

## ORIGINAL ARTICLE

# Arthropods as Indigenous Traditional Ethnomedicinal Source in Tribal Communities of Odisha

Sarbeswar Nayak<sup>1</sup>, Prafulla Kumar Mohanty<sup>2</sup>

## HOW TO CITE THIS ARTICLE:

Sarbeswar Nayak, Prafulla Kumar Mohanty. Arthropods as Indigenous Traditional Ethnomedicinal Source in Tribal Communities of Odisha. Ind. J Biol 2026; 13(1): 43-50.

## ABSTRACT

Ethnomedicinal knowledge forms an integral part of traditional healthcare systems among indigenous communities, particularly in biodiversity rich regions of India. The present study documents the ethnomedicinal practices involving arthropods among tribal communities of Koraput district, Odisha, India. Structured interviews, participatory observations, and conversations with knowledgeable elders and local healers were used to gather data. A total of seven arthropod species belonging to the phylum Arthropoda were recorded, including insects and arachnids such as red ants (*Solenopsis* sp.), praying mantis (*Mantis religiosa*), house cricket (*Acheta domesticus*), mole cricket (*Gryllotalpa gryllotalpa*), cockroach (*Periplaneta americana*), honey bee (*Apis cerana*), and scorpion (*Palamnaeus swammerdami*).

Various body parts, including the head, abdomen, cocoon with larvae, and whole body, were used either orally or topically to treat ailments such as wounds, cold and cough, otorrhoea, pain, intestinal disorders, respiratory tract infections, gastric ulcers, and piles. Preparation methods ranged from grinding, boiling, frying, burning, to ash formation, often mixed with water, edible oil, or coconut oil. Quantitative ethnobiological indices such as Relative Frequency of Citation (RFC) and Fidelity Level (FL) indicated a high degree of consensus among informants, especially for house cricket used for pain (RFC 0.98; FL 97.29) and red ant for cold, cough, and wound healing.

Both cultural beliefs and the availability of local bioresources are reflected in the ongoing reliance on arthropods. This study emphasises the need to preserve traditional knowledge and the therapeutic value of arthropods in indigenous medicine. The development of novel bioactive compounds and sustainable healthcare alternatives may benefit from scientific validation of these practices.

## AUTHOR'S AFFILIATION:

<sup>1</sup> Assistant Professor of Zoology, Department of Zoology, Bhadrak Autonomous College, Bhadrak, Odisha, India.

<sup>2</sup> Former Vice-Chancellor, Khallikote Unitary University, Brahmapur, Odisha, India.

## CORRESPONDING AUTHOR:

Prafulla Kumar Mohanty, Former Vice-Chancellor, Khallikote Unitary University, Brahmapur, Odisha, India.

E-mail: prafulla.mohanty3@gmail.com

➤ Received: 11-02-2026 ➤ Accepted: 14-03-2026



## KEYWORDS

- Ethnomedicine • Arthropods • Tribal knowledge • Traditional healthcare
- Relative Frequency of Citation • Fidelity Level

## INTRODUCTION

Ethnomedicine is the use of locally available biological resources to treat diseases and maintain health through the application of indigenous communities' traditional knowledge and practices. Arthropods, which comprise insects, arachnids, crustaceans, and myriapods, are one of the most diverse and abundant animal groups. For a long time, they have been used as traditional medicines in a variety of cultures all over the world.

Since the beginning of time, different societies have been using the therapeutic benefits of different animals and plants (Alves and Rosa, 2005; Vijaykumar et al., 2015). The traditional medical knowledge has a significant alternative role in the health care system in contemporary culture. A significant section of the population living in the Western Ghats relies on the traditional medical system because their way of life focuses on their local environment. The populace is educated on how to use the natural system for food, medicine and other necessities of life (Chellappandiyan et al., 2014). The discovery of animal resources for medical cures is significant in human health care, even though plants and plant derivatives have been employed as a main component of traditional medicine (Alves and Rosa, 2005; Costa-Neto, 2005).

India is rich in faunal biodiversity and comes first in terms of species of insects (54,600), then fish (2,546), birds (12,432), reptiles (456), mammals (390), and amphibians (209). It accounts for 10% of the documented biological species on the earth (Alfred, 1998; Puri, 2007). Great historical works like Ayurveda and Charak Samhita of India report on and chronicle a variety of zootherapeutic ancient medications (Unnikrishnan, 1998). About 15 to 20 per cent of Ayurvedic medications are made using ingredients sourced from animals. Diverse tribes and ethnic groups living in various regions of India have a wealth of information about animals and their therapeutic uses for basic healthcare (Mahawar and Jaroli, 2008). Due to the loss of many rural

communities' socioeconomic and cultural traits, it is crucial to document the customary indigenous knowledge of many ethnic population (Alonso-Castro, 2011). Numerous ethnic groups and tribes with a diverse range of cultures live in northeast of India (Alonso-Castro et al., 2011).

Odisha, a state of 30 districts, is rich in biodiversity, and the lifestyle of people differs at different corners of the state. Reports on ethnozoological practices in different districts of Odisha establish the interaction of different groups of people with their surrounding animals to cure the ailments (Sajan et al., 2017; Behera and Mohanty, 2019).

The knowledge of how various animals are used in traditional medicine by various ethnic communities is often passed down orally from one generation to the next, and this information can occasionally be lost with the passing of a seasoned expert. Due to urbanisation, the traditional knowledge system of India is quickly disappearing. Therefore, before traditional cultures are entirely lost, it is essential to research and record ethnobiological knowledge on the medicinal use of various animals in traditional medicine among diverse ethnic groups. Therefore, extensive research is required to learn about the utilisation of Indian fauna with therapeutic characteristics.

The goal of the current study is to document the zootherapeutic methods used by the tribal people who live in the Koraput area of Odisha, India. The study also aims to compile a list of the animals that the various ethnic people in the tribally predominant parts of the Koraput district employ for various medical uses. The results of this study will not only aid in the preservation of biodiversity in Koraput of Odisha but will also provide the scientific community with a starting point for research into possible bioactive chemicals in raw animal products. The misconception behind traditional ethnic claims of local healers against a variety of illness will also be revealed and established by this particular scientific research.

## MATERIALS AND METHODS

### Study site

With a total geographic area of 8, 807 sq. km, Koraput is the southernmost district of Odisha and is located between the latitude of 18° 14' and 19° 14' N and the longitude of 82° 05' and 83° 25' E. It is contiguous with the Eastern Ghats, and additionally, it is renowned for its tribal cultures and customs, rich and diversified mineral reserves, and steep topography. Its

borders are Nabarangpur district of Odisha on the north, Malkangiri district of Odisha and Visakhapatnam district of Andhra Pradesh on the south, a section of Rayagada district of Odisha and Srikakulam district of Andhra Pradesh on the east, and Bastar district of Chhattisgarh on the west (Fig.1). Numerous tribal clans and their sub-tribes call it home. The most prevalent tribes in the inner forest are the Kondha, Soura, Paroja, Bonda, and Gadaba.

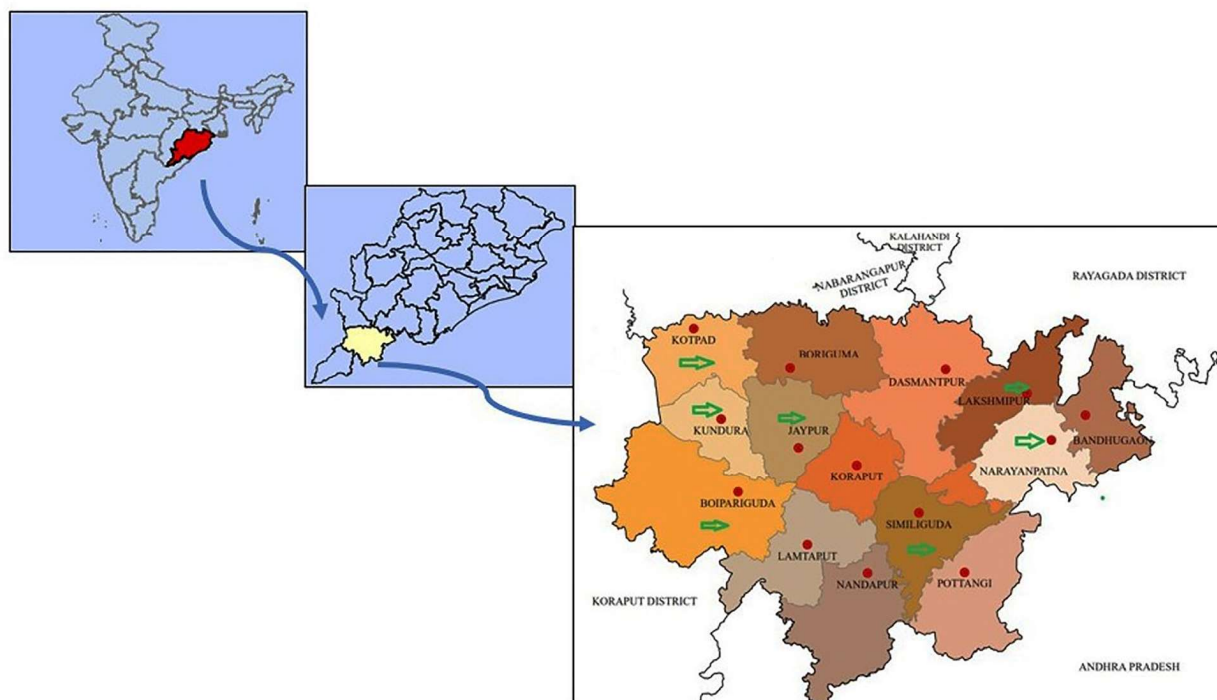


Figure 1: Map of Odisha showing Koraput district, the survey site

### Collection of data

Field research was carried out in Jeypore, Boipariguda, Kundura, Kotpad, Semiliguda, Laxmipur, and Narayanapatna areas of the Koraput district (Figure 1). Structured questionnaires were used to collect data through conversations and direct interviews with key informants from different tribes. The use of animals and their parts as traditional medicine, the method of preparation and the mode of administration were recorded. The usage of local names for animals and their parts in the treatment of different ailments was noted after consulting with key knowledge holders, aged and experienced individuals, and village healers. This information was then confirmed by repeated and cross-questioning.

## ANALYSIS OF DATA

### Relative frequency of citation

The local significance of each species is shown by the relative frequency of citation (RFC) index. The formula  $RFC = FC/N$ , where FC is the number of informants who mentioned the usage of the species, and N is the number of informants who took part in the survey, was used to determine the RFC value (Vitalini, 2012). The range of this RFC index is 0 to 1. When the RFC index is zero, no one considers the animal beneficial; meanwhile, an RFC index of one signifies that everyone who participated in the poll considers the animal valuable (Mootsamy, 2014).

**Fidelity level**

For data analysis, the fidelity level (FL) was determined to identify the animal species that research participants most frequently utilised to treat a certain illness category. Fidelity level helps determine the top choice of the resident species used to treat specific conditions. According to Friedmen (1986), the following formula was used to determine the FL:

$$FL (\%) = N_p \times 100/N$$

Where  $N_p$  is the number of informants who claim to have used a particular animal species to treat a specific ailment, and  $N$  is the total number of informants who used animals as a medication to cure any given condition.

**RESULTS AND DISCUSSION**

**Results**

The number of participants of individuals of different tribes (Figure 2) varied, whereas the Bonda tribe shows the highest number of informants, and the Gadaba tribe is the lowest one. Among the participants, male individuals predominate over females in each

tribe as well as overall (Figures 3 and 4). The usage percentage is found to be 29% of total informants (Figure 5). The arthropods used in this study, their common local name, scientific names, the use of whole body or body parts, the method of use, along with their RCF and FL values, are described (Table 1).

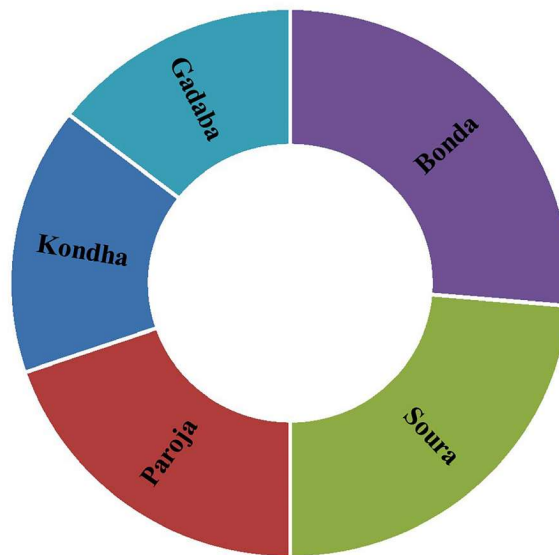


Figure 2: Participants from different tribes

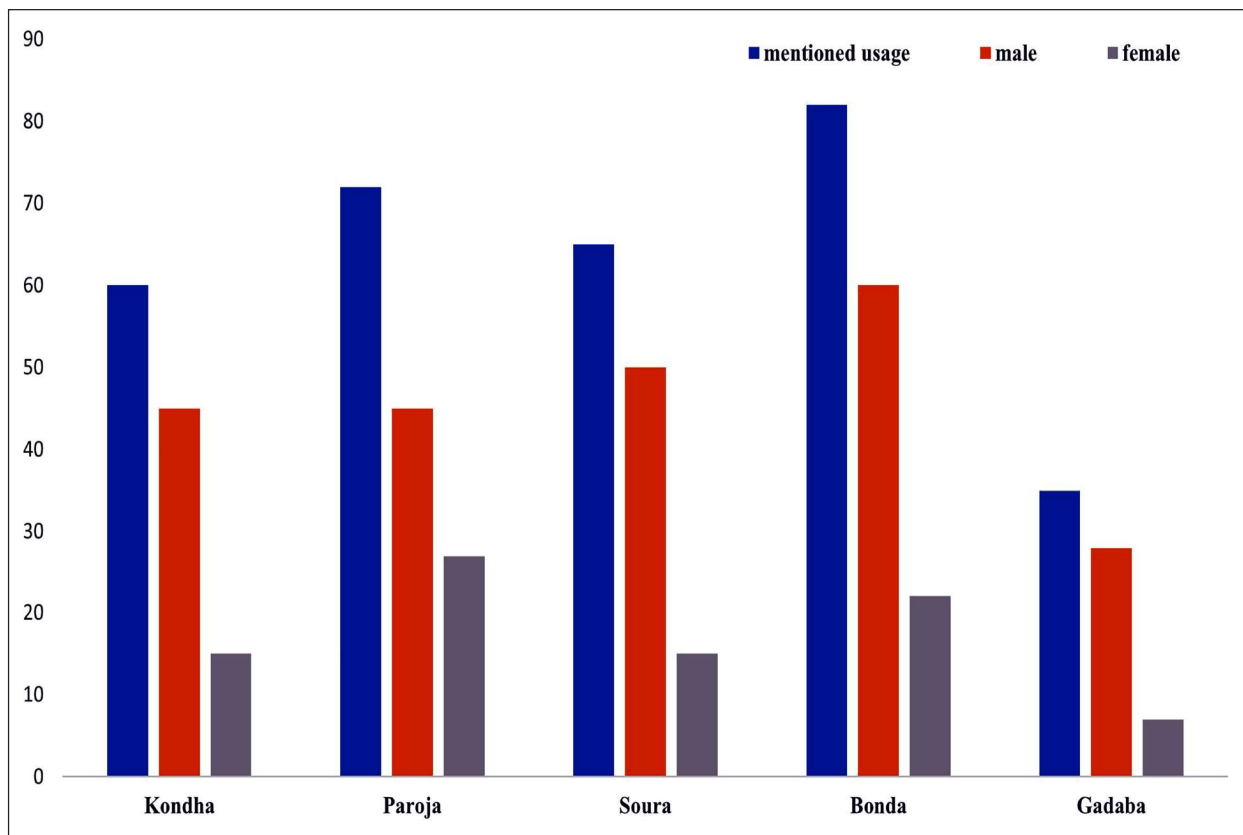


Figure 3: Gender-wise participation of mentioned usage among different tribes

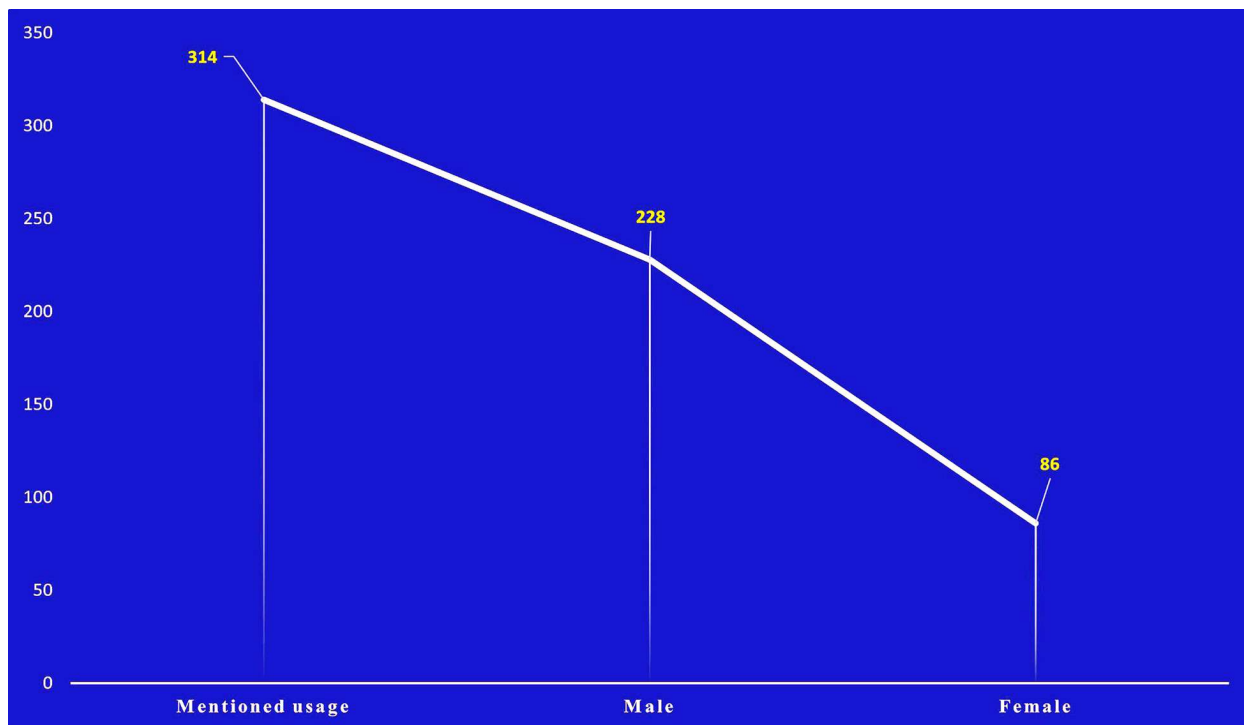


Figure 4: Total gender-wise participation from total mentioned usage in the study

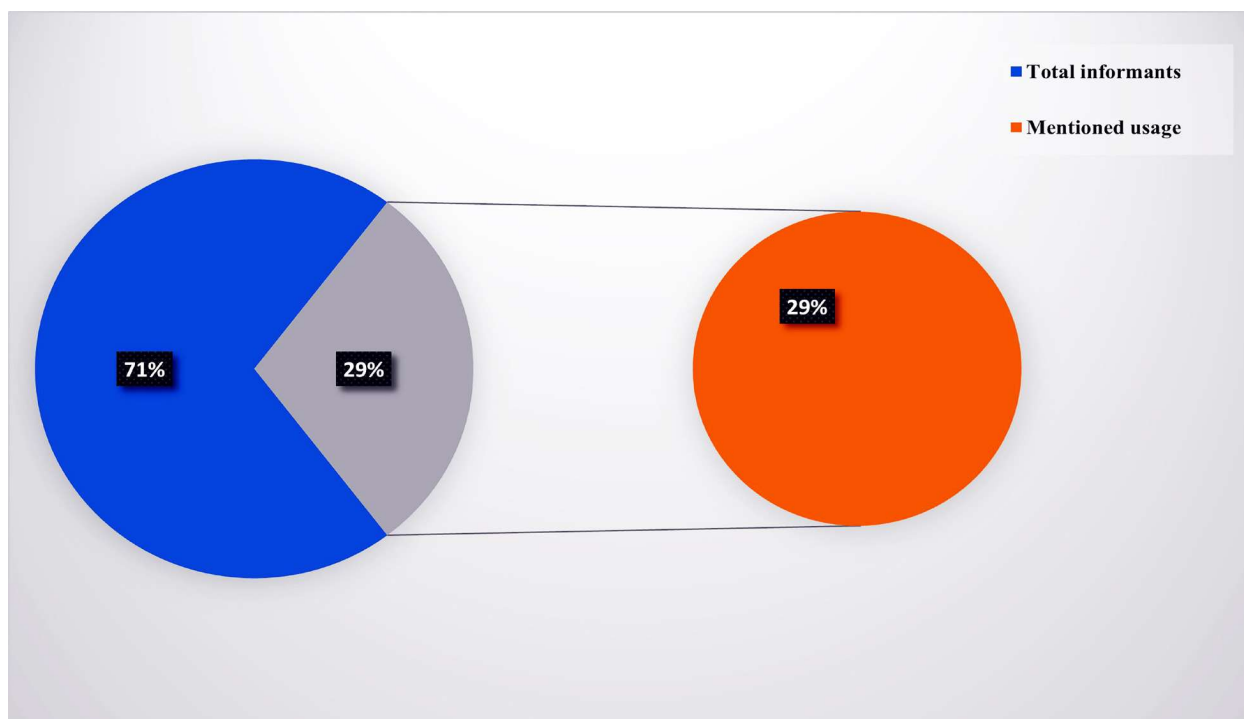


Figure 5: Percentage of mentioned usage of informants

## DISCUSSION

The current study highlights the ongoing importance of arthropods in traditional healthcare systems by documenting the ethnomedicinal use of seven arthropod species in tribal communities. According to

earlier ethnobiological studies from India and other tropical regions, where insects dominate traditional medicinal practices due to their availability and therapeutic relevance (Chakravorty *et al.*, 2011; Meyer-Rochow, 2017), insects were the most frequently used

**Table 1:** Arthropods and body parts used as ethnomedicine among tribes of Koraput district, Odisha

Arthropoda (Class/order)	Local name	English Name	Scientific Name	Part use	Application	Medicinal use	Prescription	RFC	FL
Insecta/ Hymenoptera	Pimpudi	Red ant	<i>Solenopsis</i>	Head	Topical	Stitch the minor cuts and wounds	Antennae are used in stitching to hold the outer membrane of minor cut skin	0.8	62.5
				Abdomen	Topical	Wound healing	Paste of abdomen is applied to the wound by cutting.	0.63	45
				Whole body	Oral	Cold, cough	The whole body, irrespective of sex, is ground freshly and consumed	1	73.33
Insecta/ Mantodea	Jhinkari	Praying mantis	<i>Mantis religiosa</i> (Linnaeus, 1758)	Cocoon with larvae	Topical	Otorrhoea	Larvae with the cocoon are burned, powdered, mixed with coconut oil and applied with the help of a feather	0.55	47.69
Insecta/ Orthoptera	Jhintika	House cricket	<i>Acheta domestica</i> (Linnaeus, 1758)	Whole body	Oral	Pain	Fresh animal is fried and taken	0.98	97.29
Insecta/ Orthoptera	Alkatara	Mole cricket	<i>Gryllotalpa gryllotalpa</i>	Whole body	Oral	Intestinal disorder	Abdomen boiled in water is consumed	0.73	57.69
Insecta/ Blattodea	Asarapa	Cockroach	<i>Periplaneta americana</i> (Linnaeus, 1758)	Whole body	Oral	Respiratory tract infection	Wings are removed, washed, boiled with water and consumed	0.51	91.01
Insecta/ Hymenoptera	Mahu machi	Honey bee	<i>Apis cerena</i>	Whole body	Oral	Gastric Ulcer	The whole body is ground with water and prescribed to eat	0.76	81.13
Arachnida/ Scorpiones	Kankada bicha	Scorpion	<i>Palamnaeus stammerdami</i>	Whole body	Topical	Piles	The whole body is boiled with edible oil and applied to the area	0.52	87.64
				Whole body	Topical	Wound healing	Ash is used as an antiseptic for wound healing	162	96.67

group. The use of whole bodies, specific body parts, and different developmental stages reflects a detailed indigenous understanding of arthropod biology.

The red ant (*Solenopsis* sp.) showed multiple medicinal applications, particularly for wound healing and respiratory ailments, supported by high RFC and FL values. Similar uses of red ants, including the ethnosurgical practice of using antennae to stitch minor cuts, have been reported from tribal regions of Odisha, Chhattisgarh, and Northeast India (Oudhia, 2002; Behera *et al.*, 2014). House cricket (*Acheta domestica*), which exhibited the highest RFC and FL values, has also been widely documented for its analgesic and anti-inflammatory properties in traditional medicine (Ramos-Elorduy, 2005).

The use of mole cricket (*Gryllotalpa gryllotalpa*) for intestinal disorders and cockroach (*Periplaneta americana*) for respiratory tract infections

corresponds with earlier ethnomedicinal and experimental reports indicating antimicrobial and therapeutic properties (Costa-Neto, 2005; Banjo et. al., 2006). Likewise, the medicinal application of honey bee (*Apis cerana*) for gastric ulcers supports previous findings on the gastrointestinal benefits of bee-derived products (Bogdanov, 2016). Scorpion (*Palamnaeus swammerdami*) preparations for piles and wound healing, with high FL values, are consistent with reports from other regions of India and Asia (Mahawar and Jaroli, 2008).

Overall, the close agreement with earlier studies underscores the reliability of arthropod-based ethnomedicine and highlights its potential for pharmacological exploration and conservation of indigenous knowledge.

## CONCLUSION

Arthropod-based ethnomedicinal practices among the tribes of Koraput, Odisha, represent a valuable confluence of culture, ecology, and medicine. In addition to validating and preserving indigenous knowledge, scientific investigation of these traditions opens transformative pathways for new therapeutic agents, sustainable healthcare models, and integrative medicine. Ethical collaboration, rigorous research, and conservation-oriented applications of this biocultural heritage for the benefit of global health are the paths to the future.

## REFERENCES

1. Alfred J.R.B. (1998) Faunal diversity in India: an overview. In: Faunal diversity in India, vols I-VIII. Zoological Survey of India, Kolkata, pp. 1-495.
2. Alonso-Castro A.J., Carranza-Alvarez C., Maldonado-Miranda J.J., Jacobo-Salcedo MDR, Quezada-Rivera D.A., Lorenzo-Marquez H., Figueroa-Zuniga L.A., Fernandez-Galicia C., Rios-Reyes N.A., de Leon-Rubio M.A., Rodriguez-Gallegos V., Medellin-Milan P (2011) Zootherapeutic practices in Aquismon, San Luis Potosí, Mexico. *J Ethnopharmacol* 138: 233-237.
3. Alves R.R.N., Rosa I.L. (2005) Why study the use of animal products in traditional medicine? *J Ethnobiol Ethnomed* 1:1-5.
4. Banjo A.D., Lawal O.A., Songonuga E.A. (2006) The nutritional value of fourteen species of edible insects in southwestern Nigeria. *Afr J Biotechnol* 5:298-301.
5. Behera K.K., Sahu M.C., Mishra M.K. (2014) Ethnomedicinal uses of insects in Odisha, India. *Indian J Tradit Knowl* 13:370-377.
6. Behera S., Mohanty P.K. (2019) Ethnozoological therapeutic practices of tribes of Mayurbhanj district, Odisha, India. *Int J Zool Appl Biosci* 4(6): 245-257.
7. Bogdanov S. (2016) Honey in medicine: past, present and future. *Bee World* 93: 1-8.
8. Chakravorty J., Ghosh S., Meyer-Rochow V.B. (2011) Practices of entomophagy and entomotherapy by members of the Nyishi and Galo tribes of Arunachal Pradesh, India. *J Ethnobiol Ethnomed* 7:5.
9. Chellappandian M., Pandikumar P., Mutheeswaran S., Paulraj M.G., Prabakaran S, Duraipandiyan V., Ignacimuthu S., Al-Dhabi NA (2014) Documentation and quantitative analysis of local ethnozoological knowledge among traditional healers of Theni district, Tamil Nadu, India. *J Ethnopharmacol* 154(1):116-130.
10. Costa-Neto E.M. (2005) Animal-based medicines: biological prospection and the sustainable use of zootherapeutic resources. *An Acad Bras Cienc* 77: 33-43.
11. Costa-Neto E.M. (2005) Entomotherapy, or the medicinal use of insects. *J Ethnobiol* 25: 93-114.
12. Friedman J., Yaniv Z., Dafni A., Palewitch D. (1986) A preliminary classification of the healing potential of medicinal plants based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert. *J Ethnopharmacol* 16: 275-287.
13. Mahawar M.M., Jaroli D.P. (2008) Traditional zootherapeutic studies in India: a review. *J Ethnobiol Ethnomed* 4:17-29.
14. Meyer-Rochow V.B. (2017) Therapeutic arthropods and other invertebrates used in traditional medicine. *J Ethnobiol Ethnomed* 13:9
15. Mootsamy A., Mahomoodly M.F. (2014) A quantitative ethnozoological assessment of traditionally used animal-based therapies in the tropical island of Mauritius. *J Ethnopharmacol* 154(3): 847-857.
16. Oudhia P. (2002) Traditional knowledge about medicinal insects of Chhattisgarh, India. *Insect Environ* 8: 114-115.
17. Puri S.K. (2007) Biodiversity profile of India (text only). Centre for Ecological Sciences, Indian Institute of Science, Bangalore, <http://>

- ces.iisc.ernet.in/hpg/cesmg/indiabio.html (accessed 20 June 2007).
18. Ramos-Elorduy J. (2005) Insects: A hopeful food source. *Ecol Food Nutr* 44: 263–285.
  19. Sajjan S.K., Mohapatra P.P., Tripathy B., Rout S.D. (2017) Ethnobiological knowledge and socio-biodiversity values among the Kutia Kandha tribe of Odisha, India. *J Tradit Folk Pract* 5(2): 50–62.
  20. Unnikrishnan PM (1998) Animals in Ayurveda. *J Amruthi* 1:1–15.
  21. Vijayakumar S., Yabesh JEM, Prabhu S., Ayyanar M., Damodaran R. (2015) Ethnozoological study of animals used by traditional healers in the Silent Valley of Kerala, India. *J Ethnopharmacol* 162:296–305.
  22. Vitalini S., Iriti M., Puricelli C., Ciuchi D., Segale A., Fico G. (2012) Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy): an alpine ethnobotanical study. *J Ethnopharmacol* 145: 517–529.