health. In: Grifo F, Rosenthal J. editors. Biodiversity and human health. 1<sup>st</sup> ed. Washington DC: Island Press; 1997. p. 7-38.
- Alves RRN, Rosa IL. Why study the use of animal products in traditional medicine? J Ethnobiol Ethnomed 2005;1:5.
- Adeola MO. The importance of wild animals and their parts in the culture, religious festivals, and traditional medicine, of Nigeria. Environ Conserv 1992;19:125-34.
- Anageletti LR, Agrimi U, Curia C, French D, Mariani-Constantini R. Healing rituals and sacred serpents. Lancet 1992;340:223-5.
- Marques JGW. Fauna medicinal: recurso do ambiente ou ameaca a biodiversidade? Mutum 1997;1:4.
- China National Corporation of Traditional and Herbal Medicine: Materia medica commonly used in China Beijing, Science Press; 1995.
- Schimitschek E. Insekten als Nahrung, in Brauchtum, Kult und Kultur. In: Helmcke JG, Stark D, Wermuth H. editors. Handbuch der Zoologie-eine Naturgeschichte der Stämme des Tierreichs, Band Vier. Berlin: Akademie Verlag; 1968. p. 1-62.
- Lohani U. Man-animal relationships in central Nepal. J Ethnobiol Ethnomed 2010;6:31.
- Costa-Neto EM, Marques JGW. Faunistic resources used as medicines by artisanal fishermen from Siribinha Beach, State of Bahia, Brazil. J Ethnobiol 2000;20:93-109.
- Alves RRN. Fauna used in popular medicine in Northeast Brazil. J Ethnobiol Ethnomed 2009;5:1.
- Ali SAM, Mahdihassan S. Bazaar medicines of Karachi: the drugs of animal origin. In: Mahdihassan S. editor. Bazaar Drugs and Folk Medicine in Pakistan. Karachi: Hamdard Publ; 1984. p. 69-73.
- Mahawar MM, Jaroli DP. Traditional Zootherapeutic studies in India: a review. J Ethnobiol Ethnomed 2008;4:17-29.
- Patil SH. Ethno-medico-zoological studies on Nadurbar district of Maharashtra. Indian J Traditional Knowledge 2003;2:297-9.
- Singh RAJA, Padmalatha C. Ethno-entomological practices in Tirunelveli district, Tamil Nadu. Indian J Traditional Knowledge 2004;3:442-6.
- Solavan A, Paulmurunguan R, Wilsanand V, Ranjith Sing AJA. Traditional therapeutic uses of animals among tribal population of Tamil Nadu. Indian J Traditional Knowledge 2004;3:198-204.



17. Sharma SK. A study on ethnozoology of Southern Rajasthan. In: Trivedi PC. editor. Ethnobotany. Jaipur: Aavishkar Publisher; 2002. p. 239-53.
18. Gupta L, Siroli CS, Mistry N, Dixit AM. Use of animals and animal products in traditional health care systems in District Kachchh, Gujarat. *Indian J Traditional Knowledge* 2003;2:346-56.
19. Mishra N, Rout SD, Panda T. Ethno-zoological studies and medicinal value of Similipal Biosphere, Orissa, India. *Afr J Pharm Pharmacol* 2011;5:6-11.
20. Borah MP, Prasad SB. Ethno zoological remedial uses by the indigenous inhabitants in adjoining areas of Pobitora Wildlife sactuary, Assam, India. *Int J Pharm Pharm Sci* 2016;8:90-6.
21. Betula ALS. Indigenous knowledge of zootherapeutic use among the Biate tribe of Dima Hasao District, Assam, North-eastern India. *J Ethnobiol Ethnomed* 2013;9:56.
22. Chinlapiang M, Singh RK, Shukla AC. Ethno zoological diversity of Northeast India: Emperical learning with traditional knowledge holdersof Mizoram and Arunachal Pradesh. *Indian J Traditional Knowledge* 2013;12:18-30.
23. Kakati LN, Doulo V. Indigenous knowledge system of zootherapeutic use by Chakhesang tribe of Nagaland, India. *J Human Ecol* 2002;13:419-23.
24. Ronghang R, Teron R, Tamuli KA, Rajkhowa R. Traditional zootherapy practised among the Karbis of Assam, India. *Ecoscan* 2011;1:161-6.
25. Chakravorty J, Ghosh S, Meyer-Rochow VB. Practices of entomophagy and entomotherapy by members of the Nyshi and Galo tribes, two ethnic groups of the state of Arunachal Pradesh (North-East India). *J Ethnobiol Ethnomed* 2011;7:5-18.
26. Kakati LN, Ao B, Doulo V. Indigenous knowledge of zootherapeutic use of vertebrate origin by the Ao Tribe of Nagaland. *J Human Ecol* 2006;19:163-7.
27. Verma AK, Prasad SB, Rongpi T, Arjun J. Traditional healing with animals (zoo therapy) by the major ethnic group of Karbi Anglong district of Assam, India. *Int J Pharm Pharm Sci* 2014;6:1-8.
28. Chakravorty J, Meyer-Rochow VB, Ghosh S. Vertebrate used for medicinal purposes by members of the Nyishi and Galo tribes in Arunachal Pradesh (North-East India). *J Ethnobiol Ethnomed* 2011;7:13-26.
29. Kalita D, Dutta M, Islam NM. Few plants and animals based folk medicines from Dibrugarh District, Assam. *Indian J Traditional Knowledge* 2015;4:81-5.
30. Jamir NS, Lal P. Ethno zoological practice among Naga tribes. *Indian J Traditional Knowledge* 2005;1:100-4.
31. Doley AK, Kalita J. Traditional uses of Insect and insect products in medicine and food by the mishing tribe of Dhemaji District, Assam, North East India. *Soc Sci Researcher* 2012;1:11-21.
32. Dutta P, Dey T, Manna P, Kalita J. Antioxidant potential of vespa affinis L., a traditional edible insect species of North East India. *PLoS One* 2016;11:1-19.

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