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A study on the ethnomedicinal uses of bioresources by the Bodo Community of Udalguri District, Assam, India

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Abstract
Traditional medicine has long been a vital component of the health care systems of several ethnic groups who live in rural parts of North-East India. The objective of the study was to survey and document the traditional knowledge on Ethno medicinal uses of bioresources from indigenous people inhabiting in Udalguri district of Assam. Primary data was collected through field visits by using techniques like interview, observation and discussion with people of three sample villages of Udalguri. The study identified a total of 54 species of various plants, animals, and even insects that the Bodo people of the Udalguri district frequently employ to treat a variety of illnesses, including cough, cold, breathing issues, wounds, skin conditions, cancer, and other common disorders. The results showed that the native Bodo people of Udalguri had a wealth of traditional knowledge about using animals and animal products in traditional medicine. For the protection and management of medicinal flora and faunistic resources, it is advised that this type of traditional knowledge be incorporated in the scientific literature. Also, further studies with scientific technique should be conducted on such traditional drug.

Keywords: Bodo people, bioresource, Traditional medicine, preservation

Introduction

The term "ethnomedicine" covers a broad spectrum of healthcare system architecture, practices, ideologies, and treatment approaches that have their origins in indigenous cultural evolution. Ethnomedicine is also understood to refer to the study of these practices and systems, more so from the perspective of setting them in an anthropological context as opposed to assessing their efficacy through the use of science. Such healthcare systems do not necessarily follow the structure of modern or 'Western medicine instead are based on the unique culture that has arisen from native/indigenous groups of people.

Traditional or folk medicine is the term used to describe the use of plants and animals by the indigenous people in their own systems of health care. Traditional medicine is defined as "the body of knowledge, skills, and practices based on theories, beliefs, and experiences from indigenous to different cultures that are used to promote and maintain health as well as to prevent, identify, and treat physical and mental illness."

India is gifted with enormous biodiversity. Both the relationship between man and his domesticated animals and the relationship between medicinal plants, insects, and humans have roots in primordial times. Even now, man still relies on some plants for basic healthcare in addition to all the modern medical systems. In both traditional and modern medicine around the world, plants and insects have long been used. Although plants and materials derived from plants are the main source of components for traditional medicine, finding animal resources for medical treatments is also becoming more significant in the field of human health care. Around 29 herbal medicines were found to be used in post-natal period by people of Garhwal Region, India (Juyal and Ghildiyal, 2014) [15].

Among countries, the most widely used traditional medicine today include those of China, India and Africa. Insects are very commonly incorporated as part of herbal medicine components of traditional Chinese medicine. Unlike China, the traditional insect medicine of Africa is extremely variable. In Africa, grasshopper is both eaten as food as well as consumed for medicinal purpose.

Indian traditional medicine, or ayurveda, is frequently used in conjunction with western medicine as part of standard medical care. About 15 different animal species are recorded to be used by tribes of Nandurbar district of Maharashtra (Patil, 2003) [25]. 25 vertebrates and 31 invertebrates has been used traditionally to treat ailments by people of Mizoram (Lalramnghinglova, 1999) [17]. Termites are used to treat anemia, rheumatic illnesses, and ulcers as few instances of Ayurvedic medicine in India. Assam is the second-largest state in North-Eastern India and has a diverse population of people from many different ethnic and cultural backgrounds, as well as abundant natural resources and animal sanctuaries. There have been numerous accounts on traditional Assamese medicine that is based on plants, animals, and insects. 20 plant species belonging to 17 families were found to be used traditionally by people of Gohpur, Assam (Saikia, 2006) [27]. Different ethnic groups often pass on their knowledge of and use of animals, plants, and insects in traditional medicine from one senior person in the family to the next, and if this knowledge is not carefully documented, it could be lost. It is therefore vital to preserve these by proper documentation of traditional uses of plant, animals and insects for the cure of different ailments. An effort has been undertaken to gather and document the ethno-biomedical resources from the subject area through this research. This research will be useful in learning more about the traditional medical applications of many plants, animals, and insects. Protecting the knowledge for upcoming generations may also be advantageous.

Materials and Methods

Study area

Udalguri district was selected as the study area. It is a district located on the northern bank of the Brahmaputra River in the Bodoland Territorial Region. The district's northern and eastern borders are formed by Bhutan and Arunachal Pradesh, while its western and southern borders are formed by Baksa and Sonitpur Districts. 1852.16 km^2 is roughly the size of it. It may be found at 260 45'13.21" N and 9206'7.74" E latitude and longitude, respectively. Towards the district's northernmost point, the landscape is covered in a high plain with a moderate amount of forest.

The study was conducted among the Bodo tribes during January to March, 2023 in Bwigriguri, Sudempuri, and Dhulachuburi villages of Udalguri District. There are very few proper scientific information regarding the ethno-medicine used by the people of these areas.

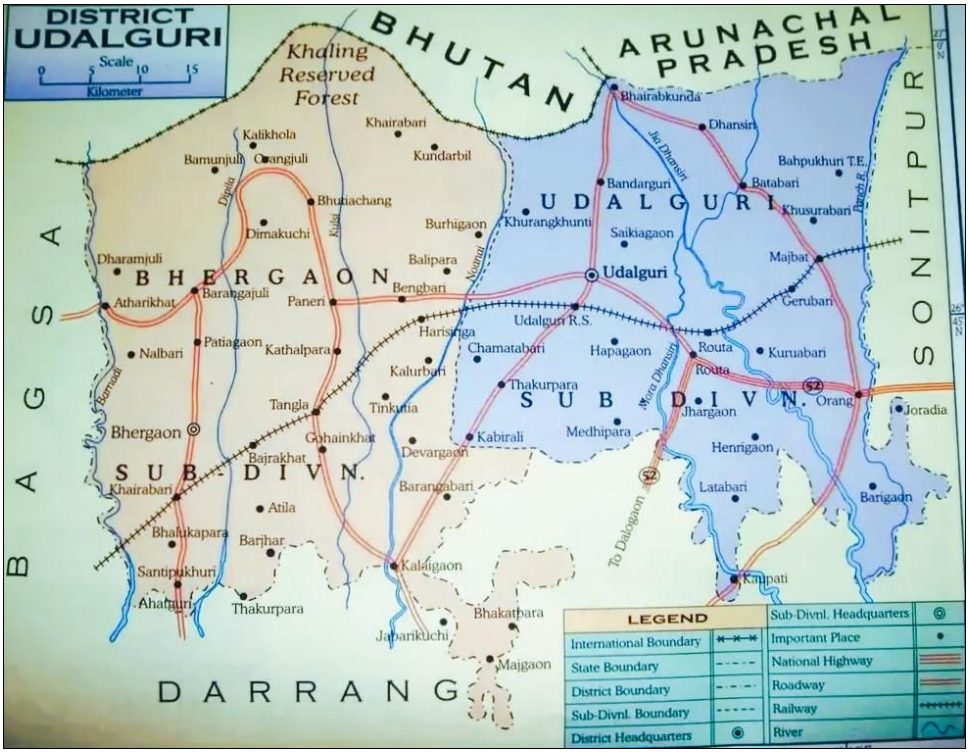

Fig 1: Map of Udalguri District, Assam, India

Methodology

A survey was conducted in the month of January to March, 2023 regarding uses of plants, animals and insects in the selected villages of Udalguri district namely Sudempuri, Bwigriguri and Dhulachburi. Primary data was collected by using techniques like interview, observation and discussion The indigenous Bodo people employed medicinal plants and insects to treat a variety of illnesses, thus frequent field trips were organized to gather information about this folk knowledge. The local inhabitants were interviewed especially the older people both men and women, who were familiar with traditional uses of indigenous plants and insects.

Results

Personal interviews with locals revealed some very valuable information about the bioresources used the Bodo people in traditional medicine. The current study provides traditional medical knowledge that uses numerous plants, animals, and their byproducts to cure various ailments. During the field survey, every respondent who revealed their traditional knowledge belonged to the Bodo community. Elderly folks gave further details on how different bioresources are used in traditional medicine. According to the research, older persons have more expertise with ethnomedical practices and are carrying knowledge that was passed down to them by family elders. The findings show that the native

population of the Udalguri district still heavily relies on traditional medicine for their basic healthcare.

The study recorded a total of 53 species which are used to treat different ailments such as cough, cold, asthma, toothache, stomach ache, burns, wounds and cuts, fracture, jaundice, typhoid, gastric etc. The species belong to different groups which include overall 21 Plants, 12 Mammals, 7 Insects, 7 Birds, 2 Amphibians, 1 Reptile, 1 Pisces, 1 Mollusca, 1 Invertebrate (earthworm)

The record of collected bioresources with their local name, scientific name, common name, parts used, medicinal uses and prescription are given in the table 1. The knowledge on medicine was recorded from Bodo community of Udalguri district, Assam.

Table 1: Following are the bioresources that are used by the Bodo people of Udalguri district of Assam in the treatment of different ailments.

Common Name		Scientific Name	Local Name	Parts used	Medicinal Uses	Prescription
1.	Black Ants	*Lasius niger*	*GwswmMwswrm*	Whole body	Toothache	Smashed and applied
2.	Honey Bee	*Apis cerana indica*	*Beremwdwi*	Honey	Cough	Mixed with tulsi, *Euphorbia trigona* (Sijou) leaf and the mixture is taken orally.
				Honey	Burns in mouth, mouth ulcers, throat pain, for good health.	Honey is directly applied on burnt areas.
3.	Cricket	*Achaeta sp.*	*Khusengra*	Whole body	To treat burning sensation while urinating.	Can be taken orally after roasting or frying the cricket.
4.	Wasp	*Polistis olivaceus*	*Berejotha*	Bee, bee larva & bee eggs	Backpain, for better eyesight.	Roasted and eaten as food.
5.	Cockroach	*Periplanata americana*	*Khangkhoma*	Whole body	Asthma	Fried and eaten
6.	Earthworm	*Lumbricus terrestris*	*Khansri*	Faeces	Treat migraine	Mixed with black pepper and applied on the forehead.
7.	Termite	*Pseudocanthothermes sp.*	*Uri*	Whole body	Breathlessness	Fried and eaten.
8.	Black beetle	*Heteronychus* sp.	*Burbila*	Whole body	Malaria	Eaten roasted
9.	Turtle	*Testudines* sp.	*Kaseo*	Hardest part of the turtle	Treat burns	Roasted into ashes and mixed with coconut oil and applied on the burnt areas.
						Turtle back cut into pieces and mixed with water; the mixture is applied on the affected areas.
10.	Monkey	*Macaques* sp.	*Mwkhra*	Flesh	Measles and small pox	Cooked and consumed
				Flesh and raw blood	Piles	Flesh is cooked and eaten or raw blood is also consumed.
				Bones	Tuberculosis	Bones are crushed and mixed with water and given orally or a medicinal pendant is given with monkey bones inside.
11.	Cow	*Bos indicus*	*Mwsow*	Fresh urine	Blood cancer, Anaemia.	Freshly taken in orally
				Fats	Treat burns, pain and to heal cracked body parts especially heel.	Fats are liquified by applying heat and then cooled down and the applied to the affected area.
12.	Pig	*Sus scrofa domesticus*	*Oma*	Pig faeces	Stomach-ache	Pig faeces mixed with some herbs and then taken orally
13.	Horse	*Equus* sp.	*Gorai*	Horse tail hair	To heal severe backpain.	Horse tail hair is scrubbed with some herbal medicine in the affected area
14.	Mithun	*Bos frontalis*	*Mwsowbolod*	Penis	Breast pain of lactating mother	Cooked and consumed
15	Sheep	*Ovis aries*	*Bwrmamenda*	Milk	Jaundice	Raw or boiled milk is consumed
16.	Mongoose	*Herpestes* sp.	*Neolai*	Meat	When bitten by dogs	Cooked and consumed
17.	Mouse	*Mus musculus*	*Enjor*	Flesh	Skin diseases	Cooked and consumed
18.	Rabbit	*Lepus* sp.	*Sesa*	Heart	Prevent miscarriage	Cooked and consumed
19.	Goat	*Capra hircus*	*Bwrma*	Tongue	To treat children who cannot speak properly	Cooked and consumed
20.	Wild pig	*Sus scrofa*	*Hagranioma*	Meat	Piles	Cooked and consumed
21.	Bat	*Rhinolophus sp.*	*Badamali*	Flesh	Breathing problems	Cooked and consumed
22.	Hen	*Gallus gallus domesticus*	*Noni dao*	Meat	Treat burns and joint pains	Melted and cooled and then applied on the affected area
23.	Dove	*Zenaida* sp.	*Daothu*	Flesh	Skin diseases	Cooked and consumed
24.	House Sparrow	*Passer domesticus*	*Sokha*	Flesh	Stammering	Cooked and consumed
25.	Crow	*Corrus splendens*	*Daokha*	Flesh	Paralysis	Cooked and consumed
26.	Pigeon	*Columba livia*	*Dao Phareo*	Flesh	Treat low blood pressure	Cooked and consumed
27.	Black Chicken	*Ayam cemani*	*Gwswmdao*	Flesh	Typhoid	Cooked with some herbs and consumed

28.	Quail	*Coturnix coturnix*	*Dao dulabata*	Eggs	Blood pressure,	Boiled and consumed
					prevent diabetes	
29.	Common Toad	*Duttaphrynus melanostictus*	*Ambusitro*	Skin	For skin diseases (ringworm) and Paronychia, a kind of finger infection.	Skin of the live animal is cut and washed and then wrapped around the infected area tightly.
30.	Bull frog	*Hoplobatrachus* sp.	*Ambubongla*	Flesh	Locals believes that it is medicine for stomach trouble and high blood pressure	Cooked and consumed
31.	Eel (Cuchia)	*Amphipnous cuchia*	*Khusia*	Flesh	Jaundice, weakness and also increases haemoglobin	Flesh is cooked with red gram leaves and consumed.
32.	Snails	*Ampullariidae* sp.	*Samo*	Meat	Eyesight	Cooked and consumed
33.	Tulsi	*Ocimum sanctum*	*Tulsi*	Leaves	Cough	Tulsi leaf paste extract, *Euphorbia trigona* leaf extract and honey mixture is taken orally.
34.	Thumbai	*Leucus aspera*	*Khansia*	Leaves	Cough and cold	Made soup with young chicken and consumed
35.	Chinese fever vine or Skunk vine	*Paederiadoetida*	*Kipibendwng*	Leaves	Gastric inflammation	Soup is consumed
					Toothaches	Leaf paste is applied on the affected teeth
					Intestinal worm abdominal pain	Raw leaves extract is consumed
36.	China rose	*Hibiscus rosa-sinensis*	*Jobaphool*	Flower	Painful and burning sensation while urinating	Paste of flower is mixed with water and consumed
37.	Jute	*Corchorus olitorius*	*Narji*	Leaves	Typhoid	Jute leaf with snail is cooked and consumed
38.	Banana	*Musa* sp.	*Thaler*	Decayed root bottom	Kill teeth worms and also to get relief from toothache	Make a paste with Ageratum conyzoides (goatweed) and applied on the affected teeth
39.	Red gram	*Cajanus cajan*	*Rohor*	Leaves	Jaundice	Soup is consumed
40.	Crape jasmine	*Tabernaemontana divaricate*	*Daodwiphool*	Flower	Red eye infection	Flower extract is applied on the affected eye
41.	Malabar Spinach	*Basella alba*	*Mwiphrai*	Whole plant	Blood loss during miscarriage	Made a watery paste and consumed
42.	Garlic	*Allium sativum*	*Sambramgupur*	Clove	Healthy heart	Cooked and consumed
					Toothache	Garlic paste mixed with Cloves oil and applied on the teeth
43.	Ginger	*Zingiber officinale*	*Haizeng*	Root	Toothache	Ginger paste is applied on the affected tooth
44.	Marigold	*Tagetes* sp.	*Gendaphool*	Leaf	Stops cut bleeding	Marigold leaf paste is applied on the cut area
45.	Hill Glory	*Clerodendrum infortunatum*	*Lwkhwna*	Young leaf	Stomach ache	Paste of hill glory leaf, Tulsi, Jujube leaves, young guava leaves and a little fresh pig feces is mixed and consumed
46.	Veld grape	*Cissus quandrangularis*	*Hajora*	Whole plant	To heal fractures	Paste of Veld grape is mixed with garlic paste and applied on the fractured area.
47.	St. John worth	*Hypericum japonicum*	*Sonapuli*	Leaves	Fever	Leaves of cintella, St. John worth and lawn marsh penny worth is cooked and consumed
48.	Gotu kola	*Cintella asiatca*	*Manimuni*	Leaves	Lumps in child's tongue	Paste of cintella and red gram is applied and also soup can be consumed
49.	Tothache plant	*Acmella ciliate*	*Zari*	Whole plant	Toothache	Leaf paste is applied
				Flower	Small painful bumps on the tongue	Flower is chewed
50.	Graviola	*Annona muricata*	*Sum Khantal*	Fruit	Cancer	Fruit is consumed
51.	Candle bush	*Senna alata*	*Dadupipang*	Leaves and flower	Ringworm	Paste is applied
52.	Ostrich fern	*Matteuccia struthiopteris*	*Dingkhiapagla*	Leaves	Nereis bite	Paste is applied
53.	Papaya	*Carica papaya*	*Mudumphul*	Stem	Wet cough	Tip of the dry stem is lit and the smoke is inhaled like a cigarette.

Source: Field survey

Photographs of the respondents showing some of the bioresources that are used for different ailments are given in the fig. 2.

Fig 2: Picture taken during the survey.

1. Skunkvine leaf for gastric inflammation and toothache.
2. Ostrich fern used when bitten by nereis.
3. **Graviola:** locals believe the fruit is used to cure breast cancer.
4. **Medicinal plants: Skunk vine:** For toothache and gastric inflammation.

Toothache plant: For toothache and painful bumps on tongue.
Crepe Jasmine: For red eye infection
***Leucas aspera*:** For cough and cold.

Fig 3: 1) Cockroach, 2) Cricket, 3) Black ants, 4) Honey bee, 5) Earthworm feces, 6) Thumbai (*Leucas aspera*), 7) Skunk vine, 8) Goat weed, 9) Graviola, 10) Crape jasmine, 11) Toothache plant, 12) Sijou (*Euphorbia trigona*), 13) Hajora (*Cissusquadriangularis*), 14) Dadufifang (*Senna alata*), 15) China rose, 16) Ostrich fern, 17) Papaya, 18) Tulsi, 19) Malabar Spinach, 20)Hill glory plant (Clerodendruminfortunatum), 21) Apple snail, 22) Cuchia, 23) Black bodied chicken, 24) Goat, 25) Horse tail hair, 26) Cow, 27) Hen/Cock, 28) Pig

Above given pictures are some of the most commonly used bioresources in traditional practices in the above -mentioned locality. The use of different plants, animals, insect- based drugs to treat different ethnic communities in different parts of India including Northeastern region has been well established by different authors, where they reported the use of different bioresources and their products in medicine as well as food and other purposes like religious purposes. The native people also sacrifice animals for different rituals according to their mythological beliefs, myth associated with therapeutics.

Discussion

From the study conducted it was found and recorded that most of the bioresources used in traditional medicine belong to plants groups followed by vertebrate animals. The local people used traditional zootherapeutic medicine and many other medicinal plants for the treatment of various ailments including diarrhea, cough, cold, blood pressure, body ache, skin diseases, toothache, gastric, jaundice, typhoid, chicken pox etc. While fat/oil of some animals such as hen and pigs, is warmed up and externally applied to relief pain and heal cracks especially on the heel. Most of the other parts of animals is cooked or boiled and eaten. Around 34 species of animals are found to be used to cure various ailments by the Biate tribe of Dima Hasao (Betlu, 2013) [2]. Borah and Surya (2016) [3] also recorded about 26 animals and their products having various ethnomedicinal uses like in treatment of jaundice, asthma, etc. Flesh is taken after cooking, while other animal byproducts like milk, urine, honey etc. of some animals are taken fresh or mixed with other ingredients. Plants parts such as leaf and flowers are cooked and consumed or turned into a paste and applied externally or taken orally. For example, flower of crape jasmine is used to treat red eye infection. Paste or flower extract is applied in the infected eye. Another example is skunk vine used for toothache and gastric inflammation. For the former the leaf is turned into a paste and applied directly on the tooth while for the later soup of skunk vine leaves are consumed. About 48 monocot plants belonging to 17 families were also found to be used in treatment of various diseases by Bodo community of Assam (Daimari, 2023) [36].

Although traditional medicine has been a vital part of primary healthcare systems since ancient times, it is remarkable to note that when researching traditional medical uses of bioresources, one should keep ecological harmony and biodiversity preservation strategies in mind. It's possible that traditional medicine is likewise surrounded by many superstitions and myths. Therefore, it is important to test for the proper therapeutic component in plants, animals, insects, and their byproducts. Traditional healers need to understand the value of protected and endangered bioresources to the balance of biodiversity. Proper awareness and scientific management of these bioresources may help in biodiversity conservation.

Conclusion

Knowledge about the bioresources such as plants, animals, insects, birds etc. that were used for medicinal purposes in the past are still being used as a part of traditional medicine. Plants, animals, aves, insects have wide spectrum application in therapeutic, religious purpose, and pharmaceutical sciences. Efforts should be made for conservation and management of these bioresources (flora and fauna). A total of 52 species were noted to be used for different kinds of ailments by the people of different villages of Udalguri District, Assam. These knowledges are important to science and human society for better understanding of traditional medicine. The present study reflects sustainable and optimum utilization of bioresources by the Bodos. Mechanism of transmission of traditional knowledge of bioresources used in traditional medicine in the society is an interesting area worth investigating. Cultural practices of resource utilization should be encouraged. These products' medical value must be confirmed by more research, and this information must be included into programmes for biodiversity conservation and management of plants, animals, insects, and avian resources.

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Conflict of interest: It is affirmed that there is no conflict of interest.

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