



RESEARCH PAPER

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A study on the prevalence of ethno medicinal practices of some insects and arachnids by the Bodo Tribe of Kokrajhar District, Assam, India

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Abstract

Zootherapy is the treatment of human illnesses with therapeutic drugs acquired from animals or produced from them. The Bodos are ethnic and linguistic community, early settlers of Assam in the Northeast part of India. Eggs, larvae, pupae, and adults of certain insect species and arachnids have been components of the Zootherapy for thousands of years. The survey was conducted in the rural areas of Kokrajhar district of Assam from February, 2022 to May, 2023. An inventory on the knowledge on the use of domesticated/wild therapeutic arthropods used by the Bodo tribe of the studied areas is presented here. The present study recorded 23 Arthropod species belonging to 17 families and 11 orders for treating at least 12 (Twelve) different kinds of human and animal ailments of which the most frequently cited ones amongst the ethnic groups were Coughs, Diarrhoea, Rheumatoid Arthritis, Stomach Ache, Wound Healing, Allergy, Epilepsy, Frequent Urination and bed wetting, Asthma, BP regulations and Typhoid in Cow. The dominant Arthropod orders reported in the study are the Araneae, Hymenoptera, Hemiptera, Coleoptera, Orthoptera, Neuroptera, Isoptera, Lepidoptera, Odonata, Blattodea and Scorpionida are found to be the least. The ethno zoological knowledge of the Bodo tribe ranges from medicinal to edible uses. This study aims to make a comprehensive list of therapeutic insects and arachnids used by the Bodo tribe of Kokrajhar District, Assam.

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Introduction

The use of plants, animals, mineral compounds, and other natural resources in traditional medicine by indigenous peoples all over the world as well as throughout history is extensively recorded. Although plants and plant-derived materials are the primary source of components for conventional healing, it is equally critical to identify animal resources for medicinal remedies. Traditional medicines use animal or animal-derived products from all taxonomic groups like echinoderms, insects, arthropods, reptiles, birds and mammals (Machkour *et al.*, 2011). Zootherapy is the treatment of human illnesses with therapeutic drugs acquired from animals or produced from them. Since ancient times, animals and their products generated from various parts of their bodies have been part of the inventory of therapeutic substances used in numerous civilizations, and such applications continue to exist in traditional medicine (Soni *et al.*, 2020). The goal of this research is to compile a complete list of medicinal insects and arachnids utilized by the Bodo tribe of Kokrajhar District, Assam.

Arachnids and Insects are the most numerous, diverse, and diverse living forms, accounting for a significant portion of the world's faunal biodiversity. They are categorized under the Phylum Arthropoda. About 80% of the world's species are accounted by the insects and they are the most diverse group of organisms (Chantawannakul P. 2020). An important role has been played by insects in the history of human nutrition all over the world. As the history of mankind, the consumption of insects as food is old as well (Narzari S. and Sharma J, 2015). Some insects are detrimental to humans, plants, and animals, but others may provide protein, lipids, vitamins, and minerals and have medicinal use (Ouango *et al.*, 2022). Although insects are consumed as a food since early times, insects and substances extracted from them are used as therapeutic agents in medical systems and many cultures. Traditional treatment has been practiced by the local healers in various nations for a long time. Plant materials have been used in ethno-therapeutics all throughout the world. However, traditional knowledge of employing insects

for medicinal purposes has been practiced by various communities all over the world. The term "Entomotherapy" comes from the Greek words Entomon (insect) + therapy (medical treatment). "Entomotherapy" is described as the use of insects and insect-derived products for prevention or treatment (Costa-Neto and E.M, 2005).

There are approximately 300 medicinal insects species distributed in 70 genera, 63 families and 14 orders at present. An estimated 1700 traditional Chinese medicine prescriptions include medicinal insects or insect-derived crude drugs (Feng *et al.*, 2009). An important role is played by the traditional medical knowledge as a part of local cultures in identifying biological resources worthy of scientific and commercial exploitation. Eggs, larvae, pupae, and adults of certain insect species have been components of the human diet for thousands of years, be it as a regular food item or sustenance during famines, as an ingredient of medicines or part of ritual practices and even novelties (Kempriai *et al.*, 2022).

Many research investigations in India have reported on the entomotherapy tradition of various indigenous communities in states like as Assam, Arunachal Pradesh, Chhattisgarh, Kerala, Manipur, Madhya Pradesh, Nagaland, and Tamil Nadu. Northeast India has a strong indigenous knowledge base on the use of flora and fauna as medicine for the treatment of a wide range of ailments. Among the fauna, edible insects have made significant advances in the treatment of numerous main ailments (Devi *et al.*, 2022). Every state in Northeast India has its unique method of practicing traditional therapies based on their ancestral knowledge, which differs by group. Many traditionally dwelling indigenous tribes and groups in Northeast India remain in continual contact with environment (Dutta *et al.*, 2016).

In Assam, the Bodos are ethnic and linguistic community, early settlers of Assam in the Northeast part of India. They are mostly confined to the extreme north of north bank of river Brahmaputra of Assam, by the foothills of Bhutan and Arunachal Pradesh (Endle S., 1911). Some of the important groups of

insects having nutritional medicinal properties used by the Bodos include insects from the orders Neuroptera, Orthoptera, Hymenoptera, Odonata, Coleoptera, Hemiptera, Isoptera, Scorpiones (Narzari S. and Sharma J, 2015). The traditional knowledge of the therapeutic uses of insects among the Bodos are often a closely guarded secret and only passed on to certain individuals from one generation to another verbally. Transfer of knowledge in this way is an age-old practice and a well-accepted socio-cultural attribute among the ethnic societies of North-East India (Chakravorty *et al.*, 2011).

Many researchers have demonstrated that insects are employed in a variety of ways among Indian ethnic tribes. Despite the fact that knowledge about edible insects is now being documented, documentation of insects with therapeutic value is weak, incomplete, and unknown to the majority of the scientific community. Various species of insects are eaten during festive seasons, some are used for therapeutic purposes, and some insects are used as a source of folk medicine. This traditional knowledge is currently diminishing, necessitating special attention (Narzari S. and Sharma J, 2015). So, the use of traditional knowledge should be documented as urgent as we can. As a result, the current study was carried out to document the therapeutic insects and arachnids used by the Bodos of Kokrajhar District, Assam.

Materials and methods

The Bodo tribe is Tibeto-Burman in origin and of Tibeto-Chinese linguistic heritage. They constitute the majority of the Plains Tribal people in Assam today. They are of Mongoloid ancestry (Census of India, 2011). According to the 2011 Census of India, they number around 1,416,125 people in the state of Assam. The Bodo-dominated territories are administered by the Bodoland Territorial Autonomous Districts (BTAD), which include Kokrajhar, Chirang, Baksa, and Udalguri (Choudhury *et al.*, 2020).

The survey was conducted in the rural areas of Kokrajhar district of Assam inhabited by the Bodo Tribe from February, 2022 to May, 2023 by performing interviews, field studies, and through

structured questionnaires. Five (5) forest villages inhabited by Bodo tribe under Kokrajhar District viz., Ramdeo (Gossaigaon), Monglajhora (Bogribari), Dangarkuti (Dotma), Amritpur (Raimona) and Taraibari (Gossaigaon) were selected for the study.

With the help of semi-structured questionnaires, personal interviews with 50 informants (34 male and 16 female), ranging in ages from 60 to 94, were conducted with village heads, elderly people, educated youths, homemakers, and traditional healers (Kabiraz/Oja). The informants were asked about the Arthropod species used as food/medicine, the manner of consumption/utilization, the type of preparations, the life phases of the insect species ingested/used, their relationship with other components, culture associated to those species, or any other applications, and so on. To evaluate the effectiveness and importance of a species for a particular disease, the fidelity level (FL) was used: $FL (\%) = N_p/N \times 100$ (where, N_p is the number of informants that claimed the use of a species to treat a particular disease and N is the number of informants that used the species as a medicine for any given ailments) (Kemprai *et al.*, 2022). For this reason, a standard questionnaire was created, and the information obtained was meticulously documented.

The Species were collected from various vegetations such as fresh water bodies, agricultural crop lands, etc. The species that were useful were collected by hand picking with the assistance of locals from the research region. The collected arthropod species were preserved following the standard procedure (Ghosh and Sengupta, 1982). The specimens are recognized using taxonomic keys that have been published (Roonwal & Chhotani, 1989; Srinivasan and Prabhakar, 2013).

Results

The present study recorded 23 Arthropod species belonging to 17 families and 11 orders for treating at least 12 (Twelve) different kinds of human and animal ailments of which the most frequently cited ones amongst the ethnic groups were Coughs, Diarrhea, Rheumatoid Arthritis, Stomach Ache, Wound Healing, Allergy, Epilepsy, Frequent Urination and bed wetting,

Asthma, BP regulations and Typhoid in Cow. Important therapeutic insect species and arachnids are used either as larvae, nymphs, pupae, or adults, or as byproducts. Throughout traditional medicine, freshly harvested insects are preferable, and 100% of the informants had used at least one therapeutic bug or its derivative products throughout their lives.

The medicinal insect species and arachnids species described in this study were mostly obtained from wild terrestrial and wild aquatic ecosystems, trees,

underground burrows, rice fields, and sandy habitats. The dominant Arthropod orders reported in the study are the Araneae, Hymenoptera, Hemiptera, Coleoptera, Orthoptera, Neuroptera, Isoptera, Lepidoptera, Odonata, Blattodea and Scorpiones are found to be the least.

Details regarding the medicinally used insect species and arachnids are given in Table 1. The latter includes the insects' local vernacular names, the parts used as well as reasons for their uses.

Table 1. Arachnids and Insects used to treat different ailments by the Bodo people in Kokrajhar District.

SL	Scientific Name	Order	Family	Common Name	Vernacular Name	Parts Used	Aliments Treated	Mode of Use	FL Level In %
1	<i>Pholcus phalangioides</i>	Araneae	Pholcidae	Daddy long-legs spider	Mai Sougra Dam Dum	Whole Adult	Shortness of Breath (Gwrwbw Saonai)	Insect inserted alive in aEri cocoon, tied around the neck hanging in the chest.	18
2	<i>Parasteatoda tepidariorum</i>	Araneae	Theridiidae	Common House Spider	Nonema/Bamlema	Spider Web	Chapped Lips/ Cracked Skin	Spider web to be applied in the affected areas	52
3	<i>Periplaneta americana</i>	Blattodea	Blattidae	Cockroach	Khankhoma	Adult Whole	Cough/ TB	Species eaten smoked/Fried	16
4	<i>Dytiscus marginalis</i>	Coleoptera	Dytiscidae	Diving Beetle	Chingkhouri	Adult Whole	Asthma / Protein Supplement	Fried and eaten	13.4
5	<i>Unidentified</i>	Coleoptera	Unidentified	Unidentified	Birbula Pisa	Whole Adult	Normalize BP Level/ Protein supplement	Fried and eaten	14
6	<i>Unidentified</i>	Coleoptera	Unidentified	Unidentified	Burbilagedet	Whole Adult	Normalize BP Level/ Protein supplement	Fried and eaten	14
7	<i>Diplonychus rusticus</i>	Hemiptera	Belostomatidae	Water bug	Not Known	Adult Whole	Asthma	Fried and eaten	15.38
8	<i>Lethocerus indicus</i> (Lep. & Serv.)	Hemiptera	Belostomatidae	Giant Water Bug	Gangjema	Adult Whole	Dry cough, Diarrhoea, Stomach ache	<ul style="list-style-type: none"> • Soup is taken • Soup is taken • Fumes of boiled bugs are inhaled 	16 19.4 27
9	<i>Laccotrepes ruber</i> (Linn)	Hemiptera	Nepidae	Unknown	LanjaiGwlaio	Whole Adult	Gastric/ Stomach Problem	Fried/ Roasted and eaten	12.9
10	<i>Oecophylla smaragdina</i> (Fabricius)	Hymenoptera	Formicidae	Weaver ant	Khwijima	Adult Whole	Epilepsy (Mirgi)	Inserted inside Eri cocoon and worn around the neck hanging in the chest.	25
11	<i>Apis indica</i>	Hymenoptera	Apidae	Honey bee	BereKonkroma	Honey/ Bee Wax	Cough Chest Pain/ Joint Pain	<ul style="list-style-type: none"> • Honey used as a remedy • Bee Wax is applied 	100
12	<i>Tetraponera rufonigra</i>	Hymenoptera	Formicidae	Bi-coloured Arboreal ant	Mwjilai	Adult Whole	Epilepsy (mirgi)	Inserted inside Eri cocoon and worn around the neck hanging in the chest.	33
13	<i>Polistis (Gyrostoma) olivaceus</i> (De Geer)	Hymenoptera	Vespidae	Paper Wasp	BereJotha	Hive	Typhoid in cow	Hive should be feeded	17.02
14	<i>Parapolybia varia</i> (Fabricius)	Hymenoptera	Vespidae	Lesser paper wasps	Mwsousalai bere	Larva	Cough/ Sore Throat	Fried and eaten	22

SL	Scientific Name	Order	Family	Common Name	Vernacular Name	Parts Used	Aliments Treated	Mode of Use	FL Level In %
15	<i>Odontotermes obesus</i>	Isoptera	Termitidae	Termite	Uri	Adult	Ulcer	Fried and eaten / Grinded as a chutney and eaten	40
16	<i>Samia ricini</i>	Lepidoptera	Saturniidae	Eri Silkworm	Indi Ampou	Pupa	Supplement for Liver diseases	Fried/Cooked and eaten.	67.8
17	<i>Myrmeleon sp.</i>	Neuroptera	Myrmeleontidae	Ant Lion	MaojiDego	Larva	Shortness of Breath (Gwrba Saonai)	Insect inserted alive in aEri cocoon, tied around the neck hanging in the chest.	23
18	<i>Ictinogomphus sp.</i>	Odonata	Gomphidae	Common Club Tail	Gandula Raja	Adult Whole	Bed wetting and frequent urination	Species eaten smoked	20
19	<i>Mantis inornate (Werner)</i>	Orthoptera	Mantidae	Praying mantis	GumaGangu	Eggs	Frequent urination and bed wetting	Egg is eaten fried	20
20	<i>Gryllotalpa africana (Beauvois)</i>	Orthoptera	Gryllotalpidae	Mole cricket	Sosroma	Adult Whole	Anti-allergic use	Insects are grinded with Lasiaspinosa (sibru) root then heated with mustard oil and the paste is applied	18.51
21	<i>Ruspolia baileyi</i>	Orthoptera	Tettigoniidae	Nsenene	Guma Gwthao	Whole Adult	Protein Supplement	Fried/ Roasted and eaten	20
22	<i>Tarbinskiellus portentosus</i>	Orthoptera	Gryllidae	Cricket	Kusengra	Whole Adult	Good Vision/ Protein Supplement	Fried/ Roasted and eaten	38.7
23	<i>Unidentified</i>	Scorpiones	Unidentified	Scorpion	Deokhafor	Adult Whole	Joint pain	Whole species is boiled in mustard oil and applied	14.28



Pholcus phalangioides
(Mai Sougra Dam Dum)



Perplaneta americana
(Khangkoma)



Unidentified (Coleoptera)
(Birbula Pisa)



Dytiscus marginalis
(Singkaori)



Unidentified (Coleoptera)
(BirbulaGidir)



Diplonychus rusticus



Lethocerus indicus
(Gangjema)



Laccotrepes ruber
(LanjaiGwla)



Apis indica
(Bere Kokhkromao)



Polistis olivaceus
(Bere Jota) (Mwjilai)



Tetraponera rufonigra
(Mwsou Salai Bere)



Parapolybia varia



Myrmeleon sp.
(MaojiDego)



Ictinogomphus sp.
(Gandula Raja)



Mantis inornate
(Guma Gangu)



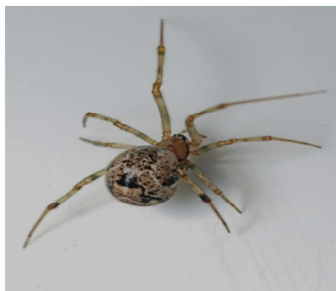
Gryllotalpa africana
(Sosroma)



Ruspolia baileyi
(Guma Gwthao)



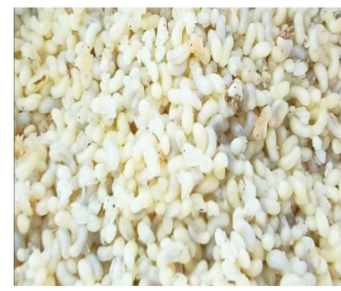
Tarbinskiellus portentosus
(Kusengra)



Parasteatoda tepidariorum
(Bamblema/ Nonema)



Samia ricini
(Indi Ampou)



Oecophylla smaragdina
(KhwijemaBidwi)

Discussions

The usage of insect species and arachnids for disease treatment is considered a family secret and is passed down from generation to generation within this group. Certain species are consumed during celebrations, for example, the larvae of *Oecophylla Smaragdina* are devoured during the Bodos' Bwisagu festival, which welcomes the spring season. The vast knowledge offered by the Bodo tribe on the therapeutic applications of insects may raise widespread awareness of the significance of insects in health and healing throughout the community (Narzari S. and Sharma J, 2015).

The current study enables us to identify medicinal arthropods as well as their products utilized in the

treatment of diseases and symptoms, implying the presence of a large number of therapeutically significant insect species and arachnids. These species are employed alone or in combination with their products, although they are most typically utilized in conjunction with medicinal plants or available nature products.

However, many more insect species identified as edible and having therapeutic properties could not be gathered since some insect species have become extremely rare. This rich conventional knowledge has now begun to erode, necessitating urgent care. More excursions, surveys, and ethnozoological information collecting on insect faunas can supply logistical knowledge on Therapeutic Insects and Arachnids. Scientific research can provide individuals with a

dependable source of medical properties (Kato and Gopi, 2009). This study compiles a list of wild and domesticated arthropod species from various families which is used by the Bodo communities of Kokrajhar District in Assam to treat various humans and animals ailments.

Conclusion

The study concluded that besides their use as a food item among the Bodo tribe in Kokrajhar District, Assam, insects are also widely used therapeutically. The use of insects in therapeutic practices has remained undiminished over the years among the Bodo tribes. Insects have been utilized among the tribe since ages. The prevalence of Entomotherapy is still clearly seen among the Bodos, but many practices and experiences of the use of insects among the Bodos need further documentation. This tribe also utilizes a wide range of biological resources in diverse ways (Doley AK. and Kalita J., 2012).

Besides insects arachnids are also used as therapeutic agents that can cure various human ailments. Therefore, we see an urgent evaluation of insect and arachnids biodiversity and the role of zootherapy. Whereas, it is important to make sure that the practices of entomophagy and entomotherapy does not disappear; on the other hand, it is necessary to protect the biodiversity of the region and to conserve the valuable insect resources found in this region for future generations. Keeping in mind, these two concepts, we need to conserve indigenous practices along with preventing the over-exploitation of arthropods considered useful (Chakravorty *et al.*, 2011).

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